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CDC Adapters for SQL Server User's Guide
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Oracle Application Server CDC Adapters for SQL Server User's Guide, 11g Release 1 (11.1.1)

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Preface

This guide is the primary source of user and reference information on the OracleAS CDC Adapter for SQL Server, which enables Oracle users to use change data capture in their integration architecture, working with the Oracle Application Server. This preface includes the following topics:

- [Audience](#)
- [Documentation Accessibility](#)
- [Related Documents](#)
- [Conventions](#)

Audience

This guide is intended for Oracle integration administrators and developers who perform the following tasks:

- Installing and configuring OracleAS CDC Adapter for SQL Server
- Diagnosing errors
- Using OracleAS for developing integration solutions using change data capture

Note: You should understand the fundamentals of OracleAS, WebLogic, the UNIX and Microsoft Windows operating system before using this guide to install or administer OracleAS Adapters for SQL Server.

Note: For the purposes of this version of the Oracle Weblogic Server, Oracle Application Server refers to the Oracle WebLogic Server and OracleAS refers to Oracle WLS.

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Related Documents

For more information, see the following documents in the Oracle Other Product One Release 10.0 documentation set or in the Oracle Other Product Two Release 6.1 documentation set:

- *Oracle Application Server Adapter Concepts Guide*
- *Oracle Application Server Adapter Installation Guide*
- *Oracle Application Server Adapter Concepts Guide*
- *Oracle Application Server Containers for J2EE User's Guide*
- *Oracle Application Server Containers for J2EE Services Guide*
- *Oracle Application Server Containers for J2EE Security Guide*

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. |

| Convention | Meaning |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| <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. |

Introduction

Change data capture (CDC) is an integration technology that enables efficient near real-time integration by capturing changes made to enterprise data sources and providing them for processing in integration middleware, such as Oracle Fusion Middleware.

The Oracle CDC Adapter for SQL Server provides such capabilities for SQL Server 2000 and 2005, capturing changes in a non-intrusive manner leveraging the SQL Server Transaction Logs (TLOG). The CDC Adapter can be used by Oracle SOA Suite (BPEL, ESB), and Oracle Data Integrator (ODI).

This chapter provides an overview of the features and architecture of the OracleAS CDC Adapter for SQL Server. It includes the following topics:

- [OracleAS CDC Adapter for SQL Server Overview](#)
- [OracleAS Adapter for SQL Server CDC Agent Architecture](#)
- [OracleAS CDC Adapter for SQL Server Architecture](#)

1.1 OracleAS CDC Adapter for SQL Server Overview

The OracleAS CDC Adapter for SQL Server captures and delivers changes (such as insert, update, and delete operations) made to tables in SQL Server 2000 and 2005. By using the CDC Adapter, you can build efficient data integration solutions that use SQL Server data, synchronize systems to ensure data integrity, update data warehouses and operational data stores in near real-time, and enable event-driven business activity monitoring and processing.

The OracleAS CDC Adapter for SQL Server has the following capabilities:

- **Non-intrusive change capture:** The OracleAS CDC Adapter for SQL Server is a log-based CDC technology. It leverages the SQL Server Transaction Logs (TLOG) to identify changes and does not add triggers or tables into the database.

The CDC agent accesses a logstream that is polled to access the changes. The agent begins polling from a specific point called the stream position (or agent context). The last position read is saved as the stream position. This next time the agent polls the logstream for information, it starts at the saved stream position.

- **Real-time data capture:** The OracleAS CDC Adapter for SQL Server captures changes to data in near-real-time for applications that demand zero latency and require the most up-to-date data. Unlike scheduled CDC solutions, near real-time data capture guarantees that a change event is can be made available in a matter of seconds at the consumer. The term near-real-time data capture is used because after a period of inactivity changes may be available after a few seconds.

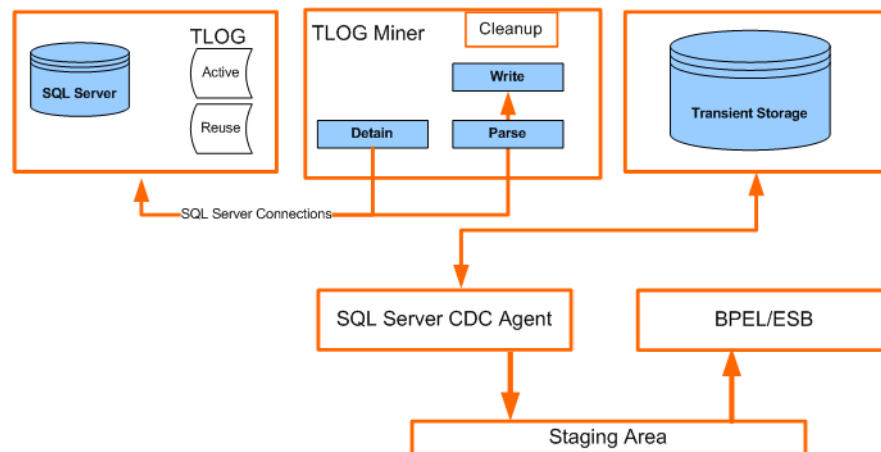
- Change storage:** The Oracle CDC Adapter for SQL Server provides a staging area that stores the captured changes in a format that is easy to access and process. The staging area ensures that changes are persisted until they are processed, and provides facilities to clean up old change records.
- Change access and delivery:** The Oracle CDC Adapter for SQL Server includes a JCA Resource Adapter that can be configured in BPEL and ESB as an inbound endpoint, delivering changes in XML format.
- Filtering.** The OracleAS CDC Adapter for SQL Server enables you to filter captured data based on the type of operation (INSERT, UPDATE, DELETE), based on column selection and even based on specific column values.
- Reliable delivery and recovery:** The Oracle CDC Adapter for SQL Server stores changes in a reliable persistent storage and uses the concept of a 'stream position' that indicates the location in the change stream that was successfully moved and processed. By storing stream positions, the CDC Adapter can always restart after failure, recover, and continue moving and delivering changes from wherever it was stopped
- Ease of use:** The OracleAS CDC Adapter for SQL Server provides an easy and intuitive way to configure CDC solutions using Oracle Studio.

Using the OracleAS CDC Adapter for SQL Server makes ETL (extract, transform, and load) processes more efficient and less disruptive to the operation of the source database systems, eliminating the need for the traditional ETL downtime window

1.2 OracleAS Adapter for SQL Server CDC Agent Architecture

The OracleAS CDC Adapter for SQL Server CDC agent uses the normal SQL Server transaction logs (TLOG) and a TLOG miner to extract the necessary data and place it into the staging area where it is available for consumption by BPEL/ESB. The following diagram shows this process:

Figure 1-1 SQL Server CDC Agent Architecture



The agent is a part of the overall OracleAS Adapter architecture that is described in [OracleAS Adapter for SQL Server CDC Agent Architecture](#). The following describes the components shown in the diagram:

- SQL Server:** The Microsoft SQL server creates transaction logs that log server activity for recovery purposes. When using Replication, the logs hold information in a format that is consumable by Oracle's CDC agents.

The active section of the TLOG contains the changes made to the currently active transaction.

The reusable or inactive section has the information from older transactions, which do not require further processing by MS SQL server. This space is reusable. It is possible to back up the data or the MS SQL Server might truncate the log to create more space. When a TLOG is truncated, some of the data is dropped and is no longer available for the CDC agent to use. The Oracle CDC solution for the MS SQL Server is designed to prevent potential data loss.

- **TLOG miner (LGR):** This component is installed as a stand-alone Microsoft Windows service. It reads the TLOG file and extracts or mines the change data and stores it in the Transient Storage area. It has two parts.
 - **TLOG Detainer:** The Microsoft SQL Server management policy periodically reorganizes the log files when necessary. In this case, the log files are truncated when their data is no longer active. The truncated data is erased from the system and cannot be used. Occasional truncation of the transaction LOG can expose the LGR to potential loss of data. The detainer is used to ensure the TLOG files are not truncated before being read by the TLOG miner.

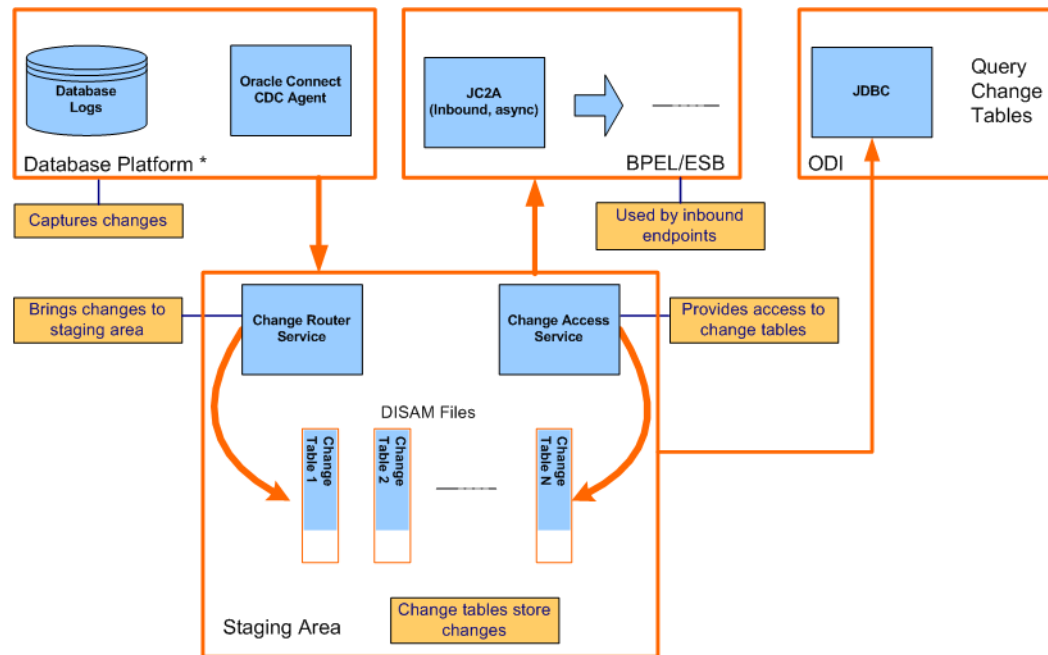
Truncation only takes place in the non-active section of the TLOG. The detainer places a detained transaction behind the logged records to be read. This creates a limit for the TLOGs active portion, which protects records from being truncated before they are read.
 - **TLOG Parser:** The parser parses the TLOG information and then writes it into Transient Storage.
- **Transient Storage:** This is a set of binary files located in a specified working directory where the LGR stores the data it mines from the TLOG into Transient Storage. The log records are kept in Transient Storage according to the LGR cleanup policy and the maximum size limit specified at configuration time.

The OracleAS CDC Adapter for SQL Server CDC agent reads the changes from Transient Storage, parses it, orders it in committed transaction order, and places it in the staging area where it can be consumed by BPEL and ESB.

For more information see, [Setting Up a Change Data Capture with the OracleAS CDC Adapter for SQL Server](#).
- **SQL Server CDC agent:** This is part of the [OracleAS Adapter for SQL Server CDC Agent Architecture](#).
- **BPEL/ESB:** This is part of the [OracleAS Adapter for SQL Server CDC Agent Architecture](#).
- **Staging Area:** This is part of the [OracleAS Adapter for SQL Server CDC Agent Architecture](#).

1.3 OracleAS CDC Adapter for SQL Server Architecture

The following figure illustrates the system components used for change data capture using the OracleAS CDC Adapter for SQL Server.

Figure 1–2 Component Architecture used with the SQL Server CDC adapter

The OracleAS CDC Adapter for SQL Server component architecture includes the following components:

- **Database Platform:** The database platform is the data source that contains the data to be captured.
- **Database Log:** The database log is a log stream that contains the raw change data.
- **Oracle Connect:** Oracle Connect runs on the back-end system and handles from the special J2CA adapter that runs on the Oracle Application Server.
- **CDC agent:** This is an OracleAS CDC Adapter for SQL Server component that runs under the control of the daemon (a listener process) on the computer where the back-end data is located. The capture agent provides access to change events in the transaction log for the change router.

The agent is located on the same computer as the changes to be captured. It maintains the last position read in the journal (the stream position or context) and starts at this point the next time it polls the journal. The context is stored in the repository where the adapter definition is stored. The adapter definition includes a single primary interaction which is used to access the appropriate journal and includes the list of tables to monitor for changes.

- **BPEL/ESB:** This is where the change events are consumed by means of a JCA provider that sends change records to an end point configured in either ESB or BPEL.
- **JC2A Resource Adapter:** A special version of the J2CA 1.5 SQL Server adapter that can read change records from the staging area. It implements inbound endpoints for BPEL and ESB that pulls change events from the staging area and deliver them as XML change documents. Each endpoint handles change records for a single captured table at the source database.

The J2CA adapter uses multiple connections to the staging area to process changes from multiple tables in parallel.

- **JDBC Driver:** Enables access to changes in the staging area using SQL queries.

- **WebLogic / BPEL Components:** Any OracleAS component that hosts and gets messages from the JC2A adapter.
- **Staging Area:** This is a set of change tables where change records are stored before being sent to BPEL/ESB. Old records from the Staging Area are deleted based upon the specified aging policy.

The Staging Area contains a DISAM data source for SQL access and a Database Events adapter for the XML access.

For more information, see [The Staging Area](#).

The staging area includes the following components:

- **Change Router:** This is an OracleAS CDC Adapter for SQL Server service that runs under the control of the daemon (a listener process) on the Oracle platform. The change router reads the change stream from the CDC agent, sorts them in transaction/commit order eliminating rolled-back changes, and distributes the changes into the various change tables.

Only one instance of the change router is active at a time against a captured database. The change router also deletes old changes from the change tables according to a configurable aging policy. policy (48 hours is the default, which means that records that have been in the staging area for more than 48 hours are deleted).
- **Change Tables:** The staging area is made of change tables, each containing changes to one captured table in the source database. These change tables maintain change events in transaction order and in occurrence order within a transaction for each captured table. The change tables are DISAM files that are indexed to support fast access to the change data, that can be accessed directly using the stream position.
- **Change Access Service.** This is an instance Oracle Connect that is installed on a separate computer or the same computer as BPEL/ESB that allows access to the change tables. This instance of Oracle Connect is configure as the staging area.
- **Oracle Studio:** Provides the developer or administrator with a graphical user interface for setting up the CDC Agent and Staging Area,using intuitive wizards. Oracle Studio can be installed on Linux, UNIX, or Windows.

1.3.1 The Staging Area

The staging area is an area used by Oracle Connect to store captured data from a journal. The journal is scanned once and changes for every required table read during that scan are passed to the staging area, where they are stored. This means that the journal is scanned once each time it is polled. After the changes are written to the staging area, processing of these changes is carried out independently of the journal.

The staging area is a benefit when transactions are used. The changed data is not written to the change queue until the transaction is committed. Thus, if the transaction fails, there is no overhead of having to back out any processing done with the steps in the failed transaction.

The staging area can be on any computer with a Windows, Linux, or UNIX operating system that is running the Oracle Application Server and does not need to be run on the same server as the SQL Server CDC adapter. Once the information is extracted from the journal and written to the staging area, processing of changes is carried out on the staging area only. Thus, the staging area should be set up to consider the network configuration and where the consumer application runs.

The staging area maintains the last position read by the consumer application (the staging area context) and starts at this point the next time a request from the consumer application is received. The context is stored in the repository where the staging area is maintained.

The staging area is indexed so that access to the staging area for a specific stream is quick.

The staging area is cleared by default every 48 hours. All events that have been in the staging area for more than 48 hours are deleted.

Configuring the OracleAS CDC Adapter for SQL Server

This chapter describes how to configure Oracle Connect using Oracle Studio.

All modeling of Oracle Connect is performed using Oracle Studio. To use Oracle Studio, you first configure it to enable access to a Windows computer where the SQL Server database resides.

This chapter includes the following topics:

- [Setting Up a Windows Computer in Oracle Studio](#)
- [Securing Access to Oracle Connect](#)
- [Setting Up a Change Data Capture with the OracleAS CDC Adapter for SQL Server](#)
- [Testing the OracleAS CDC Adapter for SQL Server CDC Solution](#)
- [Handling Metadata Changes](#)
- [Environment Verification](#)

2.1 Setting Up a Windows Computer in Oracle Studio

Using Oracle Studio, perform the following steps to configure the Windows computer:

1. From the **Start** menu, select **Programs, Oracle**, and then select **Studio**. Oracle Studio opens, displaying the Design perspective.
2. Right-click **Machines** in the Configuration Explorer and select **Add Machine**. The Add Machine screen is displayed.

Figure 2–1 The Add Machine screen

3. Enter the name of the computer you want to connect to, or click **Browse** to select the computer from the list of computers that is displayed and which use the default port (2551).
4. Specify the user name and password of the user who was specified as the administrator when Oracle Connect was installed.

Note: Selecting **Anonymous connection** enables anyone having access to the computer to be an administrator, if this was defined for the computer.

5. Click **Finish**.

The computer is displayed in the Configuration Explorer.

2.2 Securing Access to Oracle Connect

Oracle Studio includes mechanisms to secure access to Oracle Connect both during modeling and at run time.

During modeling, the following security mechanisms can be applied:

- [Setting Password Access to Oracle Studio](#)
- [Specifying Users with Administrative Rights](#)

At run time client access to Oracle Connect is provided by the user profile:

- [Setting Up Run-Time User Access](#)

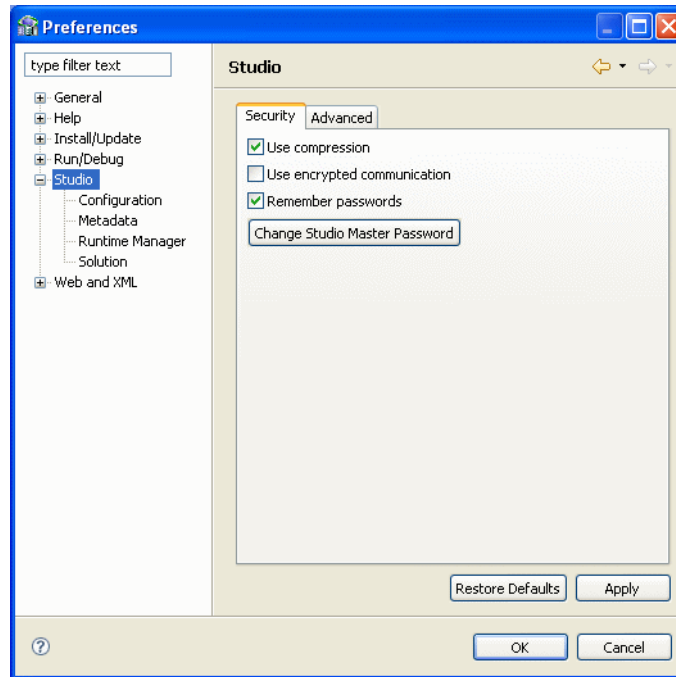
2.2.1 Setting Password Access to Oracle Studio

Initially, any operation performed using Oracle Studio does not require a password. You can set a password so that the first operation that involves accessing the server from Oracle Studio requires a password to be entered.

Perform the following steps to set password access to Oracle Studio:

1. From the **Start** menu, select, **Programs, Oracle**, and then select **Studio**. Oracle Studio opens.
2. Select **Window** from the menu bar, and then select **Preferences**. The Preferences screen is displayed.
3. Click **Studio** in the left pane as shown in the following figure:

Figure 2–2 The Preferences screen



4. Click **Change Studio Master Password**. The Change Master Password screen is displayed, as shown in the following figure:

Figure 2–3 The Change Master Password screen



5. Leave the **Enter current master password** field blank and type a new master password in the **Enter new master password** field.
6. Enter the new password again in the **Confirm new master password** field.
7. Click **OK**.

2.2.2 Specifying Users with Administrative Rights

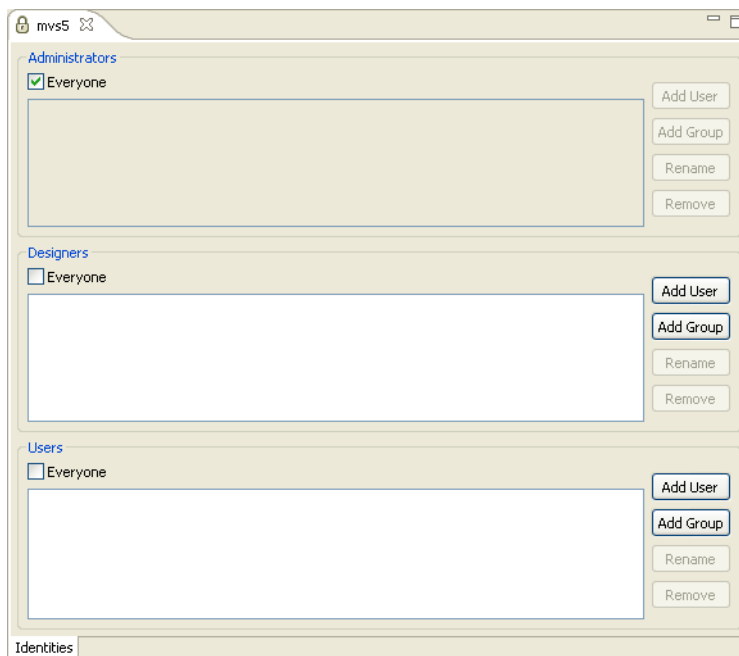
By default, only the user who was specified during the installation as an administrator has the authorization to modify settings on that computer from Oracle Studio. This user can then authorize other users to make changes or to view the definitions for a selected computer. Adding a computer to Oracle Studio is described in "[Setting Up a Windows Computer in Oracle Studio](#)".

Note: The default during installation is to enable all users to be administrators.

1. From the **Start** menu, select **Programs, Oracle**, and then select **Studio**. Oracle Studio opens.
2. In the Design perspective Configuration view, Right-click the computer and select **Administration Authorization**.

The Administration Authorization screen is displayed as shown in the following figure:

Figure 2–4 The Administration Authorization screen



The screen has the following sections:

Administrators: Administrators can view and modify all the definitions in Oracle Studio for the selected computer. On initial entry to Oracle Studio, every user is defined as a system administrator.

Designers: Designers can view all the definitions for the computer in Oracle Studio and can modify any of the definitions under the Bindings and Users nodes for the selected computer. For example, Oracle Studio database administrator can add new data sources and adapters and can change metadata definition for a table in a data source.

Users: Users can view all the definitions for the computer in Oracle Studio for the selected computer. Regular users cannot modify any of the definitions.

3. Add users or groups of users by clicking **Add User** or **Add Group** for the relevant sections.

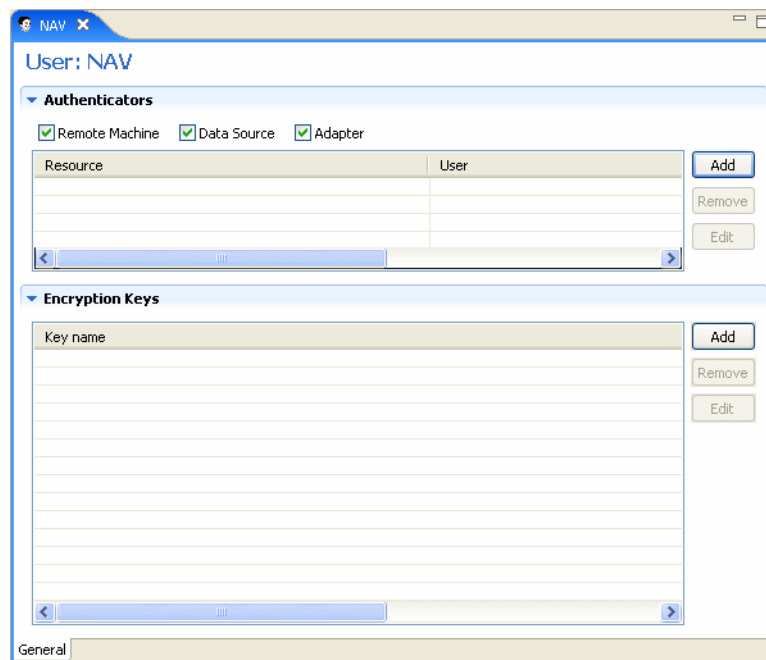
The user or group that is added must be recognized as a valid user or group for the computer. Once a name has been added to a section, only the user or group that logs on with that user name has the relevant authorization.

2.2.3 Setting Up Run-Time User Access

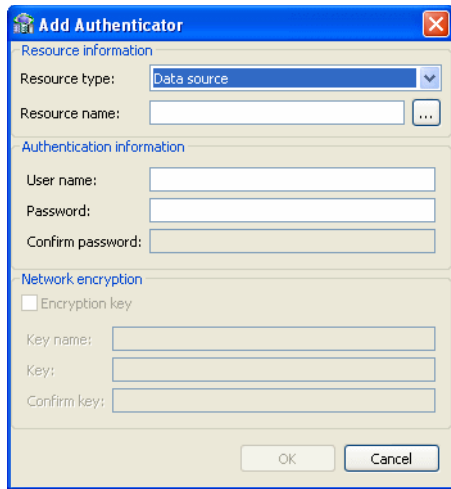
During run time, client access to Oracle Connect is provided by the user profile. A user profile contains name and password pairs that are used to access a computer, data source or application at run time, when anonymous access is not allowed.

1. From the **Start** menu, select, **Programs, Oracle**, and then select **Studio**. Oracle Studio opens.
2. From the Design perspective, Configuration view, expand the **Machines** folder, then expand the machine where you want to set the user name and password.
3. Expand **Users**.
4. Right-click the **NAV** user profile and select **Open**. The NAV user profile editor is displayed:

Figure 2–5 The User Editor



5. In the User editor, click **Add**. The Add Authenticator screen is displayed:

Figure 2–6 The Add Authenticator screen

6. Select **Remote Machine** from the **Resource Type** list.
7. Enter the name of the Windows computer defined in Oracle Studio.
8. Enter the name and password used to access the computer and confirm the password.
9. Click **OK**.

2.3 Setting Up a Change Data Capture with the OracleAS CDC Adapter for SQL Server

You must set up the Oracle Connect SQL Server CDC adapter on a Windows computer to handle capture changes to the SQL Server data. To work with the SQL Server CDC adapter, you must perform various tasks on the computer with the SQL database and then configure the change data capture using the Oracle Studio CDC Solution perspective. Oracle Studio can be installed on a Windows or UNIX computer.

Perform the following steps to set up the change data capture and configure the CDC adapter:

- [Enabling SQL Replication](#)
- [Configuring Security Properties](#)
- [Setting up Log On Information](#)
- [Setting up the Database](#)
- [Setting Up the TLOG Miner \(LGR\)](#)
- [Setting up a Change Data Capture in Oracle Studio](#)
- [Deploying a Change Data Capture](#)

2.3.1 Enabling SQL Replication

When logging an UPDATE operation, the MS SQL Server records only changed data to the TLOG. This is not enough information for the CDC agent to provide before and after images for UPDATE statements. There is not enough information to provide the values for changed columns with primary keys, which is the minimum requirement for a CDC agent.

To solve this problem, you must turn Replication on in the MS SQL Server. The log reports update changes as usual. In addition, Before Image results are also supported in this mode. Replication is valid only for tables with primary keys. Therefore, the MS SQL Server CDC Agent works only with tables that have a primary key.

The Microsoft Replication solution used by Oracle's MS SQL Server CDC must be enabled by a qualified system administrator. The system administrator must use the tools provided with the MS SQL Server to enable replication.

The following sections explain how to set up replication for SQL Server 2000 and SQL Server 2005.

2.3.1.1 SQL Server 2000 Replication

In SQL Server 2000, open the SQL Server's Publishing wizard in the Microsoft SQL Server's Enterprise Manager and follow the instructions provided by the wizard or see the SQL Server documentation.

The following should be added to the database's definitions:

- A new Distribution database
- A replication entry
- A replication monitor entry

2.3.1.2 SQL Server 2005 Replication

In SQL Server 2005, in the Microsoft SQL Server's Management Studio, follow the instructions provided by the Configure Distribution wizard to set up replication or see the SQL Server documentation.

To open the wizard from Microsoft SQL Server 2005:

- In the Microsoft SQL Server Management Studio, right-click the Replication folder and select **Configure Distribution**.

The Configure Distribution wizard opens.

You should make the following selections in the wizard:

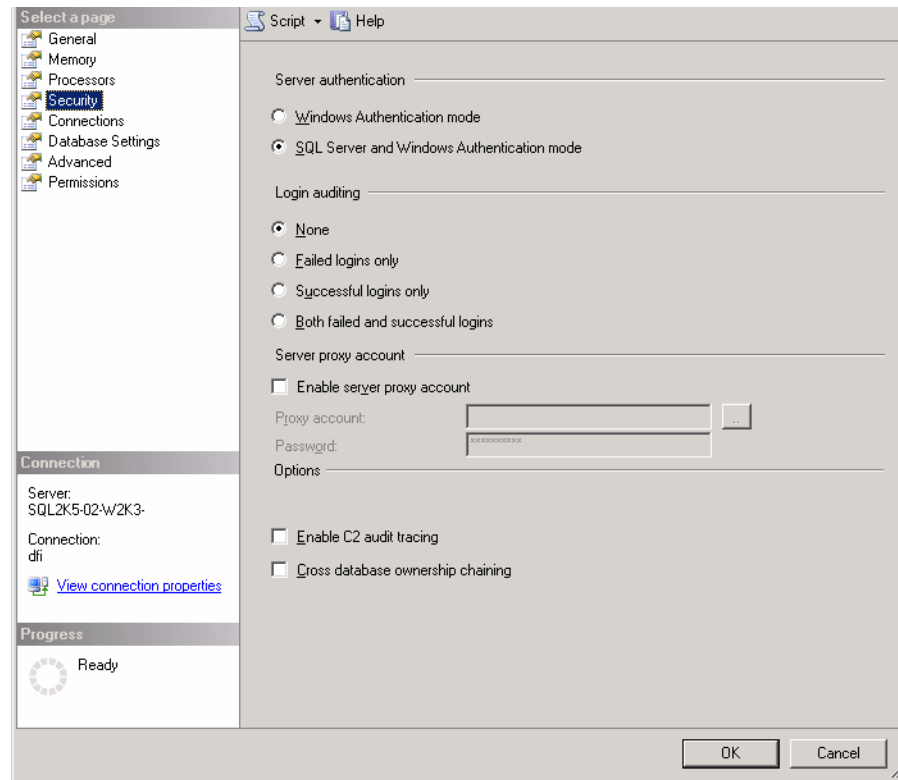
- In the Distributor step, select **<SQL Server Name> will act as its own distributor; SQL Server will create a distribution database and log**
- In the SQL Server Agent Start step, select **Yes, configure the SQL Server agent to start automatically**

2.3.2 Configuring Security Properties

To ensure that the security requirements for the OracleAS SQL server CDC adapter are met, do the following:

- Set up an account with administrator rights to run the SQL Server and MS SQL Server CDC components.
- Ensure that the OracleAS SQL Server CDC adapter and the TLOG Miner (LGR) are executed as members of the `sysadmin` server role.

In addition, set the following security properties from the SQL Server Properties dialog box. The following figure shows the **Security** tab. The example below may look different on your computer depending on the version of SQL Server you are using. The following example is from SQL Server 2005.

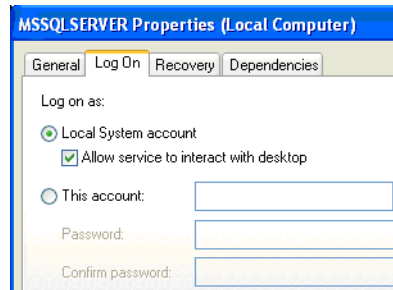
Figure 2–7 Security Settings

- Set the Authentication settings to **SQL Server and Windows**.
- Set the Audit level to **None**.

2.3.3 Setting up Log On Information

The SQL Service Login account information must match the configuration information for the Oracle IRPCD and Oracle LGR services. The logon setups should be entered in a way that allows the Oracle Services to access the SQL Server database. In most cases, the services log on at the Local System account. You should enter the following information in the SQL Server (MSSQLSERVER) Properties Log On tab. You access this through the Windows services control panel. The following describes how to set up the log on information:

1. From the Windows **Start** menu, select **Control Panel**.
2. Double-click **Administrative Tools**.
3. Double-click **Services**. The Services control panel is displayed.
4. From the Services list, right-click **SQL Server (MSSQLSERVER)** and select **Properties**.
5. Configure the system as shown in the figure below.

Figure 2–8 Log On Properties

The configuration shown is the default for the IRPCD and LGR services, which allows anonymous access.

If you want the SQL Server (MSSQLSERVER) to Log on using Windows authentication, the system administrator must enter the correct settings to log On to accounts for Oracle services.

2.3.4 Setting up the Database

You must ensure that some database set up and configurations are set so that the OracleAS CDC Adapter for SQL Server consumes the changes made to the database. This section describes the properties that must be set for the correct operation of the adapter.

2.3.4.1 SQL Server 2000 Settings

Set the following properties in the SQL Server Enterprise Manager.

- In the database properties **Options** tab, set the Recovery Model to **Full**. In this mode, the transaction Log is more durable and truncation occurs less frequently.
- Create enough log space to handle the size of the published database.
- In the database properties **Transaction Log** tab, select the correct setting for **File Growth** based on the application's capacity profile.
- Set the `trunc. log on chkpt` property to `FALSE`. To set this property, enter the following in the SQL Query Analyzer:


```
EXEC sp_dboption '<database name>', 'trunc. log on chkpt.', 'FALSE'
```
- ensure that all tables that are consumed by the SQL Server CDC have a primary key.

Note: See the documentation provided with Microsoft SQL Server for information on how to set the above properties correctly.

2.3.4.2 SQL Server 2005 Settings

Set the following properties in the SQL Server Management Studio.

- From the Object Explorer, right click the database and select **Properties**. In the **Options** tab, set the **Recovery model** to **Full**. In this mode, the transaction Log is more durable and truncation occurs less frequently.
- Create enough log space to handle the size of the published database.

- From the Object Explorer, right click the database and select **Properties**. In the Files tab, set the initial size and growth parameters for the log files based on the application's capacity profile.
- Set the `trunc. log on chkpt` property to `FALSE`. To set this property, run the following query:

```
EXEC sp_dboption '<database name>', 'trunc. log on chkpt.', 'FALSE'
```
- ensure that all tables that are consumed by the SQL Server CDC have a primary key.

Note: See the documentation provided with Microsoft SQL Server for information on how to set the above properties correctly.

2.3.5 Setting Up the TLOG Miner (LGR)

SQL Server handles logs in a way that is not fully compatible with standard CDC solutions. For example, the MS SQL Server truncates a TLOG after a period of inactivity to make more space available for logging operations. Uncontrolled LOG truncation could cause a loss of the truncated data. To solve these problems, the OracleAS CDC Adapter for SQL Server uses a TLOG miner. This component is initiated as a Microsoft Windows service. It mines the data and sends it to a Transient Storage area. The OracleAS Adapter for SQL Server uses the data in Transient Storage to consume changes.

The Log reader (LGR) is the component that actually reads the MS SQL transaction LOG. All logged data that is affected by MS replication is read and placed at the transient storage folder. It is implemented as an independent standalone Windows Service. Since its functionality is highly sensitive, it has high availability features and fault tolerance and attempts to be always up.

The following sections describe the procedures necessary for setting up the TLOG Miner service:

- [Call the LGR Service Interface](#)
- [Configuring the Template Input File](#)
- [Registering the TLOG Miner \(LGR\) Service](#)
- [Setting the Recovery Policy](#)

2.3.5.1 Call the LGR Service Interface

You must call the service interface. Enter the following command at the service command prompt to call the service interface.

```
>>>sqlcdclgr -?
```

The service interface is displayed. The service interface shows commands that you can use. The following is an example of the service interface that is displayed.

```
SQLCDCLGR Transaction LOG mining service controller:
-----
sqlcdclgr -s register -a <service-name> <input-file> Register a service and its
input file
sqlcdclgr -s unregister -a <service-name> Unregister a service
sqlcdclgr -s start -a <service-name> Start service execution
sqlcdclgr -s stop -a <service-name> Stop service execution
sqlcdclgr -s restart -a <service-name> Restart service execution (=refresh
parameters)
sqlcdclgr -p name <service-name> Display input file P_arameter name registered for
```

```

a service
sqlcdclgr -p contents <service-name> Display input file P_parameter contents
registered for a service
sqlcdclgr -p help Display help for parameters values assignment
sqlcdclgr -t T_type an input file template
sqlcdclgr -b <input-file> Run the service in an online 'B_locking' mode, using
input file
sqlcdclgr [-h|-?] Display this H_elp banner

```

```

Service input is held at: HKEY_LOCAL_MACHINE\SOFTWARE\Oracle\Oracle
Connect\Services

```

2.3.5.2 Configuring the Template Input File

The configuration template defines some basic configuration parameters. You must define some parameters manually in the template. Generate the template and then edit the parameters. Enter the following at the command prompt to generate the configuration template.

```
<your drive>:\<full path>\sqlcdclgr>sqlcdclgr -t >sqlcdclgr_pars.xml
```

The following is an example of the configuration template that opens.

```

<serviceConfig>
<cdcOrigin server='?xxx?' database='?xxx?' user='sa' password='defaultOwner='/'>
password=' ' useWindowsAuthentication='false' defaultOwner='dbo'/'>
<transientStorage directory='?xxx?'maxFileSize='1' totalSize='100'
lowThreshold='65' highThreshold='85'/'>

<logging directory='?xxx?'/'>

<control batchSize='50000' retryInterval='1' debugLevel='none'
traceDBCC='false' traceStatistics='false'/'>

<detainer detainingTimeInterval='300' detainerTxnDurationLimit='2147483647'
traceActivity='false'/'>
</serviceConfig>

```

You must enter the correct values for some of the parameters in this file. These parameters are shown as placeholders `?xxx?` in the example above. Enter the current information for your system where the placeholders are shown. The following table describes the parameters to be changed.

Table 2–1 Configuration Parameters

| Property | Parameter | Parameter Description |
|----------|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Origin | database | Enter the name of the SQL server database you are using. The name given for the database must be in the same literal form as the name given to the dbName when you Set up the Data Source . |
| | server | Enter the name of the server computer where SQL Server is installed. The name given for the server must be in the same literal form as the name given to the SQL Server Name when you Set up the Data Source . |

Table 2–1 (Cont.) Configuration Parameters

| Property | Parameter | Parameter Description |
|------------------|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | user | Enter the name of the authorized user for the server. Note: The user entered must have <code>sysadmin</code> permissions in the SQL Server database. |
| | password | Enter the password for the user entered in the User parameter. |
| | useWindowsAuthentification | The default value for this property is <code>false</code> . Change this property to <code>true</code> if you want to use Windows authentication. In this case, when you start the LGR service you do not need to provide credentials to sign in to SQL Server. |
| transientStorage | directory | Enter the full path to the directory where the transient storage files are located. |
| | maxFileSize | The maximum size (in MB) allowed for a single transient storage file. For this parameter, you can change the default value. ¹ |
| | totalSize | The maximum size (in MB) allowed for all of the transient storage. For this parameter, you can change the default value. ¹ |
| | lowThreshold | For this parameter, you can change the default value. ¹ |
| | highthreshold | For this parameter, you can change the default value. |
| logging | directory | Enter the full path to the directory where the log files are located. LOG files are named by adding the leading prefix, <code>SQLCDCLGR</code> , then the server computer identifier and the database name. An example of an LGR file name is: <code>SQLCDCLGR-192_168_165_167+CDClog5#0002.log</code> You can view the information about the log file for an LGR instance in the Windows Event Properties dialog box. |
| control | batchSize | The limit of the batch size for records being read upon a single LGR scan pass. |

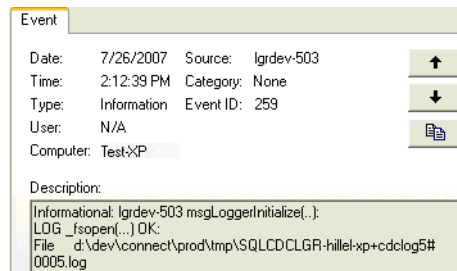


Table 2–1 (Cont.) Configuration Parameters

| Property | Parameter | Parameter Description |
|----------|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| | retryInterval | The time interval in seconds that the system waits for additional information when the number of lines is less than defined in the batch parameter. |
| | debugLevel | Set the level for the debugging log. |
| | traceDBCC | Set true or false to determine if trace information is returned to the log. |
| | traceStatistics | Set true or false to determine if tracing statistics are returned to the log. |
| detainer | detainingTimeInterval | Set the amount of time in seconds that data is held in the TLOG before it can be truncated. You can change the default for this parameter. |
| | detainerTxnDurationLimit | This is not an active parameter. |
| | traceActivity | Set true or false to determine whether to trace the detainer activity and send the information to the log. |

¹ Transient storage management is space oriented. It is based on a maximum allowed allocated space (default:100MB) and upper/lower thresholds. After every LOG scan, the LGR checks whether the transient storage space is close to exceeding its upper threshold (by default it checks to see if the storage space is at 85% or more). If it is close to exceeding the maximum space, a cleanup is started. The cleanup reduces the occupied space to the lowThreshold parameter (default 65%) of the total size specified. Cleanup activity is always reported in the LGR log file for all debug/trace settings.

Notes:

The `-p help` option displays a list of these parameters and an explanation for each.

All paths must be fully qualified. You cannot use logical names.

2.3.5.3 Registering the TLOG Miner (LGR) Service

Do the following to register the LGR service:

1. Provide a name for the service. You should use the same name as the name of the database that you are using.
2. Register the service by entering the following at the system prompt:

```
C:\Program Files\Oracle\Connect\tmp>sqlcdclgr -s register -a <service name>
C:\Program Files\Oracle\Connect\def\sqlcdclgr_pars.xml
```

Note: You must enter the *full path* to the configuration template file as the last parameter, as shown above.

The following is an example of the system response:

```
| SQLCDCLGR Transaction LOG mining feature.
| Associated program is : C:\Program Files\Oracle\Connect\BIN\sqlcdclgr.exe
+-----
Install(): Service 'SQLCDC' installed
```

```
setServiceParameter(): Parameter 'C:\Program
Files\Oracle\Connect\def\sqlcdc_lgr_pars.xml' has been set for Service 'SQLCDC'
at HKEY_LOCAL_MACHINE\SOFTWARE\Oracle\Oracle Connect\Services
addEventSource(): Key (+values) added : HKEY_LOCAL_
MACHINE\SYSTEM\CurrentControlSet\Services\EventLog\Application\SQLCDC
```

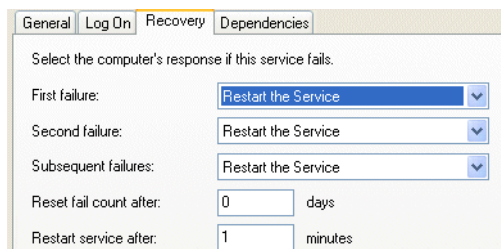
2.3.5.4 Setting the Recovery Policy

You must also set the Recovery policy for the service. The Recovery Policy is set in the Service Properties. Follow these steps to set the Recovery Policy for the new TLOG Miner (LGR) service:

Do the following to set the recovery policy:

1. From the Windows **Start** menu, select **Control Panel, Administrative Tools** and double-click the **Services** icon.
2. In the Windows Services control Panel, right click your new TLOG Miner service and select **Properties**.
3. In the Properties screen, click the **Recovery** tab.
4. Select the following computer response for each failure:
 - First failure: **Restart the Service**
 - Second failure: **Restart the Service**
 - Subsequent failures: **Restart the Service**

Figure 2–9 Recovery Tab



2.3.6 Setting up a Change Data Capture in Oracle Studio

You set up the change data capture in Oracle Studio. Oracle Studio can be installed on Windows XP or Vista operating systems, or on UNIX.

A change data capture is defined in the CDC Solution perspective, which contains a series of links to guide you through the CDC set up process. The CDC solution perspective guides display the following symbols in front of a link to show you what tasks should be done, and what tasks were completed.

- Triangle: This indicates that there are subtasks associated with this link. When you click the link, the list expands to display the subtasks.
- Asterisk (*): This indicates that you should click that link and perform the tasks and any subtasks presented. If multiple links have an asterisk, you can perform the marked tasks in any order.
- Check mark (✓): This indicates that the tasks for this link and any sublink are complete. You can double click the link to edit the configuration at any time.
- Exclamation mark (!): This indicates a potential validation error.

Perform the following to set up a change data capture:

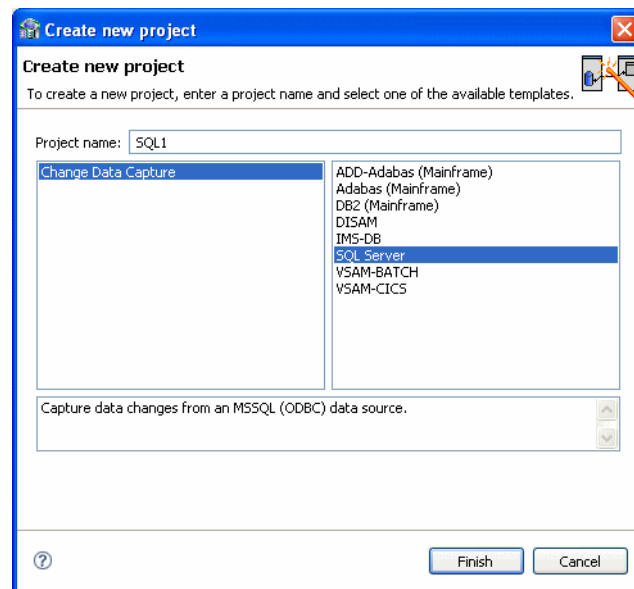
- [Create a CDC Project](#)
- [Set up the CDC Server](#)
- [Set up the Staging Area Server](#)

2.3.6.1 Create a CDC Project

Do the following to create a CDC Project

1. From the **Start** menu, select, **Programs, Oracle**, and then select **Studio**.
2. Open the CDC Solution perspective, click the **Perspective** button on the perspective toolbar and select **CDC Solution** from the list.
The CDC Solution perspective opens with the Getting Started guide in the left pane of the workbench.
3. Click **Create new project**.
The Create new project screen opens.
4. In the **Project name** field, enter a name for your project.
The types of projects available are listed in the left pane.
5. Select **Change Data Capture**.
From the right pane, select **SQL Server**.

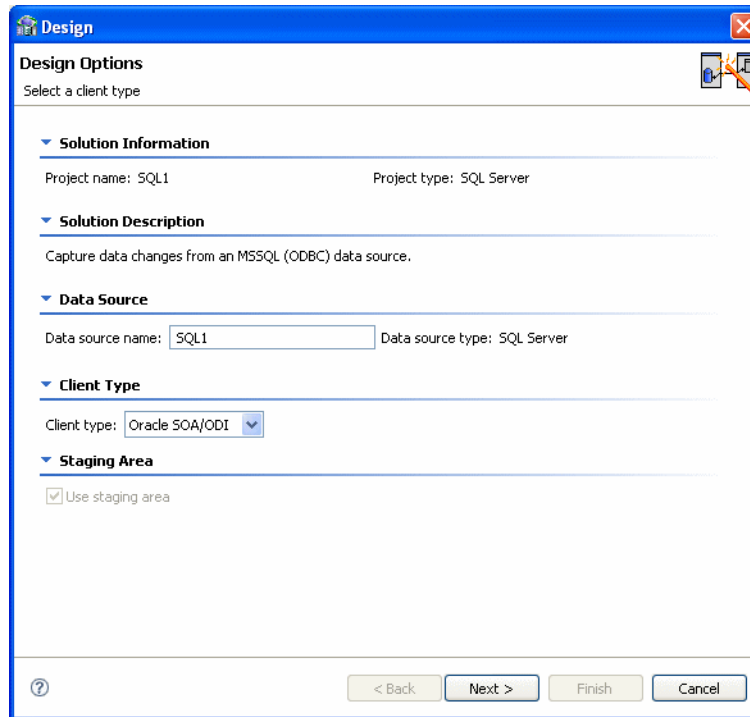
Figure 2–10 Create New Project



6. Click **Finish**. The Project Overview guide is displayed in the left pane.
7. Click **Design**. The Design wizard opens. Use this wizard to enter the basic settings for your project.

Note: The wizard screens are divided into sections. Some sections provide information only and other sections let you to enter information about the project. If you do not see any information or fields for entering information, click the triangle next to the section name to expand the section.

Figure 2–11 Design Wizard (Design Options)



8. In the **Client Type** you can select **Oracle SOA/ODI** only. The **Use staging area** is selected and cannot be changed, you must use a staging area with the OracleAS CDC Adapter for SQL Server.
9. Click **Next**.

The Design Wizard's second screen is displayed. In this step you configure the computers used in your solution. Enter the information for the following computers:

- **Server Machine Details:** Information about the computer where Oracle Connect is installed. The selection here is always **Server Machine** and **Microsoft Windows**.
- **Staging Area Details:** Information about the computer platform where the staging area is located.

In the **Name** list, you should select **Server Machine**. This creates the Staging Area on the same computer specified as the Server computer. Although this is not the default selection, and you can select a different computer, for guaranteed delivery reasons, it is recommended to use a One Machine solution when working with the OracleAs SQL Server CDC adapter.

In the **Platform** list, select the operating system for the staging area. This can be Windows, Linux or UNIX. The available options are:

- Microsoft Windows
- HP-UX
- IBM AIX
- Sun Solaris
- Linux (Red Hat)
- Suse (Linux)

Figure 2–12 Design Wizard (Configure Solution Machines)

The screenshot shows a 'Design' window titled 'Define Names for Project Machines'. The subtitle reads 'Configure the names and platform types for the selected machines.' The window is divided into three sections:

- Solution Information:** Project name: SQL1, Project type: SQL Server
- Server Machine Details:** Name: Server Machine, Platform: Microsoft Windows
- Staging Area Details:** Name: CDC Stream Service, Platform: Microsoft Windows

At the bottom, there are navigation buttons: '< Back', 'Next >', 'Finish', and 'Cancel'. A help icon (?) is also present.

10. Click **Finish**. The wizard closes.

2.3.6.2 Set up the CDC Server

Click **Implement** in the **Getting Started** guide to open the Implementation guide.

In the Implementation guide, do the following to set up the CDC server:

- [Set up the Machine](#)
- [Set up the Data Source](#)
- [Set up the CDC Service](#)

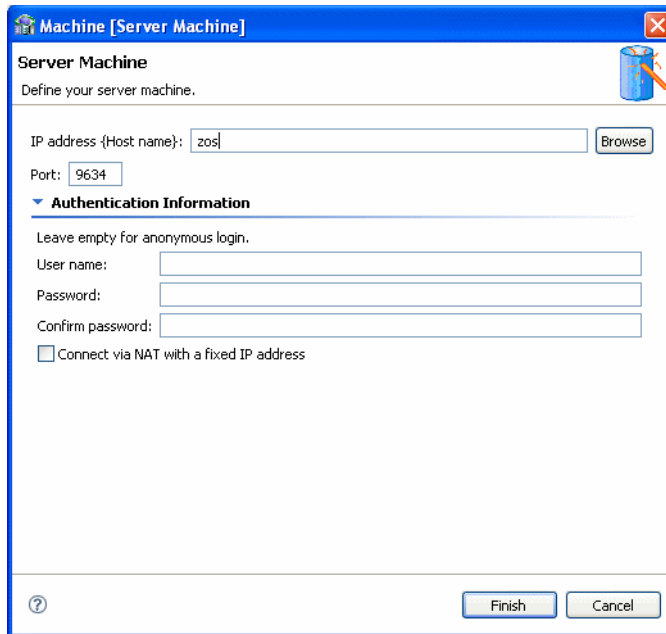
Set up the Machine

You do the following to define the IP Address/host name and Port for the CDC server machine.

1. Click **Machine**.

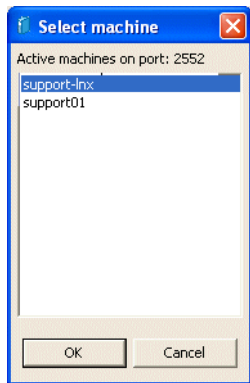
The machine definition screen is displayed:

Figure 2–13 Machine Definition



2. In the **IP address/host name** field, do *one* of the following:
 - Enter the server computer’s numeric IP address.
 - Click the **Browse** button and select the host computer from the ones presented, then click **Finish**.

Figure 2–14 Select Machine



Note: The machine you enter must be compatible with the platform designated in the [Design Wizard \(Configure Solution Machines\)](#) screen.

3. Enter the port number.
The default port number is **2551**.
4. To connect with user authentication, enter a user name and password, with confirmation, in the Authentication Information area.

5. Select the **Connect via NAT with a fixed IP address** check box if you are using Network Access Translation and want to always used a fixed IP address for this machine.
6. Click **OK**.

Continue setting up the CDC Server on the Windows computer.

Set up the Data Source

In this step, set up the SQL Server data source that you are using. Enter the following information in this step:

- **SQL Server Name:** Enter the name of the SQL server database you are using.
The name given for the database must be in the same literal form as the name given to the `database` parameter when [Configuring the Template Input File](#).
- **dbName:** Enter the name of the server computer where the SQL Server is installed.
The name given for the server must be in the same literal form as the name given to the `Server` parameter when [Configuring the Template Input File](#).

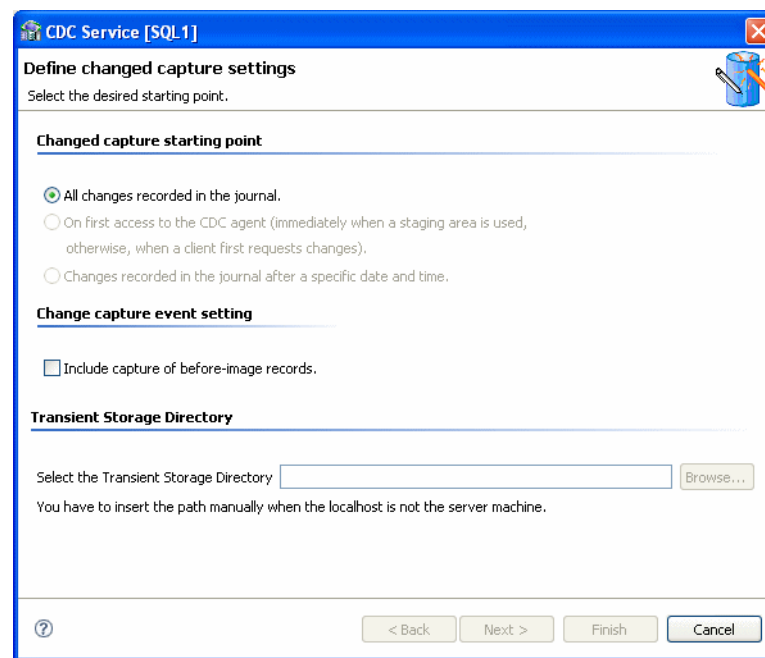
Continue setting up the CDC Server.

Set up the CDC Service

In this step you define the starting point or event for the change capture and then indicate the name of the change logger. Do the following to set up the CDC service.

1. In the Solution perspective, click **Implement**.
2. In the Server Configuration section, click **CDC Service**. The CDC Service wizard is displayed. The **Define changed capture settings** is the first step. It has three sections.

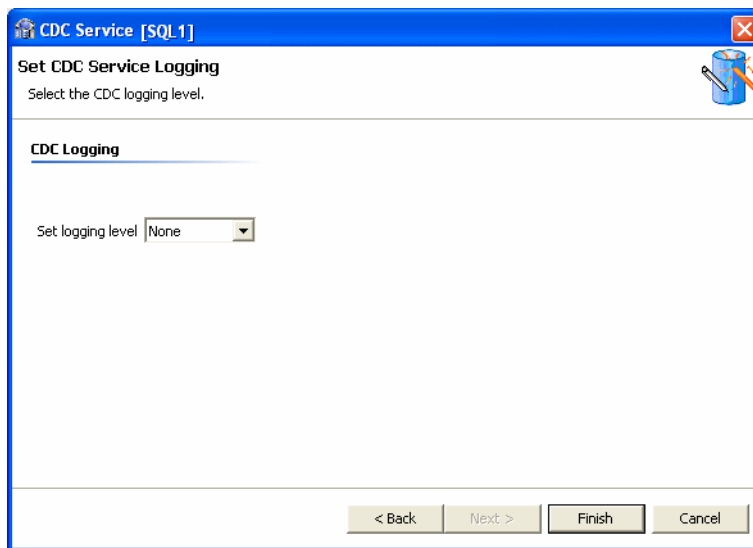
Figure 2–15 Define changed Capture Settings



3. In the **Change capture starting point** section, select *one* of the following to determine the Change Capture starting point:

- All changes recorded to the journal
 - On first access to the CDC (immediately when a staging area is used, otherwise, when a client first requests changes)
 - Changes recorded in the journal after a specific date and time.
When you select this option, click **Set time**, and select the time and date from the dialog box that is displayed.
4. In the **Change capture event setting** section, Select the **Include capture of before image records** to include these records in the CDC solution.
 5. In the **Transient Storage Directory** section, Enter the path to the folder where the transient storage is located. This should be the same location as defined in the **transientStorage** parameter when [Configuring the Template Input File](#).
The transient storage should be on the same computer where the OracleAS CDC Adapter for SQL Server is defined.
 6. Click **Next** to go to the next step where you set the CDC Service Logging. Select the log level to use from the **Logging level** list.

Figure 2–16 Logging Level



Select *one* of the following from the list:

- None
 - API
 - Debug
 - Info
 - Internal Calls
7. Click **Finish**.

Continue setting up the CDC Server on the Windows computer.

2.3.6.3 Set up the Staging Area Server

Click **Implement** in the **Getting Started** guide to open the Implementation guide.

In the Implementation guide, do the following under the **Stream Service Configuration** section, to set up the staging area server:

- [Set Up the Staging Area Machine](#)
- [Set up the Stream Service](#)
- [Configure the Access Service Manager](#)

Set Up the Staging Area Machine

To set up the machine for the staging area, do the following.

1. Under the Stream Service Configuration section, click **Machine**.
2. Use the same configurations used to [Set up the Machine](#) for the CDC server.

Continue setting up the staging area Server.

Set up the Stream Service

In this step you set up the stream service. The Stream Service configures the following:

- Staging area
- Filtering of changed columns
- Auditing

Note: Null filtering is currently unsupported. Filtering empty values is supported. Space values are truncated and are handled as empty values.

1. Click **Stream Service**. The Stream Service wizard opens.

Figure 2–17 Staging Area

Stream Service
Staging Area
Configure the staging area parameters.

Staging Area Parameters

Eliminate uncommitted changes.
 Use secured connection.
Set the event expiration (in hours): 48

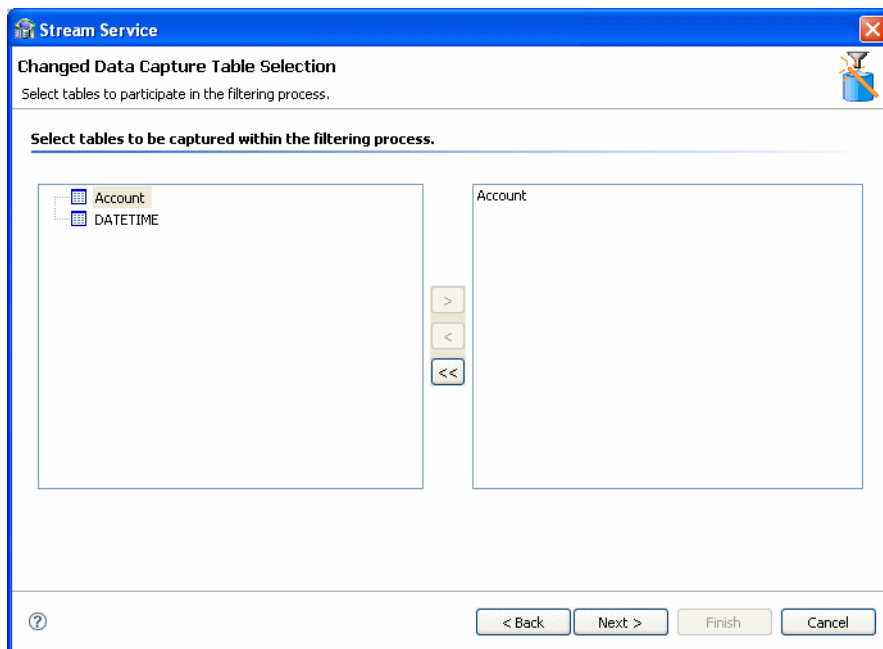
Files Location

Location of change files: C:/sa
Location of temporary staging files: (Optional)

Note: This screen appears only if you selected the inclusion of a staging area in your solution.

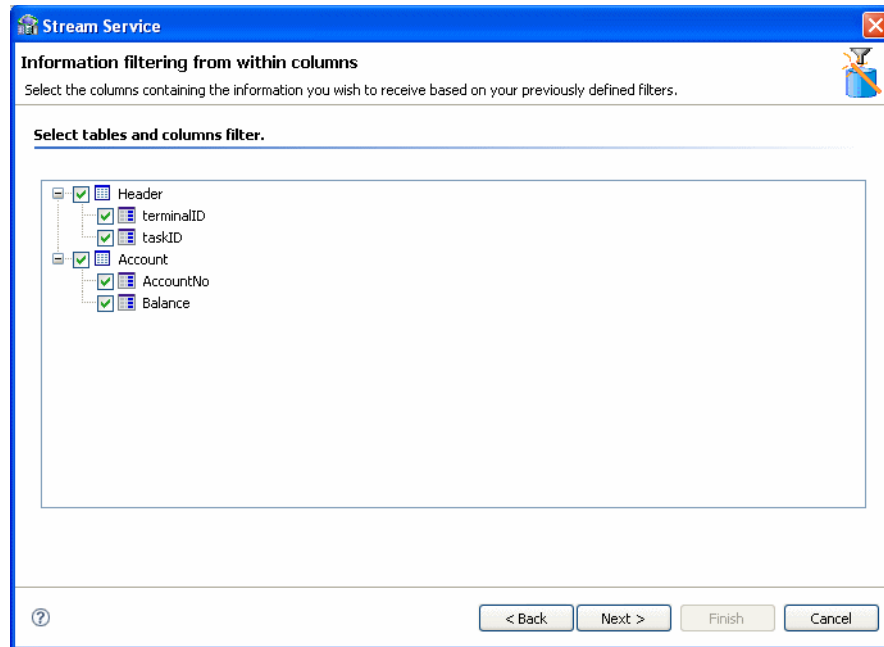
2. You can configure the following parameters in this screen:
 - Select **Eliminate uncommitted changes** to eliminate uncommitted changes from your CDC project.
 - Select the **Use secured connection** check box to configure the staging area to have a secured connection to the server. This is available only if you logged into the server using user name and password authentication.
 - Set the event expiration time in hours.
 - Under File Locations, click the **Browse** buttons to select the location of the changed files, and temporary staging files, if necessary.
3. Click **Next** to select the tables to include in the filtering process.

Figure 2–18 Select Tables



4. Click the required tables in the left pane and move them to the right pane using the arrow keys.

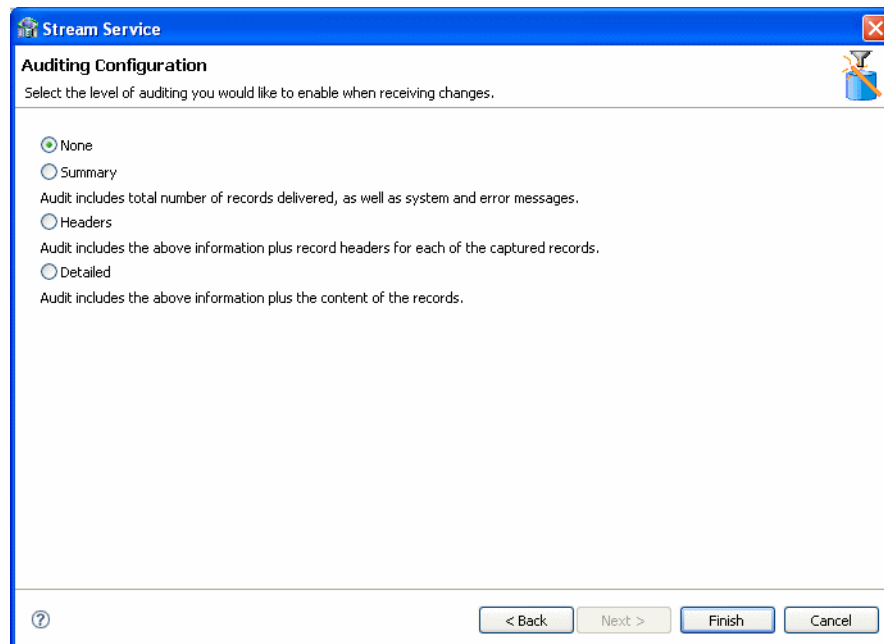
Note: You can remove the tables and add new ones to be captured after you add the tables to the right pane. For more information, see [Adding and Removing Tables](#).
5. Click **Next**. From the tables selected above, select the columns that receive changes. Select the check box next to the table to use all columns in the table.

Figure 2–19 Column Selection

Note: Table headers appear grouped in a separate table at the beginning of the list. You can also request the receipt of changes in the headers' columns.

Any data changes in the columns selected are recorded.

6. Click **Next** to go to Auditing Configuration.

Figure 2–20 Auditing Configuration

7. Select the required auditing level when receiving changes. Your options are:
 - **None:** For no changes.
 - **Summary:** For an audit that includes the total number of records delivered, system messages, and error messages.
 - **Headers:** For an audit that includes the total number of records delivered, system and error messages, and the record headers for each captured record.
 - **Detailed:** For an audit that includes the total number of records delivered, system and error messages, the record headers for each captured record, and the content of the records.
8. Click **Finish**.

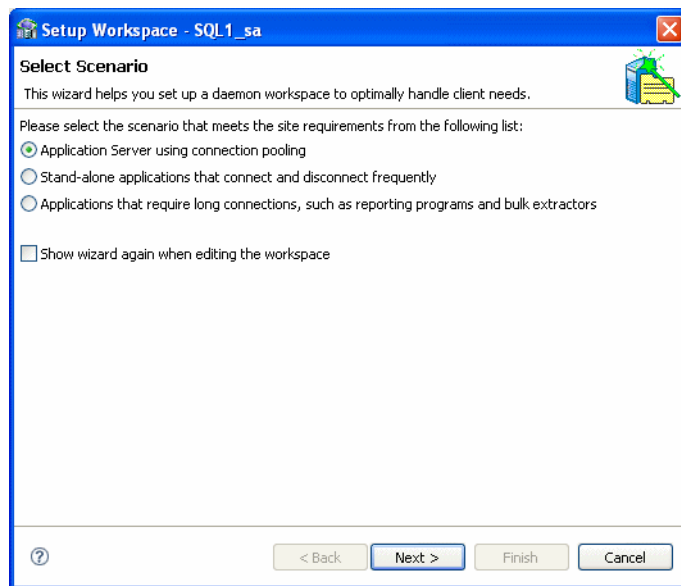
Continue setting up the staging area Server.

Configure the Access Service Manager

In this step you set up a daemon workspace for the CDC adapter. Do the following to configure the access service manager.

1. Click **Access Service Manager**.
The Setup Workspace wizard opens.

Figure 2–21 Select Scenario



2. Select the scenario that best meets your site requirements:
 - **Application Server using connection pooling**
 - **Stand-alone applications that connect and disconnect frequently**
 - **Applications that require long connections, such as reporting programs and bulk extractors**
3. Click **Next**.

The Application Server with connection pooling scenario screen is used to create a workspace server pool. The parameters available depend on the selection you made in the first screen. The following are the available parameters:

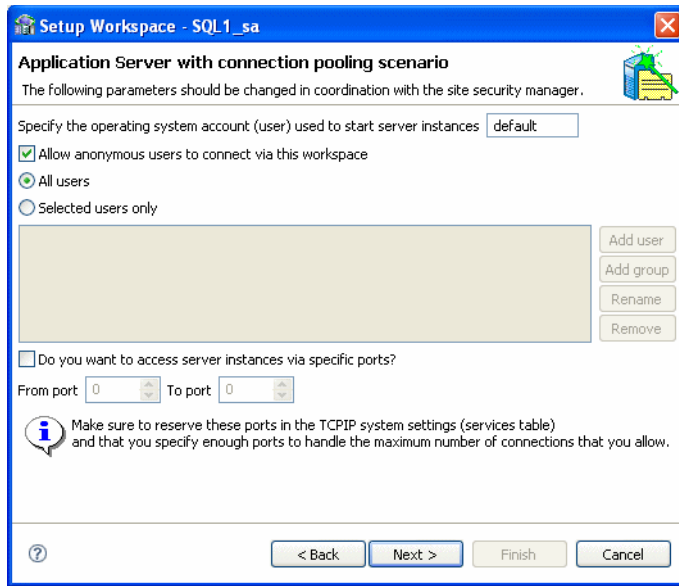
- If you selected **Application Server using connection pooling**:
 - **What is the average number of expected concurrent connections?** Enter the number of expected connections, which cannot be greater than the number of actual available connections.
 - **What is the maximum number of connections you want to open?** Enter the number of connections you want opened.
 - If you selected **Stand-alone applications that connect and disconnect frequently**, in addition to the choices listed in the item above, you can also set the following:
 - **What is the minimum number of server instances you want available at any time?** Enter the number of instances, which cannot be greater than the number of actual available instances.
 - **What is the maximum number of server instances you want available at any time?** Enter the number of instances you want to be available.
 - If you selected **Stand-alone applications that connect and disconnect frequently**:
 - **How many connections do you want to run concurrently?** Enter the number of concurrent connections to run.
4. Click **Next**. In the next screen you set time out parameters. These parameters should be changed if the system is slow or overloaded. The parameters are:
- **How long do you want to wait for a new connection to be established?** Enter the amount of time you want to wait for a new connection to be established (in seconds).
 - **How long do you want to wait for a response that is usually quick?** Change this parameter if you have a fast connection. Enter the amount of time to wait for a response (in seconds).
5. Click **Next**. In the next screen you set security parameters. You should consult with the site security manager before changing these parameters.

Edit the following parameters in this screen:

- Enter the operating system account (user name) used to start server instances.
- Select **Allow anonymous users to connect via this workspace**, to allow this option.
- Enter the permissions for the workspace. You can allow **All users** to access the workspace, or select **Selected users only** to allow only the users/groups to have exclusive access.
- Select **Do you want to access server instances via specific ports**, to allow this option. If this option is cleared, the defaults are used.

If you select this option, indicate the **From port** and **To port** and ensure that you reserve these ports in the TCP/IP system settings.

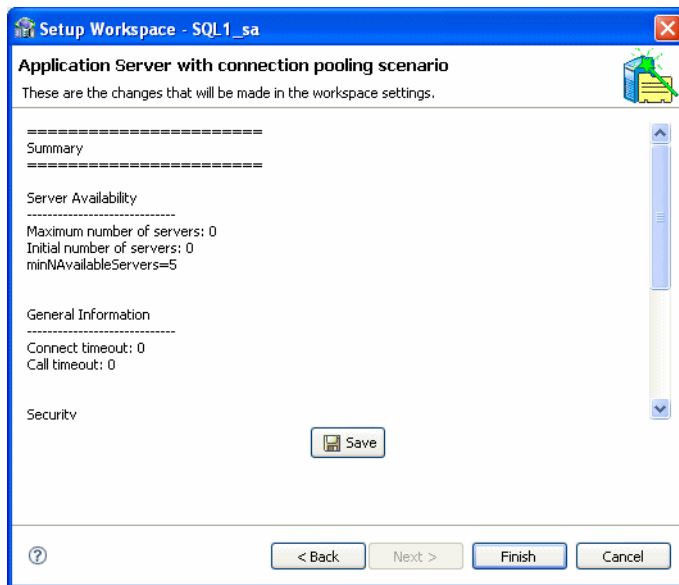
Figure 2–22 Site Security



6. Click **Next**.

The summary screen opens.

Figure 2–23 Workspace Setup Summary



7. Click **Save** and then click **Finish**.

When you complete all the Implementation operations, a check mark (✓) is displayed next to every link. Click **Done** to return so you can begin [Deploying a Change Data Capture](#).

2.3.7 Deploying a Change Data Capture

After you complete the design and implementation guides, the following procedures are available.

- **Deployment Procedure:** This section is used to deploy the project.
- **Control:** This section is used to activate or deactivate workspaces after the project is deployed and you are ready to consume changes. In this section, you can deactivate the workspace anytime you want to suspend consumption of changes from the staging area.

Note: Before deploying the solution, ensure that you have carried out the following tasks, in addition to setting up the CDC solution in Oracle Studio:

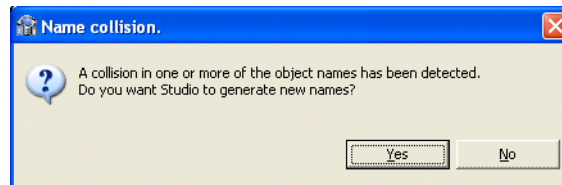
- [Enabling SQL Replication](#)
 - [Configuring Security Properties](#)
 - [Setting up Log On Information](#)
 - [Setting up the Database](#)
 - [Setting Up the TLOG Miner \(LGR\)](#)
-

Do the following to deploy the CDC solution:

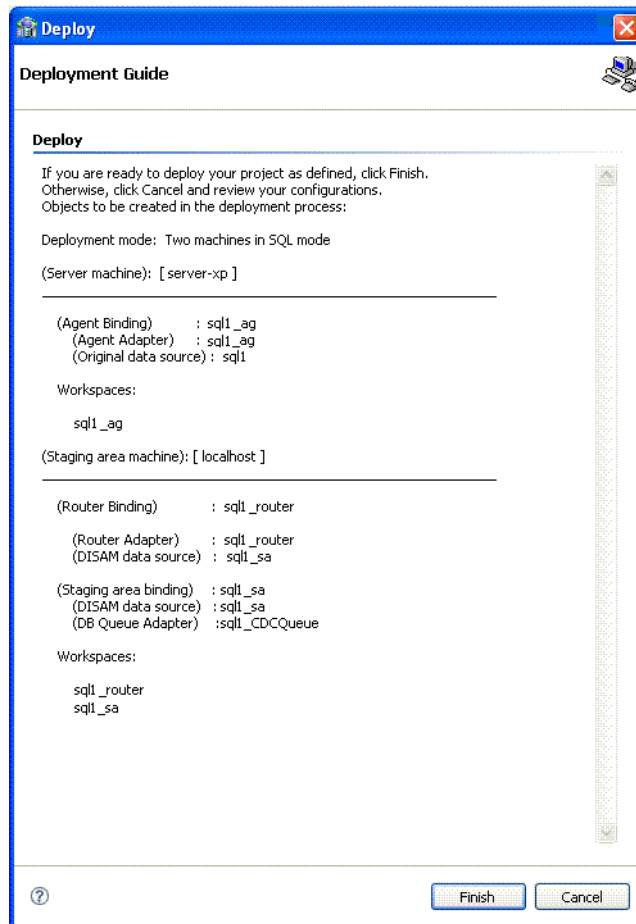
1. Click **Deploy**. The Deployment Procedure and Control sections are displayed in the Deployment view.
2. Click **Deploy** in the **Deployment Procedure** section.

Oracle Studio processes the naming information. This may take a few minutes. If there are naming collisions, a message is displayed asking if you want Oracle Studio to resolve them.

Figure 2–24 *Resolve Naming Collision*



3. Click **Yes** to resolve any naming collisions.
The Deployment Guide screen is displayed.

Figure 2–25 Deployment Guide

4. If you are ready to deploy, click **Finish**.

Otherwise, click **Cancel** and you can return to [Create a CDC Project](#), [Set up the CDC Server](#), or [Set up the Staging Area Server](#) to make any changes.

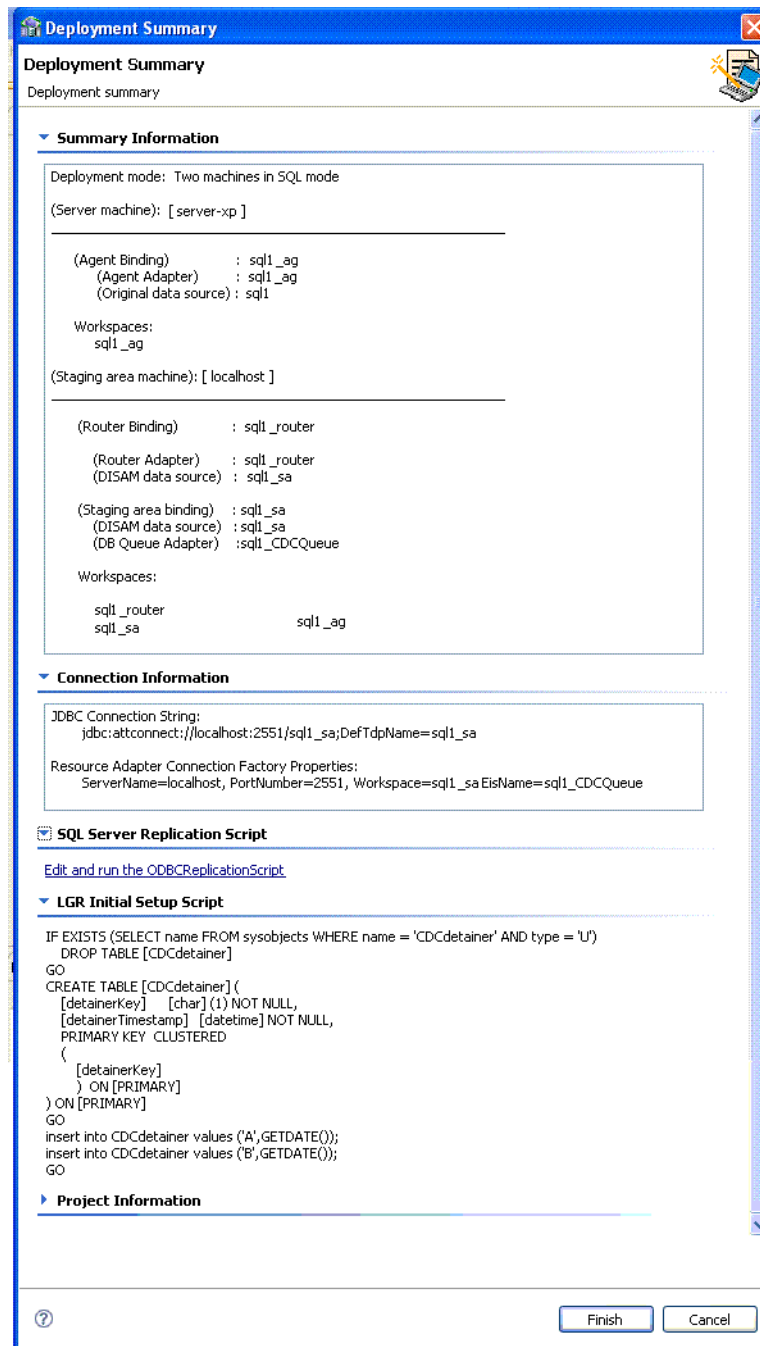
If this project was deployed previously, you are notified that re-deployment overrides the previous instance.

Notes:

- When you redeploy a project where the metadata is changed, the Staging Area (SA) tables should be deleted so that no incorrect information is reported.
 - When you redeploy a solution, a new binding is created for the solution. The new binding is created with the default parameters only. Any temporary features that were added are lost.
-
-

5. Where applicable, click **OK** to redeploy.
6. Click the **Deployment Summary** link.

The Deployment Summary is displayed. It includes the ODBC connection string, the JDBC connection string, and specific logger scripts to enable CDC capturing.

Figure 2–26 Deployment Summary

- Cut and paste any information required from the Deployment Summary screen to your environment as necessary.

Note: The scripts generated in the deployment summary is template. Before running the scripts, they should be reviewed and modified by a DBA.

- If there is nothing wrong with your deployment results, click **Finish**.

If you found problems, click **Cancel** and to return [Create a CDC Project](#), [Set up the CDC Server](#), or [Set up the Staging Area Server](#) to modify the solution.

Note: If you are redeploying a solution you must follow these directions to ensure that the `context` and `agent_context` fields of the `SERVICE_CONTEXT` table must be saved. Follow these directions to save the fields:

1. In the staging area data source run: `select context, agent_context from SERVICE_CONTEXT;` and save the returned values.
 2. Delete the `SERVICE_CONTEXT` table physical files.
 3. Re-deploy the solution.
 4. Activate the router to create the `SERVICE_CONTEXT` table.
 5. Disable the router.
 6. In the staging area data source run: `insert into SERVICE_CONTEXT (context, agent_context) values('XXX', 'YYY');` This inserts the saved values to the `SERVICE_CONTEXT` table.
 7. Activate the solution.
-

2.3.7.1 Activating and Deactivating Solution Workspaces

In the Project guide for your OracleAS CDC Adapter solution, click **Deploy**, then do *one* of the following to activate or deactivate the workspaces for a solution

- To activate workspaces, under the Control section click the **Activate Workspaces** link.
- To deactivate workspaces, click the **Deactivate Workspaces** link.

During the activation/deactivation process, you may receive messages indicating that the daemon settings on one or more of the computers involved in your solution have changed. Click **Yes** to proceed.

2.4 Testing the OracleAS CDC Adapter for SQL Server CDC Solution

Check the following to ensure that the OracleAS CDC Adapter for SQL Server operates correctly.

- The system contains a Temporary Transient working folder
- All consumed tables are "articled" within at least one Replication/publication definition
- All consumed tables have a primary key
- Verify that the TLOG Miner components are running (for more information, see [Environment Verification](#))

2.5 Handling Metadata Changes

When you make changes to the source tables in your SQL Server CDC Solution, you must ensure that the CDC solution can recognize the changes and work with them. This section provides you with a procedure to handle the metadata in your OracleAS CDC Adapter for SQL Server CDC solution if changes are made after deploying the solution. You should perform these steps at a time when there is little or no activity in the system. If you want to receive new events with a new structure, consume the

changes for the table you are updating before carrying out any the steps in this process.

Do the following to handle changes to metadata:

1. Deactivate the Solution using Oracle Studio.
2. Update the metadata on the back-end database for the table you are working with.

In Microsoft SQL Server 2005, an inconsistency between the modified metadata and the data layout can appear because of the changes made to the metadata. To handle this inconsistency:

- If a clustered index is defined for the table, run:

```
DBCC DBREINDEX ('<table name>',<clustered index>)
```

Where <table name> is the table with updated metadata, and <clustered index> is the name of its clustered index.

- If no clustered index is defined, reload the table.
3. Update the metadata in the Staging Area by doing *one* of the following:
 - If you made manual changes to the CDC solution after deployment, or if you do not want to redeploy the solution, then on the Router's (Staging Area) computer, do the following:
 - a. Run Oracle Studio, and open the Design perspective.
 - b. Edit the Metadata for the Router's Data source.
 - c. Expand the table list and edit the metadata for the table.

If you are adding a new column, you must add it to the end of the COLUMN list. This operation can also be done using the Source view. ensure you select the correct data type.

If you are modifying a data type, you must select the corresponding data type when making the modification.

- d. Save the metadata.

For more information, see [Advanced Tuning of the Metadata](#).

- For cases where you can redeploy the solution:
 - a. Run Oracle Studio, and open the Solution perspective.
 - b. Open the CDC solution project.
 - c. Click **Implement** and then click **Stream Service**.
 - d. Run the wizard.
 - e. Redeploy the solution, but do not activate it.

For more information, see [Deploying a Change Data Capture](#).

4. Delete the physical files that represent the modified tables from the Staging Area. Do *not* delete the SERVICE_CONTEXT and CONTROL_TABLE files.
5. Reactivate the solution using Oracle Studio.

2.6 Environment Verification

The following topics show how to ensure that the SQL Server CDC solution components are configured properly. This section has the following topics.

- [Verify the SQL Server Version](#)
- [Ensure that the Service is Registered](#)
- [Verify that the LGR Service is Running](#)
- [Viewing the Service Greetings](#)
- [Check the Output Files](#)

2.6.1 Verify the SQL Server Version

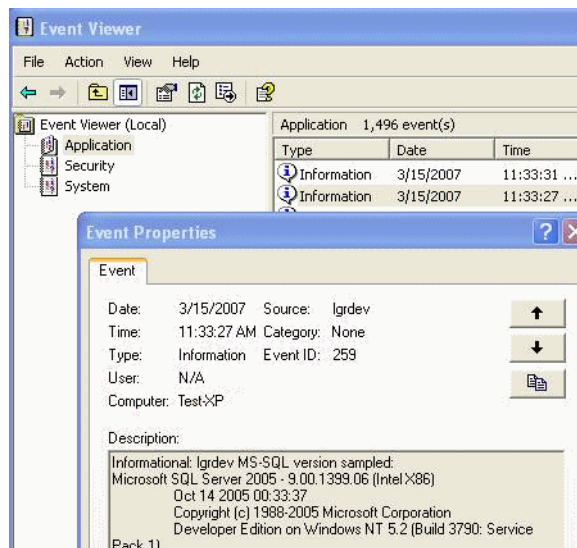
During setup, the LGR checks to see which version of the Microsoft SQL Server you are using to ensure that it works with the correct standards. You must verify that the correct SQL Server version is recognized by the LGR service. To verify the version, do one of the following:

- In the initial setup section of the LGR log file, find the back-end version stamping as follows:

```
<<20070315-113327>>      Module:sqlcdclgr/Line:697      MS-SQL version sampled:
Microsoft SQL Server 2005 - 9.00.1399.06 (Intel X86)
      Oct 14 2005 00:33:37
      Copyright (c) 1988-2005 Microsoft Corporation
      Developer Edition on Windows NT 5.2 (Build 3790: Service Pack 1)
```

- In the Windows Event Viewer, do the following:
 - Find the lgrdev source for any **Information** entry.
 - Double-click the entry to display the following. Check to see if the message describes the SQL version. If not, try another entry.

Figure 2–27 Verify SQL Server Version



2.6.2 Ensure that the Service is Registered

Use the System Registry (REGEDIT) to ensure that:

- The TLOG Miner service is registered
- The TLOG Miner service is assigned as a Windows event log source

Do the following to check that the TLOG Miner service is registered:

In the System Registry (REGEDIT), approve the service and its parameters. To access the registry:

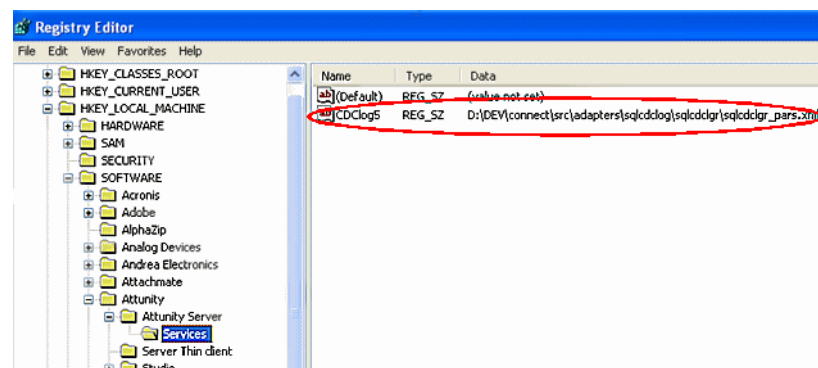
- Click **Start**, click **Run**, type **regedit**, and then click **OK**.

Scroll through the registry tree by expanding the folders that lead to the root folder where you installed Oracle Connect. The path listed here assumes that you installed Oracle Connect in the default location:

HKEY_LOCAL_MACHINE\SOFTWARE\Oracle\Oracle Connect\Services.
Ensure that the LGR service registration is listed on the right side.

The following is an example of how the registry may look:

Figure 2–28 Registry



For checking if the TLOG Miner service is assigned as a Windows event log source, follow this procedure.

Do the following to check that the LGR service is assigned as a Windows event log source:

In the System Registry (REGEDIT), browse to the CDCLog folder. To access the registry:

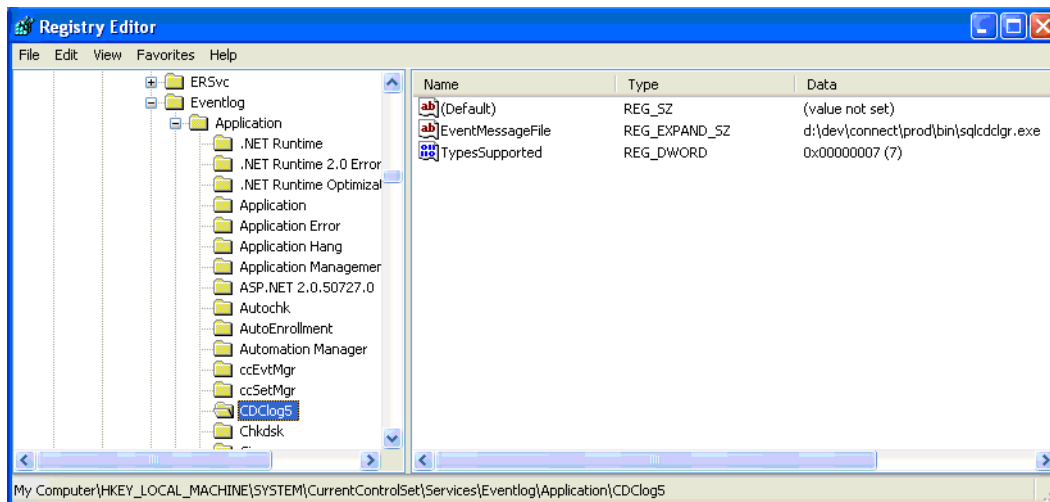
- Click **Start**, click **Run**, type **regedit**, and then click **OK**.

Scroll through the registry tree by expanding these folders:

SYSTEM\CurrentControlSet\Services\EventLog\Application\CDCLog
5. Ensure that the LGR service registration is listed on the right side.

The following is an example of how the registry may look:

Figure 2–29 Registry CDCLog folder



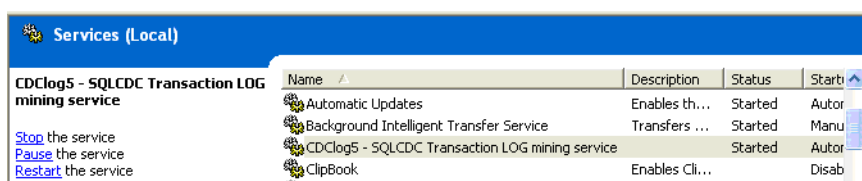
2.6.3 Verify that the LGR Service is Running

You should carry out the following to ensure that the TLOG Miner service is running:

- Ping the Service
- Start the service for a short period, and then stop it. To start the service:
 - From the Windows **Start** menu, select **Control Panel, Administrative Tools** and double-click the **Services** icon.

Find the service is listed in the **Name** list and click **Stop the service**. To start the service click **Restart the service**. See the example below.

Figure 2–30 Start and Stop the Service



2.6.4 Viewing the Service Greetings

Open the Event Viewer and view the messages in the Event Properties dialog box.

Do the following to view the event properties:

1. From the Windows **Start** menu, select **Control Panel, Administrative Tools** and double-click the **Events** icon.
2. Select System on the left side of the viewer.
3. From the right pane, right click and event from the SQL Server CDC and select **Properties**. The following figure is a sample of the information that is displayed:

Figure 2–31 Service Greeting

```
Attunity Ltd. All Rights Reserved.  
SQLCDCLGR Version facility:  
V5.01 GA - Nov-2006  
+++++  
  
Started at 10-Dec-2006 14:21.03...
```

2.6.5 Check the Output Files

You should check the following files:

- LGR Service log files: These files are in the folder or directory that is selected in the Logging parameter of the template input file.
- Transient storage output file: This file is in the folder or directory that is selected in the transientStorage parameter of the template input file.

For information on where to define these parameters, see [Configuring the Template Input File](#).

WebLogic Deployment and Adapter Integration

This chapter includes the following topics:

- [Configuring the SQL Server CDC Adapter In the Application Server](#)
- [Configuring the JCA Configuration Files for the OracleAS CDC Adapter for SQL Server](#)

3.1 Configuring the SQL Server CDC Adapter In the Application Server

You can use WebLogic application server to deploy the Oracle Connect CDC adapter. This section describes how to deploy the CDC adapter, set up the necessary connections, and build the CDC Stream Positions table.

This section includes the following topics:

- [CDC Stream Positions Table Definition](#)
- [Configuring the SQL Server CDC Adapter Connection Factory](#)

3.1.1 CDC Stream Positions Table Definition

You should create one CDC Stream Position table for each CDC adapter. The CDC Stream Positions table contains one row for each CDC process (for each captured table) to control its stream position and XA transactions. The following SQL statement is used to define the table in an Oracle database:

```
create table CDC_STREAM_POSITIONS(TABLE_NAME varchar(127) not null,
STREAM_POSITION varchar(127), PREPARED_STREAM_POSITION varchar(127),
ROLLBACK_STREAM_POSITION varchar(127), NEW_STREAM_POSITION varchar(127),
XID_FORMAT int, XID_BRANCH varchar(128), XID_GLOBAL varchar(128));
create unique index CDC_STREAM_POSITIONS_INDEX on CDC_STREAM_POSITIONS
(TABLE_NAME);
```

You can use any table name, but you cannot change the column names.

The following table describes the CDC Stream Positions table columns.

Table 3–1 CDC Stream Positions Table

| Column | Description |
|------------|------------------------------------------------------------------------------|
| TABLE_NAME | The name of the CDC table. You should not change the data in this column. |

Table 3–1 (Cont.) CDC Stream Positions Table

| Column | Description |
|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| STREAM_POSITION | The last committed stream position of the CDC process for the current table. You should not change the data in this column. |
| PREPARED_STREAM_POSITION | The last prepared stream position of the CDC process for the current table. You should not change the data in this column. |
| ROLLBACK_STREAM_POSITION | In a Rollback Loop , this column contains the stream position of the event that occurred at the time of the rollback. |
| NEW_STREAM_POSITION | You can enter a valid stream position value in this column to manually change the current stream position. Before you update this column, deactivate the corresponding CDC process. Note: Ensure that the <code>XID_FORMAT</code> column has a null value. If the <code>XID_FORMAT</code> column is not null, do not enter a value for this column. |
| XID_FORMAT | The last prepared XID fields. If the <code>XID_FORMAT</code> column is null, the stream position is committed. In this case the <code>XID_BRANCH</code> and <code>XID_GLOBAL</code> columns contain the last committed XID fields. |
| XID_BRANCH | |
| XID_GLOBAL | |

You should configure a WebLogic data source that provides access to the CDC Stream Position table.

3.1.2 Configuring the SQL Server CDC Adapter Connection Factory

Deploy the Oracle Connect RAR into the WebLogic server.

You may create the appropriate connection factories for each CDC adapter.

This table describes the connection factory properties that are relevant for the SQL Server CDC Adapter. Do not change the values of any of the other properties.

Table 3–2 Connection Properties for CDC Inbound Process

| Property | Description |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| eisName | Required. Sets the name of the adapter to use. The adapter is defined in the Oracle Connect server using Oracle Studio. |
| serverName | Required. Enter the name of the server with the TCP/IP address or host name where the Oracle Connect daemon is running. For more information, see Advanced Tuning of the Daemon for details about the daemon. |
| workspace | Required. Specifies the name of an Oracle Connect server workspace to use. For more information, see Workspaces for details about workspaces. |
| portNumber | Optional. Specifies the TCP/IP port where the Oracle Connect daemon is running on the server. The default port is 2551. |

Table 3–2 (Cont.) Connection Properties for CDC Inbound Process

| Property | Description |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| userName | Optional. Specifies a user who can access the Oracle Connect server. The user is defined in the Oracle Connect daemon configuration. For more information, see daemon Security and workspace Security for details about users allowed to access an Oracle Connect server |
| password | Optional. Specifies a valid password for the user. |
| firewallProtocol | Optional. Specifies the firewall protocol used: either <code>none</code> or <code>fixedNat</code> (the Nat protocol using a fixed address for the daemon). The default is set to <code>none</code> . |
| connectTimeout | Optional. Specifies the connection timeout in seconds. The default is 0, indicating that there is no connection timeout. |
| encryptionProtocol | Optional. Specifies the name of encryption protocol to use. The default is set to RC4. If the value of the property is not defined, the RC4 protocol is used. |
| encryptionKeyName | Optional. Specifies the name of the symmetric encryption key to use. |
| encryptionKeyValue | Optional. Specifies the value of the symmetric encryption key to use. |
| retryInterval | Optional. The amount of time the resource adapter waits if no events are found in the server before issuing the next request. The default value is 15 seconds. |
| jdbcDataSource | Required. The JNDI location of the JDBC Data Source that provides access to cdcStreamPositionsTable . |
| cdcStreamPositionsTable | The SQL table that is used to control the CDC inbound process. For more information, see CDC Stream Positions Table Definition for more information. |

3.2 Configuring the JCA Configuration Files for the OracleAS CDC Adapter for SQL Server

This section includes the following topics:

- [Creating JCA Configuration Files](#)
- [Configuring the Binding File](#)

3.2.1 Creating JCA Configuration Files

Perform the following steps to create a binding file and a WSDL file for the CDC adapter using Oracle Studio:

1. From the **Start** menu, select **Programs, Oracle**, and then select **Studio**.
2. In the Design perspective, Configuration view, expand the **Machine** folder.
3. Expand the machine with the CDC staging area.

4. Expand the **Bindings**. The binding configurations available on this computer are listed.
5. Expand the binding for the CDC staging area that you created. The name of the binding is the Project name for the CDC solution that you created in Oracle Studio with the suffix `_SA`.
6. Expand the **Adapters** folder, right-click the adapter, and select **Generate JCA Configuration Files**.
The JCA Configuration Files dialog box opens.
7. In the **Save to** field, type the path to the location where you want to save the created files, or select **Browse** to browse to a location.
8. In the **JNDI Location** change the default value for the WebLogic Connection Factory JNDI location, if necessary.
9. Click **OK** to create the files in the specified location.

The View Generated Content dialog box opens. It provides links to the binding file (*.jca) and the WSDL file that are created. If you want to view or edit the files, click the appropriate link in the dialog box.

Use these files when working with the BPEL Process Manager or Mediator.

3.2.2 Configuring the Binding File

You should not edit the WSDL file generated by Oracle Studio. You may edit the binding file to configure the `AttuCDCActivationSpec` properties. Most of these properties can also be provided using the Connection Factory. For information on how to configure the Connection Factory, see [Configuring the SQL Server CDC Adapter Connection Factory](#). You may also need to configure the `retryInterval` property in the binding file.

The binding file specifies the name of the adapter's connection factory as the value of the `adapterInstanceJndi` attribute of the `<jca:address>` element in the `<service>` section. If a connection factory exists on the application server, its properties are taken. Otherwise, the properties specified by the `AttuCDCActivationSpec` are used. If a value is specified by both the connection factory and the `AttuCDCActivationSpec`, the `AttuCDCActivationSpec` property overrides the value in the connection factory. If you want to use the value specified in the connection factory, you must delete the property from the binding file.

The following is an example of a CDC binding file:

```
<?xml version="1.0" encoding="UTF-8"?>
<adapter-config adapter="Legacy Adapter" name="calc"
xmlns="http://platform.integration.oracle/blocks/adapter/fw/metadata">
  <connection-factory UIConnectionName="pcbpel" csfKey="pcbpel"
location="eis/legacy/calc"/>

  <endpoint-interaction operation="add" portType="calcPortType">
    <interaction-spec
className="com.attunity.adapter.oracle.AtтуInteractionSpec">
      <property name="FunctionName" value="add"/>

      <property name="ExecutionTimeout" value="120"/>
    </interaction-spec>
  </endpoint-interaction>
  <endpoint-interaction operation="display" portType="calcPortType">
    <interaction-spec
```

```

className="com.attunity.adapter.oracle.AtтуInteractionSpec">
    <property name="FunctionName" value="display"/>

    <property name="ExecutionTimeout" value="120"/>
</interaction-spec>
</endpoint-interaction>
<endpoint-interaction operation="div" portType="calcPortType">
    <interaction-spec
className="com.attunity.adapter.oracle.AtтуInteractionSpec">
    <property name="FunctionName" value="div"/>

    <property name="ExecutionTimeout" value="120"/>
</interaction-spec>
</endpoint-interaction>
<endpoint-interaction operation="mul" portType="calcPortType">
    <interaction-spec
className="com.attunity.adapter.oracle.AtтуInteractionSpec">
    <property name="FunctionName" value="mul"/>

    <property name="ExecutionTimeout" value="120"/>
</interaction-spec>
</endpoint-interaction>
<endpoint-interaction operation="sub" portType="calcPortType">
    <interaction-spec
className="com.attunity.adapter.oracle.AtтуInteractionSpec">
    <property name="FunctionName" value="sub"/>

    <property name="ExecutionTimeout" value="120"/>
</interaction-spec>
</endpoint-interaction>
</adapter-config>

```

You must configure the following property in the binding file.

`retryInterval`: The amount of time the resource adapter waits if no events are found in the server before issuing the next request. The default is set to 15 seconds. This is optional.

3.3 High Availability

The Oracle legacy adapters for OracleAS support High Availability using OracleAS clusters with active-active and active-passive topologies.

In an active-active topology Oracle Application Server provides an active-active redundant model for all its components with OracleAS Clusters. In an OracleAS Cluster, two or more Oracle Application Server instances are configured to serve the same application workload. These instances can reside on the same computer or on different computers. The active instances may be front-ended by an external load balancer, which can redirect requests to any of the active instances, or by some other application-level configuration, such as address lists, to distribute the requests.

In an active-passive topology Oracle Application Server supports Active-passive model using OracleAS Cold Failover Clusters. In this case two or more application server instances are configured to serve the same application workload, but only one is active at any time.

For High Availability support in CDC Adapters, all the instances must have access to the Oracle database specified by the `jdbcDatasource` parameter in the binding file.

3.4 Troubleshooting Rollback Loops

When a problem occurs in the CDC resource adapter work thread, the thread waits for a defined period (`retryInterval`) then retries the last operation. If you want to stop the adapter, you must deactivate the endpoint. The behavior of the resource adapter is different according to the type of rollback loop. In all cases, the resource adapter writes the corresponding error messages to the resource adapter log file and sends the message to the message listener `onAlert` method.

- If the connection to Oracle Connect is lost, then the resource adapter always waits for a defined period (`retryInterval`) until the connection is reestablished.
- In all other cases, the resource adapter retries the last operation immediately and if the problem returns, the resource adapter waits for ascending periods of time, beginning with the `retryInterval` and doubling the wait time for each successive attempt, but not for more than one minute.

If the OracleAS resource manager invokes a rollback before a 2PC `prepare` operation, then the CDC resource adapter take steps to perform a special operation that assists you in troubleshooting the problem. In this case, the resource adapter separately sends each event from the last event array to the BPEL endpoint, which saves the stream position of the last problematic event in the `ROLLBACK_STREAM_POSITION` column.

If you notice that a rollback loop occurs in the CDC resource adapter work thread, check the value of the `ROLLBACK_STREAM_POSITION` is not null. If the value is not null, check whether there was a data problem. You can select the problematic event from the staging area, using the current stream position value. In this way you can analyze the data to determine what the problem is. In addition, you can skip the problematic event. In this case you stop the endpoint and update the `NEW_STREAM_POSITION` column with the value of the `ROLLBACK_STREAM_POSITION`.

Configuring a SQL Server CDC Adapter

This chapter provides an example for creating an OracleAS adapter for SQL Server. To work with an OracleAS adapter for SQL Server, you must also configure either a BPEL process or a Mediator process. For information on using BPEL or Mediator, see [Creating the Project in JDeveloper Examples](#).

4.1 Creating Outbound Interactions with the OracleAS Adapter for SQL Server

To work with the OracleAS Adapter for SQL Server and create outbound interactions, you must create a new SQL Server database and use the data to create a CDC Solution.

4.1.1 Requirements

The following is required to perform the tasks described in this chapter:

- Computer with Windows operating system
- Mainframe computer with z/OS operating system
- Oracle Connect v 11.1.1.2 installed on the Mainframe computer
- Oracle Studio v 11.1.1.2 installed on the Windows computer.

4.2 Adding the SQL Server Hospital Data Source

To create an SQL Server data source you must do the following:

- [Prepare the System](#)
- [Set up Machine Access to Oracle Connect](#)

4.2.1 Prepare the System

In your SQL Server database, you should create a database called Hospital. In this database create the following tables and columns as described in [Table 4-1](#).

Table 4-1 SQL Server Tables and Columns

| Tables | Columns |
|----------|--------------|
| HOSPITAL | HOSPNAME |
| | HOSP_ADDRESS |
| | HOSP_PHONE |
| | ADMIN |

Table 4–1 (Cont.) SQL Server Tables and Columns

| Tables | Columns |
|---------------|-----------------|
| PATIENT | HOSPNAME |
| | WARDNO |
| | PATNAME |
| | PATADDRESS |
| | PAT_PHONE |
| | BEDIDENT |
| | DATEADMT |
| | PREV_STAY_FLAG |
| | PREV_HOSP |
| | PREV_DATE |
| SYMPTOM | PREV_REASON |
| | HOSPNAME |
| | WARDNO |
| | BEDIDENT |
| | DIAGNOSE |
| | SYMPDATE |
| | PREV_TREAT_FLAG |
| | TREAT_DESC |
| SYMP_DOCTOR | |
| WARD | SYMP_DOCT_PHONE |
| | HOSPNAME |
| | WARDNO |
| | TOT_ROOMS |
| | TOT_BEDS |
| | BEDAVAIL |
| WARDTYPE | |

4.2.2 Set up Machine Access to Oracle Connect

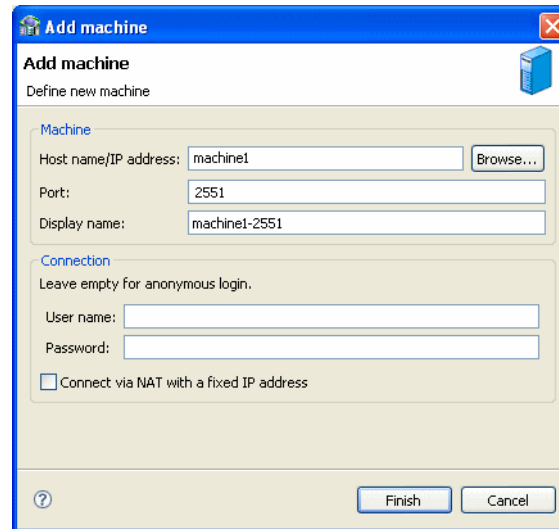
You begin by configuring access to the Windows computer with your SQL Server data. You configure this access with Oracle Connect. Open Oracle connect and follow the directions [Setting Up a Windows Computer in Oracle Studio](#). Enter the following information in the Add machine dialog box:

- **Host name/IP address:** Enter the name or IP address for the Mainframe computer with the Hospital database. This should be installed in the same directory as Oracle Connect.
- **Port:** Enter the port number where the daemon is running. The default port is 2551.
- **Display name:** You do not need to enter any information in this field (By default, the display name is the host name and the port number).
- **User name:** If the computer you are accessing needs an administrator password. If so enter the name of the computer's administrator.
- **Password:** If necessary, enter the computer administrator's password.

- **Connect via NAT with fixed IP address:** Select this if the machine uses the NAT (Network Address Translation) firewall protocol, with a fixed configuration, mapping each external IP to one internal IP, regardless of the port specified.

Figure 4–1 shows the Add Machine dialog box with the correct information:

Figure 4–1 Add Machine Dialog Box



4.3 Create a Change Data Capture

You now create the change data capture for the tables you created. When you are finished you can create WSDL and binding (jca) files. See [Create the JCA Configuration Files](#) for more information.

These files contain the information needed to create the BPEL and Mediator projects in JDeveloper. For more information on using JDeveloper for the BPEL Process Manger and Mediator, see [Creating the Project in JDeveloper Examples](#).

Before you begin to set up your change data capture ensure the SQL Server is set up to handle a change data capture. For information on how this is done see these topics.

- [Enabling SQL Replication](#)
- [Configuring Security Properties](#)
- [Setting up Log On Information](#)
- [Setting up the Database](#)
- [Setting Up the TLOG Miner \(LGR\)](#)

The following sections describe how to create a change data capture in Oracle Studio.

- [Setting up a Change Data Capture](#)
- [Deploy the Solution](#)

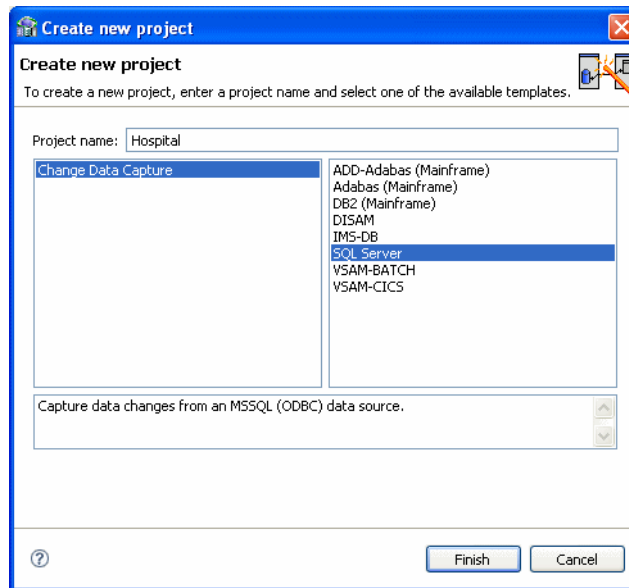
4.3.1 Setting up a Change Data Capture

The following procedure describes how to set up your change data capture for this sample. For detailed information on setting up a change data capture for SQL Server, see [Setting up a Change Data Capture in Oracle Studio](#).

1. Open the Solution perspective in Oracle Studio.
2. In the left pane, click **Create new project**.
3. Enter the following:
 - Project name: Hospital
 - Type: **SQL Server**

Figure 4–2 shows the correct data in the Create new project screen.

Figure 4–2 Create New Project



4. Click **Design** and then click **Next** and **Finish** to use the default values in the screens. If you want to set up your staging area on a UNIX computer, then you must change that setting in the second screen. For more information, see [Create a CDC Project](#).
5. Click **Implement** to go to the Implementation guide.
6. For **Server Configuration**, enter the following information:
 - **Machine:** Enter the information for the Windows computer with Oracle Connect installed.
 - **Data Source:** Enter the following:
 - **SQL Server Name:** Enter the name of the Hospital SQL Server database that you created for this project.
 - **dbName:** Enter the name of the server computer where the SQL Server is installed.

For more information, see [Set up the Data Source](#).

- **Stream Service:** You can use the default settings, which records all changes to the journal and does not include the capture of before-image records.

Note: You must ensure that you enter the path to the Transient Storage Directory. This must be in the same location as defined in the transientStorage parameter. See [Configuring the Template Input File](#) for more information.

- **Logging Level:** Use the default settings.
7. For **CDC Service Configuration**, enter the following information:
- **Machine:** Enter the information for the computer you are using as your staging area. This must be a Windows or UNIX machine.
 - **Stream Service:** Enter the following:
 - In the Staging Area screen, enter a location for the change files on the computer you specified and the Staging Area computer.
 - In the Changed Data Capture Table Selection, select all of the tables.
 - In the remaining screens, click **Next** to use the default values.
 - **Access Service Manager:** Click **Next** in all of the screens to use the default values.

For more information, see [Set up the Staging Area Server](#).

You must now [Deploy the Solution](#).

4.3.2 Deploy the Solution

To deploy the solution, click Activate Workspaces. Click **OK** in any screen that opens. If you get a message about a naming collision, you must resolve this first.

For information on deploying a change data capture, see [Deploying a Change Data Capture](#).

4.4 Create the JCA Configuration Files

You must create both a WSDL and JCA file to set up your connection with JDeveloper. You create the files using Oracle Studio before setting up the BPEL process or Mediator connections.

For information on how to create JCA configuration files, see [Creating JCA Configuration Files](#). To create the files for the `Hospital_CDCQueue` adapter, do the following:

1. From the Configuration pane in Oracle Studio, expand the binding for the CDC staging area that you created. The name of the binding is the Project name for the CDC solution that you created in Oracle Studio with the suffix `_SA`.
2. Right-click the `Hospital_CDCQueue` adapter and select **Generate JCA Configuration Files**.
3. Save the files to a place you can find when you create the BPEL process or Mediator connection.

Creating the Project in JDeveloper Examples

This chapter contains the following topics:

- [Getting Started](#)
- [Deploy a BPEL Inbound Process](#)
- [Mediator Inbound Process](#)

5.1 Getting Started

This topic describes the components necessary to work with the samples and how to prepare your system. This section has the following topics:

- [Prerequisites](#)
- [Beginning Tasks](#)

5.1.1 Prerequisites

The following are installation and configuration requirements for using the examples.

- Personal computer running Microsoft Windows XP, Windows Vista, Windows Server 2003, or Windows Server 2008 with one GB of RAM.
- The CDC adapter that you are using must be deployed to the Oracle Application Server.
- OracleAS CDC Adapter must be configured for inbound processing. See [Configuring the SQL Server CDC Adapter In the Application Server](#).
- Oracle JDeveloper must be installed.
- CDC adapter must be deployed.
- Oracle Studio with the necessary machines loaded. See [Setting Up a Change Data Capture with the OracleAS CDC Adapter for SQL Server](#).

This chapter provides examples of the configuration steps that are used when using BPEL and Mediator to work with the Oracle CDC adapters. You should be familiar with the following before working with these examples:

- How to create J2CA connections. See [Configuring the JCA Configuration Files for the OracleAS CDC Adapter for SQL Server](#) for more information.

- How to configure the OracleAS Adapters for SQL Server using Oracle Studio. See [Setting Up a Change Data Capture with the OracleAS CDC Adapter for SQL Server](#) for more information.

Integration between the OracleAS CDC Adapters for SQL Server and BPEL has the following processes:

- **Design Time:** The OracleAS Adapters for SQL Server are configured with Oracle Studio as described in [Setting up a Change Data Capture in Oracle Studio](#).
- **Run time:** After you deploy the BPEL process with JDeveloper, you can test your configurations. See [Run-time Configuration](#).

5.1.2 Beginning Tasks

Before you design the inbound process, you must perform the following:

- Perform the tasks in [Configuring a SQL Server CDC Adapter](#) to create the CDC Solution and the adapters necessary to create the JCA configuration files.
- Configure the connection for the J2CA CDC resource adapter. You do this by creating a connection factory.

For more information, see [Setting Up a Change Data Capture with the OracleAS CDC Adapter for SQL Server](#).

- Create the WSDL and binding files for the interaction. You do this in Oracle Studio before you begin to build your endpoint in JDeveloper. Oracle Studio creates the WSDL and binding (jca) files automatically, based on the interaction you create. See [Creating JCA Configuration Files](#) for information on creating these files.

5.2 Deploy a BPEL Inbound Process

This section describes how to create a BPEL inbound process that connects to a SQL Server CDC adapter. For information on how to configure a SQL Server CDC adapter for inbound, see [Setting Up a Change Data Capture with the OracleAS CDC Adapter for SQL Server](#).

To configure a process with the BPEL process manager, you use JDeveloper. This section describes how to create a BPEL inbound process for SQL Server adapters using JDeveloper. There are two configuration types necessary to perform this inbound sample.

- [Design-Time Configuration](#)
- [Run-time Configuration](#)

Before you design the inbound process, make sure to integrate and connect your OracleAS CDC adapter for SQL Server with the BPEL process manager. See [Configuring the SQL Server CDC Adapter In the Application Server](#) for more information.

You must also make sure to enter the value for the `JdbcDataSource` in the jca file. [jca](#) shows where you add this value to the jca file.

Figure 5–1 JdbcDataSource Value

```

<property name="TableName" value="HOSPITAL"/>
<property name="JdbcDataSource" value="oracdc"/>
<property name="CdcStreamPositionsTable" value=""/>

```

5.2.1 Design-Time Configuration

This section describes the design-time steps necessary to deploy a BPEL inbound process:

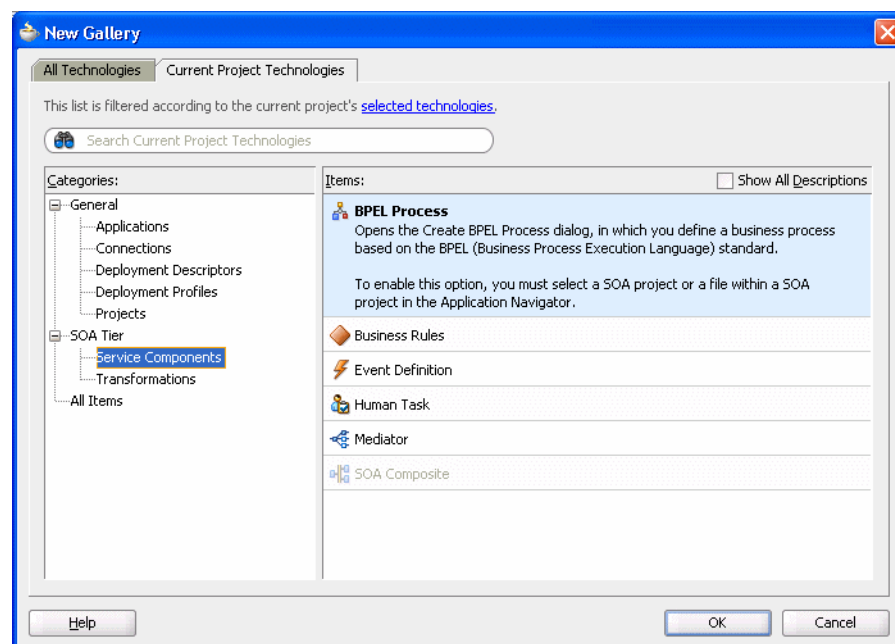
- [Create a BPEL Inbound Process](#)
- [Use a Third-Party Adapter for the Inbound Process](#)
- [Design the BPEL Inbound Process](#)
- [Deploy the Project](#)

5.2.1.1 Create a BPEL Inbound Process

Perform the following to create a BPEL project for inbound.

1. In JDeveloper, create a new SOA project
2. Right-click the SOA project and select **New**. The New Gallery is displayed as shown in [Figure 5–2](#).

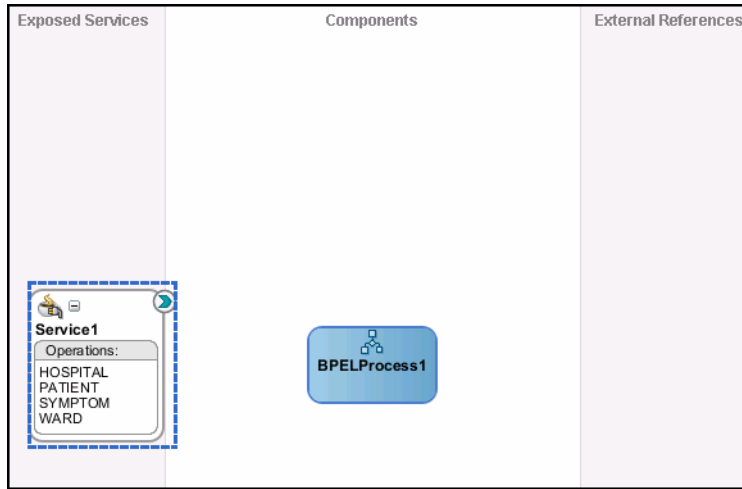
Figure 5–2 New Gallery



3. In the **Categories** list, expand **SOA Tier** and select **Service Components**.

4. From the **Items** list, select **BPEL Process** then click **OK**. The Create BPEL Process screen is displayed as shown in [Figure 5-3](#).

Figure 5-3 BPEL Process



5. Enter the following in the BPEL Process screen:
 - Enter a name for the BPEL process, for example **BPELInbound1**.
 - From the Template list, select **Define Service Later**.
6. Click **OK**. The BPEL process is displayed in the visual editor.

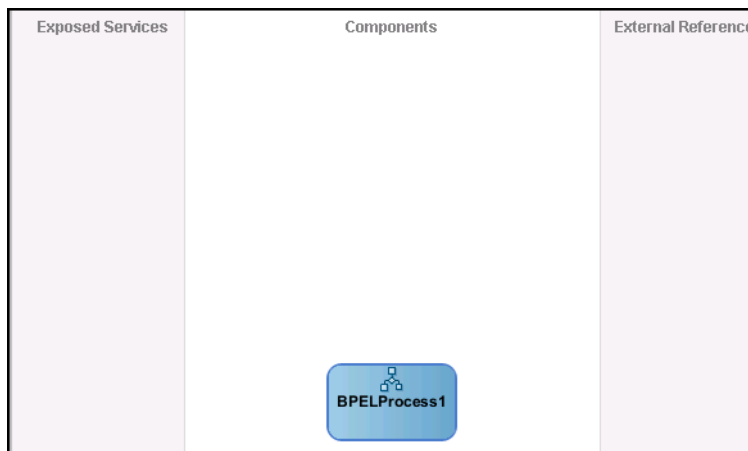
Continue with [Use a Third-Party Adapter for the Inbound Process](#).

5.2.1.2 Use a Third-Party Adapter for the Inbound Process

You use a third-party adapter as a partner link to create the inbound process. SOA executes the SQL statement defined in the interaction and passes it to a resource adapter. Perform the following to create the third-party adapter.

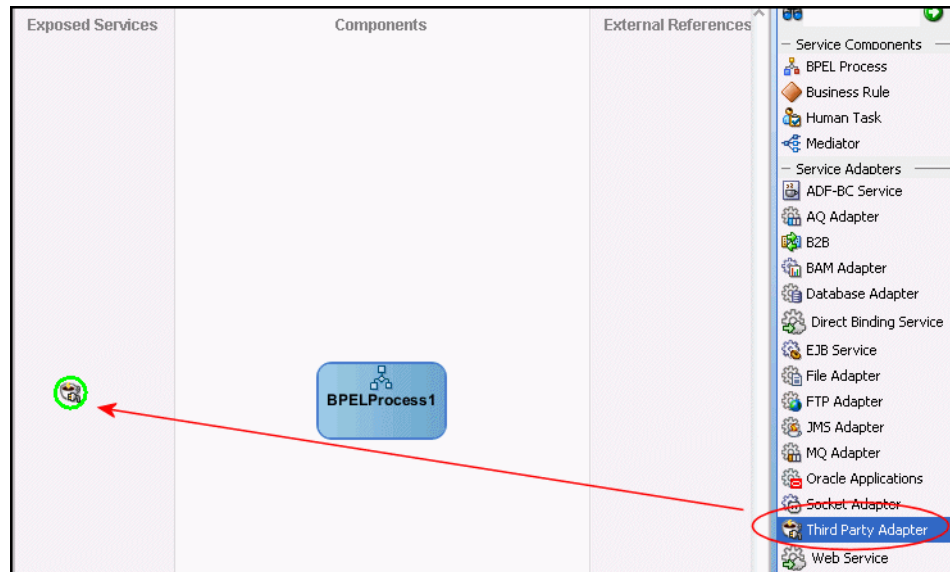
1. From the **Projects** area, on the left side, double-click the `composite.xml`. At the bottom of the visual editor, click the **Design** tab, if necessary. [Figure 5-4](#) shows the Composite view in the visual editor.

Figure 5-4 Composite View



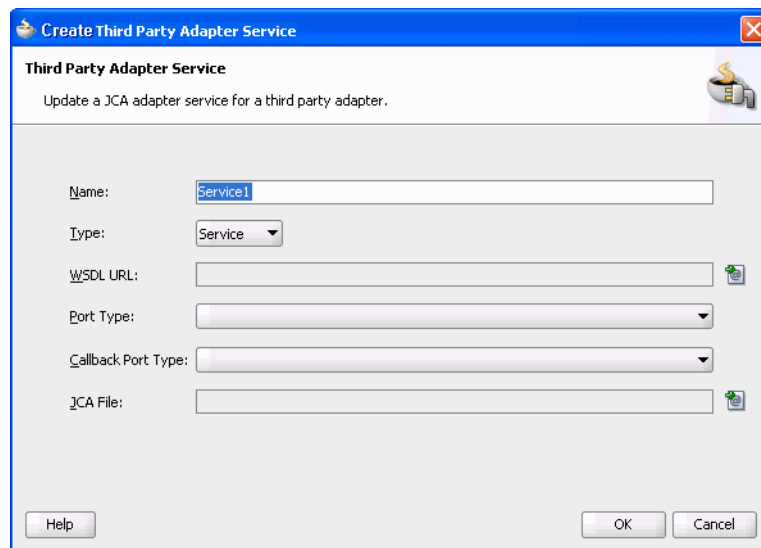
2. Drag a third-party adapter into the **Exposed Services** lane of the visual editor, as shown in [Figure 5-5](#).

Figure 5-5 Third-Party Adapter

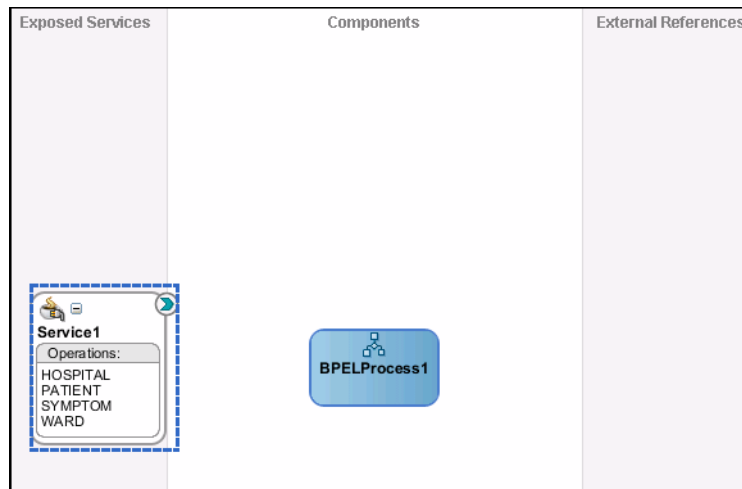


When you drag the third-party adapter into JDeveloper, the Create Third Party Adapter Service screen is displayed as shown in [Figure 5-6](#).

Figure 5-6 Create Third-Party Adapter Service



3. Click the button next to the **WSDL URL** field and browse to the WSDL file you are using.
4. In the **Type** list, select **Service**.
5. Click the button next to the **JCA File** field and browse to the binding file you are using.
6. Click **OK** to close. You should now have a composite design as shown in [Figure 5-7](#).

Figure 5–7 Ready to Create BPEL Process (Composite View)

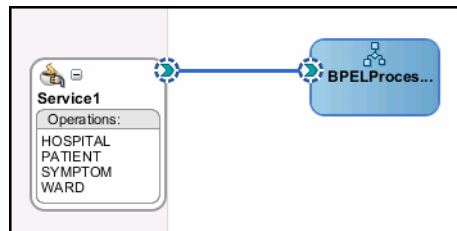
Continue with [Design the BPEL Inbound Process](#).

5.2.1.3 Design the BPEL Inbound Process

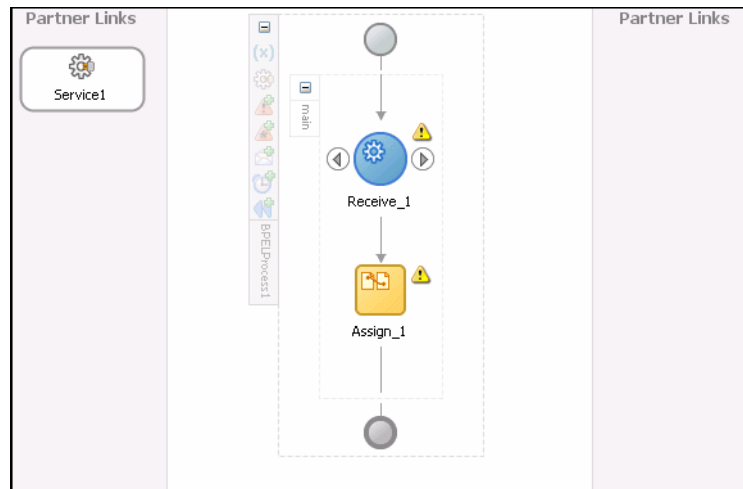
Before you begin to design the inbound process procedure, you may need to configure some activation spec properties in the binding (jca) file. For more information on working with the inbound binding file, see [Configuring the Binding File](#).

Do the following to define the BPEL inbound process.

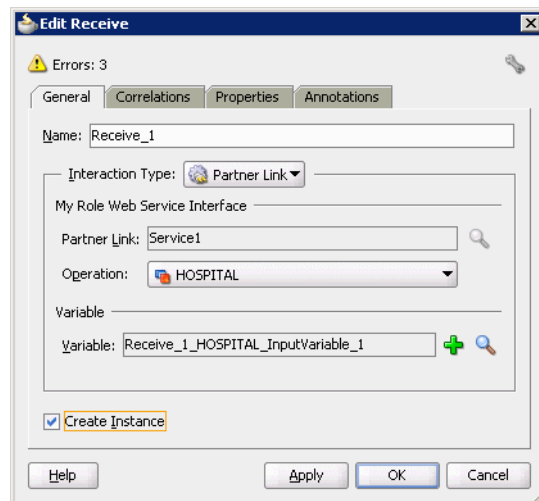
1. In the Composite, connect the BPEL process to the third-party adapter as shown in [Figure 5–8](#).

Figure 5–8 Connect to Third-Party Adapter

2. Double-click the BPEL Process.
3. From the Component Palette, BPEL Process Activities section, drag a Receive and an Assign process into the editor as shown in [Figure 5–9](#).

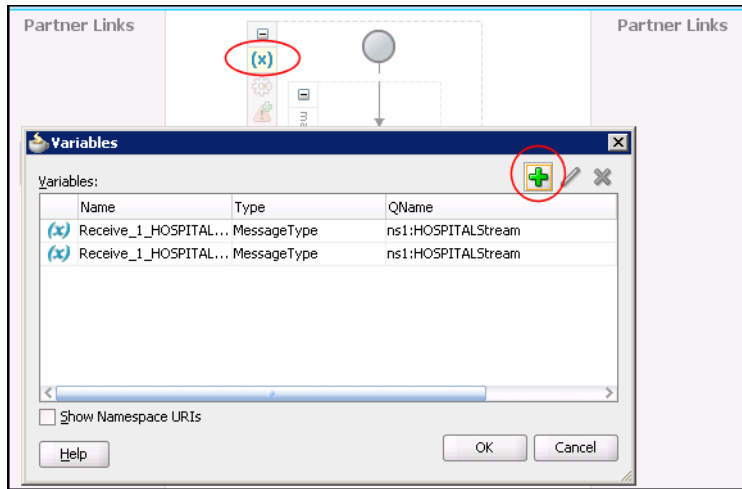
Figure 5–9 Inbound Process

4. In the Visual Editor, connect the Receive activity to the third-party adapter service (*Service1*). The Edit Receive dialog box is displayed as shown in [Figure 5–10](#).

Figure 5–10 Receive Properties

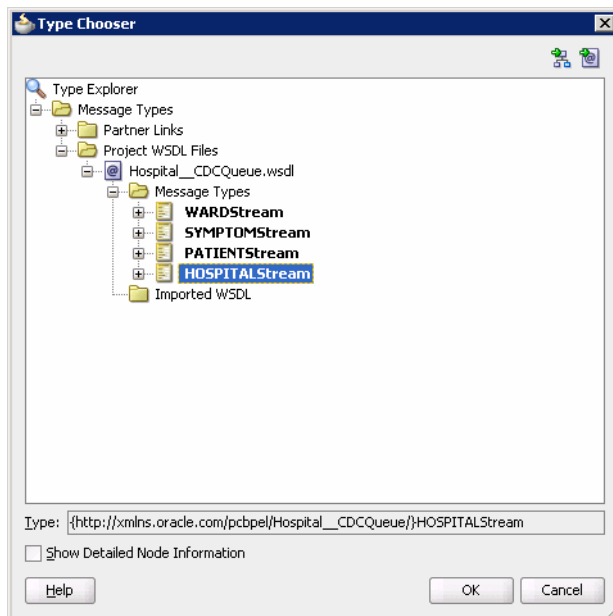
5. Do the following in the Edit Receive dialog box:
 - Create the variable. Click the plus sign to the right of the **Variable** field, then click **OK** in the Create Variable dialog box that is displayed.
 - Make sure that the **Create Instance** check box is selected.
6. Click the (x) in the visual editor as shown in [Figure 5–11](#). The Variables screen is displayed.

Figure 5–11 Add Variable



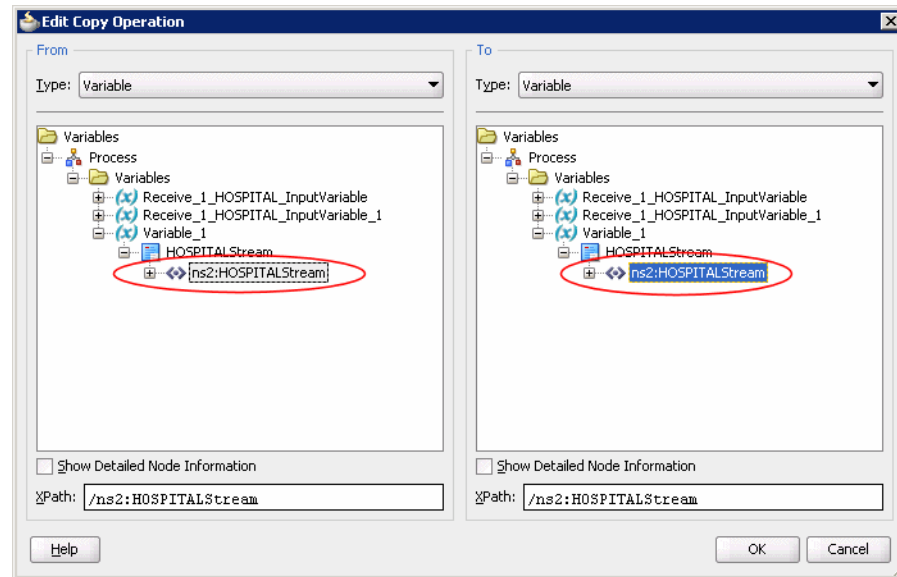
7. In the Variables screen, click the Plus sign to open the Create Variable screen.
8. In the Create Variable screen, select **Message Type**, and then click the icon next to the field to open the Type Chooser.
9. In the Type Chooser, expand the files in the tree until you find the HOSPITALStream under the Message Types folder as shown in [Figure 5–12](#).

Figure 5–12 Type Chooser



10. Double-click the Assign_1 process to open the Assign screen.
11. From the Assign screen, click the plus sign at the top as shown in and select **Copy Operation**. [Figure 5–13](#).

Figure 5–13 Edit Copy Operation



12. From the Create Copy Operation screen, for both the **From** and **To** sides, expand Variable_1, then HOSPITALstream, then select ns2:HOSPITALstream as shown in Figure 5–13.
13. Click **OK** to close the Create Copy Operation screen, then click OK to close the Assign screen and accept the information.
14. [Deploy the Project.](#)

5.2.1.4 Deploy the Project

Perform the following to deploy the project to the Oracle Application Server:

1. From the Application Navigator, right-click the project and find **Deploy** and then select the project you are deploying.
2. From the Deploy wizard, select **Deploy to Application Server**.
3. Continue to click **Next** till the end of the wizard and then click **Finish** to deploy.

5.2.2 Run-time Configuration

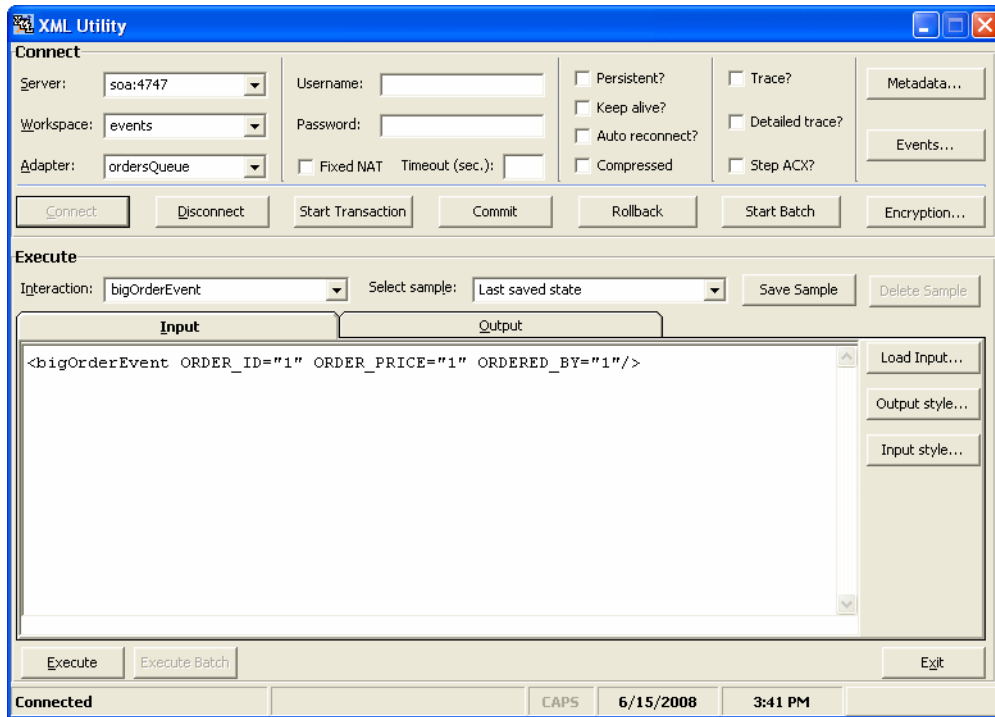
This section describes how to test the project and run it to see that the inbound process is executed successfully. By using the XML utility, you call an event in Oracle Connect that is defined in the file adapter you created. See [Triggering the Event using the XML Utility](#). Because this event is called from Oracle Connect it is an inbound event. Events that originate with SOA services in the OracleAS, it is an outbound event.

5.2.2.1 Triggering the Event using the XML Utility

Use the XML utility to create a SQL statement to trigger the event you are requesting. Do the following to trigger the event.

1. From the Start menu, select **All Programs**, then **Oracle**, then **Server Utilities**, and then **XML Utility**. The XML Utility is displayed.

Figure 5–14 Trigger for Inbound Process



- Enter the following information in the Connect section of the XML utility:
 - Server:** The name of the machine where the OracleAS Adapter for SQL Server is located.
 - Workspace:** The name of the workspace where the OracleAS Adapter for SQL Server is located. A list of available workspaces is shown in the list for this field. The workspaces are defined in Oracle Studio.
 - Adapter:** The name of the OracleAS Adapter for SQL Server. A list of available adapters is shown in the list for this field. The adapters are defined in Oracle Studio.
- Click **Connect** to connect to the selected machine.
- In the **Interaction** field, enter the name of the interaction to call. This is defined in Oracle Studio.
- In the **Input** window, enter a statement to call the interaction. You can see an example in the above figure.
- Click **Execute**. If successful, you get a return similar to the following example:

```
<?xml version="1.0"?>
<bigOrderEvent ORDER_ID="1" ORDERED_BY="1" xmlns="noNamespace://ordersQueue"/>
```

5.3 Mediator Inbound Process

This section describes how to create a Mediator inbound process that connects to a OracleAS CDC Adapter for SQL Server.

You use JDeveloper to configure a process with Mediator. This section describes how to create a Mediator inbound process for CDC resource adapters using JDeveloper. The following topics describe how to create a Mediator inbound process.

- [Beginning Tasks](#)
- [Create a Mediator Inbound Process](#)
- [Use a Third-Party Adapter for the Inbound Process](#)
- [Create a File Adapter](#)
- [Design an Inbound Mediator](#)
- [Create Mapping Rules and Map the Files](#)
- [Deploy the Project](#)

5.3.1 Beginning Tasks

Before you design the inbound process, you must perform the following:

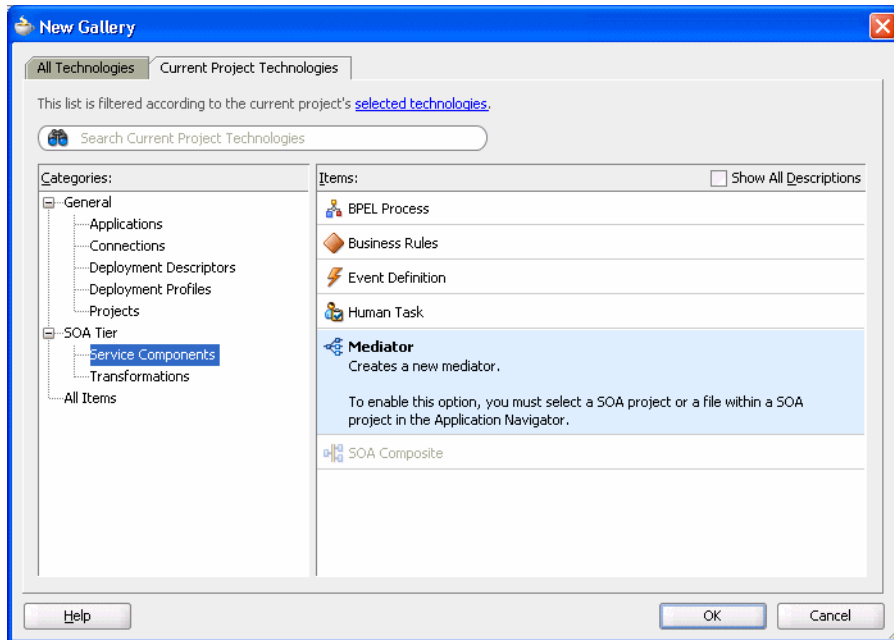
- Integrate the OracleAS CDC Adapter for SQL Server. See [Configuring the SQL Server CDC Adapter In the Application Server](#) for more information.
- Configure the connection for the J2CA CDC resource adapter. You do this by creating a connection factory. See [Configuring the JCA Configuration Files for the OracleAS CDC Adapter for SQL Server](#) for information on how to do this.
- Create the WSDL and binding file for the interaction. You do this in Oracle Studio before you begin to build your endpoint in JDeveloper. Oracle Studio creates the WSDL and binding (jca) files automatically based on the interaction you create. See [Creating JCA Configuration Files](#) for information on creating these files.

5.3.2 Create a Mediator Inbound Process

Perform the following to create an inbound Mediator project.

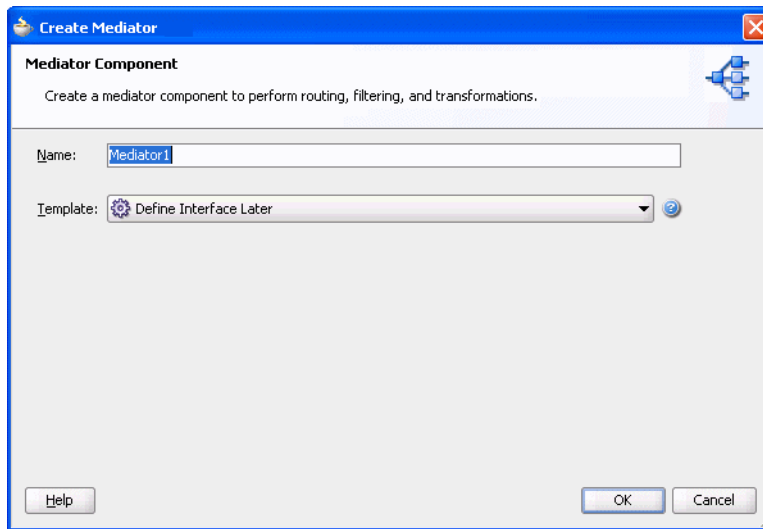
1. In JDeveloper, create a new SOA project
2. Right-click the SOA project and select **New**. The New Gallery is displayed as shown in [Figure 5-15](#).

Figure 5–15 New Gallery



3. In the **Categories** list, expand **SOA Tier** and select **Service Components**.
4. From the **Items** list, select **Mediator** then click **OK**. The Create Mediator screen is displayed as shown in [Figure 5–16](#).

Figure 5–16 Mediator



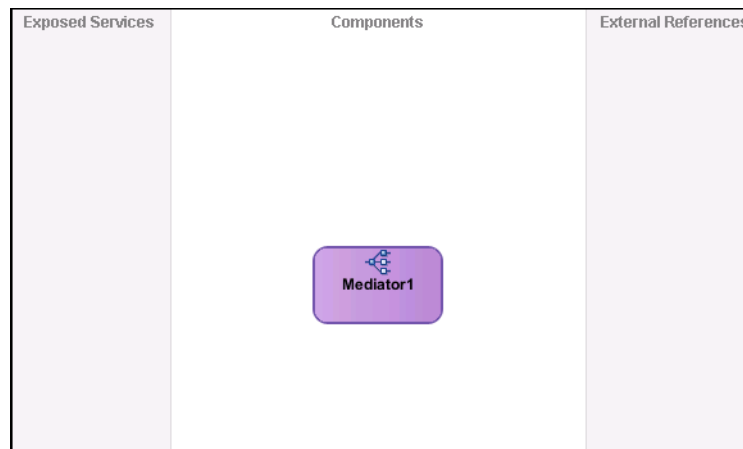
5. Enter the following in the BPEL Process screen:
 - Enter a name for the Mediator process, for example **MedInbound1**.
 - From the Template list, select **Define Service Later**.
6. Click **OK**. The Mediator process is displayed in the visual editor. Continue with [Use a Third-Party Adapter for the Inbound Process](#).

5.3.3 Use a Third-Party Adapter for the Inbound Process

You use a third-party adapter as a partner link to create the inbound Mediator. SOA executes the SQL statement defined in the interaction and passes it to a resource adapter. Perform the following to create the third-party adapter.

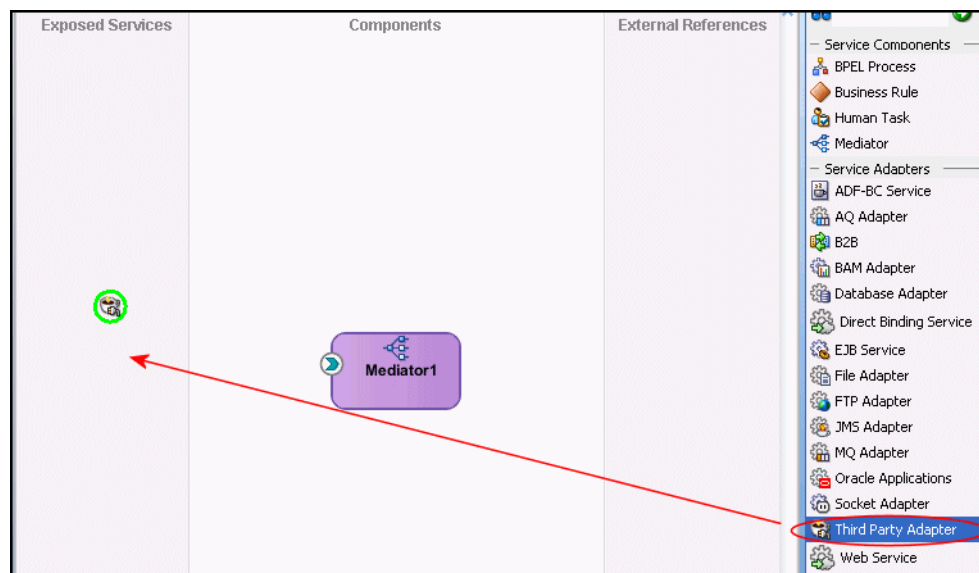
1. From the **Projects** area, on the left side, double-click the `composite.xml`. At the bottom of the visual editor, click the **Design** tab, if necessary. [Figure 5-17](#) shows the Composite view in the visual editor.

Figure 5-17 Composite View



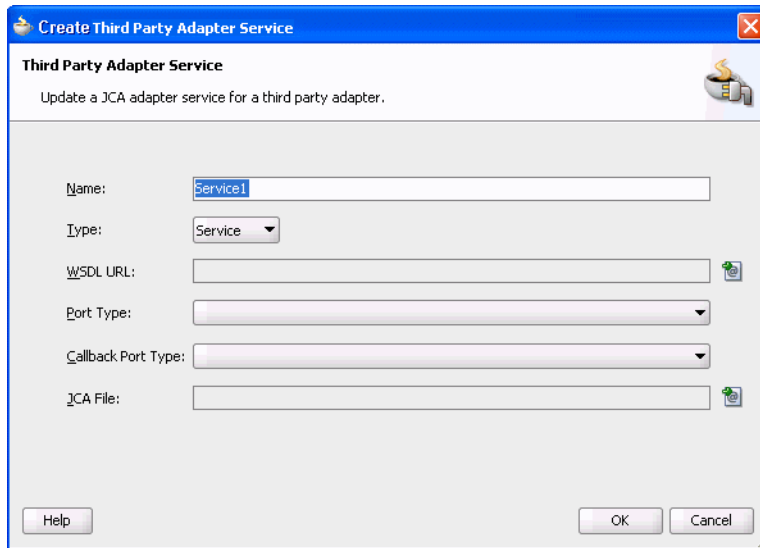
2. Drag a third-party adapter into the **Exposed Services** lane of the visual editor, as shown in [Figure 5-18](#).

Figure 5-18 Third-Party Adapter



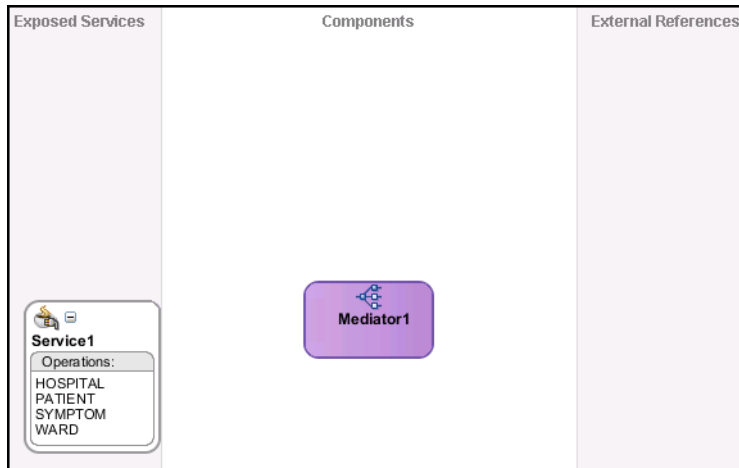
When you drag the third-party adapter into JDeveloper, the Create Third Party Adapter Service screen is displayed as shown in [Figure 5-19](#).

Figure 5–19 Create Third-Party Adapter Service



3. Click the button next to the **WSDL URL** field and browse to the WSDL file you are using.
4. In the **Type** list, select **Service**.
5. Click the button next to the **JCA File** field and browse to the binding file you are using.
6. Click **OK** to close. You should now have a composite design as shown in [Figure 5–20](#).

Figure 5–20 Ready to Create Mediator (Composite View)



Continue with [Create a File Adapter](#).

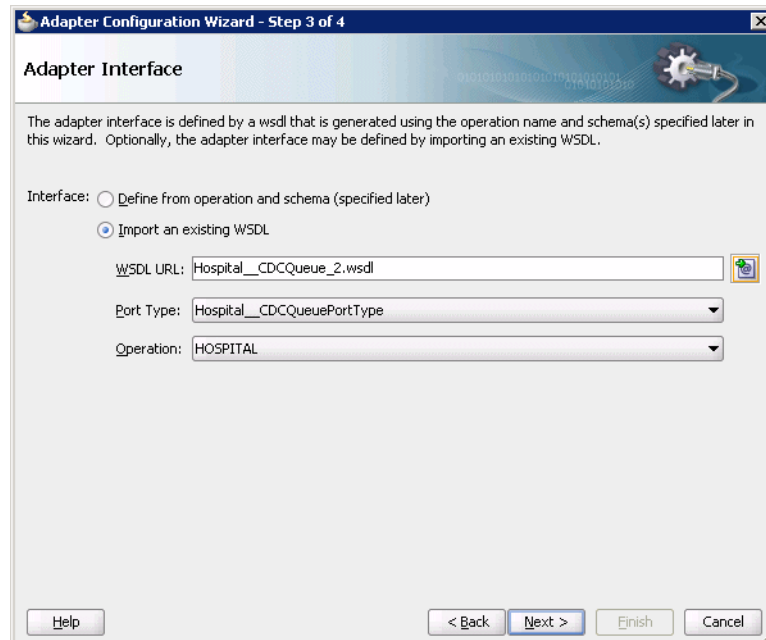
5.3.4 Create a File Adapter

Perform the following to create a file adapter.

1. In the Composite, connect the Mediator to the third-party adapter.

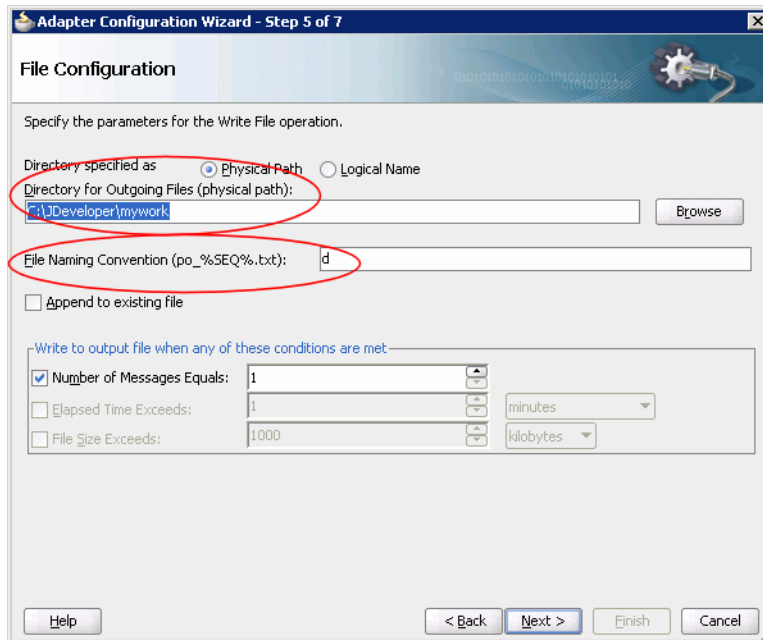
2. From the component pallet, SOA section, on the right, drag a file adapter into the **External References** lane of the visual editor. The Adapter Configuration wizard is displayed.
3. In the first screen of the Adapter Configuration wizard, enter a name for the adapter service, and click **Next**.
4. In the Adapter Interface screen, select **Import an existing WSDL**. Select the same WSDL file as you selected in [Use a Third-Party Adapter for the Inbound Process](#). [Figure 5–21](#) shows the Adapter Interface screen.

Figure 5–21 File Adapter



5. In the Operation screen, select **Write File** as the **Operation Type**.
6. In the File Configuration screen, enter a path to where the files are written, and also enter the file naming convention as shown in [Figure 5–22](#).

Figure 5–22 File Configuration Screen



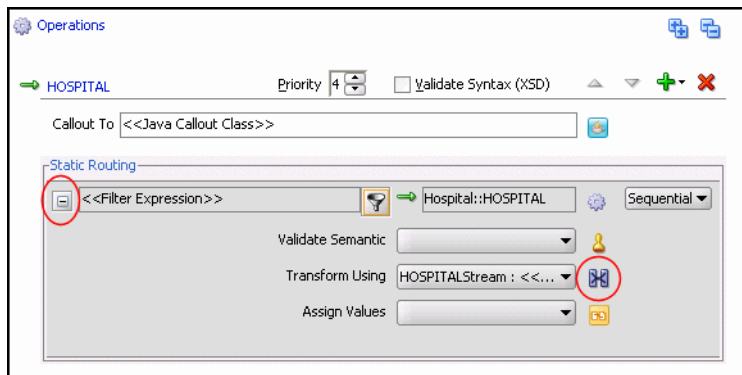
7. Click **Next** to use the default settings for each of the remaining screens in the wizard. When you get to the end click **Finish**.
8. Connect Mediator to the file adapter.
9. In the Choose Operations screen, select the Hospital for both operations. Click **OK**. Continue with [Design an Inbound Mediator](#).

5.3.5 Design an Inbound Mediator

In this step, you design the BPEL process. Perform the following to design the inbound Mediator.

1. In the Composite, double-click the Mediator.
2. Expand the Filter Expression as shown in [Figure 5–23](#).

Figure 5–23 Filter Expression



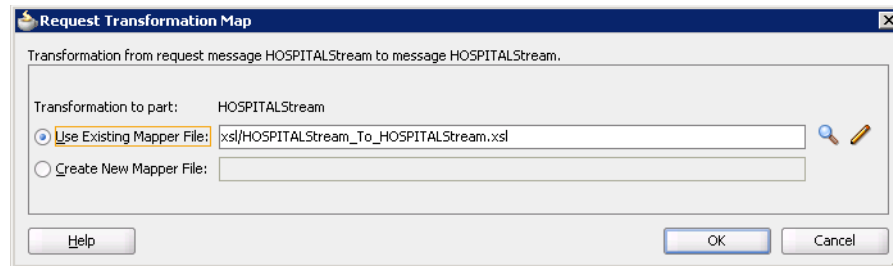
3. Continue with [Create Mapping Rules and Map the Files](#).

5.3.6 Create Mapping Rules and Map the Files

You must perform the following steps to create mapping files and map the files.

1. In the Filter Expression screen, click the icon next to the **Transform using** field as shown in Figure 5-23. The Request Transformation Map screen is displayed as shown in Figure 5-24.

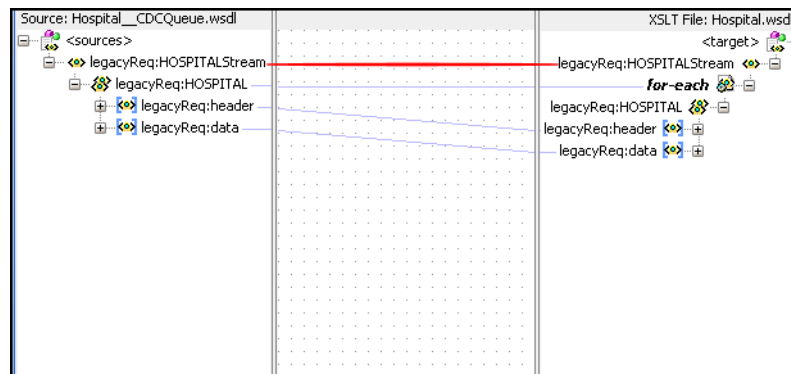
Figure 5-24 Request Transformation Map



2. In the Request Transformation Map, select **Create New Mapper** file. Use the default value.
3. Click **OK**.
4. In the visual editor, click the **HOSPITALStream to HOSPITALStream** tab. This displays the mapper.
5. Connect the `legacyReq:HOSPITALStream` elements. This is shown in red in Figure 5-25. Then expand the nodes to see the connections.

Note: The red line does not appear in JDeveloper.

Figure 5-25 Mapper Screen



6. Save and then [Deploy the Project](#).

5.3.7 Deploy the Project

Perform the following to deploy the project to the Oracle Application Server:

1. From the Application Navigator, right-click the project and find **Deploy** and then select the project you are deploying.
2. From the Deploy wizard, select **Deploy to Application Server**.
3. Continue to click **Next** till the end of the wizard and then click **Finish** to deploy.

Run-time Tasks and Troubleshooting

Run-time tasks are executed after you install and configure the OracleAS CDC Adapter for SQL Server. This chapter describes how to perform basic maintenance tasks, and make changes to CDC solutions. These tasks include:

- [Adding and Removing Tables](#)
- [Handling Metadata Changes](#)
- [Staging Area Maintenance](#)
- [Monitoring the Change Data Capture](#)
- [Daemon Life-Cycle Tasks](#)
- [Resolving Communication Errors](#)
- [Resolving Specific Errors](#)

6.1 Adding and Removing Tables

After you deploy the OracleAS CDC Adapter solution and start working with it, you may want to change the tables that are being monitored. You do this in the CDC Solution perspective of Oracle Studio. The following describes the main steps that you must follow to make changes to the table. During this operation you must go back and change some configurations you made when you set up the OracleAS CDC Adapter solution during design time. Do the following to change tables:

1. From the **Start** menu, select **Start, Programs, Oracle**, and then select **Studio**.
2. From the **Window** menu, click the **Open Perspective** button and select **CDC Solution**.
3. In the Getting Started pane, under Recent projects, click the OracleAS CDC solution that you are changing.

If you do not see the CDC solution you want to edit in the list under Recent projects, click Open an existing project and select your solution from the list in the dialog box that is displayed.

4. Click **Implement**.
5. Under the **Stream Service Configuration** section, click **Stream Service**.
6. In the first screen of the Stream Service wizard, you can change the location of the change files or click **Next** to make changes to the tables to be captured.
7. Select one or more tables from either pane.

- Select a table from the right pane then click the left arrow to move a selected table into the left pane and remove it from the list of tables to be captured.
 - Select a table from the left pane then click the right arrow to move a selected table into the right pane and add it to the list of tables to be captured.
8. Click **Next**, in the screen displayed, clear check boxes from the columns you no longer want to capture. Select check boxes from columns that are not currently included in the change data capture to include them.
 9. Click **Next**, in the screen displayed, clear and select the check boxes to change the filters used in the change data capture.
 10. Click **Next**, in the final screen you can make changes to the auditing configuration.
 11. Click **Finish** to close the wizard and save the changes.
 12. You must re-deploy the solution for the changes to be recognized at run time. For more information, see [Deploying a Change Data Capture](#).

For more information on configuring the Stream Service, see [Set up the Stream Service](#).

Note: When adding a new table, you must create a corresponding endpoint for capturing changes. For more information, see [Creating JCA Configuration Files](#).

6.2 Handling Metadata Changes

When you make changes to the metadata, you must ensure that the solution recognizes the changes and works with them. This section provides you with a procedure to handle the metadata when working with an OracleAS CDC Adapter for SQL Server solution if changes are made after deploying the solution. You should perform these steps at a time when there is little or no activity in the system. If you want to receive new events with a new structure, consume the changes for the table you are updating before carrying out any the steps in this process. Do the following to handle any changes to the metadata:

1. Deactivate the Solution workspaces using the CDC Solution perspective in Oracle Studio.
2. Update the metadata on the back-end database for the table you are working with.
3. Update the metadata in the Staging Area by doing *one* of the following:
 - If you made manual changes to the CDC solution after deployment, or if you do not want to redeploy the solution, then on the Router's (Staging Area) computer, do the following:
 - a. Run Oracle Studio, and open the Design perspective.
 - b. Edit the Metadata for the Router's Data source.
 - c. Expand the table list and edit the metadata for the table.

If you are adding a new column, you must add it to the end of the `COLUMN` list. This operation can also be done using the Source view. Ensure that you select the correct data type.

If you are modifying a data type, you must select the corresponding data type when making the modification.

- d. Save the metadata.

- For cases where you can redeploy the solution:
 - a. Run Oracle Studio, and open the Solution perspective.
 - b. Open the CDC solution project.
 - c. Click **Implement** and then click **Stream Service**.
 - d. Run the wizard.
 - e. Re-deploy the solution, but do not activate it.

For more information, see [Deploying a Change Data Capture](#).

4. Delete the physical files that represent the modified tables from the Staging Area. Do *not* delete the SERVICE_CONTEXT and CONTROL_TABLE files.
5. Reactivate the solution using Oracle Studio. For more information, see [Activating and Deactivating Solution Workspaces](#).

6.3 Staging Area Maintenance

The Staging Area files for the OracleAS CDC Adapter solution are DISAM files that store changes until the client application consumes them. When you delete old changed records they are actually only marked as deleted. New changes continue to be written to the deleted records.

In busy production sites the DISAM files can get very large, which can affect the performance of the system.

To ensure that system performance is not degraded, you should defragment the Staging Area files to better maintain the Staging Area repository. Use the following procedures and suggestions when you perform the defragmentation of the staging area:

- Defragment the DISAM files at least once a week. The frequency can vary depending on the amount of changes in the staging area.
- In addition to defragmenting the staging area files, you should also check for corrupt DISAM files.
- You should perform the maintenance processes when the lowest possible activity in your system occurs.

To defragment and maintain the staging area, use the DCHECK and DPACK DISAM utilities. The DCHECK utility is used to check for corruption of DISAM files and rebuild the bad indexes and the DPACK utility defragments the DISAM files and rebuilds them without the deleted records. This reduces the size of the files and ensures that the DISAM files contain only active and relevant records.

Do the following to perform the maintenance activities:

1. Deactivate the OracleAS CDC Solution with the staging area you working with. For more information, see [Activating and Deactivating Solution Workspaces](#).
2. Run the DCHECK utility on each file to ensure that it is not corrupted. For example, at the command prompt enter the following to check the DIASM file that represents the table called **employees**.

```
dcheck employees
```

If the file is corrupt you can use the `-b` switch to rebuild all indexes.

3. Defragment each file using the DPACK utility. For example, at the command prompt enter the following to defragment the DIASM files that represent the tables called **employees** and **salaries**.

```
dpack employees
dpack salaries
...
```

4. Reactivate all solutions. For more information, see [Activating and Deactivating Solution Workspaces](#).

6.4 Monitoring the Change Data Capture

After you deploy the OracleAS Change Data Capture, you can monitor its progress. Monitoring provides you with information about the OracleAS CDC Adapter 's status, troubleshooting and tuning. This section contains the following topics that explain monitoring in a CDC.

- [Service Context Table](#)
- [Monitoring the Status](#)

6.4.1 Service Context Table

A control table is maintained by the event router that reports its current state and other important statistics. It can be accessed with any tool that supports SQL access.

The control table is called SERVICE_CONTEXT. This table has a single row with the following columns:

Table 6–1 SERVICE_CONTEXT Table Structure

| Column Name | Data Type | Description |
|---------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| context | string (32) | The context value of the last change record in the most recently committed transaction. Use this value to synchronize the retrieval of transactions among different tables. |
| agent_context | string (64) | This is the agent context that the staging area would return to if it were to restart for whatever reason. The agent context value is calculated as follows: <ul style="list-style-type: none"> ■ If there are pending uncommitted transactions, the agent_context value is the agent context of the first event of the oldest uncommitted transaction. ■ If there are no pending uncommitted transactions the agent context of the last event of the most recently committed transaction, prefixed with 'next and indicates that on recovery, the next event after that is to be processed. The staging area maintains an internal agent_context that is more advanced than the one stored in the SERVICE_CONTEXT table. The staging area uses memory to speed up change processing and when stopped it may revert back to an earlier agent context. The amount of extra work depends on the existence of long-running transactions. |
| start_time | timestamp | The time when the staging area started. |
| status | string (16) | Staging area status. For more information, see Monitoring the Status . |
| sub_status | string (64) | A second level status. For more information, see Monitoring the Status . |

Table 6–1 (Cont.) SERVICE_CONTEXT Table Structure

| Column Name | Data Type | Description |
|----------------------------|-------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| status_message | string (80) | Message that is returned that describes the staging area status. |
| status_time | timestamp | The time that the status is updated. |
| completed_transactions | uint4 | Number of transactions processed. |
| active_transactions | uint4 | Number of transactions in progress (in memory, not yet committed or rolled back). |
| timedout_transactions | uint4 | Number of transactions that have timed out (were in memory for too long, declared to have timed out and written to a file). |
| rolledback_transactions | uint4 | Number of rolled back transactions. |
| processed_change_events | uint4 | Number of change events written out. |
| deleted_change_events | uint4 | Number of change events deleted from change table. |
| bytes_written | uint4 | Accumulated size in bytes of change records written. |
| opened_files | uint4 | Current number of physically opened files by the staging area. |
| opened_files_virtual | uint4 | Current number of logically opened files by the staging area. |
| memory_usage | uint4 | Amount of memory currently allocated for staging. |
| node_id | uint4 | A two-digit identifier with the same value as the nodeID config property when in multi-router mode. In regular mode, this column has no value. |
| last_transaction_timestamp | string (26) | The time of the last transaction. |
| Version | uint4 | The version number for the router. |
| errors | uint4 | Total number of errors reported. |
| Reduced_transactions | uint4 | The number of transactions reduced to disc. |
| compensation_records | uint4 | The number of compensation records captured. |

The CONTROL table is also used by the event router to persist its state for purpose of recovery. This table must not be modified by the users.

6.4.2 Monitoring the Status

The following table describes the status for the CDC adapters when they are running. The status is defined as a state in the SERVICE_CONTEXT table. The table describes the different statuses available for a CDC adapter.

Table 6–2 SERVICE_CONTEXT Status States

| State | Sub State | State Details | Description |
|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Active | Processing | <ul style="list-style-type: none"> ▪ Reads the change events ▪ Writes the change events ▪ Reduces the timed-out transaction to disc ▪ Deletes any expired change events | The router is connected to the CDC adapter and is processing or waiting for the change events. |
| | Idle | Waits for new change events | The router's adapter reaches the end of its journal and does not have any new change events. |
| error | router.discWriteError | Detailed error text | This indicates that the change router operation involving writing to disk failed. The most common reason is not enough disk space. Other reasons such as permissions, wrong path, or locking can also cause this. |
| | component.error This error type occurs in adapters and routers. The following are the errors that are returned for this error type: <ul style="list-style-type: none"> ▪ xmlError ▪ requestError ▪ noActiveConnection ▪ resourceLimit ▪ noSuchResource ▪ authenticationError ▪ noSuchInteraction ▪ noSuchConnection ▪ notImplemented ▪ autogenRejected ▪ resourceNotAvailable ▪ authorizationError ▪ configurationError ▪ noSuchStream ▪ temporarilyUnavailable ▪ dataError ▪ interventionRequired | Detailed error text | The prefix <i>component</i> (Adapter/Router) indicates where the error happened. The <i>error</i> in the <i>sub_state</i> column identifies the error. |
| | Disconnected | Detailed error text | This indicates that the change router operation with the CDC adapter failed and cannot be restored. |

Table 6–2 (Cont.) *SERVICE_CONTEXT* Status States

| State | Sub State | State Details | Description |
|--------|-----------|--------------------------------------------------|-----------------------------------------------------------------------------------------------|
| Paused | N/A | | Operator manually paused the change router using the <code>sqlrtr_pause</code> control reset. |
| Down | N/A | Down message (orderly shutdown or abort message) | This indicates that the change router is not running. |

6.5 Daemon Life-Cycle Tasks

Most of the daemon run-time tasks between Oracle Application Server and OracleAS CDC Adapter for SQL Server are carried out using Oracle Studio, which is used to monitor the daemon and server activity and control what happens to the daemon and server processes.

See Also: [Appendix B, "Advanced Tuning of the Daemon"](#) for details about the configuration settings.

This section contains the following topics:

- [Starting the Daemon](#)
- [Shutting Down the Daemon](#)
- [Monitoring the Daemon During Run time](#)
- [Daemon Logs](#)

6.5.1 Starting the Daemon

The daemon is started when OracleAS Adapter for SQL Server is installed. In case you have shut down the daemon, as described in [Shutting Down the Daemon](#), you can restart the daemon as described in the following task.

Note: The daemon is started on the Windows computer where Oracle Connect is installed. It cannot be started remotely using Oracle Studio.

6.5.2 Shutting Down the Daemon

To shut down the daemon use Oracle Studio, as follows:

1. From the **Start** menu, select **Start, Programs, Oracle**, and then select **Studio**.
2. Expand the **Machines** folder.
3. Right-click the computer defined in [Setting Up a Windows Computer in Oracle Studio](#) and select **Open Runtime Perspective**.
4. In the Runtime Explorer, right-click the daemon you want to shut down and select **Shutdown Daemon**.

6.5.3 Monitoring the Daemon During Run time

Use the Run-time Manager perspective of Oracle Studio to monitor the daemon during run time.

Perform the following steps:

1. From the **Start** menu, select **Start, Programs, Oracle**, and then select **Studio**.
2. Right-click the computer defined in [Setting Up a Windows Computer in Oracle Studio](#), and select **Open Runtime Perspective**.

You can manage the daemon by expanding the relevant node, daemon, workspace or server process, as described in the following sections.

6.5.3.1 Daemon (Computer) Options

Right-click the daemon to display the options available for it, including the ability to display the daemon log.

The following table lists the available daemon options:

Table 6–3 Daemon Options

| Option | Description |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Edit Daemon Configuration | Opens the daemon editor, which enables you to reconfigure the daemon. For more information, see Appendix B, "Advanced Tuning of the Daemon" for details about the configuration settings. |
| Status | Checks the status of the daemon. The information about the daemon includes the name of the daemon configuration used, the active client sessions, and logging information. |
| Reload Configuration | Reloads the configuration after any change. Servers currently started are not affected by the changed configuration. For more information, see Appendix B, "Advanced Tuning of the Daemon" for details about the configuration settings. |
| View Log | Displays the daemon log. For more information, see Daemon Logs . |
| View Events | Displays the daemon events log. |
| Daemon Properties | Displays information about the computer where the daemon is running, such as the physical address and any user name and password needed to access the computer. |
| Recycle servers | Closes all unused servers and prepares all active servers to close when the client disconnects. New connection requests are allocated with new servers. |
| Kill servers | Immediately closes all active and unused servers. Note: It is recommended to use this option with caution, as it may lead to data loss. |
| Shutdown Daemon | Shuts down the daemon on the computer. |
| Rename | Enables changing the name of the daemon displayed in the Run-time Explorer. |
| Remove | Removes the daemon from the Runtime Explorer. |
| Refresh | Refreshes the display. |

6.5.3.2 Workspace Options

Right-click a workspace to display the options available for the workspace, including the ability to display the workspace log.

The following table lists the available options:

Table 6–4 Workspace Options

| Option | Description |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Edit Workspace Configuration | Opens the daemon editor to enable you to reconfigure the workspace. For more information, see Appendix B, "Advanced Tuning of the Daemon" for details about the configuration settings. |
| Status | Checks the status of the workspace whether it is available or not. |
| Reload Configuration | Reloads the configuration of the workspace after any change. Servers currently started are not affected by the changed configuration. |
| View Log | Displays the log for all servers for the workspace. For more information, see Daemon Logs |
| View Events | Displays the workspace events log. |
| Recycle Servers | Closes all unused servers and prepares all active servers to close when the client disconnects. New connection requests are allocated with new servers. |
| Kill Servers | Immediately closes all active and unused servers. Note: Use this option with caution, as it may lead to data loss. |
| Remove | Removes the selected workspace from the Runtime Explorer. |
| Disable | Disables the selected workspace. |
| Refresh | Refreshes the display. |

6.5.3.3 Server Options

Right-click a server to display the options available for the server, including the ability to display the server log.

The options available at the server level are listed in the following table:

Table 6–5 Server Options

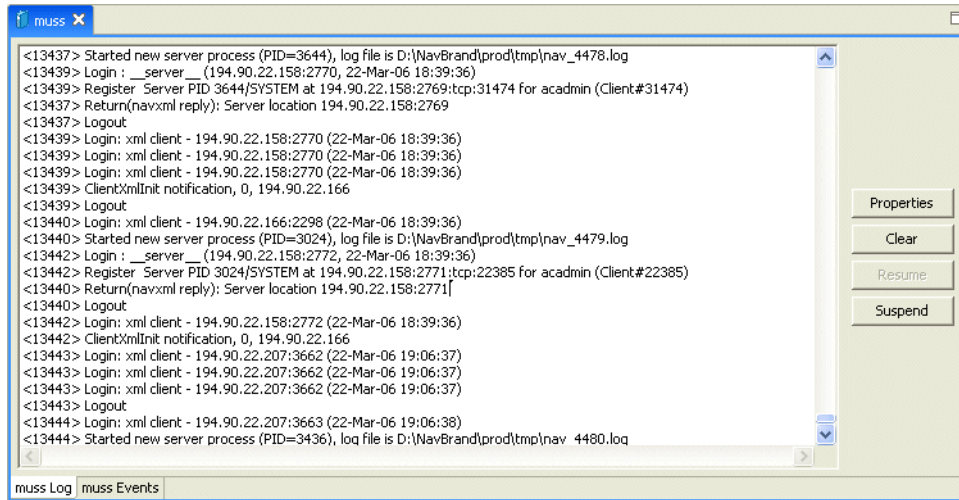
| Option | Description |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| Status | Checks the status of the server. The information about the server includes the server mode and the number of active client sessions for the server. |
| View Log | Displays the server log. For more information, see Daemon Logs . |
| View Events | Displays the server events log. |
| Kill server | Ends the server process, regardless of its activity status. Note: Use this option with caution, as it may lead to data loss. |
| Refresh | Refreshes the display. |

6.5.4 Daemon Logs

Oracle Connect produces many logs that you can use to troubleshoot problems. The daemon manages the following logs:

- Daemon
- Workspace
- Server process

The Runtime Manager perspective of Oracle Studio provides a monitor for these logs as shown in the following figure:



To display the required log, do the following:

1. In Oracle Studio, Runtime perspective, right-click, expand the Daemons folder
 If you want to view the workspace log, then expand the daemon with the workspace you want to view.
 If you want to view the server, right-click the workspace with the server you want to view.
2. Right click the daemon, workspace, or server and select **View Log**.

Each log is displayed in a different tab. You can browse the different logs by clicking the tab at the bottom of the screen.

6.5.4.1 The Log Monitor

The logs display daemon, workspace, or server events as they happen. You can view the following types of logs in the monitor:

Daemon logs: Display activity between clients and the daemon, including clients logging in and logging out from the daemon.

Workspace logs: Display information about the workspace being used by the client.

Server logs: Display activity between clients and the server process used by that client ot handle the client request.

You can change the logging level. To change the logging level, click **Properties**. The following levels of logging are available in the dialog box:

- **none:** The log displays users that log in and out.
- **error:** The log displays users that log in and out and any errors that are generated.
- **debug:** The log displays users that log in and out, any errors that are generated, and any tracing that was configured. For information on configuring the tracing options, see daemon [Logging](#) and workspace [General](#).

You can start and stop the logging display.

- Click **Suspend** to stop collecting logging information.
- Click **Resume** to start collecting logging information.

You can remove the information displayed in the log.

To remove the information, click **Clear**.

If logging is enabled, new information is continuously displayed. The cleared information cannot be viewed again.

6.6 Resolving Communication Errors

When Oracle Studio disconnects from the Windows computer that you are working with, the computer is displayed in Oracle Studio with an X in a red circle. If this situation occurs, try to access the computer later.

The following table describes the various scenarios that may exist when Oracle Application Server disconnects from the server.

Table 6–6 Scenarios When a Client Is Disconnected

| Scenario | Idle (Not Processing a Client Request) | Processing a Client Request |
|------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Explicit Disconnect (client explicitly closes connection or client program terminates) | The server is immediately notified of the disconnect and either becomes available for use by another client or terminates (if it is not reusable). | The server does not know that the client has disconnected and continues processing. When processing completes, the server tries to reply to the client and immediately gets an error that the connection was lost. The server either becomes available for use by another client or terminates (if it is not reusable). |
| Abrupt Disconnect (client closed without proper shutdown or client system hanged and communication disconnected) | The server does not know that the client has disconnected and remains in the idle state. After timing out based on whichever comes first of the value for the client idle timeout daemon workspace parameter or the TCP/IP <code>KEEPALIVE</code> parameter, the server is notified of the disconnect and either becomes available for use by another client or terminates (if it is not reusable). | The server does not know that the client has disconnected and continues processing. When processing completes, the server tries to reply to the client. After an interval (typically several minutes, depending on the TCP/IP configuration), during which the TCP/IP subsystem retries sending the message to the client, the server assumes that the client has terminated and notifies the server that the connection has been closed. The server either becomes available for use by another client or terminates (if it is not reusable). |

To troubleshoot client/server communication problems, you must be familiar with the following:

- Daemon configuration settings
- Oracle Connect security
- TCP/IP subsystem. Oracle Application Server Adapter for SQL Server uses TPC/IP for internal intercomputer communications.
- System details, such as the account name and password of the administrator account, the IP address of the computers involved and whether a portmapper is being used.

6.7 Resolving Specific Errors

The following error messages relate to errors received from Oracle Connect.

C007: Server initialization failed.

Cause: The daemon failed to start its network service.

Action: Check the processes being run on the system to see whether another daemon or program is using the port specified in the oc4j-ra-xml file for the adapter.

Action: Check the TCP/IP subsystem on the current computer by trying to ping it or run FTP or Telnet to or from it.

Action: Check whether the daemon has privileges to use the TCP/IP services on the current computer with the port specified in the oc4j-ra-xml file for the adapter.

C008: Setting server event handler failed.

Cause: Internal error.

Action: Contact Oracle Support Services.

C009: IRPCD process has been terminated by user request.

Cause: This message is informational only. The daemon successfully shut down.

Action: No action required.

C00A: Application %s not found.

Cause: The requested workspace does not exist.

Action: Check that the workspace defined in the oc4j-ra-xml file is also defined in the daemon configuration on the Windows computer. Use the Status option in the Runtime Manager perspective.

C00B: Invalid IRPCD client context.

Cause: A non-Oracle Connect program is trying to connect to the daemon.

Action: Check the processes and stop the relevant process with a system command.

C00C: Daemon request requires a server login.

Cause: A non-Oracle Connect server or program was trying to use a daemon service reserved for Oracle Connect servers.

Action: Check the processes and stop the relevant process with a system command.

C00D: Daemon request requires a client login.

Cause: The requested daemon requires a valid client login, which was not supplied.

Action: Reissue the command and specify a user name and password.

Action: Edit the user profile in Oracle Studio to specify a valid user name and password for the Windows computer with Oracle Connect.

See Also: [Setting Up a Windows Computer in Oracle Studio.](#)

C00E: Daemon request requires an administrator login.

Cause: The requested daemon service requires an administrative login.

Action: Edit the daemon security in Oracle Studio to specify a valid administrator user name and password.

See Also: Daemon [Security](#).

C00F: Anonymous client logins are not allowed.

Cause: The daemon is configured to require a valid user name and password, which were not supplied.

Action: Enable anonymous client access in daemon security in Oracle Studio.

See Also: Daemon [Security](#).

Action: Edit the user profile in Oracle Studio to specify a valid user name and password for the Windows computer with Oracle Connect.

See Also: [Setting Up a Windows Computer in Oracle Studio](#).

C010: Anonymous server logins are not allowed.

Cause: Internal error.

Action: Contact Oracle Support Services.

C011: Client has already timed out.

Cause: A server process was started on behalf of a client and the client has timed out before the server completed its startup.

Action: Increase the Connect timeout value for the server workspace in the General tab of the workspace configuration.

See Also: Workspace [General](#).

C012: Invalid username/password.

Cause: Invalid user name/password supplied when logging on to the daemon.

Action: See the daemon log file because the user name/password were not accepted.

Action: Edit the user profile in Oracle Studio to specify a valid user name and password for the Windows computer with Oracle Connect.

See Also: [Setting Up Run-Time User Access](#).

Action: Ensure that the daemon is started from an APF-authorized account that is allowed to check for system user names and passwords.

C014: Client connection limit reached - try later.

Cause: The maximum number of server processes for the workspace has been reached, and none of the active servers could accept the client connection.

Action: Increase the value of the **Number of sub-tasks** in the Server Mode section of the workspace configuration.

See Also: Workspace [Server Mode](#).

Action: Try running the command later.

C015: Failed to start server process.

Cause: The Oracle Connect daemon failed to start a server process or the started server failed upon starting up.

Action: See the daemon and server logs for the reason the server did not start. For example, you might receive a message with a reason specified in the log file similar to the following: [C015] Failed to start NAVIGATOR server process: No server account name defined for anonymous client; code: -1601: SQL code: 0

Action: If you use impersonation, check the user profile on the client. Also see C069.

To set impersonation: APF authorize all the steplibs in the server script on a z/OS computer. For example:

```
setprog... ada622-volume adavol
CICS.CICS.SDFHEXCI - p390dx
INSTROOT.load - 111111
INSTROOT.loadaut - 111111
```

INSTROOT is the high level qualifier where Oracle Connect is installed.

In the **Security** tab of the Navigator workspace, under the daemon node in the Configuration view, select **Use specific workspace account** and clear the **Workspace account** field of all values.

C016: Unexpected server state.

Cause: Internal error.

Action: Contact Oracle Support Services.

C017: Active daemon clients exist. Shutdown canceled.

Cause: One or more clients are still connected to the daemon.

Action: Wait until all the clients log off the daemon and then retry the shutdown operation.

C019: Request is not granted because someone else is locking it.

Cause: A request to lock a resource managed by the daemon was denied because another user has locked the resource.

Action: Wait for the other user to release the resource.

C01A: Lock %s not found.

Cause: A request to free a resource was denied because the caller did not lock that resource (for example, another user shut down the daemon you are working with).

Action: Contact Oracle Support Services.

C01B: Unexpected error in %s.

Cause: Internal error.

Action: Contact Oracle Support Services.

C01C: Cannot update configuration without _APPLICATIONS lock.

Cause: Internal error.

Action: Contact Oracle Support Services.

C01D: Need to lock the application first.

Cause: Internal error.

Action: Contact Oracle Support Services.

C01F: Cannot set configuration of a deleted application.

Cause: Internal error.

Action: Contact Oracle Support Services.

C020: Failed in looking up host name (gethostname())

Cause: Cannot connect to the remote computer.

Action: Check that the name specified for the computer in the oc4j-ra-xml file is correct.

Action: Check that a domain name server (DNS) is available to look up the host name.

Action: Check the TCP/IP subsystem on the computer by trying to ping it or run FTP or Telnet to or from it.

C021: Required variable %s not found

Cause: An environment variable required by the Oracle Connect server was not defined when the server started up.

Action: Check whether the startup script makes any changes to the environment variables used by Oracle Connect.

Action: Check whether the system-defined environment size is sufficiently large for Oracle Connect.

C022: Server failed to connect and register with the daemon.

Cause: An Oracle Connect server started by the daemon was not able to connect or register back with the daemon.

Action: Try to connect again.

Action: Increase the Connect timeout value for the server workspace in the General tab of the workspace configuration.

See Also: Workspace [General](#).

Action: Check that the startup script for the workspace launches the correct version of Oracle Connect.

Action: Increase the value of the **Set maximum number of server processes** parameter for the Clients per server limit in the Server Mode tab of the workspace configuration.

See Also: Workspace [Server Mode](#).

C023: Call made to unregistered module %d.

Cause: Internal error.

Action: Contact Oracle Support Services.

C024: Failed to create a socket.

Cause: An error occurred within the TCP/IP subsystem.

Action: Check whether you have sufficient system privileges.

Action: Check the TCP/IP subsystem on the computer by trying to ping it or run FTP or Telnet to or from it.

C025: Failed to set socket option %s

Cause: An error occurred within the TCP/IP subsystem.

Action: Check whether you have sufficient system privileges.

Action: Check the TCP/IP subsystem on the computer by trying to ping it or run FTP or Telnet to or from it.

C026: Failed to bind server to port %s

Cause: An Oracle Connect server or daemon was not able to bind to the specified port.

Action: Check whether another program is holding the port that was specified in the oc4j-ra-xml file for the adapter.

Action: Check whether you have sufficient system privileges.

C027: Cannot create TCP service for %s

Cause: An error occurred within the TCP/IP subsystem

Action: Check the TCP/IP subsystem on the computer by trying to ping it or run FTP or Telnet to or from it.

C028: Unable to register (%s, %d, tcp)

Cause: This error may happen when a portmapper is used (*host:a*) but the portmapper is not available.

Action: Enable the portmapper.

Action: Avoid using the portmapper (by not using *:a* when starting the daemon).

C029: Failed to create a server thread

Cause: Internal error.

Action: Contact Oracle Support Services.

C02A: Server thread failed to start

Cause: Internal error.

Action: Contact Oracle Support Services.

C02B: Stopping the %s server - no client

Cause: A server that was started by the Oracle Connect daemon to service a client did not get a client connection request within one minute. The server terminates.

Action: In most cases, the client was terminated by a user request, so no specific action is required.

Action: If no client can connect to the server, it may be that the server has multiple network cards and the Oracle Connect daemon is not aware of this. In this case, start the daemon with an IP address.

C02C: Unexpected event - a termination signal intercepted

Cause: Internal error.

Action: Contact Oracle Support Services.

C02D: Modified transport, context unknown/lost

Cause: Internal error.

Action: Contact Oracle Support Services.

C02F: Corrupted arguments passed to procedure

Cause: Internal error.

Action: Contact Oracle Support Services.

C030: Unable to free arguments for %s() of %s

Cause: Internal error.

Action: Contact Oracle Support Services.

C031: Cannot register a non-module RPC %s

Cause: Internal error.

Action: Contact Oracle Support Services.

C032: An IRPCD program is required

Cause: Internal error.

Action: Contact Oracle Support Services.

C033: An IRPCD super-server is required for module events

Cause: Internal error.

Action: Contact Oracle Support Services.

C034: An invalid super-server module ID was specified, %d

Cause: Internal error.

Action: Contact Oracle Support Services.

C035: Out of memory

Cause: Not enough memory to service a client request.

Action: Increase process memory quota or add memory to the system.

C036: Failed to register RPC procedure module %s

Cause: Internal error.

Action: Contact Oracle Support Services.

C037: Failed to register an invalid RPC procedure number %x

Cause: Internal error.

Action: Contact Oracle Support Services.

C038: Cannot reregister RPC procedure number %x

Cause: Internal error.

Action: Contact Oracle Support Services.

C042: Remote call to %s failed; %s

Cause: Remote call to API failed.

Action: Check the daemon log file.

Action: If necessary, change the level of detail written to the log file to help resolve the problem.

See Also: Daemon [Logging](#).

C043: Failed to connect to host %s;%s

Cause: The remote host is not correctly defined to Oracle Connect or is not working.

Action: Check the remote computer definition in the oc4j-ra-xml file for the adapter.

Action: Check that the daemon is up on the Windows computer with Oracle Connect. Use the Status option in the Runtime Manager perspective.

Action: Check the network connection by trying to ping the host computer or run FTP or Telnet to or from it.

C047: %s out of memory

Cause: Not enough memory was available to Oracle Connect to complete a requested operation.

Action: Terminate unnecessary processes running on the server.

Action: Add more memory to the system.

Action: Allow the process to use more memory.

Action: Limit the number of processes the daemon may start. If the demand for servers exceeds the number of available servers, clients get a message telling them the maximum number of servers has been reached and asking them to try again later.

C066: Communication error with the server%s

Cause: Connection to the Oracle Connect daemon or server failed, or an established session with a server has failed.

Action: Check the remote computer definition in the weblogic-ra-xml file.

Action: Check that the daemon is up on the Windows computer with Oracle Connect. Use the Status option in the Runtime Manager perspective.

Action: In case of a network problem, check the network connection by trying to ping the host computer or run ftp or telnet to or from it.

C067: Unexpected error occurred in server function %s

Cause: One of the server functions has exited with an exception (such as an abend, or an Invalid Instruction).

Action: Contact Oracle Support Services.

C068: Fail to login daemon

Cause: The daemon is not running on the server computer.

Action: Use the Status in Oracle Studio Runtime Manager perspective to check whether a daemon is running on the server

Action: Have the system administrator reinstall Oracle Connect on the server.

C069: Fail to get server

Cause: The Oracle Connect daemon on the server computer could not start a server process to serve the client. A separate message provides more detail on why the server process could not start.

Action: There are many possible causes of this error. If the cause is not clear from the related message, see the Oracle Connect daemon log file on the server

Action: The resolution to this error is highly dependent on the particular cause. The following are some typical causes and resolutions.

Action: Some process creation quota was exceeded. Either try again later or increase the quota or the other relevant system resources.

Action: The server startup script failed.

Action: The user name given is not allowed to use the requested server. Use an authorized user name.

Action: A limit on concurrent clients for a server has been reached. Try again later.

Action: If you use impersonation, check the user profile on the client. Also see C015.

C06A: Failed to connect to server

Cause: The server assigned to the client did not accept the client connection. A separate message provides more detail about why the server process did not accept the connection.

Action: See the daemon and server log files because the server was not available to accept its assigned client.

C06B: Disconnecting from server

Cause: A network failure, or a server computer failure or a server program failure caused the connection to end. The currently active transaction is also stopped.

Action: Oracle Connect automatically tries to reestablish a connection with a server upon the next SQL command issued against the server. Once the network or computer failure is corrected, the connection to the daemon is reestablished automatically.

C070: Server failed to send reply to the client

Cause: Server terminated unexpectedly.

Action: Unless the client was intentionally stopped (for example, using Control-C), contact Oracle Support Services.

C071: Connection to server %s was disconnected. Cursors state was lost.

Cause: Either a network failure, a server computer failure or a server program failure caused the connection to end. The currently active transaction is also stopped.

Action: Normally, Oracle Connect automatically tries to create a session with the server upon the next attempt to access the server. If the network and server are accessible, the next operation should succeed. Otherwise, the network or server computer should be fixed before connection can be resumed.

Action: In case of a server failure not related to callable user code, contact Oracle Support Services.

C072: Reconnect to server %s

Cause: This is an informational message only. The client has reestablished its connection with the server.

Action: No action is required.

C073: The parameters passed to the admin server are invalid: %s

Cause: Internal error.

Action: Contact Oracle Support Services.

C074: No authorization to perform the requested operation (%s)

Cause: User/account has insufficient privileges.

Action: Grant administrative privileges to the user/account using the Administrator parameter of the Security tabs in the daemon and workspace configurations.

See Also: [Damon Security](#) or [Workspace Security](#).

C075: Failed to register daemon in the TCP/IP service table

Cause: Registration of the daemon in the TCP/IP services file has failed.

Action: Check that the account running the daemon has the permissions to update the TCP/IP services file.

E001: Failed in lock/release operation

Cause: A lock or release operation of a global resource has failed. A separate message provides more details. The separate message specifies the cause of this error.

Action: There are various causes for this error, including lack of sufficient privileges or a system resource shortage.

J0006: Operation on already closed connection was requested

Cause: A request using a connection that was closed was attempted.

Action: Reopen the connection and try again.

J0028: Internal Error: Unknown XML tag %s

Cause: Internal error.

Action: Contact Oracle Support Services.

J0030: Internal Error: Method %s needs to be overwritten

Cause: Internal error.

Action: Contact Oracle Support Services.

J0031: Internal Error: Required attribute %s not found in %s verb

Cause: Internal error.

Action: Contact Oracle Support Services.

J0032: Internal Error: %s ACP object was returned instead of %s as expected

Cause: Internal error.

Action: Contact Oracle Support Services.

J0033: Internal Error: Attempt to work with closed socket

Cause: Internal error.

Action: Contact Oracle Support Services.

J0034: Internal Error: corrupted message; %s bytes read instead of %s as expected

Cause: XML sent from the client to the server has become corrupted.

Action: Check compression settings for XML transferred from the client to the server. If the settings are OK, retry sending the request from the client to the server.

J0035: Internal Error: Invalid redirection address %s returned by daemon

Cause: Internal error.

Action: Contact Oracle Support Services.

J0036: %s: %s

Cause: One of the following errors was received from the server: 0 - server.internalError, 1 - client.xmlError, 2 - client.requestError, 3 - client.noActiveConnection, 4 - server.resourceLimit, 5 - server.redirect, 6 - client.noSuchResource, 7 - client.authenticationError, 8 - client.noSuchInteraction, 9 - client.noSuchConnection, 10 - server.notImplemented, 11 - server.xaProtocolError, 12 - server.xaUnknownXID, 13 - server.xaDuplicateXID, 14 - server.xaInvalidArgument, 15 - client.autogenRejected, 16 - server.xaTransactionTooFresh, 17 - server.resourceNotAvailable, 18 - client.authorizationError, 19 - server.configurationError

Action: Review the server log file to determine the problem.

J0037: Internal Error: No ACP response when %s was expected

Cause: Internal error.

Action: Contact Oracle Support Services.

J0039: Internal Error: ACP root is not found in the XML

Cause: Internal error.

Action: Contact Oracle Support Services.

J0040: Internal Error: Input record is required for interaction %s execution

Cause: Internal error.

Action: Contact Oracle Support Services.

J0048: Invalid metadata type %s is passed to %s function

Cause: A request for metadata was not fulfilled.

Action: Check the validity of the request.

J0050: Key of the put method must be of type string

Cause: In either a GET or PUT operation, the key must be a string.

Action: Change the key used in the operation to a valid key.

J0059: Value %s is invalid for attribute %s

Cause: A request for metadata was not fulfilled.

Action: Check the validity of the request.

J0068: Value must be of type string

Cause: In a PUT operation, the value must be a string.

Action: Change the value used in the operation to a valid value.

J0069: Value must be of type MappedRecord

Cause: In a PUT operation, the value must be a mapped record.

Action: Change the value used in the operation to a valid value.

J0070: Value must be of type MappedRecord[]

Cause: In a PUT operation, the value must be mapped record array.

Action: Change the value used in the operation to a valid value.

J0071: Bad key for mapped record, #element or #element[] is required

Cause: In a PUT operation, the value must be mapped record array.

Action: Change the key used in the record to a valid key.

J0072: Value must be of type Object[]

Cause: In a PUT operation, the value must be mapped record array.

Action: Change the value used in the operation to a valid value.

J0078: In nonpersistent connection and the nonkeep alive encryption is not supported - ignored

Cause: Encryption is not supported for nonpersistent connections.

Action: There is no action to take. This warning can be ignored.

J0079: Invalid argument passed to %s - Argument: %s, Value: %s

Cause: The value pass.

Action: Change the argument used to a number.

Advanced Features of OracleAS CDC Adapter for SQL Server

Oracle Connect includes several tuning parameters that can improve performance. Specifically, the daemon can be configured to optimize communication between the Windows operating system and a client.

In addition, the binding environment can be tuned to optimize the request handling.

This chapter contains the following topics:

- [Configuring the Daemon for High Availability](#)
- [Configuring a Binding Environment](#)
- [Migration Considerations](#)
- [Security Considerations](#)
- [Transaction Support](#)

7.1 Configuring the Daemon for High Availability

The daemon workspace is responsible for allocating server processes to clients. You can configure a workspace to use a pool of server processes so that a server process is always available for a client request.

Use Oracle Studio to maintain daemon and daemon workspace parameters to control the allocation of server processes and their management in a pool.

You can also have several daemon workspace configurations. This lets you create individual workspaces for use with different adapters or CDC adapters.

7.1.1 Adding a New Daemon Workspace Configuration

Use Oracle Studio to add a new daemon configuration. You can set up different daemon configurations for different situations.

Carry out the following steps to add a new daemon workspace configuration:

1. From the **Start** menu, select **Programs, Oracle**, and then select **Studio**.
2. In the Design Perspective Configuration view, expand the **Machines** folder and then expand the machine where you want to add the workspace.
3. Expand the **Daemons** folder. The daemon available on this computer are listed.
4. Right-click **IRPCD** and select **New Workspace**. The New Daemon Workspace screen is displayed.

5. Enter a name for the new workspace and then enter a description, if desired.
6. Select whether to use default settings or copy the properties of an existing workspace.
To copy the properties of an existing workspace, click the Browse button and select the workspace from which you want to copy the properties.
7. Click **Next**. The Select Scenario screen is displayed.
8. Select **Application Server using connection pooling** and click **Next**.
9. Continue through the wizard, entering the required values for the workspace.
10. Click **Finish**.

The workspace is displayed under the **IRPCD** daemon node.

7.1.2 Editing the Workspace

You edit a workspace by using the tabs described in the following table:

Table 7–1 Workspace Properties tabs

| Tab | Description |
|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| General | Specifies general information including the server type, the command procedure used to start the workspace, the binding configuration associated with this workspace (which dictates the data sources and applications that can be accessed) the timeout parameters, and logging information (which dictates the data sources and applications that can be accessed), the timeout parameters, and logging information. |
| Server Mode | Contains the workspace server information including features that control the operation of the servers started up by the workspace and allocated to clients. |
| Security | Specifies administration privileges, user access, ports available to access the workspace and workspace account specifications. |

Use Oracle Studio to access these tabs, as follows:

1. From the **Start** menu, select **Programs, Oracle**, and then select **Studio**.
2. In the Design perspective Configuration view, expand the **Machines** folder and then expand the machine where you want to edit the workspace.
3. Expand the **Daemons** folder. The daemon available on this computer are listed.
4. Expand the **IRPCD** daemon. The daemon workspaces are listed.
5. Right-click the workspace you are editing and select **Open**.
6. Click the tab that contains the information you want to edit. For more information about the tabs and the fields in these tabs, see [Workspaces](#).
7. After editing the workspace, click **Save**.

7.1.3 Configuring the Server Mode

The server mode defines how the daemon starts new processes. The daemon supports the following server modes:

- **singleClient:** Each client receives a dedicated server process. The account in which a server process runs is determined either by the client login information or by the specific server workspace.

This mode enables servers to run under a particular user account and isolates clients from each other (because each receives its own process). However, this server mode incurs a high overhead due to process startup times and may use a lot of server resources (because it requires as many server processes as concurrent clients).

- **multiClient:** Clients share a server process and are processed serially. This mode has low overhead because the server processes are initialized. However, because clients share the same process, they may impact one another, especially if they issue lengthy queries.

The number of clients that share a process is determined by the Clients per server limit (the maximum number of concurrent clients a server process for the current workspace accepts).

- **reusable:** An extension of the single client mode. Once the client processing finishes, the server process does not die and can be used by another client, reducing startup times and application startup overhead.

This mode does not have the high overhead of single client mode because the servers are initialized. However, this server mode may use a lot of server resources (because it requires as many server processes as concurrent clients).

The other modes can be set so that the server processes are reusable by setting the number of times a process can be reused with the `Reuse limit` value (the maximum number of times a particular server process can be reused or how many clients it can serve before it is retired). Reuse of servers enhances performance because it eliminates the need to repeat initializations. However, reuse runs a risk of higher memory leakage over time. The default value for the `Reuse limit` field is `None`, indicating that no reuse limit is enforced.

Set the server mode in the **Server Mode** tab of the daemon workspace editor as shown in the following figure:

Figure 7–1 The Server Mode tab

When using any of the server modes you can specify a pool of server processes. These server processes are started when the daemon starts and are maintained in a pool. The server processes are available for use by new client requests from the pool, saving initialization time. Instead of starting a new server process each time one is requested by a client, the client receives a process immediately from the pool of available processes. When the client finishes processing, this server process either dies, or if reusable servers have been specified, it is returned to the pool.

You set up a pool of server processes by specifying the following parameters in the **Server Mode** tab.

- **Port Range:** Select the range for specific firewall ports through which you access the workspace. Determines the range of ports available for this workspace when starting server processes. Use this option when you want to control the port number, so that Oracle Connect can be accessed through a firewall.
- Enter the port range in the following fields:
- **From:** Enter the highest numbered port in the range
 - **To:** Enter the lowest numbered port in the range
- **Use Default Port Range:** Select this to use the port range that is defined in the daemon.
 - **Maximum number of server processes:** Enter the maximum number of server processes that can run at the same time.
 - **Limit server reuse:** Select this to limit the number of servers that can be reused. If this is selected, the **Reuse limit** parameter is available.

If **Limit server reuse** is selected, in the field next to the check box, enter the maximum number of times a server can be reused. Select the maximum of clients accepted in a server process.

A one-client server can be reused after its (single) client has disconnected. Reuse of servers enhances startup performance because it avoids the need to repeat initialization.

This parameter is not available if the Limit server reuse parameter is not selected.

This parameter is not available if the server mode value is **singleClient**.

- **Limit Concurrent clients per server:** Select this to limit the number of clients that a server can accept for the current workspace process.

If this is not selected, the number of clients is unlimited.

If **Limit concurrent clients per server** is selected, in the field next to the check box, enter the maximum number of clients that a server process for the current workspace accepts. The default for this field is **None**, indicating that the number of clients for each server is unlimited. This field is available if the server mode value is **multiClient** or **multiThreaded**.

- **Specify Server Priority:** Enter the priority for servers. For example, a workspace for applications with online transaction processing can be assigned a higher priority than a workspace that requires only query processing. The lower the number, the higher the priority. For example, workspaces with a priority of 1 are given a higher priority than workspaces with a priority of 2.

Note: This is unavailable if **Use default server priority** is selected.

- **Use default server priority:** Select this to set the priority to 0. There is no specific priority for this workspace. Clear this check box to set a priority in the **Specify Server Priority** parameter.

- **Keep when daemon ends:** Select this to stop all servers started by that daemon when a daemon is shutdown, even if they are active. Select this if you want the servers for the workspace to remain active, even after the daemon has been shut down. If selected, it is the responsibility of the system operator or manager to ensure that the servers are eventually stopped. This must be done at the system level.

- **Number of prestarted servers in pool:** Enter the number of server processes that are prestarted for this workspace when the daemon starts. These are available for use by new client processes with minimal initialization time. Instead of starting a new server process each time one is requested by a client, the daemon immediately allocates (to the client) a server from a pool of available servers. When the number of available server processes drops lower than the value specified in the Minimum number of available servers field, the daemon again starts server processes until the specified number of available servers is reached. The default for this parameter is 0, meaning that no servers are prestarted for this workspace.

- **Number of spare servers:** Enter the minimum number of server processes in the prestarted server's pool before the Oracle Connect daemon resumes creating new server processes (up to the number specified in the Initial number of servers field value, described earlier). If this parameter is set to a value greater than the Initial number of servers field value, the daemon considers the value to be the same as the value specified in the Initial number of servers field. In this case, a new server process is started and added to the pool each time a server process is removed from the pool and allocated to a client). The default for this parameter is 0, which means that new servers are created only when there are no other available servers.

- **Number of sub-tasks:** Enter the number of sub-tasks for a server that are prestarted for this workspace when the daemon starts. In addition to setting up a

pool of server processes as described earlier, you can set additional server processes as sub-tasks by specifying this parameter. If you set 10 servers and 10 prestarted sub-tasks then 100 tasks are started (10 sub-tasks for each process).

7.2 Configuring a Binding Environment

Each binding configuration includes the following information:

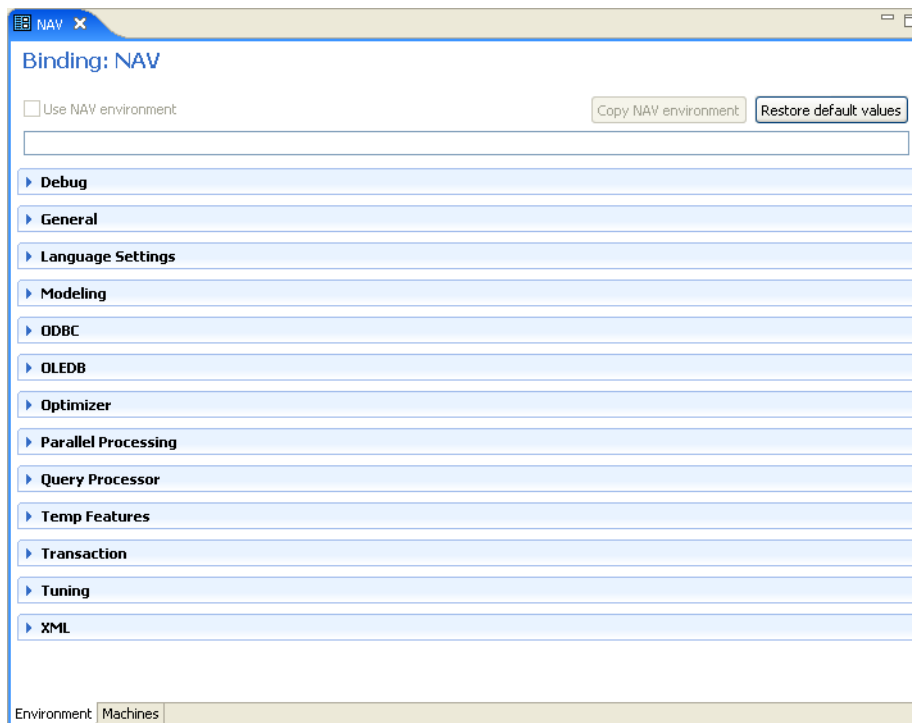
- Environment settings, which are used to configure the environment used by any of the adapters or CDC adapters defined in the binding.
- Application adapters on the current computer.

To configure environment settings in Oracle Studio, perform the following steps:

1. From the **Start** menu, select **Programs, Oracle**, and then select **Studio**.
2. In the Design perspective Configuration view, expand the **Machine** folder, then expand the machine where you want to configure the binding.
3. Expand the **Bindings** folder. The binding available on this computer are listed.
4. Right-click **NAV** and select **Open**.
5. In the **Environment** tab, edit the environment settings as needed. To edit an environment setting, expand the property category and click the value to edit.

The binding **Environment** tab is shown in the following figure:

Figure 7–2 The Binding Properties tab



The binding environment is divided into the following categories:

- [Debug](#)
- [General](#)

- Language
- Modeling
- ODBC
- OLEDB
- Optimizer
- Query Processor
- Transaction
- Tuning
- XML

7.2.1 Debug

The following table lists the parameters that define debugging and logging operations:

Table 7–2 Debug Parameters

| Parameter | Description |
|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ACX trace | Select this for the input xml sent to the back-end adapter and the output xml returned by the back-end adapter to be written to the log. |
| GDB Trace | This parameter is not applicable for use with OracleAS CDC Adapter for SQL Server. |
| General trace | Select this to log general trace information. The default writes only error messages to the log. Note: Changing the default setting can degrade performance. |
| Query warnings | This parameter is not applicable for use with OracleAS CDC Adapter for SQL Server. |
| Add timestamp to traced events | Select this to add a time stamp on each event row in the log. |
| Query Processor trace | This parameter is not applicable for use with OracleAS CDC Adapter for SQL Server. |
| Binary XML Log Level | Select the binary XML log level from the list. The following logging levels are available: <ul style="list-style-type: none"> ■ None ■ API ■ Info ■ Debug |
| Log file | The high-level qualifier of the log file for messages. The following type of message are written to the log: <ul style="list-style-type: none"> ■ Error messages ■ Trace information and information about the query optimization strategy, if General Trace is selected. |
| Trace Directory | This parameter is not applicable for use with OracleAS CDC Adapter for SQL Server. |
| Optimizer trace | This parameter is not applicable for use with OracleAS CDC Adapter for SQL Server. |

Table 7–2 (Cont.) Debug Parameters

| Parameter | Description |
|------------------------------|--------------------------------------------------------------------------------------------------------|
| Transaction extended logging | Select this for the transaction manager to write additional information about transactions to the log. |

7.2.2 General

The following table lists the parameters that define general operations where temporary files are written.

Table 7–3 General Parameters

| Parameter | Description |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| NAV_UTIL editor | This parameter is not applicable for use with OracleAS CDC Adapter for SQL Server. |
| Temporary Dir | The directory where temporary files are written, including the temporary files created for use by hash joins and for sorting files. The default is the current high-level qualifier. |
| Year 2000 policy | <p>Determines the way two-digit years are converted into four-digit years. When the <code>year2000Policy</code> parameter is not set, or when it is set to a value outside the range of values defined for the policy, as described in the following paragraphs, a default value of 5 and the Sliding Base Year policy is used. Two policies are provided:</p> <p>Fixed Base Year: <code>year2000Policy</code> is set to a value greater than, or equal to 1900. In this case, the value of <code>year2000Policy</code> is the first four-digit year after 1900 that can be represented by a two-digit year. For example, if <code>year2000Policy</code> is set to 1905, the years 2000->2004 are represented by 00->04. All other two digits map to 19xx.</p> <p>This solution is most required if there is live data at the low end (close to the year 1900), which the user wants to keep with the current two-digit format.</p> <p>The user usually changes the base date only after ensuring that these old dates have been deleted from the data source.</p> <p>Sliding Base Year: <code>year2000Policy</code> is set to a positive value less than 100. In this case, the value of <code>year2000Policy</code> represents the number of years ahead of the current year that can be represented by a two-digit number. With each passing year the earliest year that can be represented by a two-digit number changes to a year later.</p> |
| Cache buffer size | Enter the number of bytes to be used for a memory buffer on a client computer, which is used by the Oracle Connect client/server to store read-ahead data. The default is 200000. |

7.2.3 Language

The following table lists the parameters that define globalization support:

Table 7-4 Language Settings Parameters

| Parameter | Description |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Language | Identifies the application language. A default code page is selected based on the value specified for this parameter. For more information, see Appendix D, "Globalization Settings" . |
| Code Page | For use with globalization support to identify the code page for the workspace. For more information, see Appendix D, "Globalization Settings" . |
| NLS String | Specifies the code page used by a field whose data type is defined as <code>nlsString</code> . Use this for a field whose code page is other than that of the computer code page. This parameter includes the following values: <ul style="list-style-type: none"> ■ The name of the code page. ■ Whether the character set reads from right to left (as in middle eastern character sets). <p>The default is <code>false</code>.</p> |

7.2.4 Modeling

The **Modeling** parameters are not applicable with OracleAS CDC Adapter for SQL Server.

7.2.5 ODBC

The **ODBC** parameters are not applicable for use with OracleAS CDC Adapter for SQL Server.

7.2.6 OLEDB

The **OLEDB** parameters are not applicable for use with OracleAS CDC Adapter for SQL Server.

7.2.7 Optimizer

The following parameters enable you to customize the performance:

Optimizer goal: The optimization policy. Select one of the following from the list to the right:

- **none** (default): All row optimization is used.
- **first:** First row optimization is performed based on the assumption that the results produced by the query are used as the rows are retrieved. The query optimizer uses a strategy that retrieves the first rows as fast as possible, which might result in a slower overall time to retrieve all the rows.
- **all:** Optimization is performed based on the assumption that the results produced by the query are used after all the rows have been retrieved. The query optimizer uses a strategy that retrieves all the rows as fast as possible, which might result in a slower time to retrieve the first few rows.

Aggregate queries automatically use all row optimization, regardless of the value of this parameter.

All other optimizer parameters are not applicable for use with the OracleAS CDC Adapter for SQL Server.

7.2.8 Parallel Processing

The following list shows the parallel processing properties. The parallel processing properties control how parallel processes are handled in the binding.

Table 7–5 Parallel Processing Parameters

| Parameter | Description |
|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Disable threads | Select this to disable multi-threading. If this is selected, the following properties are disabled: <ul style="list-style-type: none"> ▪ Disable threaded read ahead (QP): Select this to disable read-ahead functionality. ▪ Disable query read ahead (QP): Select this to disable read-ahead functionality for components using Query Processor services. ▪ ODBC async execution Select this property to enable ODBC asynchronous execution ▪ Disable QP parallel execution: Select this to disable parallel processing for query execution. This option is available only if both Disable threaded read ahead (QP) and Disable query ready ahead (QP) are <i>not</i> selected. ▪ Hash parallelism: Select this to read both sides of hash joins at the same time. By default, this property is selected. If you do not want this behavior, clear the check box. |

7.2.9 Query Processor

The following table lists the parameters that enable you to fine tune how queries are processed:

Table 7–6 Query Processor Parameters

| Parameter | Description |
|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| Disable command reuse | Select this to disable Query Processor caching the executed state of a query for reuse. |
| Disable DS property cache | Select this to disable caching data source properties. |
| Disable insert parameterization | Select this to disable parameterization constants in INSERT statements. |
| Disable metadata caching | Select this to disable caching object metadata. If this is selected, the object metadata is taken from the original data source instead of the cache. |
| Disable query parameterization | Select this to not convert constants into parameters when accessing data sources. |
| Disable row mark field fetch | Select this for OLE DB <code>getRows</code> errors to be marked and reshown on every <code>getRows</code> , if the rowset is active. |
| Compile after load | Select this to compile an Oracle Connect procedure or view after it is read. |

Table 7–6 (Cont.) Query Processor Parameters

| Parameter | Description |
|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ignore segments bind failure | This property determines how Oracle Connect responds when the execution of one of the segments of a segmented data source fails: <ul style="list-style-type: none"> ■ Select this to Log a message and continue execution. This is the default setting. ■ Clear the check box to Log a message and stop execution. By default, this property is selected. If you want to stop execution after sending a message, clear this check box. |
| Prompt database-user password | Select this to configure Oracle Connect to prompt the user for security information when accessing a data source. |
| Use alternate qualifier | Select this to use the @ symbol instead of a colon (:) when connecting to multiple data sources. |
| Use table filter expression | Select this to enable the use of tables that have filter expressions specified in their metadata. |
| Write empty string as null | Select this to replace empty strings in a SET clause of an UPDATE statement or in a VALUES list of an INSERT statement with null values. |
| Optimistic for update | Select this to use optimistic locking as the default locking behavior on queries with a FOR UPDATE clause. |
| Disable compilation cache | Select this to disable saving successfully compiled statements in the cache. |
| Maximum SQL cache | Enter the maximum number of SQL queries that can be stored in cache memory. This property's value is ignored if Disable compilation cache is selected. The default is 3. |
| First tree extensions | Enter the maximum size allowed for an SQL query after compilation. The default is 150. |
| Maximum columns in parsing | Enter the maximum number of columns that a query can reference. The default is 500. |
| Maximum segmented database threads | Enter the maximum number of open threads allowed, when working with segmented databases. |
| Minimum number of parameters allocated | Enter the minimum number of parameters that can be used in a query. |
| Continuous query retry interval | Enter the number of seconds that the query processor waits before executing a query again, when no records are returned. The default is 2. |
| Continuous query timeout | Enter the number of seconds that the query processor continues to issue queries, when no records are returned. The default is 3600 (one hour), which indicates that after an hour without new messages the continuous query ends. Enter 0 to indicate that there is no timeout and the continuous query does not end automatically. |
| Continuous query prefix | Enter a prefix to replace the \$\$ prefix that is used to identify the continuous query special columns. For example, if you enter ##, then the continuous query alias is '##StreamPosition' and the control command alias is '##ControlCommand'. |

Table 7–6 (Cont.) Query Processor Parameters

| Parameter | Description |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Arithmetic fixed precision | <p>Enter an integer determine the precision scale factor for floating decimal position. The default is 0, which indicates that the exact arithmetic function is not used.</p> <p>When the value is set to a small positive integer, the special precise floating point arithmetic is used in the query processor. The value determines the precision scale factor (for example, a value of 2 indicates two digits decimal precision). Setting this parameter can be done at a workspace level and it affects all queries running in that workspace with no change to the query or to the underlying data source. The query processor ADD(), SUBTRACT() and SUM() functions that currently use double arithmetic for both floating and decimal types use this logic. When the value is set to the default, 0, the exact arithmetic function is not used.</p> <p>This property is used to set the Exact Arithmetic function. The <code>qpArithmeticFixedPrecision</code> property is an integer value that determines the fixed precision the Oracle Connect query processor uses for precise floating point arithmetic. It is used to create an accurate result when using the SUM function. Because floating point data types are not accurate their results over time does not correspond to the expected arithmetic sum. In other words, in the floating point representation, values such as 0.7 cannot be represented precisely. If there are eight precision digits, there is usually imprecision in the least significant digit so the number is actually approximately 0.699999995. The <code>qpArithmeticFixedPrecision</code> property corrects this imprecision by using an exact floating point.</p> |
| Parser depth | The maximum depth of the expression tree. The default is 500 |
| Token size | Enter the maximum length of a string in an SQL query. The minimum value is 64. The default value is 350. |
| Insert from select commit rate | Enter the commit rate to use when executing an INSERT-FROM-SELECT operation. If a value more than 0 is entered, a commit is performed automatically after inserting the indicated number of rows. For example, if the value is 5, a commit is performed every time 5 rows are inserted. |
| Disable SQS cache | Select this to always read compiled Oracle Connect procedures and views from a disk. In this case, they are not saved in the cache. |
| Procedures cache size | Enter the number of stored queries created with a CREATE PROCEDURE statement that can be kept in cache memory. This property's value is ignored if Disable SQS cache size is selected. |
| Expose XML fields | <p>Expose XML fields: Select this to display data returned for a query as XML, representing the true structure of the result. This is useful when querying a data source table that contains arrays or variants.</p> <ul style="list-style-type: none"> XML field name: Enter the name used in a query to indicate that the data is returned as XML, instead of the keyword XML. This is available only if Expose XML fields is selected. |

7.2.10 Transaction

The following table lists the parameters that define transaction support:

Table 7–7 Transaction Parameters

| Parameter | Description |
|-------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Transaction extended logging | Select this to write extended information about transactions to the transaction manager log files. |
| Commit on destroy | Select this to commit all single-phase commit transactions opened for a data source, if a connection closes while the transaction is still open. |
| Disable 2PC | Select this to disable two-phase commit capabilities, even in drivers that support two phase commit. |
| User commit confirm table | This parameter is not applicable for use with OracleAS CDCAdapter for SQL Server. |
| Transaction log file | The high-level qualifier and name of the log file that logs activity when using transactions. |
| Recovery Delay | The number of minutes from the start of a transaction before any recovery operation on that transaction can be attempted. The default is 15 minutes. |
| Time limit | Enter the time to wait for a transaction to complete before an error is returned. This parameter is also used when performing a RECOVERY, and it then indicates the number of minutes to wait before a forced activity can be performed, since the last transaction activity. |
| Conversions | |
| Select one: | <p>No conversion: Select this if you want all transactions to remain as sent. This is selected by default</p> <p>Convert all to distributed: Select this to convert all simple transactions into distributed transactions.</p> <p>Convert all to simple: Select this to convert all distributed transactions into simple transactions.</p> |

7.2.11 Tuning

The following table lists the parameters that define the tuning:

Table 7–8 Tuning Parameters

| Parameter | Description |
|-------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Dsm maximum buffer size | Enter the maximum size of a cache memory. This cache is used when memory is required on a temporary basis (as when Oracle Connect sorts data for a query output, for a subquery, or for aggregate queries). This cache size is not used for hash joins and lookup joins. The default value is 1000000 bytes. For more information, see the <code>hashBufferSize</code> parameter. |
| Dsm maximum Sort buffer size | Enter the maximum size of the sort buffers. Use this parameter instead of <code>dsmMaxBufferSize</code> for sorts only. The default value is 1000000 bytes. |

Table 7–8 (Cont.) Tuning Parameters

| Parameter | Description |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Dsm middle buffer size | Enter the maximum size of the index cache. This cache is not used for hash joins and lookup joins. The default value is 100000 bytes. |
| File pool size | Enter the maximum number of files that can be opened in the file pool. The default is 10. |
| File pool size per file | Enter the size of the file in the pool. The default is 3. |
| File close on transaction | Select this if you want the File Pool to close when a transaction is committed. |
| Use global file pool | Select this to use a global file pool. When the workspace server mode parameter is set to multiClient or reusable, this parameter also indicates whether the file pool closes upon the client disconnection. |
| Hash buffer size | Enter the amount of cache memory that is available for each hash join or lookup join. The default is 1000000 bytes. |
| Hash max open files | Enter the maximum number of files that a query can open simultaneously for use when performing hash joins. The number assigned to this parameter must not exceed the system maximum. The default is set to 90 files. Note: The hash join optimization strategy results in several files being opened to perform the join. The larger the table size, the more files are opened. By adjusting this parameter you can disable hash joins on very large tables, while allowing hash joins for small tables. |
| Hash primary extent size | Enter the primary extent size. |
| Hash secondary extent size | Enter the secondary extent size. |
| Hash enable RO | Select this for the QP to store the first hash bucket in memory instead of a sequential file. |

7.2.12 XML

The following table lists the parameters that define XML support:

Table 7–9 XML Category Parameters

| Parameter | Description |
|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| COM maximum XML in memory | Specifies the maximum size of an XML document held in memory. The default is 65535 bytes. |
| COM maximum XML size | Specifies the maximum size of an XML document passed to another computer. The default is 65535 bytes. Note: When you increase this value for this property, you may need to increase the value for the Maximum XML in memory property in the daemon. For more information on daemons, see Control . |
| COM XML transport buffer size | Enter the maximum size of the internal communications buffer. The default value (-1) indicates there is no size limit. |

Table 7–9 (Cont.) XML Category Parameters

| Parameter | Description |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| XML date format | Enter the date format to use for XML. The options are: <ul style="list-style-type: none"> ■ ISO (the default): The date format is: YY-MM-DDThh:mm:ss [.ss. .] ■ ODBC: The date format is: YYYY-MM-DD HH:MM:SS [.NNN. . .] |
| Replace invalid XML characters | Select this to replace invalid XML characters with a '?'. This property is used for diagnostic and troubleshooting purposes. |
| XML trim char columns | Select this to enable padded spaces to be trimmed from XML string columns when the record format is fixed. By default this is selected, and padded spaces are trimmed for fixed size character columns. If you do not want this behavior, clear this check box. |

7.3 Migration Considerations

You can migrate an adapter configuration from one platform to another. The configuration information is stored in the Oracle Connect repository on the source platform and is exported to an XML file which can then be imported to the target platform.

Note that when migrating a configuration, file names and paths that are specific to the source platform must be changed to valid files on the target platform.

To migrate an adapter configuration using Oracle Studio, perform the following steps:

1. From the **Start** menu, select **Programs, Oracle**, and then select **Studio**.
2. In the Design perspective, Configuration view, expand the **Machines** folder.
3. Right-click the required computer, and select **Export XML definitions**.
4. In the **File name** field, type the path and name of the XML file where the XML representation of the computer and its complete configuration is stored.
5. Edit any paths in the XML definition to the paths required on the target platform. For example, the setting for the serverLogFile might need changing, depending on the platform.
6. Set up the target platform in Oracle Studio in the same way you set up the source platform, as described in [Setting Up a Windows Computer in Oracle Studio](#).
7. In the Configuration Explorer, right-click the target computer and select **Import XML definitions**.
8. Import the XML file to the target platform.

7.4 Security Considerations

Oracle Connect works within the confines of the platform security system.

In addition, Oracle Connect provides the following security:

- A binary XML encryption mechanism, which is activated as follows:
 1. The client's first message to the server includes a pre-defined shared key, including the key name and value in the connection string. The server gets the key value for the key name passed from the client from the native object store (NOS).

2. The server generates a random 128-bit RC4 session key which is returned encrypted to the client, using the shared key. If no predefined shared key is provided, then a predefined, hardcoded key is used (this key is hardcoded on the client and on the server).
 3. Passwords are always encrypted when passed over the wire, using an RC4, 128-bit session key, regardless of whether the entire session is encrypted or not.
 4. If a predefined shared key was provided, then the entire session is encrypted. Otherwise, only the password exchange is encrypted (using the hardcoded key).
- Credentials: Passwords and user names exchanged over the network are encrypted using a pre-defined, hardcoded, 128-bit RC4 session key.
 - Design Time: Security within Oracle Studio to grant access to Oracle Studio itself and to grant access to computers, user profiles and workspaces.
 - Run time: Security used to access SQL Server, including controlling the daemon for the access.

7.4.1 Setting Design Time Security

Set design-time security as described in the following sections:

- Securing access to Oracle Studio is described in [Setting Password Access to Oracle Studio](#).
- Securing rights to configure a computer in Oracle Studio is described in [Specifying Users with Administrative Rights](#).
- Securing access to user profiles is accomplished by right-clicking the relevant user profile in Oracle Studio and selecting **Change Master Password**. In the dialog box that is displayed, specify a password that must be provided in the future to edit the specific user profile.
- Securing access to workspaces is accomplished by right-clicking the relevant workspace in Oracle Studio and selecting **Set Authorization**. In the dialog box that is displayed, specify a valid user and password that must be provided in the future to edit the specific workspace.

7.4.2 Setting Run-time Security

During run time, security considerations are implemented as follows:

- When the client request accesses the legacy platform through the daemon, either anonymous access is allowed or a valid user name and password must be provided for the computer in the user profile. The `userName` and `password` properties in the J2CA 1.5 SQL Server adapter are used at this stage to access the daemon.

Note: The user name used to access the daemon must also be the name of a user profile used.

- Access by the client must be through a valid port, according to the port range entered in the **Server** section of the workspace **Server Mode** tab in Oracle Studio. For more information, see the explanation of the workspace [Server Mode](#).

Note: Access to the legacy platform through a firewall using the NAT protocol is specified when the computer is added to Oracle Studio.

- To be allocated a server process, the client must be granted anonymous access to the workspace or be listed in the **Authorized Workspace Users** section of the workspace **Security** tab in Oracle Studio. For more information, see the explanation of the workspace [Security](#) tab.
- The ability to run commands on the daemon, such as starting or stopping a daemon or ending server processes is available only to administrators who have been registered in Oracle Connect as a daemon administrator. A client is registered as a valid daemon administrator in the Administrator privileges section of the daemon **Security** tab in Oracle Studio. For more information, see explanation of the daemon [Security](#) tab.

Note: You can also specify administrators who can run commands only at the level of the workspace. Select these administrators in the workspace **Security** tab, as described in the explanation of the workspace [Security](#).

7.5 Transaction Support

OracleAS CDC Adapter for SQL Server supports global transactions and can fully participate in a distributed transaction.

To work with global transactions, select **Convert all to distributed** in the Transaction section of the binding environmental properties. For more information, see [Transaction](#) in the [Configuring a Binding Environment](#) section.

You can use SQL Server with its two-phase commit capability both under MTS, and directly through an XA connection. In both cases, Microsoft DTC must be running on the server.

If you are working under MTS, start an OLE transaction. The SQL Server data source is automatically included in the distributed transaction.

If the connection to the data is through an XA connection, the connection is made automatically. The daemon server mode must be configured to Single-client mode. For more information, see [Server Mode](#)).

To use distributed transactions from an ODBC-based application, ensure that AUTOCOMMIT is set to 0.

Advanced Tuning of the Metadata

Oracle Studio enables you to work directly with the data source metadata and to define outbound adapter interactions. In addition, Oracle Studio defines input and output structures used for these interactions. The interactions and input and output structures are maintained as metadata by Oracle Studio in the **Metadata** tab of the Design perspective.

This appendix contains the following sections:

- [Metadata for the SQL Server Data Source](#)
- [Adapter Metadata](#)

A.1 Metadata for the SQL Server Data Source

Using Oracle Studio, perform the following steps to maintain the metadata for the SQL Server data source:

1. From the **Start** menu, select **Programs, Oracle**, and then select **Studio**.
2. Expand the **Machines** folder, then expand the CDC Server machine that you defined when you [Set up the CDC Server](#).
3. Expand the **Bindings** folder.
4. Expand the binding with the name of your CDC solution and the suffix `_ag`.
5. Expand the **Data sources** folder to display the data sources.
6. Right-click the SQL Server data source and select **Show Metadata View** to display the **Metadata** view.
7. Right-click the table you want to view in the Metadata Explorer and select **Edit**.

The metadata editor opens, displaying the **General** tab, with general table details. The following tabs are used to view and edit the metadata:

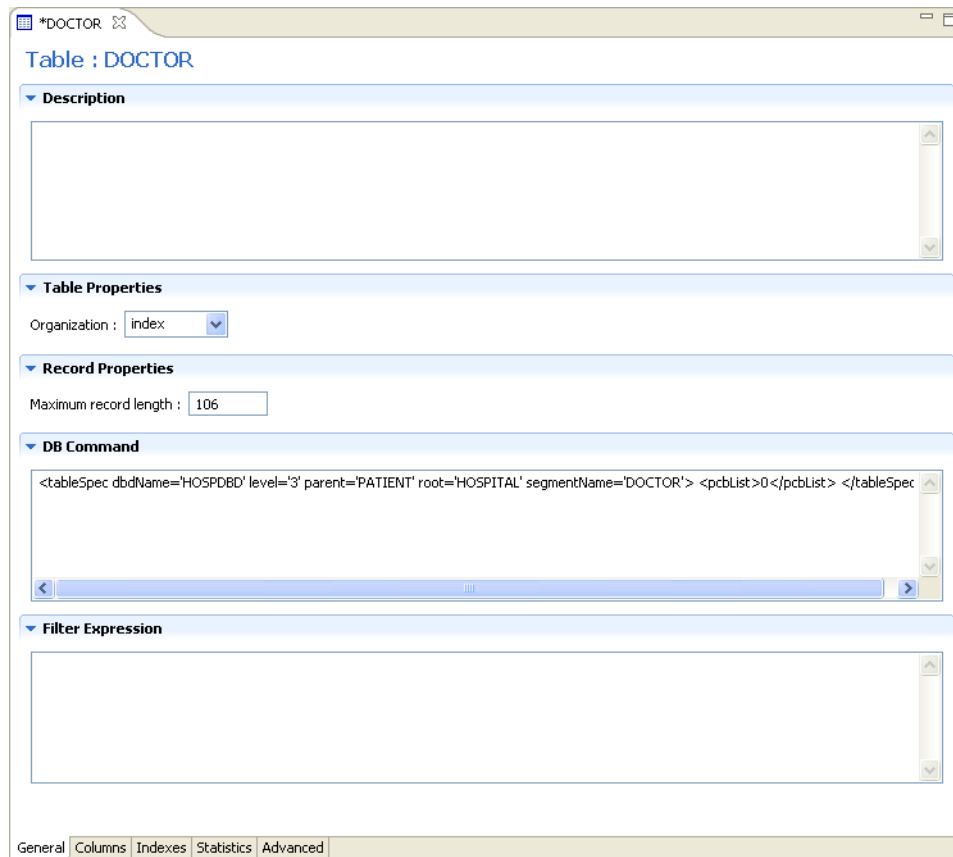
- [General Tab](#)
- [Columns Tab](#)
- [Indexes Tab](#)
- [Statistics Tab](#)
- [Advanced Tab](#)

A.1.1 General Tab

Use the **General** tab to maintain information about the whole table, such as the table name and the way the table is organized.

The **General** tab is shown in the following figure:

Figure A-1 The General Tab



The **General** tab comprises fields, as listed in the following table:

Table A-1 General Tab Components

| Field | Description |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Description | An optional description of the table. |
| Table Properties | |
| Data file location | The name of the file that contains the table. You must enter the full path and include the file extension for the file. For example, <code>D:\COBOL\orders.cob</code> . You can click Browse and browse to find and enter the location of the table file. Note: Do not enter the file extension for DIASM or CIASM files. |

Table A-1 (Cont.) General Tab Components

| Field | Description |
|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Organization | <p>Select how the record represented by the table is organized. The options that are displayed depend on the record. The following options are available:</p> <ul style="list-style-type: none"> ■ Index ■ Sequential ■ Relative: Used with RRDS files. Access to a specific record number of a relative file is performed by using a pseudo column to specify the record position. The hash symbol (#) is used to specify a pseudo column. For example: <pre>SELECT * FROM colleges WHERE # = 6</pre> |
| Record format | Specifies how the record, represented by the table, is formatted. The options that are displayed depend on the record. The SQL Server records have a fixed format. |
| Maximum record length | The maximum allowable size of a record (in bytes). |
| DB Command | SQL Server specific commands are displayed in the DB Command section of the General tab. The information displayed is generated automatically when the metadata is generated and should not be modified. |
| Filter Expression | A WHERE clause. This clause is added to every query accessed using this metadata. The filter is specified without the WHERE keyword. Specify a filter when several logical tables are stored in the same physical file. |

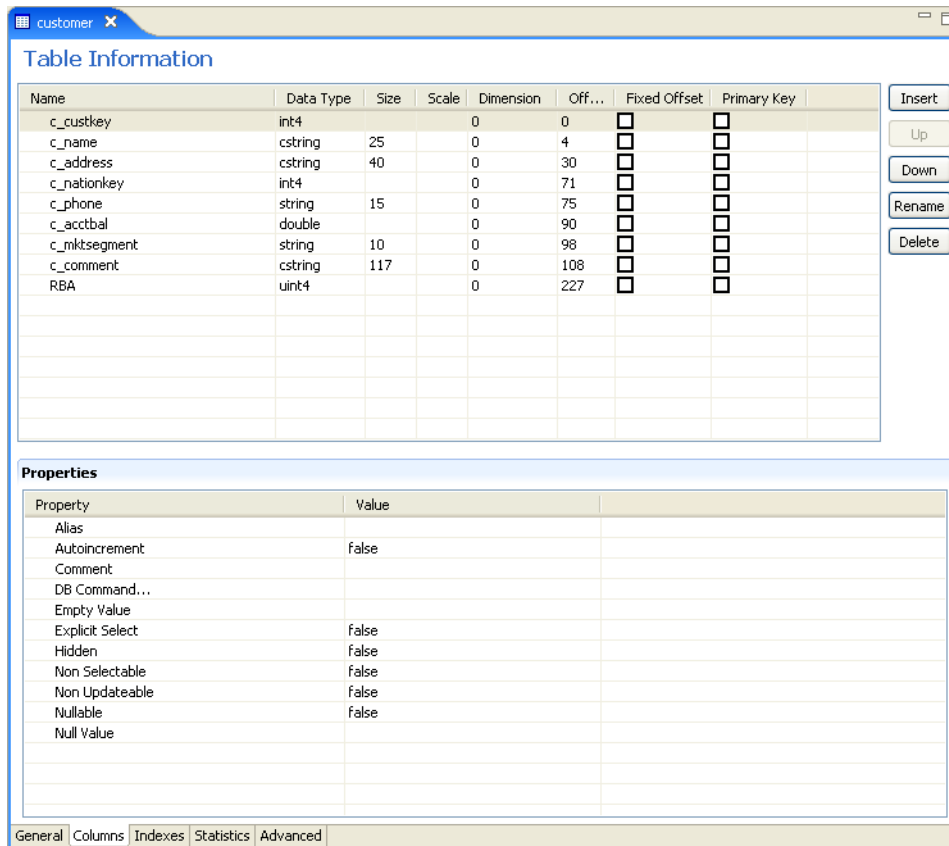
A.1.2 Columns Tab

Use the **Columns** tab to specify metadata that describe the table columns. The tab is divided into the following:

- [Column Definition Section](#)
- [Column Properties](#)

The **Columns** tab is shown in the following figure:

Figure A–2 The Columns Tab



A.1.2.1 Column Definition Section

The top section of this tab lets you define the columns in the source data. You can click in any row (which represents a column in the data base table) to edit the information. The following table describes this section.

Table A–2 Metadata Column Tab Definitions

| Field name | Description |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name | The name of the column |
| Data type | The data type of the column. Selecting this field displays a list of the possible data types. |
| Size | The size of the column |
| Scale | The information entered in this field depends on the data type: For decimal data types, this is the number of digits to the right of the decimal place. This number must not be greater than the number of digits. The default value is 0. For scaled data types, this is the total number of digits. The number must be negative. |

Table A–2 (Cont.) Metadata Column Tab Definitions

| Field name | Description |
|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Dimension | <p>The maximum number of occurrences of a group of columns that are part of an array.</p> <p>The (+) to the left of a column indicates a group field. This type of field has a Dimension value. Click (+) to display the group members.</p> |
| Offset | An absolute offset for the field in a record. |
| Fixed offset | <p>This column lets you determine whether to calculate the offset. There are two options:</p> <ul style="list-style-type: none"> ■ Calc offset: If you clear this check box, the absolute offset for each of the columns is calculated. ■ Fixed offset: When you select this check box, you have a fixed offset. <p>The offset of a field is usually calculated dynamically by the server at run time according the offset and size of the proceeding column. Select the check box in this column to override this calculation and specify a fixed offset at design time. This can happen if there is a part of the buffer to skip.</p> <p>By selecting the check box, or by editing the offset value you pin the offset for that column. The indicated value is used at run time for the column instead of a calculated value. Note that the offset of following columns that do not have a fixed offset are calculated from this fixed position.</p> |
| Primary Key | Select this to indicate that this column is a primary key. |

The buttons on the right side of the tab are used to manipulate the data in this section of the tab. The following table describes how you can move around in this section.

Table A–3 Definition Section Buttons

| Button | Description |
|--------|---------------------------------------------------------------------------------------------------------------------------------|
| Insert | Inserts a column to the table. You can insert a new column. If the table has arrays, you can add a new child column. |
| Up | Moves your selection to the column directly above where the currently selected column. |
| Down | Moves your selection to the column directly below where the currently selected column |
| Rename | Lets you rename the selected column. |
| Delete | Deletes the selected column. |
| Find | Click this button to open a list of all columns in the database. Select a column and click OK to select it in the table. |

A.1.2.2 Column Properties

You can change the property value by clicking in the **Value** column. To display the column or properties, select a column from the Column Definition (top) section.

The properties for the column are displayed at the bottom of the tab.

The following table shows some properties available for selected columns.

Table A-4 Metadata Properties

| Property | Description |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Alias | A name used to replace the default virtual table name for an array. Virtual table names are created by adding the array name to the record name. When an array includes another array the name of the nested array is the name of the record and the parent array and the nested array. When the default generated virtual table name is too long, use an Alias to replace the long name. |
| Autoincrement | The current field is updated automatically by the data source during an <code>INSERT</code> statement and is not explicitly defined in the <code>INSERT</code> statement. The <code>INSERT</code> statement should include an explicit list of values. This attribute is used for fields such as an order number field whose value is incremental each time a new order is entered to the data source. |
| Comment | A short note or description about the column. |
| DB command | SQL Server specific commands for the column. The information displayed is generated automatically when the metadata is generated and should not be modified. |
| Empty value | The value for the field in an insert operation, when a value is not specified. |
| Explicit Select | When <code>true</code> , the current field is not returned when you execute a <code>SELECT * FROM . . .</code> statement. To return this field, you must explicitly ask for it in a query, for example, <code>SELECT NATION_ID, SYSKEY FROM NATION</code> where <code>SYSKEY</code> is a field defined with Explicit Select. You cannot use an asterisk (*) in a query where you want to retrieve a field defined with the Explicit Select value. |
| Hidden | The current field is hidden from users. The field is not displayed when a <code>DESCRIBE</code> statement is executed on the table. |
| Non Selectable | When <code>true</code> , the current field is never returned when you execute an SQL statement. The field is displayed when a <code>DESCRIBE</code> statement is executed on the table. |
| Non Updateable | If <code>true</code> , the current field cannot be updated. |
| Nullable | This value allows the current field to contain <code>NULL</code> values. |
| Null value | The null value for the field during an insert operation, when a value is not specified. |
| Chapter of | This property shows that the set member field is a chapter of an owner field. A value for this property must be used when accessing a set member as a chapter in an ADO application. This property is used for DBMS metadata. |
| OnBit | The position of the bit in a <code>BIT</code> field and the starting bit in a <code>BITS</code> field. |
| Subfield of | The value is generated automatically when you generate metadata from SQL Server data that includes a superdescriptor based on a subfield. A field is created to base this index on, set to the offset specified as the value of the <code>Subfield start</code> field. If no value is entered in the <code>Subfield start</code> field, the subfield is set by default to an offset of 1. |
| Subfield start | The offset within the parent field where a subfield starts. |

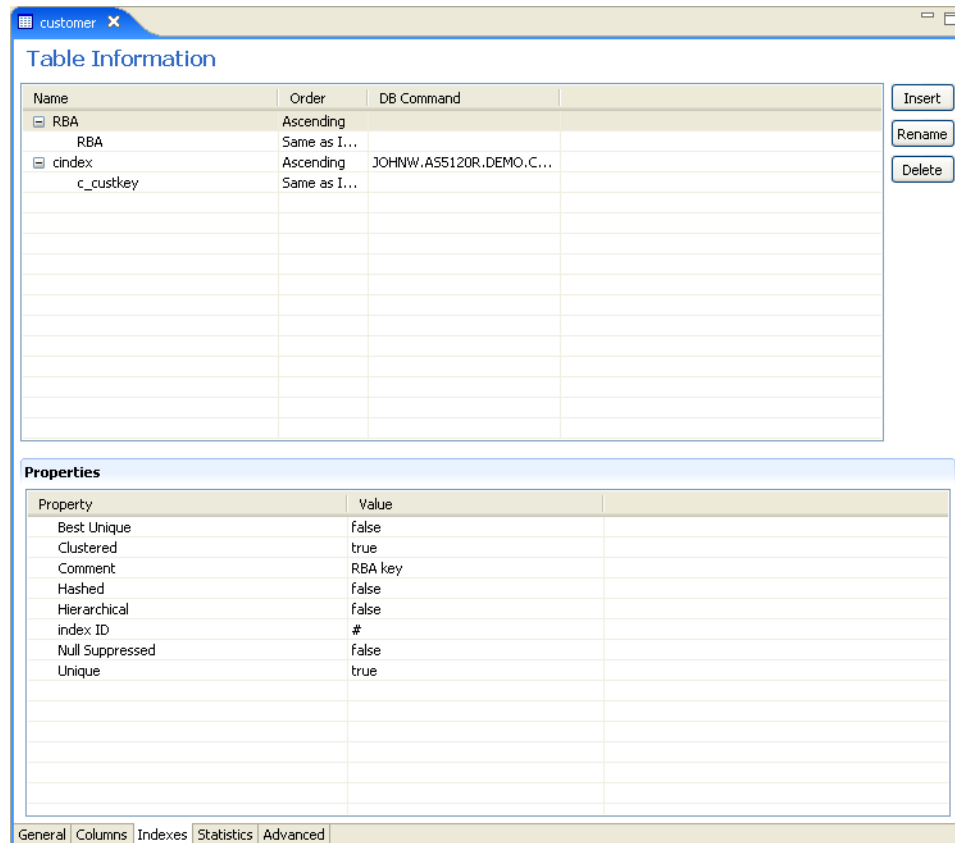
A.1.3 Indexes Tab

Use the **Indexes** tab to specify metadata describing the indexes of a table.

Note: The Indexes tab contains information only if the **Organization** field in the Table tab is set to **Index**.

The **Indexes** tab is shown in the following figure:

Figure A-3 The Indexes Tab



This tab has two sections. The first section lets you define the index keys for the columns in the table. The bottom of the tab lists the properties for each of the columns at the top.

The following sections describe the **Indexes** tab:

- [Table Information](#)
- [Properties](#)

A.1.3.1 Table Information

The following table describes the fields for the top part of the tab, which defines the indexes used for the table.

Table A-5 Indexes Tab Components

| Field | Description |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name | The names of existing indexes for the current table. |
| Order | The ordering of the rows retrieved by the index. |
| DB Command | SQL Server-specific commands for the index. The information displayed is generated automatically when the metadata is generated and should not be modified. |

The buttons on the right side of the tab are used to manipulate the data in this section of the tab. The following table describes how you can move around in this section.

Table A-6 Index Definition Buttons

| Button | Description |
|--------------|-------------------------------------|
| Insert | Inserts an index to the table. |
| Rename Index | Lets you rename the selected index. |
| Delete | Deletes the selected index. |

A.1.3.2 Properties

You can index properties for each index column. To display the index properties, Select a column from the Index Definitions (top) section.

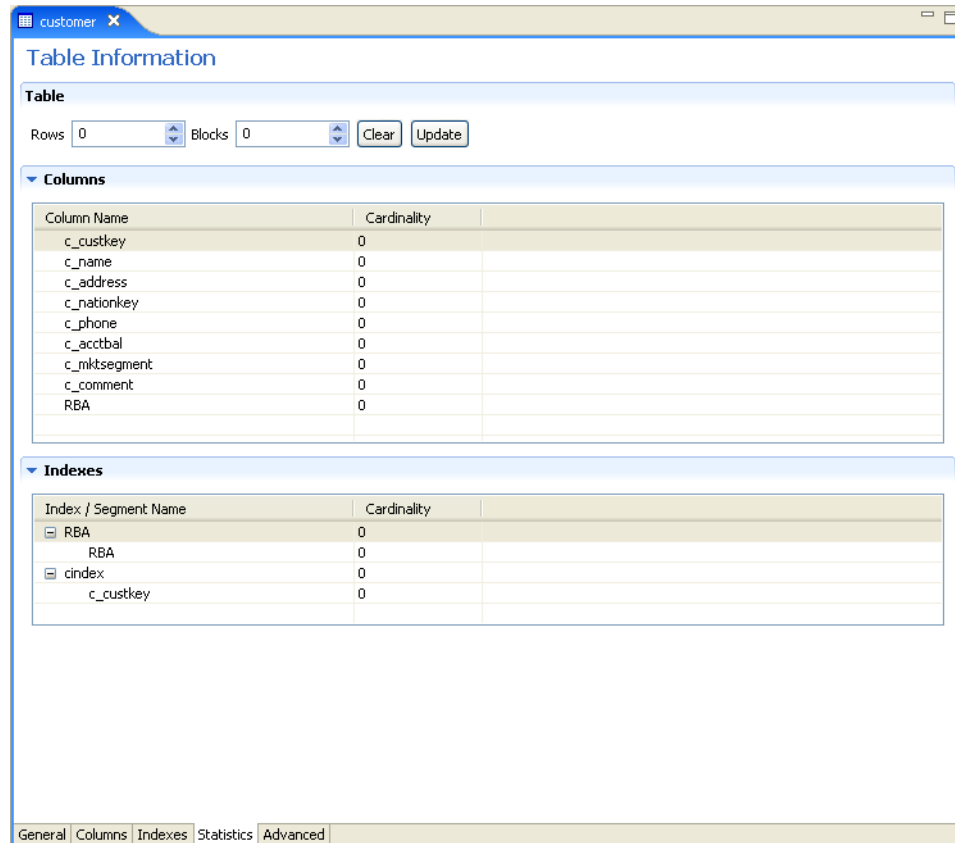
The properties for the column are displayed at the bottom of the tab.

This properties displayed at the bottom of the tab describe the index or segment. The properties available depend on the data source.

A.1.4 Statistics Tab

Use the **Statistics** tab to update metadata statistics for a table. The **Statistics** tab is shown in the following figure:

Figure A-4 The Statistics tab



The **Statistics** tab has three sections. The following tables describe each section.

Table A-7 Table Information

| Field | Description |
|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Rows | Enter or use arrows to select the approximate number of rows in the table. If the value is -1, then the number of rows in the table is unknown (a value was not supplied and the update statistics utility was not run to update the value). A value of 0 indicates that this table is empty. |
| Blocks | Enter or use arrows to select the approximate number of blocks in the table. Note: If neither the number of rows nor the number of blocks is specified for a table, queries over the table might be executed in a nonoptimal manner. |

Use the Columns group box to specify cardinality for each of the columns in the table:

Table A-8 Columns group Components

| Field | Description |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Column name | The columns in the table. |
| Cardinality | The number of distinct values for the column. If the value is -1, then the number of distinct values for the column is unknown (a value was not supplied and the update statistics utility was not run to update the value). A value of 0 indicates that there are no distinct values for the column. |

Use the Indexes group box to specify cardinality for the columns in each of the indexes in the table:

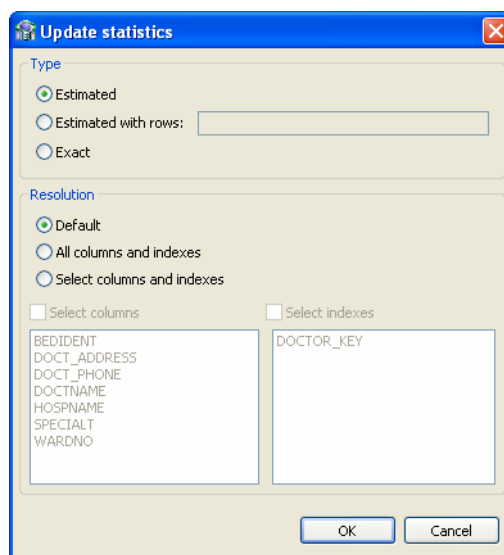
Table A-9 Indexes group Components

| Field | Description |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Indexes and segments | The indexes and segments in the table. |
| Cardinality | The number of distinct key values in the index. If the value is -1, then the number of distinct key values in the index is unknown (a value was not supplied and the update statistics utility was not run to update the value). A value of 0 indicates that there are no distinct key values in the index. |

A.1.4.1 Generating Statistics

Click **Update** in the **Statistics** tab to generate updated statistics for the table. The Update Statistics screen is displayed, as shown in the following figure:

Figure A-5 The Update Statistics screen



The following tables list the fields that are used to update statistics:

The **Type** section lets you edit the following:

Table A–10 Type Components

| Field | Description |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Estimated | An estimation of the amount of statistical information returned. |
| Estimated with rows | An estimation of the amount of statistical information returned. The estimate includes an estimation of the number of rows in the table. Specify the number in the text box. This number is used to shorten the time to produce the statistics if the value specified here is the correct value, or close to the correct value. |
| Exact | The exact statistical information returned. Note that this can be a lengthy task and can lead to disk space problems with large tables. |

The **Resolution** section lets you specify the statistical information returned:

Table A–11 Resolution Components

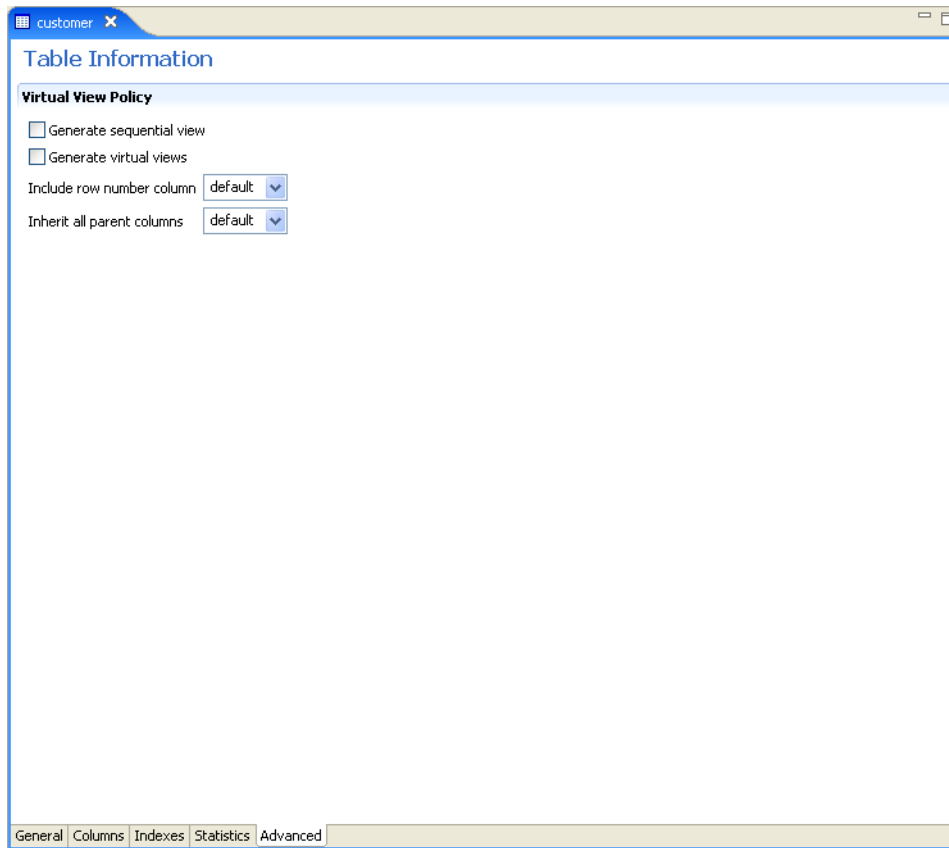
| Field | Description |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Default | Only information about the table and indexes is collected. Information for partial indexes and columns is not collected. |
| All columns and indexes | Information about the table, indexes, partial indexes and columns is collected. |
| Select columns and indexes | Enables you to select the columns and indexes for which you want to collect statistics. In the enabled list of columns or indexes, left click those columns you want included (you can use shift-click and control-click to select several columns or indexes). |

A.1.5 Advanced Tab

The **Advanced** tab lets you enter information about the virtual view policy for arrays. These parameters are valid only if you are using virtual array views. The

configurations made in this editor are for the selected table, only. The same parameters are configured on the data source level in the data source editor.

Figure A–6 Data Source Metadata Advanced Tab



Enter the following information in this tab:

- **Generate sequential view:** Select this to map non-relational files to a single table.
- **Generate virtual views:** Select this to have individual tables created for each array in the non-relational file.
- **Include row number column:** Select one of the following:
 - **true:** Select **true**, to include a column that specifies the row number in the virtual or sequential view. This is true for this table only, even in the data source is not configured to include the row number column.
 - **false:** Select **false**, to not include a column that specifies the row number in the virtual or sequential view for this table even if the data source is configured to include the row number column.
 - **default:** Select **default** to use the default data source behavior for this parameter.
- **Inherit all parent columns:** Select one of the following:
 - **true:** Select **true**, for virtual views to include all the columns in the parent record. This is true for this table only, even in the data source is not configured to include all of the parent record columns.

- **false**: Select **false**, so virtual views do not include the columns in the parent record for this table even if the data source is configured to include all of the parent record columns.
- **default**: Select **default** to use the default data source behavior for this parameter.

A.2 Adapter Metadata

Use Oracle Studio to maintain the metadata for your CDC Queue adapter.

1. From the **Start** menu, select **Programs, Oracle**, and then select **Studio**.
2. Expand the **Machines** folder, then expand the machine with your staging area.
3. Expand the **Bindings** folder.
4. Expand the binding for your staging area (with the suffix `_sa`).
5. Expand the **Adapters** folder to display the adapters list.
6. Right-click the CDC Queue adapter, and select **Show Metadata View** to open the Metadata view.

You can create and edit the adapter metadata as follows:

- **Adapter Metadata General Properties**: Enter and edit information about the adapter, such as the adapter name and the way in which you connect to the adapter. You make these changes in the Design perspective, Metadata view.
- **Adapter Metadata Interactions**: Enter details of an interaction. The interaction Advanced tab is displayed for some adapters only, such as the Database adapter and includes more details about the interaction.
- **Adapter Metadata Schema Records**: The input and output record structure for a record in the adapter definition.

A.2.1 Adapter Metadata General Properties

You can enter and edit information about the adapter, such as the adapter name and the way in which you connect to the adapter. You make these changes in the Design perspective, Metadata view. The following describes how to open the Adapter General Properties editor.

1. In Oracle Studio Design perspective, Metadata view, expand the **Adapters** folder.
2. Right-click the adapter to edit, and select **Open**.

The General properties editor is displayed.

The Adapter General Properties editor is shown in the following figure:

Figure A-7 Adapter Metadata General Properties

The screenshot shows a window titled 'Adapter:imstm' with a 'General' tab selected. The 'Details' section has three input fields: 'Description' (empty), 'Version' (containing '1.0'), and 'Header' (empty). Below this is the 'Adapter Specifications' section, which contains a table with two columns: 'Property' and 'Value'. The table is currently empty.

The **General** properties are listed in the following table:

Table A-12 General tab Components

| Field | Description |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Description | Specifies an identifying description of the adapter. |
| Authentication mechanism | Specifies the authentication to access the adapter. The available mechanisms are: <ul style="list-style-type: none"> ■ kerbv5 ■ none ■ basic password |
| Max request size | Specifies the maximum size in bytes for an XML request or reply. Larger messages are rejected with an error. |
| Max active connections | Specifies the maximum number of simultaneous connections for an adapter (per process). |
| Max idle timeout | Specifies the maximum time, in seconds, that an active connection can stay idle. After that time, the connection is closed. |
| Adapter Specifications | Specifies the adapter-specific properties for an interaction. The SQL Server CDC Queue adapter does not have any adapter-specific properties. |

A.2.2 Adapter Metadata Interactions

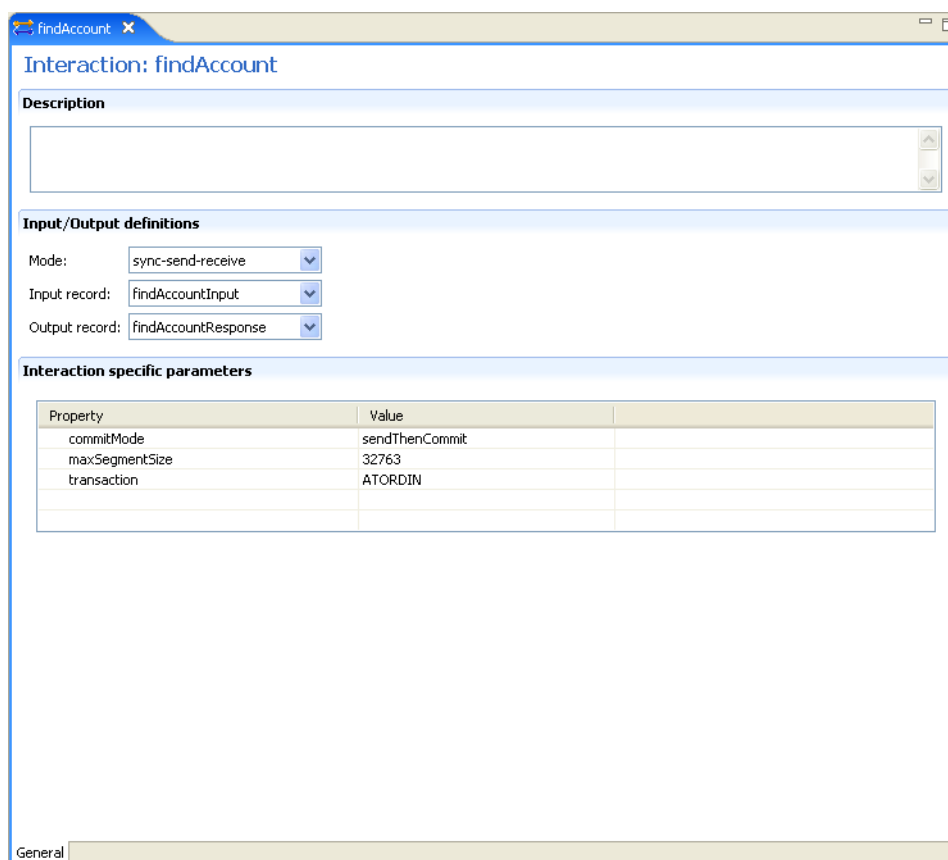
The Adapter Metadata Interactions editor defines an interaction and its input and output definitions. The following describes how to open the Adapter Metadata editor.

1. In Oracle Studio Design perspective, Metadata view, expand the **Adapters** folder.
2. Expand the adapter with the interaction to edit.
3. Expand the **Adapter** folder.
4. Right-click the adapter you want to edit and select **Open**.

The Adapter Metadata Interactions editor is displayed.

The Adapter Metadata Interactions editor is shown in the following figure:

Figure A–8 Adapter Metadata Interactions



The Adapter Metadata Interaction properties are listed in the following table:

Table A–13 Interaction General tab Components

| Field | Description |
|-------------|--------------------------------------------------------|
| Description | Provides a descriptive identifier for the interaction. |

Table A–13 (Cont.) Interaction General tab Components

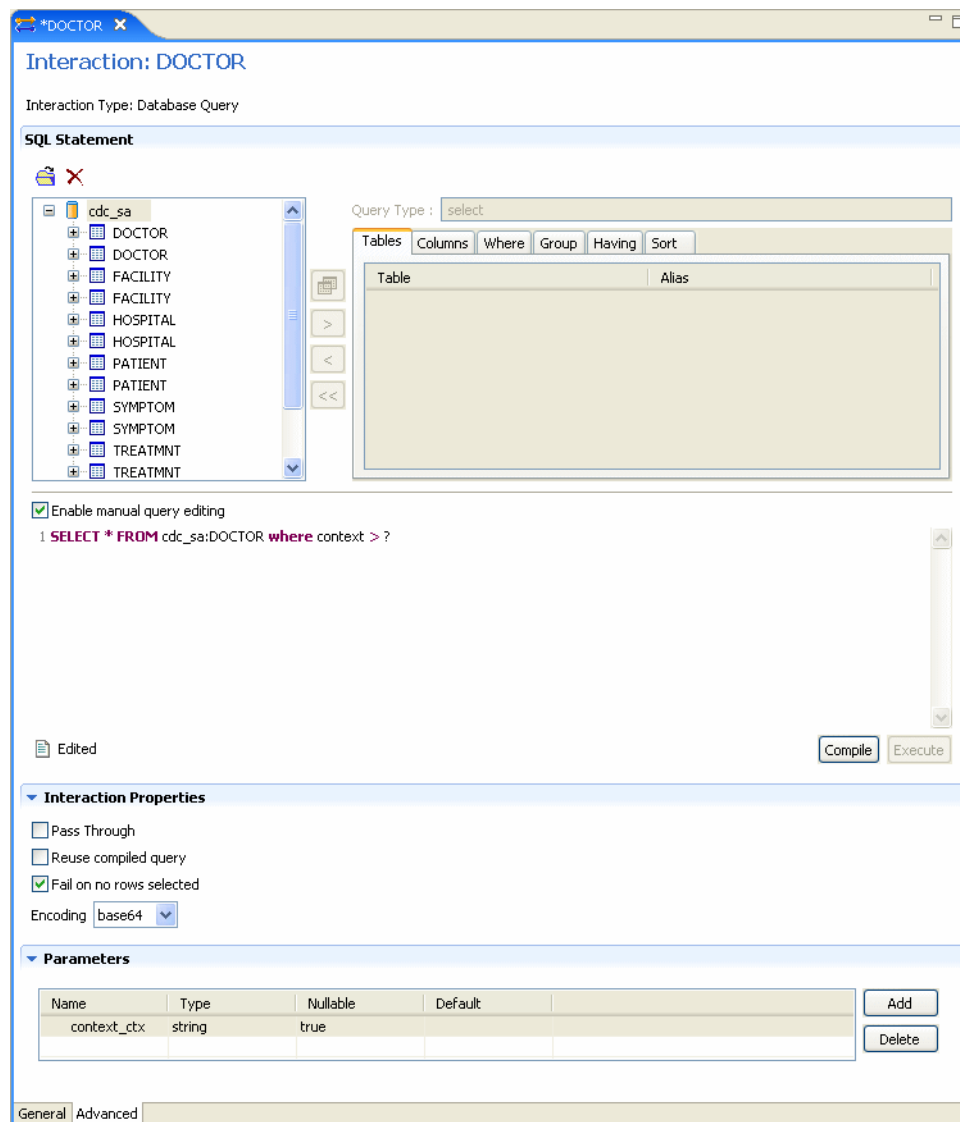
| Field | Description |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Mode | Determines the interaction mode. The following interaction modes are available: <ul style="list-style-type: none"> ■ sync-send-receive: The interaction sends a request and expects to receive a response. ■ sync-send: The interaction sends a request and does not expect to receive a response. ■ sync-receive: The interaction expects to receive a response. |
| Input record | Identifies an input record. |
| Output record | Identifies an output record for the results of an interaction. |
| Interaction Specific Parameters | Specific properties for the interaction. When an Interaction Advanced tab is used, this section is not displayed. |

A.2.2.1 Interaction Advanced Tab

In the Adapter Metadata Interactions editor, click **Advanced** at the bottom of the editor to open the Interaction **Advanced** tab. Use this to enter advanced details for the interaction or to create interaction manually.

The following figure shows the Interactions **Advanced** tab.

Figure A-9 Interaction Advanced Tab



This tab has three sections.

The **SQL Statement** section lets you build any valid SQL statement. Use the tabs to select the tables and statement types and build a statement. When you select **Enable manual query editing**, you can manually enter a valid SQL statement at the bottom of the screen.

The **Interaction Properties** section lets you select any of the following:

- **Pass Through:** Select this to pass a query directly to the SQL Server data.
- **Reuse compiled query:** Select this to save query objects created in the previous execution to the cache. This allows the objects to be reused.
- **Fail on no rows returned:** Select this if you want the system to return an error if no rows are selected.
- **Encoding:** Select one of the following from the list:
 - **base64:** Select this for base 64 encoding

- **hex**: Select this for hexadecimal encoding

The **Parameters** section lets you create parameters to use for the interaction. To create a parameter, click **Add**. Enter a name in the dialog box and click **OK**. The parameter is entered in the list. You can edit the following properties for each parameter you create. Click in the corresponding cell to edit the properties.

- **Name**: The name of the parameter. This is automatically entered when you create a new parameter. You can click in the cell to change this parameter.
- **Type**: The type of parameter. Select one of the following types from the list:
 - **string**
 - **number**
 - **timestamp**
 - **binary**
 - **xml**
- **Nullable**: Select True or False to determine whether the parameter can be nullable.
- **Default**: Enter a default value for the parameter, which is used if the parameter attribute is missing in the input record.

Notes:

- If a field is not nullable and a default value is not supplied in the schema part of the Adapter Definition, an error occurs if the parameter attribute is missing in the input record.
 - The parameters must be entered in the same order as they are used in the SQL statement.
-
-

A.2.3 Adapter Metadata Schema Records

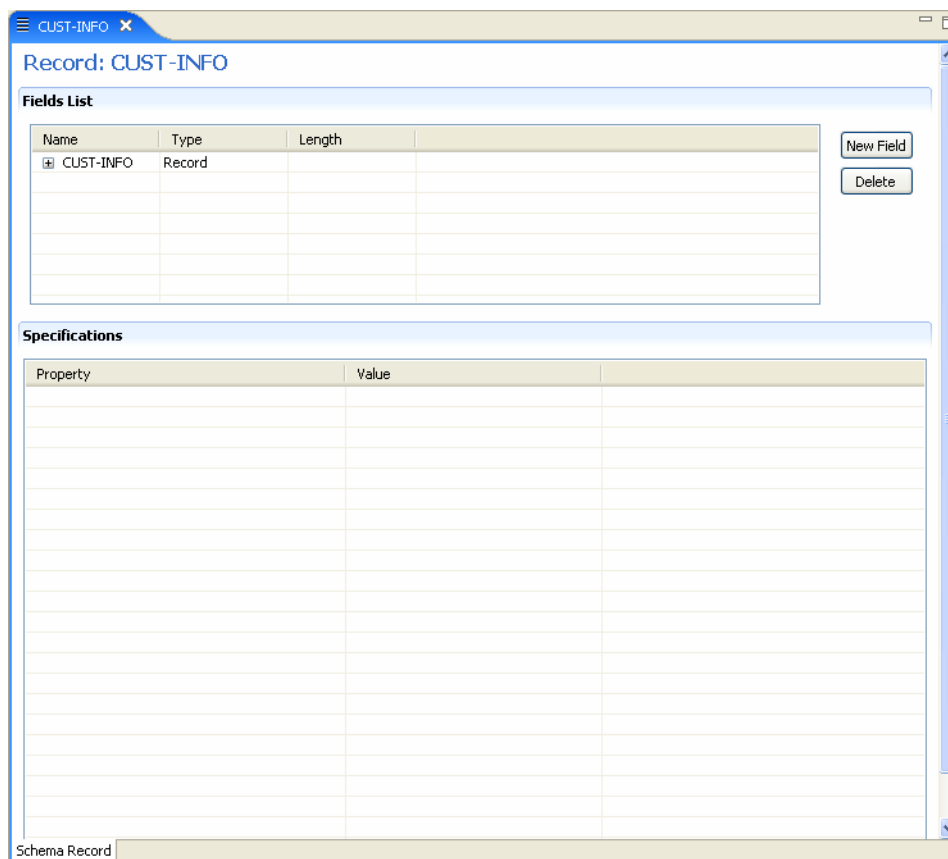
The Adapter Metadata Schema Records editor defines the general details of the input and output record structures for the interaction. The following describes how to open the Adapter Metadata Schema Records editor:

1. In Oracle Studio Design perspective, Metadata view, expand the **Adapters** folder.
2. Expand the adapter with the schema records to edit.
3. Expand the **Schemas**.
4. Right-click the schema you want to edit and select **Open**.

The Adapter Metadata Schema Records editor is displayed.

The Adapter Metadata Schema Records editor is shown in the following figure:

Figure A–10 Adapter Metadata Schema Records



The Adapter Metadata Schema Records properties are listed in the following tables:

Table A–14 Schema Record Tab

| Field | Description |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Fields list | <p>Defines the single data item within a record. This section has a table with the following three columns:</p> <ul style="list-style-type: none"> ▪ Name: The name of the field ▪ Type: The data type of the field. For a list of the valid data types, see the Valid Data Types table. ▪ Length: The size of the field including a null terminator, when the data type supports null termination (such as the string data type). |
| Specifications | <p>Defines specific field properties. To display the properties, select the specific field in the Fields list.</p> |

The following table describes the valid data types that can be used when defining these specifications in the Schema Record editor.

Table A–15 Valid Data Types

| Binary | Boolean | Byte |
|--------|---------|------|
| Date | Double | Enum |

Table A-15 (Cont.) Valid Data Types

| Binary | Boolean | Byte |
|------------------|-----------|--------|
| Float | Int | Long |
| Numeric([p],[s]) | Short | String |
| Time | Timestamp | |

A.2.4 Adapter Metadata XML

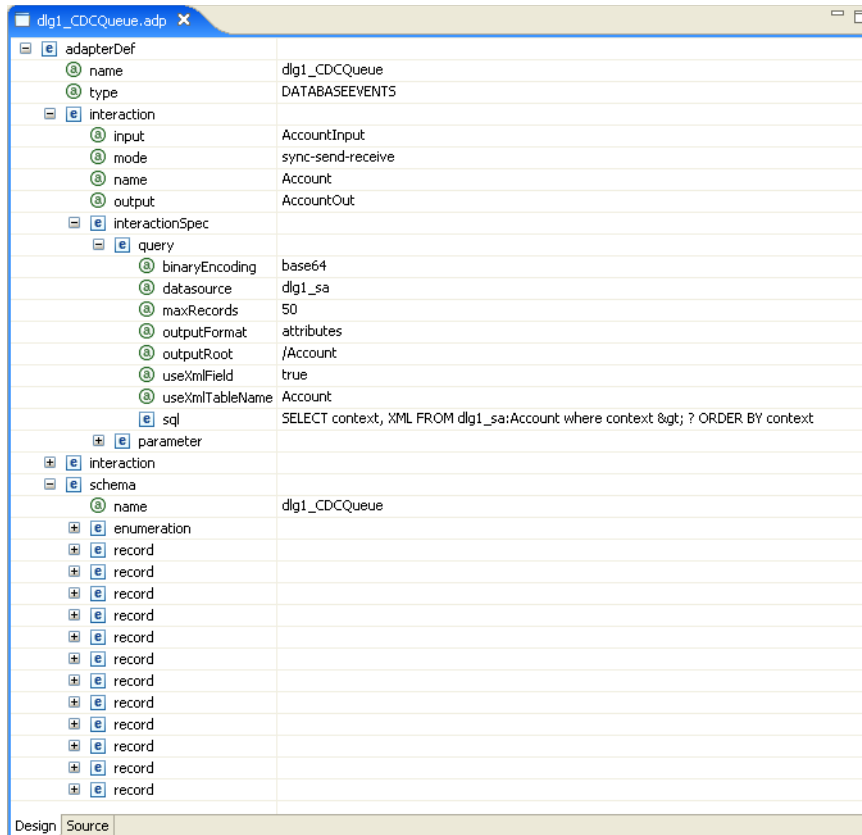
You can also edit the adapter metadata by viewing its XML schema. The following describes how to open the adapter metadata XML editor:

1. In Oracle Studio Design perspective, Metadata view, expand the **Adapters** folder.
2. Right-click the adapter to edit, and select **Open as XML**.

The adapter XML editor is displayed in the Design view.

The adapter XML editor is shown in the following figure:

Figure A-11 Adapter Metadata XML Editor



For information on how to edit the properties in the XML editor Design view, see [Appendix E, "Editing XML Files in Oracle Studio"](#).

For an explanation of which attributes you can edit for the CDC Queue adapter, see [CDC Queue Adapter Properties](#).

Advanced Tuning of the Daemon

The daemon configuration is managed using Oracle Studio. Daemon configuration is divided into the following groups:

- [Control](#)
- [Logging](#)
- [Security](#)
- [Workspaces](#)

B.1 Control

Using the **Control** tab for the daemon, you define various daemon control options. The **Daemon Control** tab is accessed as follows:

1. From the **Start** menu, select **Programs, Oracle**, and then select **Studio**.
2. From the Design perspective Configuration view expand the **Machines** folder.
3. Right-click the computer and select **Open Runtime Perspective**.
4. Right-click the required daemon in the Runtime Explorer and select **Edit Daemon Configuration**. The **Control** tab for the daemon is displayed in the editor.
5. After making changes to the daemon, right-click the daemon and select **Reload Configuration**.

Note: You can also change daemon settings using the Configuration Explorer, by selecting a computer and scrolling the list to the required daemon. Right-click the daemon and select **Edit Daemon**.

Changes made to the daemon configuration are only implemented after the configuration is reloaded using the **Reload Configuration** option in the Runtime Manager perspective.

The **Control** tab is shown in the following figure:

Figure B-1 The Control tab

The following table shows the parameters that can be set in the **Control** tab:

Table B-1 Daemon Control tab Components

| Field | Description |
|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Daemon IP Address | Enter the IP address of the computer(s) where the daemon is listening. If no IP address is entered, the daemon listens on all available IP addresses. |
| Daemon port | Enter the port where the daemon is listening. If no port is entered, the daemon listens on all available ports. |
| Automatically recover from failure | The daemon restarts automatically if it fails for any reason (any error that causes the daemon process to terminate, such as network process lost or the CPU running the daemon crashes and the backup daemon is defined on another CPU). All available and unconnected servers are terminated and any connected servers are marked and terminated on release. Also the backup starts a backup for itself. The backup appends a new log file to the log of the original daemon, adding a line indicating that a backup daemon was started. |
| Maximum XML request size | The maximum number of bytes that the daemon handles for an XML document. |
| Default language | The language that the daemon supports. This setting is used when working with a client with a code page different from the server code page. |
| Maximum XML in memory | The maximum amount of space reserved for the XML in memory. |

Table B-1 (Cont.) Daemon Control tab Components

| Field | Description |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Call timeout | <p>The timeout period for <i>short</i> calls for all daemons. The definition of a short call is a call that should be completed in a few seconds. For example, most calls to a database such as DESCRIBE should be completed in a few seconds as opposed to call like a GETROWS call, which can take a long time. In heavily loaded or otherwise slow systems, even short calls such as calls to open a file, may take a significant amount of time. If a short call takes more than the specified time to complete, then the connection is stopped. The default value for this parameter is 60 seconds. Values of less than 60 seconds are considered to be 60 seconds.</p> <p>Specifying the timeout in a workspace overrides the value set in this field for that workspace.</p> |
| Connect timeout | <p>The time the client waits for a daemon server to start. If the daemon server does not start within this period, then the client is notified that the server did not respond. The value specified for this parameter serves as the default timeout for all the workspaces listed in the daemon configuration. The default value for this parameter is 60 seconds.</p> <p>Notes:</p> <ul style="list-style-type: none"> ■ Entering the timeout in a workspace overrides the value set in this field for that workspace. ■ Even if the XML source does not list this parameter in the workspace section, the workspace gets it using the default value. To prevent a workspace from using the default value, you must enter a value of zero for this parameter in the workspace section. |
| Client idle timeout | <p>The maximum amount of time any daemon client may be idle before the connection with the server is closed.</p> <p>Specifying the timeout in a Workspace overrides this setting for that workspace.</p> |

B.2 Logging

Using the **Logging** tab, you define the daemon log file settings, the log file structure and the location where the log is saved. In addition, use it to define the data that is logged and traced in the file.

The following describes how to open the **Logging** tab.

1. From the **Start** menu, select **Programs, Oracle**, and then select **Studio**.
2. From the Design perspective Configuration view expand the **Machines** folder.
3. Right-click a computer and select **Open Runtime Perspective**.
4. Right-click the daemon in the Runtime Explorer and select **Edit Daemon Configuration**.
5. Click the **Logging** tab.
6. After making changes to the daemon, right-click the daemon and select **Reload Configuration**.

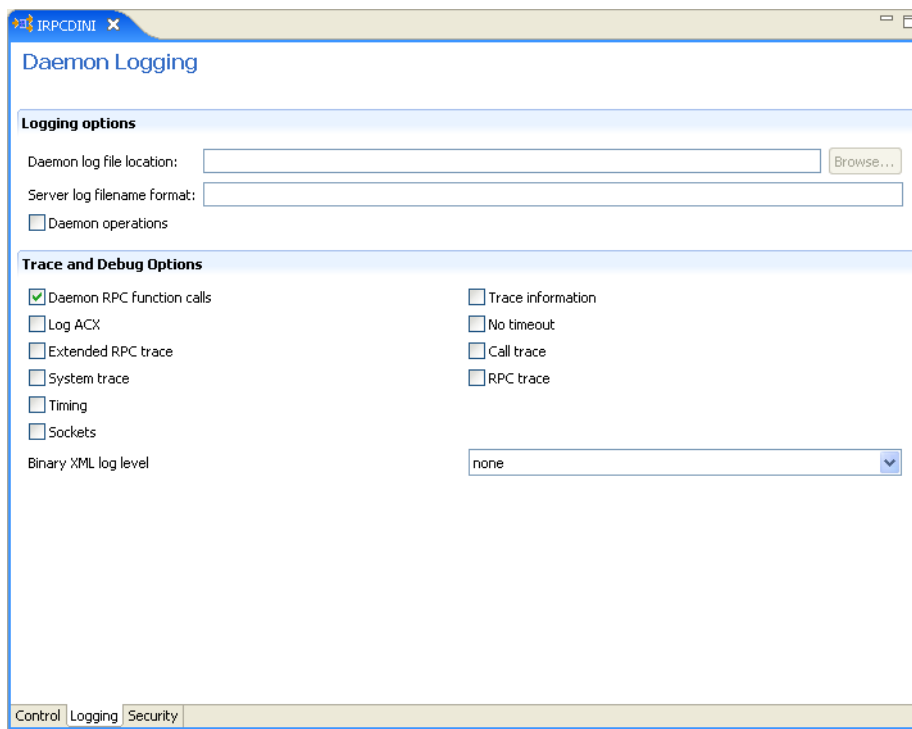
Note: You can also change daemon settings using the Configuration Explorer, by selecting a computer and scrolling the list to the required daemon. Right-click the daemon and select **Edit Daemon**.

Changes made to the daemon configuration are only implemented after the configuration is reloaded using the **Reload Configuration** option in the Runtime Manager perspective.

7. Right-click the daemon and select **Recycle Servers**. Any servers in the connection pool are closed and new servers start with the new configuration.

The **Logging** tab for the daemon is shown in the following figure:

Figure B–2 The Logging tab



The **Daemon Logging** tab comprises fields, as listed in the following table:

Table B–2 Daemon Logging tab Components

| Field | Description |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Logging options | |
| Daemon log file location | Specifies the daemon produces its log data. The full path must be specified. |
| Server log filename format | Defines the name and location of the server log file. The field must specify the full path name. If no directory information is provided for the log file, then it is located in the login directory of the account running Oracle Connect workstation. |
| Daemon operations | Select this to log all of the daemon operations. |

Table B-2 (Cont.) Daemon Logging tab Components

| Field | Description |
|----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Tracing and debug options | |
| Daemon RPC function calls | Select this to log all daemon RPC function calls. |
| Log ACX | Select this if you want to log requests and processes. |
| Extended RPC trace | Generates a verbose message in the server log file for each low-level RPC function called. This is useful for troubleshooting the server. |
| System trace | Generates system-specific tracing of various operations. |
| Timing | Generates a time stamp for every entry to the server log file. |
| Sockets | Generates a message in the server log file for each socket operation. |
| Trace information | Select this to log low-level RPC operations. |
| No timeout | Disables the standard RPC timeouts, setting them to a long duration (approximately an hour) to facilitate debugging. |
| Call trace | Generates a message in the server log file for each RPC function called. This is useful for troubleshooting the server. |
| RPC trace | Enables debugging messages on the server. |
| Binary XML log level | Sets the binary XML log level. Your options are: <ul style="list-style-type: none"> ▪ debug ▪ none (the default) ▪ api ▪ info |

The following tokens can appear in the log file template and are replaced accordingly:

- %A: workspace name
- %D: date (yymmdd)
- %I: instance number of the given workspace server
- %L: server account login directory
- %P: server process ID
- %T: time (hhmmss)
- %U: server account name (user name)

For example, %L/server_%A%I.log may produce a log file such as:
/usr/smith/server_sales15.log.

The default log file template is %L/server_%A%I.log.

B.3 Security

The following **Security** tab for the daemon is used to:

- Grant administration rights for the daemon.
- Determine access to the computer.

The following shows how to open the Daemon **Security** tab:

1. From the **Start** menu, select **Programs, Oracle**, and then select **Studio**.
2. From the Design perspective Configuration view expand the **Machines** folder.
3. Right-click the computer and select **Open Runtime Perspective**.
4. Right-click the daemon in the Runtime Explorer and select **Edit Daemon Configuration**.
5. Click the **Security** tab.
6. After making changes to the daemon, right-click the daemon and select **Reload Configuration**.

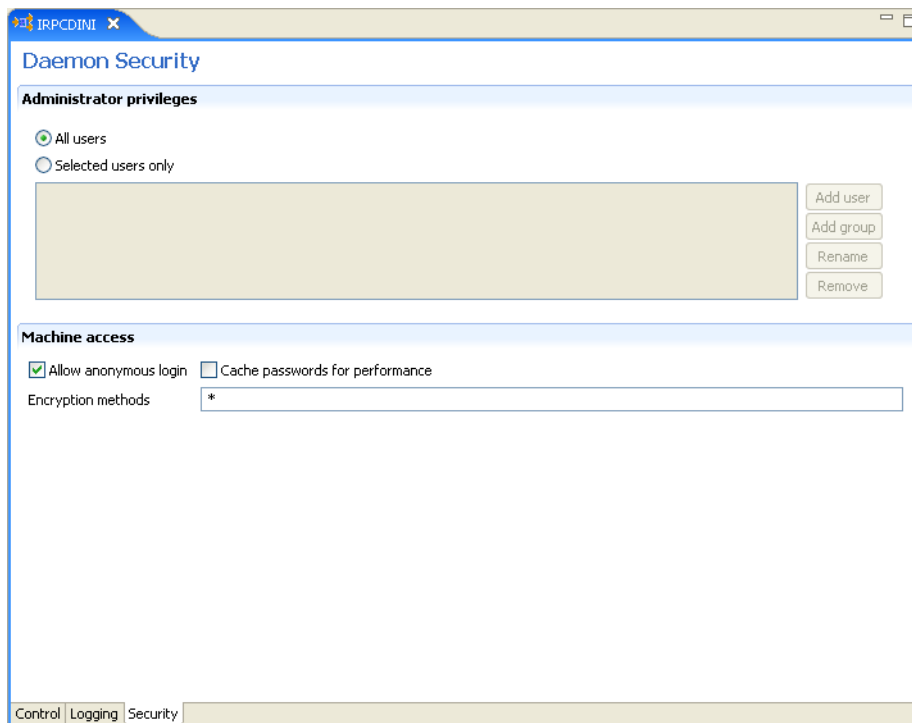
Note: You can also change daemon settings using the Configuration Explorer, by selecting a computer and scrolling the list to the required daemon. Right-click the daemon and select **Edit Daemon**.

Changes made to the daemon configuration are not implemented. They are only implemented after the configuration is reloaded using the **Reload Configuration** option in the Runtime Manager.

7. Right-click the daemon and select **Recycle servers**. Any servers in the connection pool are closed and new servers start with the new configuration.

The Daemon **Security** tab is shown in the following figure:

Figure B–3 The Daemon Security tab



The **Daemon Security** tab comprises fields, as listed in the following table:

Table B-3 Daemon Security tab Components

| Field | Description |
|----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Administrators privileges | Identifies the users (accounts) allowed to perform administrative tasks (tasks that require administrative login). |
| All users | Enables all users to access the daemon and change the settings. |
| Selected users only | Identifies the names of users (accounts) and groups that can be administrators. ¹ If a user is not specified, the account from which the daemon was started is considered the administrator. Note that the daemon does not require the user to log in to the account on the system, but to log in to the daemon using the account name and password. |
| Machine access | Manages access to the computer. |
| Allow anonymous login | Whether workspaces allow anonymous logins (without user name/password entries). For the optimal level of security, keep this option unchecked and define a user name for the Daemon Administrators parameter. If unchecked, then no workspace can have an anonymous client. If checked, then a particular workspace allows anonymous clients. |
| Cached password | Enables login passwords to be cached. This enhances performance by reducing login times for future connections from the same client in a session. |
| Encryption methods | Specifies the encryption method used to send information across the network. The default is an asterisk (*), meaning that all methods are acceptable. If an encryption method is specified, it must be used. The RC4 and DES3 protocols are currently supported. |

¹ The name is prefixed with '@', to use the operating system GROUP feature.

B.4 Workspaces

A daemon can include several workspaces. A workspace defines the server processes and environment that are used for the communication between the client and the server for the duration of the client request. Each workspace has its own definition. The workspace definition is divided into the following groups:

- [General](#)
- [Server Mode](#)
- [Security](#)

B.4.1 General

Using the **General** tab, you enter general information about the features that control the operation of the workspace, such as the server type, the command procedure used to start the workspace and the binding configuration associated with this workspace.

Do the following to open the **General** tab:

1. From the **Start** menu, select **Programs, Oracle**, and then select **Studio**.
2. From the Design perspective Configuration view, expand the **Machines** folder.

3. Right-click a computer and select **Open Runtime Perspective**.
4. Expand the Daemons node to display the workspaces in the Runtime Explorer.
5. Right-click the workspace and select **Edit Workspace Configuration**. The **General** tab opens.
6. After making changes to the workspace, right-click the daemon and select **Reload Configuration**.

Note: You can also change daemon settings using the Configuration Explorer, by selecting a computer and scrolling the list to the required daemon. Right-click the daemon and select **Edit Daemon**.

Changes made to the daemon configuration are not implemented. They are only implemented after the configuration is reloaded using the **Reload Configuration** option in the Runtime Manager.

7. Right-click the daemon and select **Recycle Servers**. Any servers in the connection pool are closed and new servers start with the new configuration.

The **General** tab is shown in the following figure:

Figure B-4 The General tab

The **General** tab comprises fields, as listed in the following table:

Table B-4 General Tab Components

| Field | Description |
|-------|-------------|
| Info | |

Table B-4 (Cont.) General Tab Components

| Field | Description |
|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Workspace name | The name used to identify the workspace. Note: The default configuration includes the default Navigator workspace. This workspace is automatically used if a workspace is not specified as part of the connection settings. |
| Description | A description of the workspace. |
| Startup script | The full path name of the script that starts the workspace server processes. The script specified here must always activate the <code>nav_login</code> procedure and then run the server program (<code>svc</code>). If you do not specify the directory, the startup procedure is taken from the directory where the daemon resides. Oracle Connect includes a default startup script, which it is recommended to use. |
| Server type | This field is not applicable for use with OracleAS Adapters for SQL Server. |
| Workspace binding name | This field is not applicable for use with OracleAS Adapters for SQL Server. |
| Timeout parameters | The time the client waits for the workspace server to start. If the workspace server does not start within this period, then the client is notified that the server did not respond. Specifying the timeout here overrides the default setting, specified in the Control section. For more information, see Control for details about the Daemon Control section. |
| Client idle timeout | The maximum amount of time a workspace client can be idle before the connection with the server is closed. |
| Connect timeout | The time the client waits for a workspace server to start. If the workspace server does not start within this period, then the client is notified that the server did not respond. |
| Call timeout | The timeout period for <i>short</i> calls for all daemons. The definition of a short call is a call that should be completed in a few seconds. For example, most calls to a database such as <code>DESCRIBE</code> should be completed in a few seconds as opposed to call like a <code>GETROWS</code> call, which can take a long time. In heavily loaded or otherwise slow systems, even short calls such as calls to open a file, may take a significant amount of time. If a short call takes more than the specified time to complete, then the connection is stopped. The default value for this parameter is 60 seconds. Values of less than 60 seconds are considered to be 60 seconds. Specifying the timeout in a workspace overrides the value set in this field for that workspace. |

Logging and Trace Options

Table B–4 (Cont.) General Tab Components

| Field | Description |
|---------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Specific log file format | <p>Defines the name and location of the server log file if you want the data written to a file instead of SYSOUT for the server process. The parameter must specify the name and the high level qualifier.</p> <p>The following tokens can appear in the log file template and are replaced accordingly:</p> <ul style="list-style-type: none"> ■ %A: workspace name ■ %D: date (yymmdd) ■ %I: instance number of the given workspace server ■ %L: server account's login directory ■ %P: server's process ID ■ %T: time (hhmmss) ■ %U: server's account name (user name) |
| Trace options | <p>Specifies the type of tracing to be performed. The following tracing options are available:</p> <ul style="list-style-type: none"> ■ No timeout: Select this to disable the standard RPC timeouts, setting them to a long duration (approximately an hour) to facilitate debugging. ■ Call trace: Select this to generate a message in the server log file for each RPC function called. This is useful for troubleshooting the server. ■ RPC trace: Select this to enable debugging messages on the server. ■ Sockets: Select this to generate a message in the server log file for each socket operation. This is useful for troubleshooting client/server communication - providing a detailed trace of every client/server communication. ■ Extended RPC trace: Select this to generate a verbose message in the server log file for each low-level RPC function called. This is useful for troubleshooting the server. ■ System trace: Select this to generate operating system-specific tracing. ■ Timing: Select this to generate a time stamp for every entry to the server log file. |
| Query governing restrictions | |
| Max number of rows in a table that can be read | Select the maximum number of table rows that are read in a query. When the number of rows read from a table exceeds the number stated the query returns an error. |
| Max number of rows allowed in a table before scan is rejected | <p>Select the maximum number of table rows that can be scanned. This parameter has different behavior for query optimization and execution.</p> <ul style="list-style-type: none"> ■ For query optimization, the value set is compared to the table cardinality. If the cardinality is greater than the value, the scan strategy is ignored as a possible strategy (unless it is the only available strategy). ■ For query execution, a scan is limited to the value set. When the number of rows scanned exceeds the number entered, the query returns an error. |

B.4.2 Server Mode

The Server Mode tab lets you configure the features that control the operation of the servers started up by the workspace and allocated to clients.

For example, you can configure the workspace to start several servers for future use before any client request, instead of starting each server when a request is received from a client.

Do the following to open the **Server Mode** tab:

1. From the **Start** menu, select **Programs, Oracle**, and then select **Studio**.
2. From the Design Perspective Configuration view, expand the **Machines** folder.
3. Right-click the computer and select **Open Runtime Perspective**.
4. Expand the Daemons node to display the workspaces in the Runtime Explorer.
5. Right-click the workspace and select **Edit Workspace Configuration**.
6. Click the **Server Mode** tab.
7. After making changes to the workspace, right-click the daemon and select **Reload Configuration**.

Notes:

- You can also change daemon settings using the Configuration Explorer, by selecting a computer and scrolling the list to the required daemon. Right-click the daemon and select **Edit Daemon**.
 - Changes made to the daemon configuration are not implemented. They are only implemented after the configuration is reloaded using the **Reload Configuration** option in the Runtime Manager.
-
-

8. Right-click the daemon and select **Recycle Servers**. Any servers in the connection pool are closed and new servers start with the new configuration.

The **Server Mode** tab is shown in the following figure:

Figure B-5 The Server Mode tab

Workspace Server Mode

Server

Workspace server mode: []

Port range: From 0 To 0

Use default port range

Maximum number of server processes: 0

Limit server reuse: 50

Limit concurrent clients per server: 0

Specify server priority: 0

Use default server priority

Keep when daemon ends

Server Provisioning

Number of prestarted servers in pool: 0

Number of spare servers: 0

Prestarted server pool limit: 0

Resource limitations

Number of sub-tasks (OS/390 specific): 0

General | Server Mode | Security

The **Server Mode** tab has the following fields:

Table B-5 Server Mode Tab Components

| Field | Description |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Workspace server mode | <p>Specifies the type of new server processes that the daemon starts. The daemon supports the following server modes:</p> <ul style="list-style-type: none"> ▪ singleClient: Each client receives a dedicated server process. The account in which a server process runs is determined either by the client login information or by the specific server workspace. <p>This mode enables servers to run under a particular user account and isolates clients from each other, as each receives its own process. However, this server mode incurs a high overhead due to process startup times and can use a lot of server resources as it requires as many server processes as concurrent clients.</p> ▪ multiClient: Clients share a server process and are processed serially. This mode has low overhead because the server processes are initialized. However, because clients share the same process, they can impact one another, especially if they issue lengthy queries. The number of clients that share a process is determined by the Clients per server limit field. ▪ multiThreaded: This mode is not applicable for use with OracleAS Adapter for SQL Server. ▪ reusable: An extension of single-client mode. Once the client processing finishes, the server process does not die and can be used by another client, reducing startup times and application startup overhead. <p>This mode does not have the high overhead of single-client mode because the servers are initialized. However, this server mode can use a lot of server resources as it requires as many server processes as concurrent clients.</p> <p>Note: The other modes can be set so that the server processes are reusable. The Reuse limit field value controls the number of times a process can be reused.</p> |
| Reuse limit | <p>Sets the maximum number of times a particular server can be reused. A one-client server can be reused after its (single) client has disconnected. Reuse of servers enhances startup performance because it is not necessary to repeat initialization. The default for this field is none (0), indicating that server reuse is unlimited. This parameter is disabled only if the server mode value is singleClient.</p> |
| Clients per server limit | <p>Sets the maximum number of clients a server process for the current workspace accepts. The default for this field is none (0), indicating that the number of clients for each server is unlimited. This field is enabled only if the server mode value is multiClient or multiThreaded.</p> |

Table B-5 (Cont.) Server Mode Tab Components

| Field | Description |
|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Server availability | <p>Specifies the number of servers in a pool of servers, available to be assigned to a client.</p> <p>The following options are available:</p> <ul style="list-style-type: none"> ▪ Initial number of servers: The number of server processes that are prestarted for this workspace when the daemon starts. When the number of available server processes drops lower than the value specified in the Minimum number field, the daemon again starts server processes until this number of available server processes is reached. The default for this field is 0. ▪ Minimum number: The minimum number of server processes in the prestarted pool before the daemon resumes creating new server processes (to the value specified in the Initial number of servers field). If this field is set to a value higher than the Initial number of servers field, the daemon uses the value specified in the Initial number of servers field. The default for this field is 0. ▪ Keep when daemon ends: When a daemon is shutdown, all the servers started by that daemon are also stopped, even if they are active. Set this field to <code>true</code> if you want the servers for the workspace to remain active, even after the daemon has been shut down. If this field is set to <code>true</code>, it is the responsibility of the system operator or manager to ensure that the servers are eventually stopped. This must be done at the system level. ▪ Set maximum number of servers: The maximum number of available server processes. Once this number is reached, no new nonactive server processes are created for the particular workspace. For example, if several server processes are released at the same time, so that there are more available server processes than specified by this field, the additional server processes higher than this value are terminated. The default for this field is zero, meaning that there is no maximum. |
| Port range | <p>Determines the range of ports available for this workspace when starting server processes. Use this option when you want to control the port number, so that Oracle Connect can be accessed through a firewall.</p> <p>Enter the port range in the following fields:</p> <ul style="list-style-type: none"> ▪ From: enter the lowest numbered port in the range. ▪ To: Enter the highest numbered port in the range. |
| Use default port range | Select this to use the port range that is defined in the daemon. This is defined in the Port range for servers field in the daemon Control tab. |
| Maximum number of server processes | Enter the maximum number of server processes that can run at the same time. |
| Limit server reuse | Select this to limit the number of servers that can be reused. If this is selected, the Reuse limit parameter is available. |

Table B-5 (Cont.) Server Mode Tab Components

| Field | Description |
|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Limit concurrent clients per server | <p>If Limit server reuse is selected, in the field next to the check box, enter the maximum number of times a server can be reused. Select the maximum of clients accepted in a server process.</p> <p>A one-client server can be reused after its (single) client has disconnected. Reuse of servers enhances startup performance because it is not necessary to repeat initialization.</p> <p>This parameter is not available if the Limit server reuse parameter is not selected.</p> <p>This parameter is not available if the server mode value is singleClient.</p> |
| Specify Server Priority | <p>Select this to limit the number of clients that a server can accept for the current workspace process.</p> <p>If this is not selected, the number of clients is unlimited.</p> <p>If Limit concurrent clients per server is selected, in the field next to the check box, enter the maximum number of clients that a server process for the current workspace accepts. The default for this field is None, indicating that the number of clients for each server is unlimited. This field is available if the server mode value is multiClient or multiThreaded.</p> <p>Set the priority for servers. For example, a workspace for applications with online transaction processing can be assigned a higher priority than a workspace that requires only query processing. The lower the number, the higher the priority. For example, workspaces with a priority of 1 are given a higher priority than workspaces with a priority of 2.</p> <p>Note: This is unavailable if Use default server priority is selected.</p> |
| Use default server priority | <p>Sets the priority to 0. There is no specific priority for this workspace. Clear this check box to set a priority in the Specify server priority parameter.</p> |
| Keep when daemon ends | <p>Select this to stop all servers started by that daemon when a daemon is shutdown, even if they are active. Select this if you want the servers for the workspace to remain active, even after the daemon has been shut down. If selected, it is the responsibility of the system operator or manager to ensure that the servers are eventually stopped. This must be done at the system level.</p> |
| Server Provisioning | |
| Number of prestarted servers in pool | <p>Initial number of servers: The number of server processes that are prestarted for this workspace when the daemon starts. When the number of available server processes drops lower than the value specified in the Minimum number field, the daemon again starts server processes until this number of available server processes is reached. The default for this field is 0.</p> |

Table B-5 (Cont.) Server Mode Tab Components

| Field | Description |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Number of spare servers | The minimum number of server processes in the prestarted pool before the daemon resumes creating new server processes (to the value specified in the Initial number of servers field). If this field is set to a value higher than the Initial number of servers field, the daemon uses the value specified in the Initial number of servers field. The default for this field is 0. |
| Prestarted server pool limit | The maximum number of available server processes. Once this number is reached, no new nonactive server processes are created for the particular workspace. For example, if several server processes are released at the same time, so that there are more available server processes than specified by this field, the additional server processes higher than this value are terminated. The default for this field is zero, meaning that there is no maximum. |
| Resource limitations | |
| Nuber of sub-tasks | The number of sub-tasks for a server that are prestarted for this workspace when the daemon starts. In addition to setting up a pool of server processes as described earlier, you can set additional server processes as sub-tasks by specifying this parameter. If you set 10 servers and 10 prestarted sub-tasks then 100 tasks are started (10 sub-tasks for each process). |

B.4.3 Security

The **Security** tab lets you configure the security level for a workspace. This lets you set the security options for the workspace only. The Security tab is used to:

- Grant administration rights for the workspace
- Determine access to the workspace by a client

Do the following to open the **Security** tab:

1. From the **Start** menu, select **Programs, Oracle**, and then select **Studio**.
2. From the Design Perspective Configuration view, expand the **Machines** folder.
3. Right-click the computer and select **Open Runtime Perspective**.
4. Expand the Daemons node to display the workspaces in the Runtime Explorer.
5. Right-click the workspace and select **Edit Workspace Configuration**.
6. Click the **Security** tab.
7. After making changes to the workspace, right-click the daemon and select **Reload Configuration**.

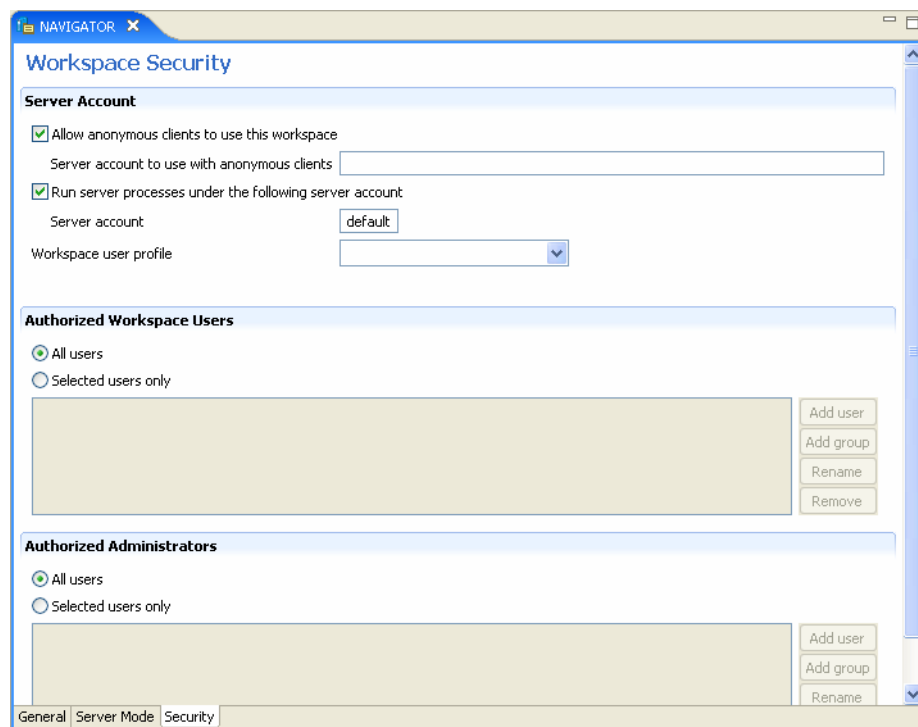
Notes:

- You can also change daemon settings using the Configuration Explorer, by selecting a computer and scrolling the list to the required daemon. Right-click the daemon and select **Edit Daemon**.
- Changes made to the daemon configuration are not implemented. They are only implemented after the configuration is reloaded using the **Reload Configuration** option in the Runtime Manager.

8. Right-click the daemon and select **Recycle Servers**. Any servers in the connection pool are closed and new servers start with the new configuration.

The **Security** tab is shown in the following figure:

Figure B-6 The Security tab



The **Security** tab has the following fields:

Table B-6 Security Tab

| Field | Description |
|-----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Server Account | This section defines the users (accounts) allowed to access the workspace, firewall access ports, workspace account, and anonymous login permissions. |
| Use specific workspace account | <p>Select this to define the operating system account used for the workspace.</p> <p>If selected, enter the name of the workspace account in the workspace account field.</p> <p>If not selected, the account name that was provided by the client is used.</p> |
| Allow anonymous clients to use this workspace | <p>Select this to allow this workspace to be invoked without authentication.</p> <p>If selected, enter the name of the workspace account in the Server account to use with anonymous clients field.</p> |
| Authorized Workspace users | <p>Indicate which users have permission to use the workspace. Select one of the following</p> <ul style="list-style-type: none"> ■ All users: Any user who has logged on to the daemon may use the workspace ■ Selected users only: Select this to allow only users (or accounts) with specific permission to use the workspace. When this is selected, add the names of users (or accounts) and groups that can be use the workspace in the field below. Note: If no user is specified, any user who has logged on to the daemon may use the workspace. |
| Authorized Administrators | <p>Identifies the users (accounts) with administrator privileges. Select one of the following:</p> <ul style="list-style-type: none"> ■ All users: Indicates that anyone can access the workspace and change the settings. ■ Selected users only: Select this to allow only users (or accounts) with specific permission to be administrators. When this is selected, add the names of users (or accounts) and groups that can be workspace administrators. If no user is specified, any user who has logged on to the daemon may administrator this workspace. |

Editing Properties for the OracleAS CDC Adapter for SQL Server

The OracleAS CDC Adapter for SQL Server has several configuration properties. You can edit the properties in Oracle Studio after [Setting Up a Change Data Capture with the OracleAS CDC Adapter for SQL Server](#). This chapter describes the configuration properties and how to edit them. It contains the following sections:

- [Editing Properties in Oracle Studio](#)
- [Configuration Properties](#)
- [Access to Change Events](#)
- [Transaction Support](#)
- [Security](#)

C.1 Editing Properties in Oracle Studio

After you create the OracleAS CDC solution, you can also edit the properties. The solution create two adapters, the adapter and the CDC Queue adapter. The adapter is created on the server computer and the CDC Queue adapter is created on the staging area computer. For more information, see [Setting up a Change Data Capture in Oracle Studio](#).

C.1.1 Editing the OracleAS CDC Adapter Properties

To edit the CDC adapter properties, open the Oracle Studio Design perspective and find the binding for the CDC solution on the server computer. Then open the adapter, which contains the name of the CDC solution with the suffix `_ag` added to it. Changes to adapter properties are reset when the CDC solution is redeployed, therefore these changes must be reapplied following solution deployment. For information on deploying a solution, see [Deploying a Change Data Capture](#).

Do the following to edit the CDC adapter properties.

1. From the **Start** menu, select, **Programs, Oracle**, and then select **Studio**.
2. Expand the **Machines** folder.
3. Expand the server machine that you created when [Setting up a Change Data Capture in Oracle Studio](#).
4. Expand the **Bindings** folder, and then expand the binding the name of the CDC solution with the suffix `_ag` added to it.
5. Expand the **Adapter** folder.

6. Right-click the adapter with the name of the solution and the suffix `_ag` and select **Open**.
The adapter configuration editor opens in the editor, which displays the properties for the adapter.
7. Edit the adapter parameters as required.
For more information, see [OracleAS CDC Adapter Configuration Properties](#) for a description of the properties.

C.2 Configuration Properties

This section describes the configuration properties for the SQL Server CDC adapter. You can edit the properties using Oracle Studio. The SQL Server CDC has the following types of properties:

- [CDC Logger Properties](#)
- [OracleAS CDC Adapter Configuration Properties](#)
- [Change Router Properties](#)
- [Referential Integrity Considerations](#)

C.2.1 CDC Logger Properties

`Logger Name`: the name of the logstream used for the data capture.

C.2.2 OracleAS CDC Adapter Configuration Properties

This section describes the common configuration properties for Oracle CDC adapters and the change router configuration properties, which is located on the staging area computer.

To edit the CDC adapter properties, open the Oracle Studio Design perspective and find the binding for the CDC solution you created. The binding contains the name of the CDC solution with the suffix `_ag` added to it. Open the adapter with the name of the solution and the suffix `_ag` to edit the properties. For information on how to edit adapter properties in Oracle Studio, see [Editing Properties in Oracle Studio](#). Changes to adapter properties are reset when the CDC solution is redeployed, therefore these changes must be reapplied following solution deployment.

For a description of the configuration properties, see the following topics:

- [OracleAS CDC Adapter for SQL Server Properties](#)
- [CDC Queue Adapter Properties](#)
- [Common CDC Adapter Properties](#)

C.2.2.1 OracleAS CDC Adapter for SQL Server Properties

The following describes the properties for the OracleAS CDC Adapter for SQL Server.

There are also additional properties that are common to all Oracle CDC adapters. For a description of the common Oracle CDC adapter properties, see [Common CDC Adapter Properties](#).

- `transientStorageDirectory`: Enter the full path to the folder with the Transient Storage file. This property is also defined in the CDC solution wizard when [Set up the CDC Service](#).

C.2.2.2 CDC Queue Adapter Properties

The CDC Queue adapter is a data base adapter that is found in the staging area. It is created automatically when [Setting up a Change Data Capture in Oracle Studio](#). It has three properties that can be viewed in the adapter's editor in Oracle Studio:

- `connectString`
- `defaultDatasource`
- `multipleResults`

To ensure that the queue adapter works properly with your CDC solution, do not change the values for these properties.

The CDC Queue adapter may have additional properties that can be viewed in the adapter's XML schema. For information on how to view the XML, see [Adapter Metadata XML](#).

The following property, which is viewed in the XML only can be edited:

- `maxRecords`: The maximum number of records that can be returned.

For information on how to edit XML records in Oracle Studio, see [Editing XML Files in Oracle Studio](#).

C.2.2.3 Common CDC Adapter Properties

The following table describes the common configuration properties for Oracle CDC adapters. For information on specific CDC adapter properties for the OracleAS CDC Adapter for SQL Server, see [OracleAS CDC Adapter for SQL Server Properties](#).

Table C-1 CDC Adapter Configuration Properties

| Parameter | Type | Default | Description |
|---------------------------------|---------|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <code>datasource</code> | string | | The name of the data source for the OracleAS CDC Adapter . |
| <code>routers</code> | | | A list of users who can connect to the adapter and get change events from it for processing. If no routers are specified, any valid user for the workspace can get change events from the Oracle Connect adapter. To add the list of users in Oracle Studio, expand the <code>router</code> property then right-click <code>users</code> . A new entry called <code>Item(#)</code> is added to the Property column. In the Value column, enter the User Name for this router. |
| <code>retryInterval</code> | int | 2 | The polling interval for the database journal When no events are received in the database journal, the adapter waits for the amount of time (in seconds) that is indicated for this property. |
| <code>getTransactionInfo</code> | boolean | true | When set to true, transaction information (begin, commit, rollback) is returned. |
| <code>getBeforeImage</code> | boolean | false | When true, before image information is returned. |

Table C-1 (Cont.) CDC Adapter Configuration Properties

| Parameter | Type | Default | Description |
|---------------------------------------|---------|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <code>realTime</code> | boolean | <code>true</code> | When <code>true</code> , this reduces latency in getting change events, however it also increases the polling of the database journal. The change router asks for N events from the adapter. If the adapter finds fewer than N events in the database journal and <code>realTime</code> is <code>true</code> , these events are immediately returned to the change router. If <code>realTime</code> is <code>false</code> , the adapter polls the journal again after waiting for the number of seconds indicated in the <code>retryInterval</code> . |
| <code>logLevel</code> | | | The logging level. The following are the available log levels: <ul style="list-style-type: none"> ■ <code>none</code> ■ <code>api</code> ■ <code>internalCalls</code> ■ <code>info</code> ■ <code>debug</code> |
| <code>checkTimeoutEveryNEvents</code> | int | 100 | The number of events that occur before the CDC adapter checks the <code>timeout</code> value. For example, if this property is set to 100, the adapter checks the <code>timeout</code> value after 100 events have taken place. If the amount of time set in the <code>timeout</code> property is past, the adapter times out. |

C.2.3 Change Router Properties

The following table describes the SQL-based change event router configuration parameters.

To edit the router properties, open the Oracle Studio Design perspective and find the binding for the CDC solution you created. The binding contains the name of the CDC solution with the suffix `_router` added to it. Open the adapter with the name of the solution and the suffix `_router` to edit the properties. For information on how to edit adapter properties in Oracle Studio, see [Editing Properties in Oracle Studio](#).

Table C-2 Change Router Configuration Parameters

| Parameter | Type | Default | Description |
|----------------------------|--------|---------|----------------------------------|
| <code>cdcDatasource</code> | string | | The OracleAS Change Data Source. |

Table C-2 (Cont.) Change Router Configuration Parameters

| Parameter | Type | Default | Description |
|------------------------------------------|----------------|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <code>eliminateUncommittedChanges</code> | Boolean | false | When set to <code>true</code> , only committed change records are moved to the Change Table. If <code>false</code> , all change records are moved to the change tables (in which case, memory usage is minimal) hence the change table may contain rolled back data. For most adapters, following the RI considerations results in rolled-back changes eliminated naturally by compensating change records generated by the adapter in a rollback. Consult the respective CDC adapter documentation for details. For more information, see Referential Integrity Considerations). |
| <code>eventExpirationHours</code> | int | 48 | Indicates how long change records are kept in change tables within the staging area. After the indicated time, change records are deleted. You can set a value between 0 and 50000. A value of 0 means that the records are never deleted. A value of 1 indicates that the records are kept for one hour. |
| <code>logLevel</code> | enum | | The logging level for the router. The following are the available log levels: <ul style="list-style-type: none"> ▪ none ▪ api ▪ internalCalls ▪ info ▪ debug. |
| <code>maxDeletedEventsInBatch</code> | int | 500 | Controls how many expired change records are delete in a single pass. In rare cases, you must lower this value to reduce latency when a large number of change events is continuously being received. |
| <code>maxOpenfiles</code> | int | 200 | Controls the number of physical files opened by the router. |
| <code>maxTransactionMemory</code> | int (in Kb) | 1000 | Specifies how much memory can be stored in memory per transaction before it is off-loaded to disk. This number should be higher than the average transaction size so that the slower-than-memory disk is not used too often. |
| <code>maxStagingMemory</code> | int (in Kb) | 10000 0 | Specifies how much memory in total can be used for storing active transactions (ones that have not yet committed or rolled back). |

Table C-2 (Cont.) Change Router Configuration Parameters

| Parameter | Type | Default | Description |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| sourceEventQueue | Structure: | | Connection information to the OracleAS CDC Adapter . |
| <ul style="list-style-type: none"> ■ server ■ workspace ■ adapter ■ eventWait ■ maxEventsAsBlocks ■ reconnectWait ■ fixedNat | <ul style="list-style-type: none"> string string string int int int boolean | <ul style="list-style-type: none"> 30 250 15 false | |
| stagingDirectory | string | | Specifies the directory where the staging area change files are stored. This directory also stores off-loaded transactions, timed-out transactions, and error files. |
| transactionTimeout | int (in seconds) | 3600 | Specifies how long can a transaction be active without getting new events. This parameter should be set according to the corresponding setting of the captured database. In particular, this setting must not be lower than the database's transaction time-out setting as this may lead to the loss of transactions. |
| useType | enum | sqlBbased Cdc | This parameter must be set to this value. |
| routers | | | <p>A list of users who can connect to the change event router and get change events from it for processing. If no routers are specified, any valid Oracle Connect user for the workspace may get change events from the adapter.</p> <p>To add the list of users in Oracle Studio, expand the <code>router</code> property then right-click <code>users</code>. A new entry called <code>Item(#)</code> is added to the Property column. In the Value column, enter the User Name for this router.</p> |
| senders | | | <p>A list of users who can connect to the change event router and send change events to it for processing. If no routers are specified, any valid Oracle Connect user for the workspace may get change events from the adapter.</p> <p>To add the list of users in Oracle Studio, expand the <code>sender</code> property then right-click <code>users</code>. A new entry called <code>Item(#)</code> is added to the Property column. In the Value column, enter the User Name for this router.</p> |

Table C-2 (Cont.) Change Router Configuration Parameters

| Parameter | Type | Default | Description |
|---------------------------|---------|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| subscribeAgentLog | Boolean | False | When set to <code>true</code> , the change router writes the contents of the OracleAS CDC Adapter 's log in to its own log. Do not set this property to <code>true</code> if the <code>logLevel</code> property is set to <code>debug</code> because the large amount of information that is sent in this mode causes performance delays. |
| nodeID | string | | ID for a node when using multi-router mode. Each node represents a router. |
| alternativeOwnerSeparator | string | .. | This is the value of the separator that is used to separate the name of the owner and the suffix table. In Oracle Studio, the default separator for the staging area is an underscore (<code>_</code>). For example, <code>owner.table</code> . When using SSIS to configure a CDC solution, an underscore causes an error. When you change the default separator in the Oracle Studio Preferences window, the new value is entered in this property. |

C.2.4 Referential Integrity Considerations

Some related tables have referential integrity (RI) constraints enforced on them. For example, with `OrderHeader` and `OrderLines` one cannot have `OrderLines` without an associated `OrderHeader`.

When processing change events by the table (which is how an OracleAS CDC works) as opposed to by transaction, referential integrity cannot be maintained properly. For example, when first handling all `OrderHeader` records and then all `OrderLines` records then a deleted `OrderHeader` may be applied long before the required delete of the associated `OrderLines` records.

In order to reduce the potential referential integrity to a known time frame after which referential integrity is restored, a somewhat different process is needed (compared with Reading the Change Tables').

A special `SYNC_POINTS` table should be added to maintain a common sync-point for use with multiple related tables. The table is defined as follows:

Table C-3 SYNC_POINTS Table Structure

| Column Name | Data Type | Description |
|------------------|-------------|-------------------------------------------------------------------------------------------------------|
| application_name | string (64) | The application for which the processing is done. |
| table_name | string (64) | The name of the synchronization point |
| context | String (32) | A stream position that can be safely used as an upper bound for event retrieval of all related tables |

This table's primary unique key is the concatenation of `application_name` + `sync_name`. The use of this table is not mandatory but it is part of the recommended use pattern of SQL-based CDC.

The SYNC_POINTS table is created with the following definition (where filename is changed into an actual path):

```
<?xml version='1.0' encoding='UTF-8'?>
<navobj>
  <table name='SYNC_POINTS'
    fileName='<staging-directory-path>SYNC_POINTS' organization='index'>
    <fields>
      <field name='application_name' datatype='string' size='64' />
      <field name='sync_name' datatype='string' size='64' />
      <field name='context' datatype='string' size='32' />
    </fields>
    <keys>
      <key name='Key0' size='128' unique='true'>
        <segments>
          <segment name='application_name' />
          <segment name='sync_name' />
        </segments>
      </key>
    </keys>
  </table>
</navobj>
```

The following procedure describes how to ensure RI is regained after a group of ETL rounds. It is an extension of the procedure described earlier for consuming change records. Here we assume that tables T1, T2 and T3 are related with RI constraints and that A is the application we are working under.

To create a stream position

1. This is a one-time setup step aimed to create a stream position record for T [1/2/3] + A in the STREAM_POSITIONS table. The following SQL statement creates that record:

```
insert into STREAM_POSITIONS values ('A', 'T1', '');
insert into STREAM_POSITIONS values ('A', 'T2', '');
insert into STREAM_POSITIONS values ('A', 'T3', '');
```

2. This step is performed at the beginning of a group of ETL rounds processing (that is before starting to process change events for T1, T2 and T3). The goal here is to get a shared sync point for retrieval of T1, T2 and T3. This is done by sampling the 'context' column of the SERVICE_CONTEXT table. This value is the stream position of the last change record in the most recently committed transaction. This is done as follows:

```
insert into SYNC_POINTS
  select 'A' application_name, 'T123' sync_name, context from SERVICE_
CONTEXT;
```

Here, T123 is the name chosen for the synchronization [points of tables T1, T2, and T3.

3. This step is where change data is actually read. It occurs on each ETL round.

```
select n.* from T t, STREAM_POSITIONS sp, SYNC_POINTS sy where
  sp.application_name = 'A' and
  sp.table_name = 'T' and
  sy.application_name = sp.application_name and
  sy.sync_name = 'T123' and
  n.context > sp.context and n.context <= sy.context order by n.context;
```

Note that “`n.context <= sy.context`” is used because the context represents a change record to be processed and processing should include the change record associated with `sy.context`, too.

This query retrieves change records starting from just after the last handled change record but stopping at a common sync point. “`n.*`” can be replaced with an explicit list of columns, however it is important that the ‘context’ column must be selected as this is the change record stream position which is required for the next step.

This step occurs after each ETL round when all change records were retrieved and processed for a table `Ti`. Let’s assume that the value of the ‘context’ column of the last change record was ‘`C`’. This value must be stored back into the `STREAM_POSITION` table for the next ETL round. This is done with:

```
update STREAM_POSITIONS set context='C' where application_name 'A' and table_name = 'Ti';
```

This value can be stored more frequently during the ETL process as needed. The general guideline is that when change record data has been committed to the target database, the stream position should be updated as well.

C.3 Access to Change Events

Changes are captured and maintained in a change table. The table contains the original table columns and CDC header columns. The header columns are described in the following table:

Table C-4 Header Columns

| Column Name | Description |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| context | <p>The change record stream position in the staging area. The column is defined as primary unique index. It is a 32-bytes string with the following structure:</p> <pre><yyyymmdd>T<hhmmss>.<nnnn><cccccc></pre> <p>Where:</p> <ul style="list-style-type: none"> ▪ <code><yyyymmdd>T<hhmmss></code> is the commit processing timestamp as generated in the staging area when starting to process the <code>Commit</code> event. ▪ <code><nnnn></code> is a unique number to differentiate between transactions committed during the same second (up to 99,999 are assumed). ▪ <code><cccccc></code> is a counter for the change events in the transaction making every stream position unique (up to 9,999,999 are assumed). |
| agent_context | <p>The original change record stream position from the agent (non-numeric). This column is defined as alternate, descending unique index. It is used:</p> <ul style="list-style-type: none"> ▪ To ensure that a change event does not appear more than once in the change table. ▪ To allow scanning of a change table backward, peeking easily for the last <code>N</code> change events. ▪ When working with complex records, multiple records may result from a single back-end change record. This column enables the user to associate these records with the single change record. |

Table C–4 (Cont.) Header Columns

| Column Name | Description |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| operation | This column lists the operations available for the CDC adapter. The available operations are: <ul style="list-style-type: none"> ▪ INSERT ▪ DELETE ▪ UPDATE ▪ BEFOREIMAGE ▪ COMMIT ▪ ROLLBACK |
| transactionID | The operation's transaction ID. The transaction ID is increased each time a new transaction starts and a BEGIN_AXACT record is logged. |
| tableName | The name of the table where the change was made. For INSERT, UPDATE, and BEFOREIMAGE operations, the owner name and then the table name are displayed. For COMMIT and ROLLBACK operations, this value is the same as the OPERATION value. |
| rowID | An identifier for the row. |
| timestamp | The date and time of the occurrence. |

C.4 Transaction Support

The OracleAS CDC Adapter for SQL Server supports transactions.

C.5 Security

The following are some specific security requirements for this CDC agent:

- You must have an account with administrator rights to run the MS SQL Server and MS SQL Server CDC components.
- The CDC agent and the TLOG Miner (LGR) must be executed as members of the sysadmin server role.

C.6 Data Types

The following table shows the Oracle Connect data types and their SQL equivalent that are supported by the OracleAS CDC Adapter for SQL Server. In addition to the data types listed in this table, there is some limited support for [User Defined Data Types \(UDT\)](#).

Table C–5 Supported Data Types

| Char | SQLCHAR |
|----------|-------------|
| Char | SQLCHAR |
| Datetime | SQLDATETIME |
| Decimal | SQLDECIMAL |
| Double | SQLFLT8 |
| Float | SQLFLT8 |

Table C-5 (Cont.) Supported Data Types

| Char | SQLCHAR |
|------------------------------------------------------------------|----------------------|
| Int | SQLINT4 |
| Money | SQLMONEY |
| Nchar | SQLNCHAR |
| Nvarchar | SQLNVARCHAR |
| Numeric | SQLNUMERIC |
| Real | SQLFLT4 |
| Smalldatetime | SQLDATETIME4 |
| Smallint | SQLINT2 |
| Smallmoney | SQLMONEY4 |
| Tinyint | SQLINT1 |
| Bigint | SQL_BIGINT |
| Binary | SQLBINARY |
| Varchar | SQLCHAR |
| Bit (Limited to one column per table) | SQLBIT |
| Ntext- Value processing is skipped. The field is exposed as NULL | |
| Text - Value processing is skipped. The field is exposed as NUL. | |
| Uniqueidentifier | SQL_UNIQUEIDENTIFIER |

Note: The OracleAS CDC Adapter for SQL Server supports only the data types listed in the Supported Data Types table.

C.6.1 User Defined Data Types (UDT)

The OracleAS CDC Adapter for SQL Server does not provide complete support for UDT.

To handle a UDT, Oracle Connect maps it onto its base type and handles it as if it were the base data type.

Globalization Settings

The OracleAS CDC Adapter for SQL Server provides the globalization support for the following languages:

- Arabic
- English (the default)
- French
- German
- Greek
- Hebrew
- Italian
- Japanese
- Korean
- Portuguses
- Simple Chinese
- Spanish
- Traditional Chinese
- Turkish

This appendix describes how to define the language support.

D.1 Defining the Language and Code Page

The language and code page parameters are accessed from the computer where Oracle Studio is installed.

Perform the following steps to define the required language and code page:

1. From the **Start** menu, select **Programs, Oracle**, and then select **Studio**.
2. In the Design perspective **Configuration** view, expand the **Machines** folder.
3. Expand the machine for which you want to set the language.
4. Expand the Bindings folder and right-click the **NAV** binding.
5. Select **Open**.
6. Expand the **Language Settings** and do the following:

- From the **Language** list, select the NLS supported language to use in this binding. Valid values are listed in the Language Name column of [NLS Language Codes](#) table.
- From the **Codepage** list, select the code page to use with this language. The code pages available are determined by the Language that is selected. If you have additional code pages available, you can manually enter them in this field.

Note: If you change the language, the code page also changes. Ensure that you want to use the selected code page with the language you selected.

If no code page is selected, the default code page for the selected language is used.

- From the **NLS string** list, select the NLS string for this language and code page. The NLS strings available are determined by the code page that is selected. If you have additional NLS strings available, you can manually enter them in this field.

The code page is used by a field with a data type defined as `nlsString`. This parameter is used for a field with a code page that is different than the computer's code page. This property includes values for the name of the code page and whether the character set reads from right to left (as in middle-eastern character sets).

For example, the following specifies a Japanese EUC 16-bit code page:

```
<misc nlsString="JA16EUC,false"/>
```

7. Save the change. New servers are used for the language selected.

The following table lists the code pages:

Table D-1 NLS Language Codes

| Language Name | Language Code | Windows Default | ASCII Platforms (Default) | EBCDIC Platforms (Default) | Alternative Code pages (EBCDIC based unless noted otherwise) |
|---------------|---------------|-----------------|---------------------------|----------------------------|-----------------------------------------------------------------------------|
| English US | ENUS | Windows-1252 | ISO-8859-15 | IBM1140 | IBM285, IBM500, IBM1148, IBM1047, ISO-8859-1 (ASCII based) |
| English UK | ENUK | Windows-1252 | ISO-8859-15 | IBM1146 | IBM285, IBM037, IBM500, IBM1140, IBM1148, IBM1047, ISO-8859-1 (ASCII based) |

Table D-1 (Cont.) NLS Language Codes

| Language Name | Language Code | Windows Default | ASCII Platforms (Default) | EBCDIC Platforms (Default) | Alternative Code pages (EBCDIC based unless noted otherwise) |
|----------------------|----------------------|------------------------|----------------------------------|-----------------------------------|------------------------------------------------------------------------------------------------------|
| French | FRE | Windows-1252 | ISO-8859-15 | IBM1147 | IBM297, IBM037, IBM500, IBM1140, IBM1148, IBM1047, ISO-8859-1 (ASCII based) |
| Latin International | LAT | Windows-1252 | ISO-8859-15 | IBM1148 | IBM500, IBM037, IBM1140, IBM1047, ISO-8859-1 (ASCII based) |
| Spanish | SPA | Windows-1252 | ISO-8859-15 | IBM1145 | IBM284, IBM037, IBM500, IBM1140, IBM1148, IBM1047, ISO-8859-1 (ASCII based) |
| German | GER | Windows-1252 | ISO-8859-15 | IBM1141 | IBM273, IBM037, IBM500, IBM1140, IBM1148, IBM1047, ISO-8859-1 (ASCII based) |
| Portuguese | POR | Windows-1252 | ISO-8859-15 | IBM1140 | IBM037, IBM500, IBM1148, IBM1047, ISO-8859-1 (ASCII based) |
| Italian | ITL | Windows-1252 | ISO-8859-15 | IBM1144 | IBM280, IBM037, IBM500, IBM1140, IBM1148, IBM1047, ISO-8859-1 (ASCII based) |
| Greek | GRK | Windows-1253 | ISO-8859-7 | IBM875 | - |
| Russian ¹ | RUS | Windows-1251 | ISO-8859-5 | IBM1154 | IBM1025 |

Table D-1 (Cont.) NLS Language Codes

| Language Name | Language Code | Windows Default | ASCII Platforms (Default) | EBCDIC Platforms (Default) | Alternative Code pages (EBCDIC based unless noted otherwise) |
|-----------------------|----------------------|------------------------|----------------------------------|-----------------------------------|---------------------------------------------------------------------|
| Turkish ² | TUR | Windows-1254 | ISO-8859-9 | IBM1155 | IBM1026 |
| Hebrew | HEB | Windows-1255 | ISO-8859-8 | IBM424 | IBM 862 |
| Arabic | ARA | Windows-1256 | ISO-8859-6 | IBM420 | |
| Japanese | JPN | SJIS | SJIS | IBM939 | EUC-JP=EUC, VMS-JP |
| Chinese - Simplified | SCHI | GBK | GBK | IBM935 | - |
| Chinese - Traditional | TCHI | BIG5 | BIG5 | IBM937 | - |
| Korean | KOR | MS949 | EUC-KR | IBM933 | MS949 |

¹ Russian users who use ANSI 1251 Cyrillic as their Windows code page must edit the `RUS.TXT` file and compile it to `RUS.CP` using the `NAV_UTIL CODEPAGE`.

² To work with solutions in Oracle Studio, when using Turkish, add the `-nl en` switch to the Target path in the Oracle Studio shortcut properties. For example: `"C:\Program Files\Oracle\Studio1\studio.exe -nl en"`

Editing XML Files in Oracle Studio

In many cases you must manually edit the metadata to configure parts of a solution or composition. Metadata is created in XML format. You define aspects of a solution by changing the values of the elements and attributes of the XML files that belong to the solution. Oracle Studio provides a graphical interface where you can define the various aspects of a solution. This interface lets you make changes easily without having to manually edit the XML file.

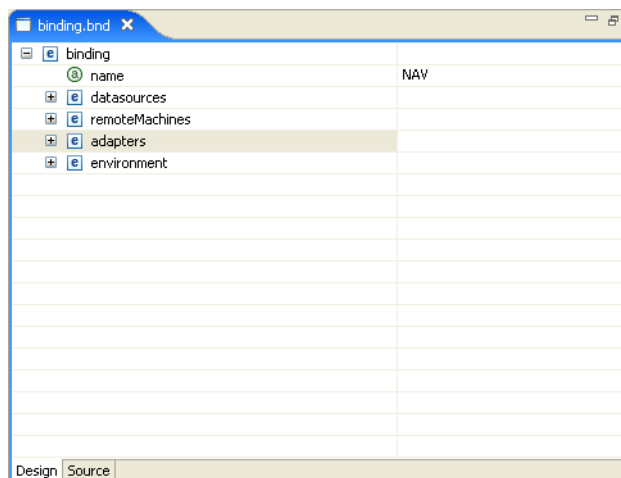
E.1 Preparing to Edit XML Files in Oracle Studio

You can edit XML files for the following items in Oracle Studio:

- Machines
- Bindings.
- Daemons
- Users

When you open an XML file, a graphical representation of the file is opened in the editor. The editor displays the elements and attributes in the first column and their corresponding values in the second column. Each entry has an icon that indicates whether the entry is an element or an attribute. Click the **Source** tab to view the file in its native format. The following figure is an example of the editor's view of an XML file.

Figure E-1 XML Graphical Display



Do the following to edit an XML file in Oracle Studio

1. In the Design perspective, open the Navigator view.
2. In the Navigator view, find the item with the XML file to edit. This can be a machine, binding, daemon, or user.
3. Right-click the item and select **Open as XML**. A graphical list of the file's elements and attributes opens in the editor.
4. Find the element or attribute (property) to change.
5. Click in the right column next to the property you are changing and edit or add the value.
6. Save the file, then select it again in the Project Explorer and press F5 to refresh.
The XML file is updated automatically.

E.2 Making Changes to the XML File

You can also make the following changes to XML files in Oracle Studio:

- [Remove Objects](#)
- [Add DTD Information](#)
- [Edit Namespaces](#)
- [Add Elements and Attributes](#)
- [Replace an Element](#)

E.2.1 Remove Objects

You can delete an element, attribute, or other object from the XML file.

Do the following to remove an object

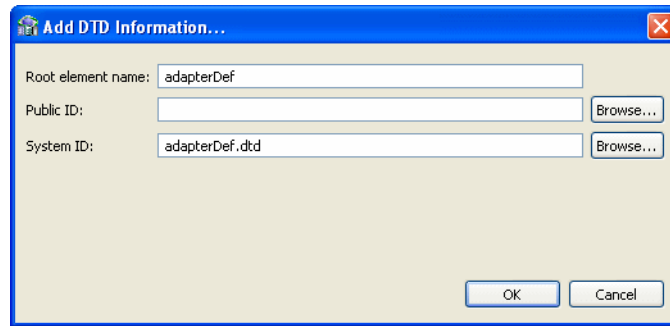
1. Right-click an object from the list in the editor.
2. Select **Remove**.

E.2.2 Add DTD Information

You can add DTD information to an element or attribute.

Do the following to add DTD Information

1. Right-click an element or attribute and select **Add DTD Information**. The Add DTD Information dialog box opens.

Figure E–2 Add DTD Information Dialog Box

2. Enter the information requested in the dialog box. The following table describes the Add DTD Information dialog box.

Table E–1 Add DTD Information

| Field | Description |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Root element name | The name of the XML root element. |
| Public ID | <p>The value in this field is the Public Identifier. It is used to associate the XML file (using an XML catalog entry) with a DTD file by providing a hint to the XML processor.</p> <p>Click Browse to select an XML catalog entry from a list. An XML Catalog entry contains two parts, a Key (which represents a DTD or XML schema) and a URI (which contains information about a DTD or XML schema's location). Select the catalog entry you want to associate with your XML file.</p> |
| System ID | <p>The value in this field is the DTD the XML file is associated with. You can change the DTD the file is associated with by editing this field. The XML processor tries to use the Public ID to locate the DTD, and if this fails, it uses the System ID to find it.</p> <p>Click Browse to select a system ID. You can this in two ways:</p> <ul style="list-style-type: none"> ■ Select the file from the workbench. In this case, update the with the import dialog box. ■ Select an XML catalog entry. |

3. Save the file, then select it again in the Project Explorer and press F5 to refresh. The XML file is updated automatically.

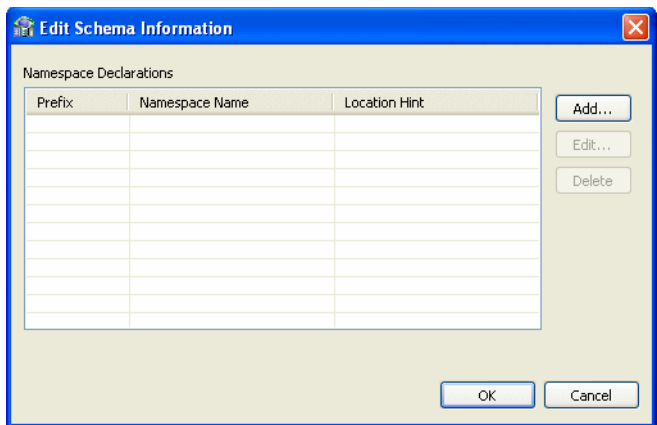
E.2.3 Edit Namespaces

You can make changes to the namespaces associated with an element or attribute.

Do the following to edit namespaces

1. Right-click an element or attribute and select **Edit namespaces**. The Edit Schema Information dialog box opens.

Figure E-3 Edit Schema Information



2. Click a button to make any changes to this information.

Do the following to add a new namespace

1. From the Schema Information dialog box, click **Add**.
2. The Add Namespace Definitions dialog box opens. Select one of the following:
 - **Select from registered namespaces.** This selection is available when the dialog box opens. Select from the list of registered namespaces and then click OK. If no registered namespaces are available, the list is empty.
 - **Specify new namespace.** Enter the information described in the following table:

Table E-2 New Namespace

| Field | Description |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Prefix | The prefix is added to all qualified elements and attributes in the XML file. |
| Namespace Name | The namespace of the XML file. |
| Location Hint | <p>The location of the XML schema of the XML file. An XML Catalog ID or a URI can be entered in this field.</p> <p>Click Browse to search for the schema you want You can this in two ways:</p> <ul style="list-style-type: none"> ■ Select the schema from the workbench. In this case, update the with the import dialog box. ■ Select an XML catalog entry. <p>The Namespace Name and Prefix fields are be filled with the appropriate values from the schema (you must leave the fields blank for this to occur).</p> <p>Note: If you are creating an XML file from an XML schema, you cannot change the Namespace Name or Location Hint values.</p> |

To edit a namespace

1. From the Schema Information dialog box, click **Edit**.
2. Enter the information in the fields.

E.2.4 Add Elements and Attributes

You can add additional elements and attributes to the XML file.

Do the following to add Elements and Attributes

1. Right-click an element.
2. Select one of the following:
 - **Add Attribute** to add an attribute under the selected element.
 - **Add Child** to add another element under the selected element
 - **Add Before** to add another element above the selected element
 - **Add After** to add another element below the selected element
3. Provide a name for the element or attribute if required. You may also select the element from a submenu. The element or attribute is added to the file.
4. Save the file, then select it again in the Project Explorer and press F5 to refresh.
The XML file is updated automatically.

E.2.5 Replace an Element

You can replace an element with another legal element.

Do the following to replace an element

1. Right-click an element from the list in the editor.
2. Select **Replace with**.
3. Select an element from the submenu. Only legal elements are available.
4. The original element is replaced with the selected element.

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