Migrating to PowerExchange Express CDC for Oracle
Abstract

To capture Oracle change data, you can migrate from the PowerExchange Oracle CDC with LogMiner solution to the PowerExchange Express CDC for Oracle solution. PowerExchange Express CDC captures Oracle change records faster and more efficiently in environments that meet its requirements and restrictions. This article describes how to perform this migration.

Supported Versions

- PowerExchange 9.5.1

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Overview

If you currently use PowerExchange Oracle CDC with LogMiner but need better change capture performance, consider migrating to PowerExchange Express CDC for Oracle. To use PowerExchange Express CDC for Oracle, your Oracle environment must meet certain requirements and restrictions.

This article describes a typical migration scenario in which you migrate CDC workflows that contain Oracle source tables incrementally. This practice helps avoid potential migration problems because you verify that a set of Oracle tables is correctly migrated before migrating additional tables. The specific migration steps depend on your environment.

In this scenario, the current PowerExchange Oracle CDC with LogMiner environment has the following characteristics:

- PowerExchange 9.5.1 runs on an operating system that PowerExchange Express CDC supports.
- You use PowerCenter 9.5.1.
- The PowerExchange Logger for Linux, UNIX, and Windows runs in continuous mode.
- Your PowerCenter CDC sessions extract change data in continuous extraction mode with a PWX Oracle CDC Real Time application connection.

During an initial test period, you run PowerExchange Express CDC for Oracle and PowerExchange Oracle CDC with LogMiner in parallel on separate PowerExchange instances. You install PowerExchange Express CDC for Oracle on the Oracle source system because the Express CDC capture code must run on the source system or a system of the same architecture. The PowerExchange Logger instance also runs on the Oracle source system. PowerExchange Oracle CDC with LogMiner continues running in its current location, which can be on the same system or a different system.

After you verify that PowerExchange Express CDC can successfully capture change data for Oracle source tables, switch the PowerCenter CDC workflows and sessions one-by-one to the PowerExchange Express CDC for Oracle instance. The procedure for migrating the first set of Oracle tables is different than the procedure for migrating a subsequent set of tables.

You do not need to redefine capture registrations. You can use the DTLURDMO utility to copy the capture registrations and extraction maps that you use for PowerExchange Oracle CDC with LogMiner to the PowerExchange Express CDC for Oracle instance. Also, you do not need to perform any CDC configuration tasks in Oracle other than configuring a new Oracle user ID. You completed all of the other required Oracle configuration tasks when you implemented PowerExchange Oracle CDC with LogMiner.
Prerequisites

Before you begin migration to PowerExchange Express CDC for Oracle, make sure that your environment complies with the following requirements:

- You run Oracle 10g Release 2 or Oracle 11g Release 1 or 2 on an operating system that PowerExchange Express CDC supports.
- You have a license key that includes PowerExchange Express CDC for Oracle. The same license key can also include PowerExchange Oracle LogMiner CDC.
- You run the PowerExchange Express CDC for Oracle capture process on the Oracle source system or on a system that has the same operating system and architecture as the Oracle system.
- The operating system user ID under which the PowerExchange Express CDC capture process will run has the authority to read the Oracle redo logs.
- The PowerExchange clients, including the PowerExchange Navigator and the PowerExchange client code on the PowerCenter Integration Service system, are at the same release level as PowerExchange Express CDC for Oracle.
- You can create an Oracle user ID that has the privileges that are specified in the ora_orad.sql file on the PowerExchange Express CDC for Oracle instance.
- The PowerExchange Express CDC for Oracle log reader will be able to access the Oracle redo log files. If the redo log files are not stored in ASM, the operating system user ID under which Express CDC runs must have the authority to read active and archived redo logs. If the redo log files are stored in ASM, Express CDC requires an Oracle user ID with SYSDBA or SYSASM authority to connect to ASM to get change data from the redo logs.
- In Oracle, ARCHIVELOG mode and minimal global supplemental logging are enabled. Also, the registered Oracle source table columns for which you want to capture change data are associated with an unconditional supplemental log group.
- The PowerExchange Express CDC for Oracle restrictions are acceptable in your CDC environment.

For more information, see the PowerExchange CDC Guide for Linux, UNIX, or Windows.

CDC Restrictions

Migrate to PowerExchange Express CDC for Oracle only if the following restrictions are acceptable:

- PowerExchange Express CDC for Oracle does not support the following Oracle environments, objects, and features:
  - Oracle transparent data encryption (TDE) of columns, tables, and table spaces.
  - Any type of encryption of table spaces.
  - In Oracle 10g, PowerExchange Express CDC for Oracle does not capture data from tables or table spaces that use Oracle compression.
    In Oracle 11g Release 2 or later, Express CDC can capture conventional DML changes from tables and table spaces that use Oracle basic compression, Advanced Compression, or Exadata Hybrid Columnar Compression.
  - Tables that are defined with sorted hash cluster columns
  - Index-organized tables (IOTs)
  - Virtual columns and columns that have unsupported datatypes
    Because you cannot include these columns in capture registrations, PowerExchange Express CDC for Oracle does not capture change data for them. However, PowerExchange Express CDC for Oracle can capture change data for other columns in the same registered table.
- PowerExchange Express CDC for Oracle does not capture the following types of operations:
  - Direct-path INSERTs
  - INSERT AS SELECT, MERGE, and PL/SQL FORALL operations that use the APPEND hint or parallel mode
- SQL*Loader direct-path loads
- CREATE TABLE...AS SELECT operations

- PowerExchange Express CDC for Oracle can capture data that the SQL*Loader utility loaded into Oracle tables with the following restrictions:
  - The load type must be conventional path.
  - The load method must be Insert, Append, or Replace. Do not use Truncate. If you use Truncate, the SQL*Loader issues TRUNCATE TABLE DDL. PowerExchange cannot capture row deletions that result from TRUNCATE TABLE DDL.
  - If a PowerExchange Express CDC source instance has redo logs on a RAW device, the PowerExchange Logger for Linux, UNIX, and Windows and database row tests fail when they try to process the logs.

**Migrating the First Set of Oracle Tables to PowerExchange Express CDC for Oracle**

Use this procedure to migrate the first set of Oracle tables from PowerExchange Oracle CDC with LogMiner to PowerExchange Express CDC for Oracle. You can also use this procedure to migrate all Oracle tables of CDC interest at one time.

During migration, you must restart the PowerExchange Logger on both PowerExchange instances. On the PowerExchange Oracle CDC with LogMiner instance, restart the PowerExchange Logger to stop reading changes for the tables that you are migrating. On the PowerExchange Oracle Express CDC instance, where the PowerExchange Logger has no change capture history, cold start the PowerExchange Logger in batch mode initially to set a restart point and then warm start the PowerExchange Logger to begin capturing changes for the migrated tables from that restart point.

Also, you must restart the workflows that include the migrated Oracle tables to begin using the new connection definition for extracting changes from PowerExchange Logger log files on the PowerExchange Express CDC instance.

**Note:** If a PowerCenter CDC workflow contains multiple Oracle source tables, you must migrate all of these tables at one time.

1. Complete a full installation of PowerExchange 9.5.1.
   - If the previous PowerExchange version with LogMiner CDC runs on the same Oracle system, install the PowerExchange 9.5.1 release at a different path and directory location.
2. Configure the PowerExchange 9.5.1 instance for PowerExchange Express CDC for Oracle.
   - You must run a separate PowerExchange Listener and a separate PowerExchange Logger for Linux, UNIX, and Windows instance.
     a. In the dbmover.cfg configuration file, configure the following statements:
        - LISTENER statement
        - A NODE statement with the same node name and port as the LISTENER statement
        - CAPT_PATH and CAPT_XTRA statements
        - CAPX CAPI_CONNECTION statement
        - ORAD CAPI_CONNECTION statement
        - ORACLE_CAPTURE_TYPE statement
        - ORACLEID statement
        For more information about these statements, see the *PowerExchange Reference Manual*.
     b. Customize the PowerExchange Oracle Express CDC configuration file.
        - Use the sample pwxorad.cfg file that PowerExchange 9.5.1 supplies. For more information, see the *PowerExchange CDC Guide for Linux, UNIX, and Windows*. 
c. Configure the PowerExchange Logger.
   Use the sample pwxccl.cfg file that PowerExchange 9.5.1 supplies. For more information, see the PowerExchange CDC Guide for Linux, UNIX, and Windows.

4. Verify the PowerExchange 9.5.1 installation.

5. In PowerCenter Workflow Manager, define the following connections for the CDC sessions that you are migrating to PowerExchange Express CDC:
   - A connection that you use temporarily during migration. With this connection, workflows stop after processing all of the changes to end-of-log (EOL) that are in the PowerExchange Logger log files on the PowerExchange Oracle CDC with LogMiner instance.
     This connection is the same as the PWX Oracle CDC Real Time connection that you used for PowerExchange Oracle CDC with LogMiner except that you must set the Idle Time connection attribute to 0. A setting of 0 causes the PowerExchange Listener to return an end-of-file (EOF) to the CDC session as soon it reaches the EOL. After the session processes all of the changes to EOL, it ends.
   - A PWX Oracle CDC Real Time connection that you will use on an ongoing basis for the CDC sessions that you are migrating to the PowerExchange Express CDC for Oracle instance.
     In the CAPI Connection Name Override field, enter the name of the CAPX CAPI_CONNECTION statement that you defined in the dbmover.cfg file on the PowerExchange Express CDC for Oracle instance.

6. Use the DTLURDMO utility to copy capture registrations and extraction maps for the Oracle tables that you are migrating from the PowerExchange Oracle CDC with LogMiner instance to the PowerExchange Express CDC for Oracle instance.
   Configure DTLURDMO control statements in a control file. Do not include the RENAME statement. For example, use the following syntax:
   ```
   USER user_ID;
   EPWD encrypted_password;
   SOURCE source_node;
   TARGET target_node;
   DETAIL;
   REG_COPY;
   SELECT REG_NAME='reg_name_mask';
   CREATEXMAPS;
   ```
   **Note:** If you edited your original extraction maps, for example, to add Before Image (BI) or Change Indicator (CI) columns, use the XM_COPY statement instead of the CREATEXMAPS statement. XM_COPY copies the original extraction maps, whereas CREATEXMAPS regenerates the extraction maps based on the registrations.
   To run the utility, enter the following command from the directory where DTLURDMO is installed:
   ```
   dtlurdmo path/control_file_name
   ```
   For more information about the utility, see the PowerExchange Utilities Guide.

7. In Oracle, stop SQL insert, update, and delete activity and DDL changes on the Oracle tables that you want to migrate.
   You can either stop the applications that update the tables or lock the tables in exclusive mode. To lock the tables, use the following SQL command:
   ```
   LOCK TABLE table_name
   IN EXCLUSIVE MODE;
   ```

8. Record the Oracle current system change number (SCN).
   To get the current SCN, you can use the following command:
   ```
   Select dbms_flashback.get_system_change_number from dual;
   ```

9. On the PowerExchange Oracle CDC with LogMiner instance, verify that the PowerExchange Logger has processed change records beyond the Oracle current SCN that you recorded. Then shut down the PowerExchange Logger.
Message PWX-11082 reports the current SCN and the processing SCN. The processing SCN should be greater than the current SCN, and this current SCN should be greater than the current SCN that you got immediately after stopping change activity on the Oracle tables. When you shut down the PowerExchange Logger, it records a restart point that is after the processing SCN.

10. To ensure that the PowerCenter CDC workflows that process the Oracle tables that you are migrating have extracted all of the changes to EOL from the PowerExchange Oracle CDC with LogMiner instance, complete the following steps:
   a. Stop the PowerCenter CDC workflows that process the Oracle tables that you are migrating.
   b. In PowerCenter Task Developer, edit the PowerCenter sessions that are associated with the CDC workflows that you just stopped to switch to the temporary connection that specifies an **Idle Time** setting of 0. You created this connection in step 5.
      On the **Mapping** tab, select an Oracle source definition. Under **Connections**, select the connection name in the **Value** field.
   c. Restart the workflows. Wait for the workflows to process all of the changes from the PowerExchange Logger log files on the PowerExchange Oracle CDC with LogMiner instance to EOL and then stop.

11. After the workflows stop, edit the associated PowerCenter sessions again to switch to the connection that you will use on an ongoing basis to extract changes from the PowerExchange Express CDC for Oracle instance. You created this connection in step 5.

12. In the PowerExchange Navigator, deactivate the capture registrations for the Oracle tables that you want to migrate. In each of these registrations, set the **Status** option to **History**.
   Registrations that have a status of **History** cannot be activated again. They are permanently deactivated.
   **Tip:** If you need to revert any of the migrated tables to the PowerExchange Oracle LogMiner CDC instance, you can use the DTLURDMDO utility to copy their registrations and extraction maps back to the PowerExchange Oracle LogMiner CDC instance.

13. On the PowerExchange Oracle LogMiner CDC instance, enter COLL_END_LOG=0 in the PowerExchange Logger configuration file and then warm start the PowerExchange Logger.
   The sample PowerExchange Logger configuration file is named pwxccl.cfg. When COLL_END_LOG=0 is specified, the PowerExchange Logger runs in continuous mode.

14. On the PowerExchange Express CDC for Oracle instance, enter COLL_END_LOG=1 in the PowerExchange Logger configuration file and then cold start the PowerExchange Logger.
   When COLL_END_LOG=1 is specified, the PowerExchange Logger runs in batch mode.
   The PowerExchange Logger tries to start capturing changes from the current point in the change stream. However, because activity on the Oracle tables is suspended, the PowerExchange Logger receives no changes to process. As a result, the PowerExchange Logger shuts down.

15. In Oracle, allow change activity to resume on the Oracle source tables that you are migrating.

16. On the PowerExchange Express CDC for Oracle instance, enter COLL_END_LOG=0 in the PowerExchange Logger configuration file and then warm start the PowerExchange Logger.
   When COLL_END_LOG=0 is specified, the PowerExchange Logger runs in continuous mode.
   The PowerExchange Logger starts capturing changes based on the restart point that it recorded.

17. Optional. To verify that PowerExchange Express CDC for Oracle is successfully capturing change data, perform a CAPXRT database row test of a migrated extraction map in the PowerExchange Navigator.
   In the **Location** field, enter the node name that is defined in the NODE statement in the local dbmover.cfg file that points to the PowerExchange Listener on the PowerExchange Express CDC for Oracle instance.

18. On the PowerCenter Integration Service system, delete the restart token file for each CDC workflow that includes the Oracle tables that you are migrating.
19. Cold start these CDC workflows.

The workflows begin extracting change data for the migrated tables from the PowerExchange Logger log files on the PowerExchange Express CDC instance from the default restart point. In this case, the default restart point is the beginning of the oldest PowerExchange Logger log file that is recorded in the CDCT file.

You can migrate additional Oracle source tables to PowerExchange Express CDC for Oracle whenever necessary. See “Migrating a Subsequent Set of Oracle Tables to PowerExchange Express CDC for Oracle” on page 7.

Migrating a Subsequent Set of Oracle Tables to PowerExchange Express CDC for Oracle

After you migrate the first set of Oracle tables from PowerExchange Oracle CDC with LogMiner to PowerExchange Express CDC for Oracle, you can migrate additional tables.

Before you begin, verify that the PowerExchange Listener is running.

Note: If a PowerCenter CDC workflow contains multiple Oracle source tables, you must migrate all of these tables at one time.

1. In Oracle, stop SQL insert, update, delete activity and DDL changes on the Oracle tables that you want to migrate.

You can stop applications that update the tables or lock the tables in exclusive mode.

2. Get the Oracle current SCN.

3. On the PowerExchange Oracle LogMiner CDC instance, verify that the PowerExchange Logger has processed changes beyond the Oracle current SCN. Then shut down this PowerExchange Logger.

Message PWX-11082 reports the current SCN and the processing SCN. The processing SCN should be greater than the current SCN, and this current SCN should greater than the current SCN that you got immediately after stopping change activity on the Oracle tables. When you shut down the PowerExchange Logger, it saves a restart point that is after the processing SCN.

4. To ensure that the PowerCenter CDC workflows that process the Oracle tables that you are migrating have extracted all of the changes to EOL from the PowerExchange Oracle CDC with LogMiner instance, complete the following steps:
   a. Stop the PowerCenter CDC workflows that process the Oracle tables that you are migrating.
   b. In PowerCenter Task Developer, edit the PowerCenter sessions that are associated with the CDC workflows that you just stopped to switch to the temporary connection that specifies an Idle Time setting of 0. You previously created this connection when migrating the first set of Oracle tables.
      On the Mapping tab, select an Oracle source definition. Under Connections, select the connection name in the Value field.
   c. Restart the workflows. Wait for the workflows to process all of the changes from the PowerExchange Logger log files on the PowerExchange Oracle CDC with LogMiner instance to EOL and then stop.

5. After the workflows stop, edit the associated PowerCenter sessions again to switch to the connection that you will use on an ongoing basis to extract changes from the PowerExchange Express CDC for Oracle instance. You previously created this connection when migrating the first set of Oracle tables.

6. Use the DTLURDMO utility to copy capture registrations and extraction maps for the Oracle tables that you are migrating from the PowerExchange Oracle CDC with LogMiner instance to the PowerExchange Express CDC for Oracle instance.

   Note: If you edited the original extraction maps, for example, to add Before Image (BI) or Change Indicator (CI) columns, use the XM_COPY statement instead of the CREATEXMAPS statement. XM_COPY copies the original extraction maps, whereas CREATEXMAPS regenerates the extraction maps based on the registrations.
7. In the PowerExchange Navigator, deactivate the original capture registrations on the PowerExchange Oracle LogMiner CDC instance for the Oracle tables that you are migrating. In each of these registrations, set the **status** option to **History**.

   Registrations that have a status of **History** cannot be activated again. They are permanently deactivated.

8. If you are not migrating the last set of Oracle tables to PowerExchange Express CDC for Oracle at this time, and you plan to still use PowerExchange Oracle CDC with LogMiner to process some tables, warm start the PowerExchange Logger on the PowerExchange Oracle CDC with LogMiner instance.

9. On the PowerExchange Oracle Express CDC instance, verify that the PowerExchange Logger has processed changes beyond the Oracle current SCN that you recorded in step 2. Then shut down this PowerExchange Logger.

10. Cold start the CDC workflows for which you edited session properties in step 5.

   The workflows begin extracting Oracle change data from the PowerExchange Logger log files on the PowerExchange Express CDC instance from the default restart point. In this case, the default restart point is the beginning of the oldest PowerExchange Logger log file that is recorded in the CDCT file.

11. On the PowerExchange Express CDC instance, warm start the PowerExchange Logger in continuous mode.

   The PowerExchange Logger should start in continuous mode unless you changed the `COLL_END_LOG=0` setting in the PowerExchange Logger configuration file.

   Repeat this procedure until all Oracle tables of CDC interest have been migrated.

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