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Informatica® PowerExchange

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CDC Guide for z/OS

Informatica PowerExchange CDC Guide for z/OS
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Preface

Use the *Informatica® PowerExchangechange® CDC Guide for z/OS* to learn how to configure, implement, and manage PowerExchange change data capture (CDC) for relational and nonrelational data sources in z/OS environments. Refer to this guide after you complete PowerExchange installation.

In this guide, the term *DB2* refers to Db2 for z/OS.

Note: Certain settings of third-party systems may prevent Informatica PowerExchange connectors from (i) retrieving data from the source database and/or (ii) populating data in the target database. Setting incompatibilities include, but may not be restricted to, the inclusion of parameters such as "CDC_EXCLUDE_JOBNAME" parameters which prevent data from the job being captured and populated to the CA-Datacom maintained CDC database.

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Part I: PowerExchange Change Data Capture Introduction

This part contains the following chapter:

CHAPTER 1

Change Data Capture Overview

This chapter includes the following topics:

PowerExchange CDC Overview

PowerExchange Change Data Capture (CDC) provides the ability to capture insert, update, and delete operations performed against z/OS data sources. When capturing changes, PowerExchange uses techniques that help minimize the impact on the performance and availability of the source table, database, or data set.

Sometimes, PowerExchange CDC captures changes in near real time by integrating with the transaction that performs the change. This technique is called synchronous change data capture. In other cases, PowerExchange CDC captures changes from the source database or source relational database logs. This technique is known as asynchronous or log-based change data capture.

PowerExchange can capture changes from the following z/OS data sources:

- Adabas files
- Datacom databases
- DB2 for z/OS tables
- IDMS databases
- IMS databases
- VSAM data sets

PowerExchange uses the following components for change data capture:

PowerExchange Agent

On a z/OS system, provides and verifies capture registration information for ECCRs.

PowerExchange Condense

Optionally creates condense files that contain a condensed version of the change data in the change stream.

PowerExchange Environmental Change Capture Routine (ECCR)

On a z/OS system, captures change data from a data source and passes the captured changes to the PowerExchange Logger for recording.

PowerExchange Listener

Manages data maps for nonrelational files and DB2 tables and capture registrations and extraction maps for all data sources. It also handles extraction requests for bulk data and change data.

PowerExchange Logger

On a z/OS system, receives captured change data from the ECCRs that are connected to it and stores the change data in log data sets.

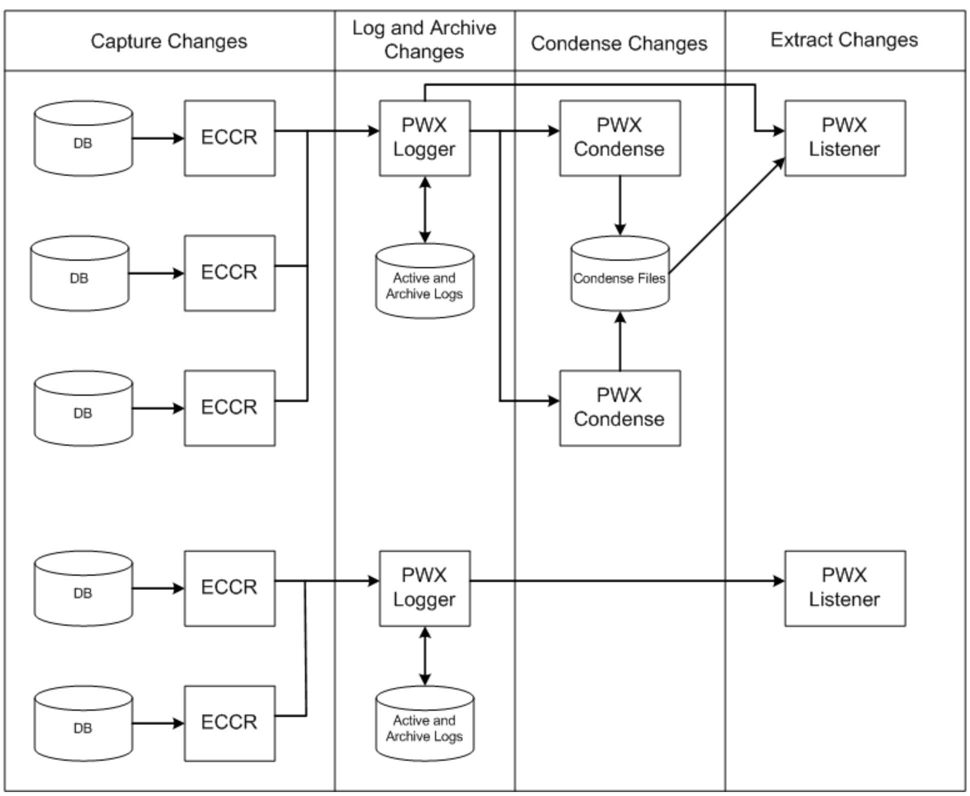
PowerExchange Navigator

The graphical user interface that you use to define and manage data maps, capture registrations, and extraction maps for the data sources from which you want to extract bulk data or capture change data.

The PowerExchange Navigator runs on Windows. All of the other components run on z/OS.

The PowerExchange architecture is flexible enough to provide for many alternative configurations. You can configure PowerExchange to handle large volumes of change data using multiple instances of PowerExchange CDC components on a single z/OS system. You can capture change data from different source types to multiple PowerExchange Loggers.

The following figure shows an example configuration on a single z/OS system:



This sample configuration contains the following components:

- Multiple ECCRs writing to a single PowerExchange Logger.
- Multiple instances of the PowerExchange Logger running simultaneously.

- Multiple instances of PowerExchange Condense running simultaneously to extract changes from the logs of one PowerExchange Logger.
- Multiple instances of the PowerExchange Listener running simultaneously and extracting changes from the logs of a PowerExchange Logger.
- One PowerExchange Listener extracting changes from both the logs of a PowerExchange Logger and from condense files. To prevent data loss, the PowerExchange Logger provides dual logging for both the active and archive log data sets.

You can use PowerCenter® to propagate the change data to one or more relational or nonrelational targets in your enterprise. PowerExchange CDC works in conjunction with PowerCenter to perform the following tasks:

- Capture change data for sources from which you want to propagate data
- Create an inventory of captured change data that you can use for auditing, recovery, and data propagation
- Provide data transformation capabilities that enable you to propagate changes that are captured from a database on one system to another type of database that is on another system

PowerExchange Components for CDC

PowerExchange uses a number of components for change data capture. The PowerExchange Navigator runs on Windows. All of the other components run on MVS.

PowerExchange Agent

On an MVS system, the PowerExchange Agent provides and verifies capture registration information for ECCRs. The PowerExchange Agent provides capture registration information to the following ECCRs:

- DB2
- IMS Synchronous
- Batch VSAM
- CICS/VSAM

Other ECCRs read capture registrations directly from the CCT data set. For all of the ECCRs, the PowerExchange Agent verifies the capture registration information.

The PowerExchange Agent also manages global queues and data flow among various PowerExchange CDC components.

PowerExchange Environmental Change Capture Routine (ECCR)

On an MVS system, the ECCR captures change data from a data source and passes the captured changes to the PowerExchange Logger for recording.

PowerExchange provides an ECCR for each data source. The ECCR captures the changes to the source and passes the captured changes to the PowerExchange Logger for recording.

The mechanism that the ECCR uses to capture the changes depends on the data source. Some ECCRs capture changes synchronously as the changes are occurring. Other ECCRs capture changes asynchronously from database logs or CDC tables.

PowerExchange provides synchronous ECCRs for the following sources:

- Datacom
- IMS
- Batch VSAM
- CICS/VSAM

PowerExchange provides asynchronous ECCRs for the following sources:

- Adabas
- Datacom
- DB2
- IDMS
- IMS

With the exception of Datacom, the asynchronous ECCRs are log-based. Datacom is a table-based ECCR.

PowerExchange Listener

The PowerExchange Listener manages data maps for nonrelational files and DB2 tables and capture registrations and extraction maps for all data sources. It also handles extraction requests for bulk data and change data.

The PowerExchange Listener maintains these definitions in the appropriate files:

- Data maps in the DATAMAPS file
- Capture registrations in the CCT file
- Extraction maps in the DTLCAMAP file

When you create and manage capture registrations and extraction maps, the PowerExchange Navigator communicates with the PowerExchange Listener on MVS. When you open a registration group or an extraction group, the PowerExchange Navigator communicates with the PowerExchange Listener to read the appropriate capture registrations or extraction maps. The PowerExchange Navigator uses the location specified in the registration and extraction group definitions to determine the PowerExchange Listener to contact.

PowerExchange Logger for z/OS

The PowerExchange Logger for z/OS receives change data from the ECCRs that connect to it and stores the change data in log data sets.

Real-time extraction sessions or PowerExchange Condense jobs can then extract data from the log data sets. Alternatively, you can configure the PowerExchange Logger for Linux, UNIX, and Windows on a remote system to read read change data from the PowerExchange Logger for z/OS log files and relog that data on the Linux, UNIX, or Windows system.

The PowerExchange Logger for z/OS stores change data in an active log data set. When the active log data set becomes full, the PowerExchange Logger for z/OS archives the change data to a sequential archive log data set. To prevent data loss, the PowerExchange Logger provides dual logging for both the active and archive log data sets.

PowerExchange Condense

PowerExchange Condense creates condense files that contain a condensed version of the changes that were captured by an ECCR and stored by the PowerExchange Logger. PowerExchange Condense processes changes for a single data source. You can run multiple PowerExchange Condense jobs.

When you create a capture registration, specify either full condense or partial condense. For full condense, PowerExchange creates VSAM condense files that contain all successful changes. Full condense processing rationalizes all insert, update, and delete activity into the final image of the row or record. Transactional integrity is not maintained in full condense files.

For partial condense, PowerExchange creates sequential condense files that contain all successful changes. Transactional integrity is maintained in partial condense files.

When using PowerExchange Condense, you extract the change data from the condense files rather than from the PowerExchange Logger log data sets.

PowerExchange Navigator

The PowerExchange Navigator is the graphical user interface that you use to define and manage data maps, capture registrations, and extraction maps for the data sources from which you want to extract bulk data or capture change data.

PowerExchange uses capture registrations to determine what sources are eligible for CDC.You use the PowerExchange Navigator to create and manage capture registrations and extraction maps for change data capture sources. Extraction maps can be imported into PowerCenter for use in extracting the captured change data.

For more information about creating and managing capture registrations and extraction maps, see the *PowerExchange Navigator User Guide*.

PowerExchange CDC for z/OS Data Sources

PowerExchange provides an Environmental Change Capture Routine (ECCR) for each data source. An ECCR captures changes from a data source and passes the captured change data to the PowerExchange Logger for logging.

Restriction: For most CDC data source types, the maximum length of a record for which PowerExchange can capture and process change data is 128,000 bytes. For Adabas spanned records, PowerExchange CDC supports the Adabas maximum spanned record size. For Datacom sources, other Datacom record length limits might apply. For more information, see the CA Datacom documentation.

Adabas Change Data Capture

PowerExchange for Adabas CDC reads an Adabas Protection Log (PLOG) to capture change data. When Adabas switches to a new PLOG, PowerExchange for Adabas CDC records the new PLOG data set name in the PLOG catalog (PCAT).

The Adabas ECCR runs in a separate address space. It periodically checks the PCAT for new PLOGs from which to capture changes and passes any changes from those logs to the PowerExchange Logger for recording.

Each Adabas ECCR captures changes for a single Adabas database. If you have multiple Adabas databases, run an Adabas ECCR for each Adabas database.

Datacom Change Data Capture

PowerExchange for Datacom table-based CDC captures changes asynchronously from Datacom CDC tables. The table-based ECCR listens for changes to the CDC tables and writes the change data to the PowerExchange Logger. You must have Datacom Release 11 SP4 or later.

DB2 for z/OS Change Data Capture

PowerExchange for DB2 CDC uses the DB2 Instrumentation Facility Interface (IFI) to capture change data from DB2 logs. The DB2 ECCR runs in a separate address space and issues IFI 306 calls to DB2 to retrieve the changes. DB2 reads the DB2 logs and passes the data to the DB2 ECCR. The DB2 ECCR passes the change data to the PowerExchange Logger for recording.

A single DB2 ECCR can process change data for all DB2 subsystems in a DB2 data-sharing group.

IDMS Change Data Capture

PowerExchange for IDMS CDC can capture changes asynchronously from IDMS logs. For IDMS asynchronous change data capture, PowerExchange uses the IDMS log-based ECCR. The IDMS log-based ECCR runs in a separate address space. It reads IDMS archive logs to capture change data. When IDMS archives an active journal, PowerExchange for IDMS CDC records the new archive log in the Log Catalog. The IDMS log-based ECCR periodically checks the Log Catalog for new archive logs from which to capture changes and passes any changes from those logs to the PowerExchange Logger for recording.

IMS Change Data Capture

PowerExchange for IMS CDC can captures changes synchronously in the IMS region or asynchronously from IMS logs.

The IMS synchronous ECCR runs in the IMS region. It captures changes as they occur and passes the changes to the PowerExchange Logger for recording. The IMS synchronous ECCR captures changes in the following IMS environments:

- DBCTL
- DB/DC
- Batch

The IMS log-based ECCR runs in a separate address space. It periodically checks the IMS RECON data sets for new system log data sets (SLDS) from which to capture changes and passes any changes from those logs to the PowerExchange Logger for recording.

VSAM Change Data Capture

PowerExchange for VSAM CDC synchronously captures change data for VSAM data sets from batch jobs and from CICS regions.

The Batch VSAM ECCR runs in the batch job address space. It captures changes as they occur using a VSAM JRNAD exit and passes the changes to the PowerExchange Logger for recording.

The CICS/VSAM ECCR runs in the CICS region. It captures changes as they occur using CICS global user exits (GLUE) and task-related user exits (TRUE) and passes the changes to the PowerExchange Logger for recording.

PowerExchange Message Log Data Sets

PowerExchange writes messages to multiple message data sets on z/OS. PowerExchange also writes some WTO messages to the system operator console.

Note: You can determine which, if any, of these locations to route a particular message by using the message destination override capability. For more information, see the *PowerExchange Reference Manual*.

PowerExchange uses the following message log data sets:

DTLLOG

When alternative logging is enabled, the DTLLOG data set contains only the messages up to the point when the alternative logging subtask initializes. Usually, this information consists of only the DBMOVER statements. If you enabled traces with the TRACE statement in the DBMOVER configuration member, the data set also includes diagnostic trace information.

When alternative logging is *not* enabled, the DTLLOG data set is the primary message log data set for run-time messages from the PowerExchange programs and components, including the PowerExchange Agent, PowerExchange Condense, PowerExchange Listener, ECCRs, and PowerExchange utilities.

If you set the CAPT_STATS parameter to Y for the Adabas, Datacom, IDMS, or IMS log-based ECCR, the data set also contains ECCR capture statistics by capture registration.

All message lines begin with a time stamp.

Note: Alternative logging is enabled by default in the TRACING statement in the DBMOVER configuration member.

DTLLOG*nn*

When alternative logging is enabled, PowerExchange sends run-time messages from PowerExchange components, programs, and commands to a set of DTLLOG*nn* data sets that are used in a rotating manner. If you set the CAPT_STATS parameter to Y for the Adabas, Datacom, IDMS, or IMS log-based ECCR, the DTLLOG*nn* log data sets contain ECCR capture statistics messages by capture registration. The DTLLOG*nn* data sets do not include trace information.

The data set names end with a sequential number *nn*. When a log file reaches its specified size, PowerExchange switches to the next log file and begins overwriting any data in that file. Informatica strongly recommends that you use alternative logging on z/OS to help improve logging performance and be able to customize the amount of data that is logged for long-running jobs.

To allocate the DTLLOG*nn* data sets, you can either add DTLLOG*nn* DD statements in the JCL for a PowerExchange component that logs messages to these data sets or configure the TRACING statement to dynamically allocate the data sets. To send the output to a JES2 or JES3 SYSOUT file rather than a data set that you specify, enter a single DLTLLOG01 DD statement in the JCL that specifies the SYSOUT parameter. By using SYSOUT, you can keep the output from a single PowerExchange Listener execution with the rest of the job output. With dynamic allocation, PowerExchange dynamically creates a set of log data sets in a separate directory for each PowerExchange process. The generated data set names vary by component type.

If you use an extended sequential data set as the DTLLOG*nn* data set format, PowerExchange writes only one message on each track. If you use a normal sequential data set, PowerExchange writes one message to each data block.

Note: On z/OS, you cannot see log records in an alternative log data set until the data set is closed. Informatica recommends that you specify VIEW=Y in the TRACING statement to periodically close and reopen an alternative log data set based on the FLUSH interval so that you can view the log records. On operating systems other than z/OS, you do not need to set VIEW=Y because you can view the log records whenever PowerExchange flushes them to disk.

DTLOUT

DTLOUT is a dynamically allocated data set that usually contains normal output from PowerExchange programs. When alternative logging is disabled, this data set contains most of the same run-time messages as in the DTLLOG data sets but without the time stamps at the beginning of each message line.

If you set the CAPT_STATS parameter to Y for the Adabas, Datacom, IDMS, or IMS log-based ECCR, the DTLOUT data set also contains ECCR capture statistics messages by capture registration.

If alternative logging is enabled and you use PowerExchange Condense, the DTLOUT data set contains messages only if condense file allocation errors occurred.

DTLERR

DTLERR is a dynamically allocated data set that contains error and diagnostic messages from PowerExchange programs.

EDMMSG

The EDMMSG data set contains PWXEDM messages from the PowerExchange ECCRs, PowerExchange Logger for z/OS, Log Read API (LRAPI), and the Log Write API (LWAPI). The data set is allocated based on the EDMMSG DD statement in the JCL for a component, or if you do not include the EDMMSG DD in the JCL, the EDMMSG data set is dynamically allocated.

The EDMMSG data set includes Logger messages that are generated when CDC workflows run. If you use PowerExchange Condense, this data set also includes messages that indicate the PowerExchange Logger and PowerExchange Agent to which a Condense job attaches and the starting point at which to begin, which is passed to the Logger.

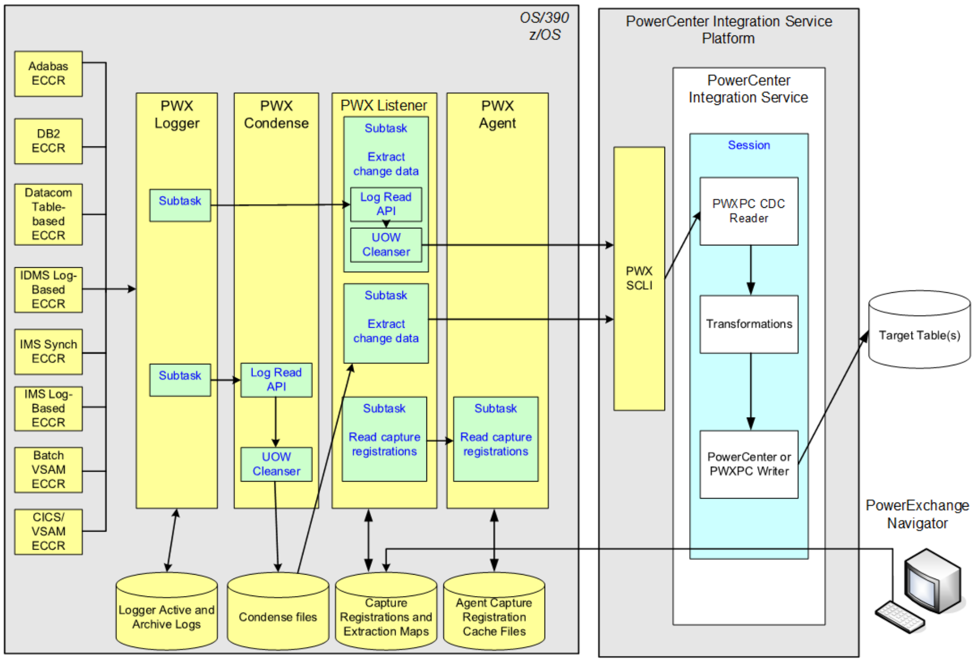
PowerExchange Integration with PowerCenter

PowerCenter works in conjunction with the PowerExchange Client for PowerCenter (PWXPC) to extract the change data that PowerExchange captures and apply it to one or more targets.

The primary function of PWXPC is to integrate PowerExchange with PowerCenter so that PowerCenter can access PowerExchange-controlled data and write it to various targets. With PWXPC, CDC sessions can extract change data from both PowerExchange Logger log data sets and PowerExchange Condense condense files.

PowerCenter provides transformation and data cleansing capabilities, which you can use in your CDC sessions.

The following figure shows the data flow for processing change data that PowerExchange captured from z/OS data sources:



In this data flow, PowerExchange ECCR components capture change data and send it to the PowerExchange Logger. Optionally, PowerExchange Condense reads data from the PowerExchange Logger log files and writes it to condense files. When a CDC session runs on the PowerCenter Integration Service machine, PWXPC uses the PWX SCLI interface to communicate with the PowerExchange Listener on the z/OS system to retrieve change data.

For more information about PWXPC, see *PowerExchange Interfaces for PowerCenter*.

Summary of CDC Implementation Tasks

After you install PowerExchange, you can configure change data capture and extraction, materialize targets, and start extraction processing.

The following table identifies the tasks that you perform to implement change data capture and extraction processing for a z/OS data source:

Step	Task	References
1	Configure the PowerExchange Listener.	- *PowerExchange Bulk Data Movement Guide* - "Configuring the PowerExchange Listener" on page 27
2	Start the PowerExchange Listener.	"Managing the PowerExchange Listener" on page 35
3	Configure the PowerExchange Agent.	"Configuring the PowerExchange Agent " on page 39
4	Start the PowerExchange Agent.	"Managing the PowerExchange Agent" on page 50

Step	Task	References
5	Configure the PowerExchange Logger.	"PowerExchange Logger Configuration Considerations" on page 58
6	Start the PowerExchange Logger.	"Managing Log and Restart Data Sets" on page 72
7	Configure the appropriate PowerExchange ECCR for the data source.	"CDC Sources Configuration and Management" on page 139
8	Create a data map using the PowerExchange Navigator. This step is required for nonrelational sources.	*PowerExchange Navigator User Guide*
9	For DB2 sources that require user-defined fields and expressions, create a data map using the PowerExchange Navigator.	*PowerExchange Navigator User Guide*
10	Define and activate capture registrations and extraction maps for the data source using the PowerExchange Navigator.	*PowerExchange Navigator User Guide*
11	Materialize the target from the source.	*PowerExchange Bulk Data Movement Guide*
12	Establish a starting point for the extraction.	"Change Data Extraction" on page 311
13	Start the ECCR.	"CDC Sources Configuration and Management" on page 139
14	(Optional) Configure PowerExchange Condense.	"Configuring PowerExchange Condense" on page 99
15	(Optional) Start PowerExchange Condense.	"Starting and Stopping PowerExchange Condense" on page 129
16	Prepare and extract change data using PowerCenter.	- *PowerExchange Interfaces for PowerCenter* - *PowerCenter Designer Guide* - *PowerCenter Workflow Basics Guide*

Part II: CDC Components Configuration and Management

This part contains the following chapters:

CHAPTER 2

PowerExchange Listener

This chapter includes the following topics:

PowerExchange Listener Overview

The PowerExchange Listener is a PowerExchange CDC component that provides services to other PowerExchange CDC components and to PowerExchange users.

The PowerExchange Listener provides the following types of services:

- Stores and manages data maps, capture registrations, and extraction maps for z/OS sources registered for CDC
- Provides new or modified capture registrations to the PowerExchange Agent
- Provides captured change data to PowerCenter extractions and to the PowerExchange Navigator database row tests

The PowerExchange Listener interacts with the following PowerExchange CDC components:

- PowerExchange Navigator
- PowerExchange Agent
- PowerExchange Logger

Configuring the PowerExchange Listener

The PowerExchange Listener manages capture registrations and extraction maps for change data capture sources. Also, you must connect to the PowerExchange Listener to extract the captured change data.

Before performing change data capture from z/OS data sources, configure the following items for the PowerExchange Listener:

- The PowerExchange Listener JCL on the z/OS system where change data, capture registrations, and extraction maps reside

- The DBMOVER configuration file statements that the PowerExchange Listener uses, including the CAPI_CONNECTION statements for the data sources

Configuring the PowerExchange Listener JCL

Change data capture requires additional DD statements in the PowerExchange Listener JCL. If you selected change data capture options during the installation process, PowerExchange customizes the PowerExchange Listener JCL to include these DD statements.

Verify that the PowerExchange Listener JCL is correct. If necessary, correct the JCL and recycle the PowerExchange Listener.

The following table lists the DD statements required for CDC:

DD Statement Name	Description
DTLAMCPR	Required. Points to the VSAM CCT data set, which contains the capture registrations.
DTLCACDC	Optional. Points to the VSAM CDCT data set, which contains condense file information. This DD statement is only necessary if you are using PowerExchange Condense.
DTLCACDE	Required. Points to the VSAM CDEP data set, which contains the application names. This DD statement is necessary to perform database row tests from the PowerExchange Navigator and if extracting data using PowerExchange ODBC connections in PowerCenter.
DTLCAMAP	Required. Points to the VSAM DTLCAMAP data set, which contains the extraction maps.
EDMPARMS	Required. Points to the USERLIB library, which contains the EDMSDIR module options used to connect to the appropriate PowerExchange Agent and Logger.

Note: If you want to override the default time that the Log Read API (LRAPI) waits for a response after sending a command to the PowerExchange Logger for z/OS, you can include the EDMLRPRM DD statement with the appropriate parameters in the PowerExchange Listener JCL. The parameters then pertain to all LRAPI instances and extractions. Alternatively, you can specify the parameters for a specific LRAPI instance by specifying the EDMLRPRM DD in the job that issues the Log-Read API (LRAPI) calls to the PowerExchange Logger. For more information, see “Overriding Log-Read API Timed Defaults” on page 69.

Configuring CAPI_CONNECTION Statements

To extract captured change data using real-time extraction mode, the PowerExchange Listener invokes the Log-Read API to connect to the PowerExchange Logger.

Change the DBMOVER configuration parameters used by the PowerExchange Listener on the MVS system where the change data is stored to include UOW Cleanser and Log-Read API CAPI_CONNECTION statements. Recycle the PowerExchange Listener to activate the changes in the DBMOVER configuration parameters.

CAPI_CONNECTION - LRAP Statement

The LRAP CAPI_CONNECTION statement specifies a named set of parameters that the Consumer API (CAPI) uses for the Log Read API (LRAPI) component of the PowerExchange Logger for z/OS.

The LRAPI connects to the PowerExchange Logger to read change data for the address space that is extracting that data, such as the PowerExchange Listener address space.

Data Sources: Adabas, CA Datacom/DB, CA IDMS/DB, Db2 for z/OS, IMS, and VSAM

Related Statements: CAPI_CONNECTION - UOWC

Required: Yes for z/OS CDC

Syntax:

```
CAPI_CONNECTION=([DLLTRACE=trace_id]
                  ,NAME=capi_connection_name
                 [,TRACE=trace_name]
                  ,TYPE=(LRAP
                        ,AGENT=agent_id
                        ,LOG=logger_id
                       [,EOF={Y|N}]
                       [,FUZZYRSTART={Y|N}]
                       [,UIDFMT={UID|CONN|CORR|CTYPE|PLAN|ALL}]
                       [,UIDFMTIMS={UID|PSB|ALL}]
                   )
)
```

Parameters:

DLLTRACE=*trace_id*

Optional. A user-defined name for the TRACE statement that activates internal DLL tracing for this CAPI. Specify this parameter only at the direction of Informatica Global Customer Support.

NAME=*capi_connection_name*

Required. A unique user-defined name for this CAPI_CONNECTION statement.

Maximum length is eight alphanumeric characters.

TRACE=*trace_name*

Optional. A user-defined name for the TRACE statement that activates the common CAPI tracing. Specify this parameter only at the direction of Informatica Global Customer Support.

TYPE=(LRAP, ...)

Required. Type of CAPI_CONNECTION statement. For the LRAPI, this value must be LRAP.

AGENT=*agent_id*

Required. The PowerExchange Agent ID. This value must match the value in the AGENTID parameter of the EDMSDIR module. PowerExchange reads the EDMSDIR module from the EDMPARMS DD statement, or if this statement is not specified, from the STEPLIB or JOBLIB DD statement.

Maximum length is four alphanumeric characters.

LOG=*logger_id*

Required. The PowerExchange Logger ID. This value must match the value specified in the LOGGER parameter of the EDMSDIR module.

Maximum length is four alphanumeric characters.

EOF={N|Y}

Optional. Controls whether PowerExchange stops change data extractions after reaching the end-of-log (EOL).

Options are:

- **N**. PowerExchange does not stop change data extractions when EOL is reached.
- **Y**. PowerExchange stops change data extractions when EOL is reached.

Default is N.

Because this parameter affects all users of the LRAP CAPI_CONNECTION statement, Informatica recommends that you use one of the following alternative methods to stop change data extractions at EOL:

- For CDC sessions that use real-time extraction mode, enter 0 for the **Idle Time** attribute on the PWX DB2zOS CDC Real Time application connections.
- For PowerExchange Condense, enter 1 in the COLL_END_LOG statement in the CAPTPARM configuration member.
- For CDC sessions that use ODBC connections, enter 0 for the WAITTIME parameter in the ODBC data source.

FUZZYRSTART={Y|N}

Optional. Controls whether the restart2 token in the restart information that the PowerExchange Client for PowerCenter sends to the PowerExchange Logger for z/OS for a CDC session points to a begin-uow record or any RBA position that you specify in the restart2 token.

This parameter also pertains to the Restart Token 2 value that you specify for PowerExchange Navigator CAPX and CAPXRT database row tests.

Options are:

- **Y**. Allow the restart2 token to point to any position in the PowerExchange Logger logged data. This option enables you to skip a problematic record.
- **N**. Require the restart2 token to point to a begin-uow record in the PowerExchange Logger logged data.

Default is Y.

UIDFMT={UID|CONN|CORR|CTYPE|PLAN|ALL}

Optional. For Db2 for z/OS CDC sources, controls the type of value that PowerExchange returns in the generated DTL__CAPXUSER field in each change record. Options are:

- **UID**. Returns the user ID of the user who made the change.
- **CONN**. Returns the Db2 connection identifier at the time the change was made.
- **CORR**. Returns the Db2 correlation identifier at the time the change was made.
- **CTYPE**. Returns the Db2 connection type at the time the change was made.
- **PLAN**. Returns the Db2 plan name at the time the change was made.
- **ALL**. Returns all of the information supplied by the other options. PowerExchange provides this information in a colon-delimited list in the following format:

    userid:*plan_name*:*correlation_id*:*connection_id*:*connection_type*

Default is UID.

Restriction: You can specify only one option.

UIDFMTIMS={UID|PSB|ALL}

Optional. For IMS synchronous CDC data sources, controls the type of value that PowerExchange uses to populate the generated DTL__CAPXUSER column in each change record. Options are:

- **UID**. Returns the user ID of the user who made the IMS change.
- **PSB**. Returns the IMS program specification block (PSB) name.

- **ALL**. Returns both the user ID and PSB name in the format *userid*:*psbname*.

Default is UID.

Restriction: You can specify only one option.

CAPI_CONNECTION - UOWC Statement

The UOWC CAPI_CONNECTION statement specifies a named set of parameters that the Consumer API (CAPI) uses for the UOW Cleanser.

In the change stream for some data sources, changes from multiple UOWs are intermingled. The UOW Cleanser reconstructs the intermingled changes read from the change stream into complete UOWs in chronological order based on end time.

Operating Systems: i5/OS, Linux, UNIX, Windows, and z/OS

Data Sources: Db2 for i5/OS and z/OS CDC sources

Related Statements: CAPI_CONNECTION - AS4J and CAPI_CONNECTION - LRAP

Required: Yes, for CDC for the specified sources

Syntax:

```
CAPI_CONNECTION=([DLLTRACE=trace_id]
                  ,NAME=capi_connection_name
                 [,TRACE=trace_name]
                  ,TYPE=(UOWC
                         ,CAPINAME=source_capi_name
                        [,BLKSIZE=block_size]
                        [,CUOWS={number_of_concurrent_UOWs|34}]
                        [,DATACLASS=data_class]
                        [,LARGEOPS=number_of_operations]
                        [,MEMCACHE={cache_size|1024}]
                        [,MONITORINT={minutes|5}]
                        [,RSTRADV=seconds]
                        [,SPACEPRI={primary_space|50}]
                        [,SPACETYP={BLK|TRK|CYL}]
                        [,SPILLKEEP=number_of_spill_files]
                        [,STORCLASS=storage_class]
                        [,TIMESTAMP={LOG|COMMIT}]
                        [,UNIT=unit]
                   )
)
```

Parameters:

DLLTRACE=*trace_id*

Optional. A user-defined name for the TRACE statement that activates internal DLL tracing for this CAPI.

Specify this parameter only at the direction of Informatica Global Customer Support.

NAME=*capi_connection_name*

Required. A unique user-defined name for this CAPI_CONNECTION statement.

Maximum length is eight alphanumeric characters.

TRACE=*trace_name*

Optional. A user-defined name for the TRACE statement that activates the common CAPI tracing.

Specify this parameter only at the direction of Informatica Global Customer Support.

TYPE=(UOWC, ...)

Required. The type of CAPI_CONNECTION statement. For the UOW Cleanser, this value must be UOWC.

CAPINAME=*capi_name*

Required. The value of the NAME parameter in the related source-specific CAPI_CONNECTION statement, which can be one of the following statement types:

- AS4J CAPI_CONNECTION statement for Db2 for i (i5/OS) sources
- LRAP CAPI_CONNECTION statement for data sources on z/OS

BLKSIZE=*block_size*

Optional. The block size, in bytes, for the sequential UOW spill files that the UOW Cleanser creates when the memory cache cannot hold all changes for a UOW.

The following table shows valid values by CDC source type:

Data Source Type	Valid Values	Default Value
Db2 for i (i5/OS)	A number from 8 through 32760	32760
z/OS data sources	A number from 8 through 32760	18452

CUOWS=*number_of_concurrent_UOWs*

The expected number of concurrent UOWs that contain data of CDC interest. If you specified a large MEMCACHE value, have excessive spill file allocations, and notice a large number of concurrent UOWs reported in message PWX-10742 or PWX-10782, increase this parameter value to cause less memory cache to be used per UOW. By reducing memory cache use per UOW, more concurrent UOWs can be accommodated without allocating spill files. This parameter in no way restricts the maximum number of concurrent UOWs that the UOW Cleanser can process.

Valid values are 1 through 65535. Default is 34.

DATACLASS=*data_class*

Optional. On z/OS, the SMS data class that the UOW Cleanser uses when allocating the sequential UOW spill files. If you do not specify this parameter, the SMS ACS routines can assign the data class.

LARGEOPS=*number of operations*

Optional. Overrides the default value that PowerExchange uses to identify transactions as large transactions for reporting purposes. Enter the number of DML operations (inserts, updates, and deletes), in thousands, that a transaction must contain to be considered a large transaction.

PowerExchange issues status messages for large transactions that meet this criteria. If PowerExchange issues too many messages, you can increase this value to limit the number of messages.

Valid values are 1 through 2147483 (1000 through 2,147,483,000 operations). The default value is one half of the MEMCACHE parameter value rounded up to the nearest thousand. Based on the default MEMCACHE value of 1024 KB, the default LARGEOPS value is 1000 (1,000,000 operations).

MEMCACHE={*cache_size*|1024}

Optional. The maximum memory cache size, in kilobytes, that PowerExchange allocates to reconstruct complete UOWs.

Enter a number from 0 through 2147483647. Default is 1024 KB. If you enter 0, the memory cache size is limited only by the available memory on the system.

For each extraction session, PowerExchange keeps all changes for each UOW in the memory cache until it processes the end-UOW record. PowerExchange incrementally allocates memory cache up to the limit that this parameter specifies. If the memory cache is too small to hold all of the changes in a UOW, PowerExchange spills the changes to a sequential files on disk, called UOW spill files.

Each UOW spill file contains one UOW. A UOW might require multiple UOW spill files to hold all of the changes for that UOW. If the change stream contains multiple large UOWs and the memory cache is insufficient, PowerExchange might create numerous UOW spill files.

PowerExchange processes the change stream more efficiently if it does not need to use UOW spill files. A large number of UOW spill files can degrade extraction performance and cause disk space shortages.

Important: If the change stream contains small UOWs, the default value might be sufficient. However, Informatica recommends that you specify a larger value because the default value is often too small.

The location in which PowerExchange allocates the UOW spill files varies by operating system, as follows:

- For i5/OS, PowerExchange uses CRTPF command to create a physical file for UOW spill files.

  PowerExchange names the UOW spill files using the C/C++ tmpnam() function.
- For Linux and UNIX, PowerExchange uses the current directory by default for UOW spill files. To use a different directory, specify the TMPDIR environment variable.

  PowerExchange names the UOW spill file names using the prefix "dtlq" and the operating system function tempnam.

  Note: The UOW spill files are temporary files that are deleted when PowerExchange closes them. These files are not visible in the directory while they are open.
- For Windows, PowerExchange uses the current directory by default for UOW spill files. To use a different directory, specify the TMP environment variable.

  PowerExchange names the UOW spill file using the prefix "dtlq" and the Windows _tempnam function.
- For z/OS, PowerExchange uses dynamic allocation to allocate temporary data sets for the UOW spill files. Generally, SMS controls the location of temporary data sets. If you do not use SMS to control temporary data sets, the UNIT parameter controls the location for the UOW spill files.

  Because PowerExchange allocates temporary data sets for the UOW spill files, z/OS assigns these files system-generated data set names, which begin with SYS*yyddd*.T*hhmmss*.RA000.*jobname*.

Warning: PowerExchange allocates the cache size for each extraction operation. If you use a large MEMCACHE value and run many concurrent extraction sessions, memory constraints can occur.

MONITORINT=*minutes*

Optional. The time interval, in minutes, at which PowerExchange checks transaction activity for long outstanding transactions and large transactions. A long outstanding transaction is one that remains active for two monitoring intervals, and a large transaction is one that meets the LARGEOPS criteria. When this interval elapses, PowerExchange issues messages that identify the large transactions and long outstanding transactions and report their processing activity. PowerExchange also issues messages that identify the current position in the change stream. Valid values are 0 through 720. A value of 0 disables monitoring. Default is 5.

RSTRADV=*seconds*

The time interval, in seconds, that PowerExchange waits before advancing restart and sequence tokens for a registered data source during periods when UOWs do not include any changes of interest for the data source. When the wait interval expires, PowerExchange returns the next committed "empty UOW," which includes only updated restart information.

Enter a number from 0 through 86400. No default is provided.

PowerExchange resets the wait interval to 0 when one of the following events occur:

- PowerExchange completes processing a UOW that includes changes of interest.
- PowerExchange returns an empty UOW because the wait interval expired without PowerExchange receiving any changes of interest.

For example, if you specify 5, PowerExchange waits five seconds after it completes processing the last UOW or after the previous wait interval expires. Then PowerExchange returns the next committed empty UOW that includes the updated restart information and resets the wait interval to 0.

If you do not specify RSTRADV, PowerExchange does not advance restart and sequence tokens for a registered source during periods when PowerExchange receives no changes of interest. When PowerExchange warm starts, it reads all changes, including those not of interest for CDC, from the restart point.

For Db2 for i (i5/OS) sources, Informatica recommends that you use this parameter if the change records that PowerExchange reads from i5/OS journal receivers are created under commitment control. If the change records are created without commitment control, do not specify this parameter.

Attention: A value of 0 can degrade performance. In addition to the UOWs that contain changes for registered sources of interest, PowerExchange returns an empty UOW for every UOW that does not contain changes for the registered sources of interest.

SPACEPRI={*primary_space*|50}

Optional. On z/OS, the amount of primary space that the UOW Cleanser uses for allocating UOW spill files. The SPACETYP parameter indicates the type of space units.

Enter a number from 1 through 16777215. Default is 50 blocks.

The UOW Cleanser does not use secondary space. Instead, when a spill file becomes full, the UOW Cleanser allocates another spill file of the same size.

SMS ACS routines can override the UOW spill file size.

Note: On i5/OS, the UOW Cleanser allocates UOW spill files as physical files with SIZE(*NOMAX), which means that the maximum spill file size is controlled by the system maximum file size. On Linux, UNIX, and Windows, PowerExchange allocates UOW spill files as temporary files that are 2 GB in size.

SPACETYP={BLK|TRK|CYL}

Optional. On z/OS, the type of units in which the primary space for UOW Cleanser allocation of UOW spill files is expressed.

Options are:

- **BLK**. Blocks.
- **CYL**. Cylinders.

- **TRK**. Tracks.

Default is BLK.

SPILLKEEP=*number_of_spill_files*

Optional. The number of spill files that the UOW Cleanser retains for re-assignment. The UOW Cleanser retains spill files instead of deallocating them so that the files are available to be reassigned to new transactions. This feature is intended to prevent excessive file deallocation and allocation activity.

Valid values are 0 through 999. On z/OS and i5/OS, the default is 3. On Linux, UNIX, and Windows, the default is 0.

STORCLASS=*storage_class*

Optional. On z/OS, the SMS storage class name that the UOW Cleanser uses to allocate UOW spill files.

TIMESTAMP={LOG|COMMIT}

Optional. The type of timestamp that PowerExchange records in the generated DTL__CAPXTIMESTAMP column of each change record for a transaction. Specify this parameter only if you want to display the commit timestamp instead of the timestamp from the source logs or data sets.

Options are:

- **LOG**. The timestamp of a change on the source database, as recorded by the DBMS in the source database logs or data sets near the time when the change is made. For more information, see Appendix B, "DTL__CAPXTIMESTAMP Time Stamps" on page 395.
- **COMMIT**. The timestamp of the transaction commit on the source database. Specify this option if you use the timestamp to calculate latency.

Default is LOG.

UNIT=*unit*

Optional. On z/OS, the generic or esoteric unit name that the UOW Cleanser uses to allocate UOW spill files.

Managing the PowerExchange Listener

You can control certain aspects of PowerExchange Listener processing by using commands.

Starting the PowerExchange Listener

You can run the PowerExchange Listener as a started task or batch job. Because the PowerExchange Listener is long running, usually the preferred method is to run the PowerExchange Listener as a started task.

Start the PowerExchange Listener prior to starting any other PowerExchange CDC component address space, including the PowerExchange Agent address space.

To start the PowerExchange Listener, issue the MVS START command followed by the name of the started task or batch job. For example:

```
START listener_task_name
```

Stopping the PowerExchange Listener

To stop the PowerExchange Listener, you can use the MVS MODIFY command (F) followed by the PowerExchange CLOSE or CLOSE FORCE command.

Use the following syntax:

```
F listener_task_name,CLOSE
```

Command descriptions:

- CLOSE causes the PowerExchange Listener to stop after all user subtasks complete, including bulk data movement subtasks and CDC subtasks.
- CLOSE FORCE causes the PowerExchange Listener to wait 30 seconds for active tasks to complete and then stops any remaining active tasks before shutting down. This command has the same result as the MVS STOP (P) command.

Note: You can use the pwxcmd program to issue the close or closeforce command from a Linux, UNIX, or Windows system.

Controlling PowerExchange Listener Tasks

PowerExchange supplies several commands that you can use to control PowerExchange Listener tasks.

Enter PowerExchange Listener commands with the z/OS MODIFY (F) command. Use the following syntax:

```
F listener_task_name,command
```

Use the following commands to list or stop PowerExchange Listener tasks:

LISTTASK

Lists all active PowerExchange Listener tasks.

STOPTASK

Stops a specified PowerExchange Listener task.

Alternatively, you can use the pwxcmd program to issue listtask and stoptask commands from a remote Linux, UNIX, or Windows system to a PowerExchange Listener running on a z/OS system. The pwxcmd commands provide the same results.

For more information about PowerExchange Listener commands, see the *PowerExchange Command Reference*.

Controlling PowerExchange Listener Resource Usage

You can use Workload Manager (WLM) service classes to control PowerExchange Listener usage of resources, such as storage, CPU, and I/O devices.

For more information, see "Using WLM Service Classes to Prioritize PowerExchange CDC Started Tasks on z/OS" on page 386.

CHAPTER 3

PowerExchange Agent

This chapter includes the following topics:

PowerExchange Agent Overview

The PowerExchange Agent is a PowerExchange CDC component that provides services to other PowerExchange CDC components. It runs as a started task in a separate address space.

The PowerExchange Agent has the following characteristics:

- The PowerExchange Agent interacts with the following PowerExchange CDC components:
  - PowerExchange Listener
  - Environmental Change Capture Routines (ECCRs)
  - PowerExchange Logger for z/OS
- The PowerExchange Agent provides the following services to the other CDC components:
  - Gets and manages global queues for the PowerExchange CDC components.
  - Gets new or modified capture registrations from the PowerExchange Listener.
  - Manages data flow between PowerExchange CDC components that run in different address spaces.
  - Manages requests from ECCRs for capture registration information.
  - Provides access to authorized users.
  - Provides a common message log.
- Start the PowerExchange Agent started task after you start the PowerExchange Listener and before you start the PowerExchange Logger and ECCRs. The following start order is recommended:
  1. PowerExchange Listener
  2. PowerExchange Agent
  3. PowerExchange Logger
  4. ECCRs

- The PowerExchange Agent connects to a single PowerExchange Listener. By default, the PowerExchange Agent gets capture registration information from the PowerExchange Listener.
- If you run more than one PowerExchange Listener on the z/OS system and create, edit, or delete capture registrations, make sure that you use the PowerExchange Listener on z/OS that interacts with the PowerExchange Agent. This requirement applies to registration changes that you make from the PowerExchange Navigator and with the DTLUCBRG and DTLURDMO utilities. The PowerExchange Agent can then refresh its memory cache with information from the CCT file that reflects the registration changes.
- The PowerExchange Agent uses the AgentID parameter in the AGENTCTL member, to which the EDMSCTL DD in the Agent JCL points, to create its z/OS subsystem. Use the AgentID to communicate with the PowerExchange Agent address space.
- You can control certain aspects of PowerExchange Agent processing by issuing commands from the MVS system console.
- The PowerExchange Agent cannot run as a batch job.

Running Multiple Instances of the PowerExchange Agent

You can run multiple instances of the PowerExchange Agent simultaneously on a single MVS system. For example, you may want to run separate instances for your test and production environments. Ideally, you should create a separate test and production environment and use a different PowerExchange Agent for each environment.

Use the following rules and guidelines when you run multiple instances of the PowerExchange Agent:

- A PowerExchange Agent can only use one PowerExchange repository.
- Multiple PowerExchange Agents can share the same PowerExchange repository.
- The Batch VSAM ECCR status specified in AGENTCTL parameters affects all PowerExchange Agents on a single MVS system. If you activate or deactivate the Batch VSAM ECCR for one PowerExchange Agent, the status changes for all PowerExchange Agents on the same MVS system.
- The AgentID specified in the AGENCTL parameters is defined as an MVS subsystem. To use the same AgentID for different PowerExchange Agents, each PowerExchange Agent must reside on a different MVS system.

Configuring z/OS for the PowerExchange Agent

To optimize the z/OS configuration for the PowerExchange Agent, consider increasing the following items:

- Number of linkage indexes.
- Number of common data spaces.

Linkage Indexes and Common Data Spaces

You might need to increase the values of the NSYSLX and MAXCAD parameters in the EASYS*xx* member of the SYS1.PARMLIB library.

To determine whether to increase these values, use the following guidelines:

- Each PowerExchange Agent requires two linkage index entries.
  During warm start processing, the PowerExchange Agent reuses the linkage index entries. During cold start processing, two new linkage index entries are used. Consider increasing the NSYSLX parameter of the EASYS*xx* member in SYS1.PARMLIB.
- Each PowerExchange Agent uses one common data space.
  If you use the SHUTDOWN command with the COMPLETELY option to stop the PowerExchange Agent, PowerExchange CDC deletes the data space. However, if you do not specify the COMPLETELY option, the data space persists.

  When you restart the PowerExchange Agent, the agent reuses the data space if it exists, unless you are performing a cold start. Consider increasing the MAXCAD parameter of the EASYS*xx* member in the SYS1.PARMLIB to enable increased usage of common data spaces.

If you change the NSYSLX and MAXCAD parameter, you must IPL the z/OS system for the changes to take effect.

Global Enqueue for PowerExchange CDC

PowerExchange CDC issues only SYSTEMS-level enqueues for serializing across multiple MVS systems. To use PowerExchange CDC on multiple MVS systems, you must make use of a global serialization product such as GRS or MIM to propagate these enqueues.

If you are using a cross-system serialization product that requires you to specifically define the enqueues that need to be propagated globally, you need to know the QNAMEs issued by PowerExchange CDC.

Note: The DB2 ECCR uses a SYSTEMS-level enqueue to prevent multiple instances of the same ECCR running. The QNAME is DB2CAPT. The RNAME is an eight-byte field, the NAME= value from the DB2 ECCR REPL2CTL control file statement CA. The SYSTEMS enqueue exists for the life of the ECCR execution.

You might need to include this information in the options for your cross-system serialization product to ensure these enqueues are properly handled.

Configuring the PowerExchange Agent

The PowerExchange Agent has several options and parameters that control unique aspects of its operation:

- EDMSDIR module options
- AGENTCTL parameters
- AGENTREP parameters

When you install PowerExchange, these options and parameters are configured with defaults and values you provide in the z/OS Installation Assistant. Prior to starting any PowerExchange CDC components, review the PowerExchange Agent options and parameters to ensure they are appropriate for your installation.

EDMSDIR Options Module

Set configuration options for the PowerExchange Agent in the EDMSDIR options module.

When you run the SETUPAGT job during installation, the PowerExchange installer assembles and link-edits the EDMSDIR options module and writes it to the PowerExchange USERLIB data set for CDC. The USERLIB is created when you run the SETUPCC1 job during installation. The installer enters values for some EDMSDIR options based on your entries in the z/OS Installation Assistant.

The EDMSDIR options apply to any PowerExchange CDC component that points to this USERLIB library. You can modify the EDMSDIR options, if necessary.

The following table describes the EDMSDIR options:

Option	Description	Default Value	Valid Values
AGENTID	The name of the default PowerExchange Agent.	EDMA	A valid name has the following characteristics: - Consists of four characters, beginning with a letter, #, @, or $. - Does not conflict with an existing MVS subsystem. - Is not the same as the LOGGER name.
CCERR	The action to take when a Db2 for z/OS, IMS synchronous, batch VSAM, or CICS/ VSAM ECCR is unable to capture changes for a data source.	CONT	Valid values: - **CONT**. Stops change data capture but allows the transaction or job to continue. Some changes might not be captured. - **ABEND**. Ends the job. The transaction does not update the source. For IMS synchronous capture, the BMP or MPP ends abnormally but the control region continues to be active. In a batch DL/I environment, the batch jobs abend. **Notes:** - If you specify ABEND and the CICS/VSAM ECCR encounters a serious error or abends during initialization, PowerExchange ends and backs out in-flight CICS transactions on VSAM source files during syncpoint processing. If this action is not possible, PowerExchange shuts down the CICS region to ensure data integrity. - If the PowerExchange Logger abends or shuts down, it cannot receive updates from the ECCR. In this case, the CICS/ VSAM ECCR causes the CICS update transaction to abend with abend code ASP7 at the transaction syncpoint. Because the transaction does not write updates to the VSAM files that are registered for change capture, PowerExchange does not miss any changes. - Similarly, if the registration status of a file cannot be determined when the file is opened, the CICS/VSAM ECCR abends transactions that update the file, typically with abend code ASP7 at the transaction syncpoint. This situation might occur when the PowerExchange Agent is down or repository access through the PowerExchange Agent has been stopped. Because no updates are written to the files with the uncertain registration status, PowerExchange does not miss any changes.

Option	Description	Default Value	Valid Values
CENTURY	Controls whether to include the century in dates that the PowerExchange CDC components display.	Y	Valid values: - **Y**. Displays the century. - **N**. Displays the date without the century.
DATE	The date format that the PowerExchange CDC components use, for example, in messages.	(MDY,/)	In the date format, the first value is one of the following format values: - **YMD**. For YY/MM/DD. - **MDY**. For MM/DD/YY. - **DMY**. For DD/MM/YY. The second value is the separator to use in the date. You can use any character. Default is the forward slash (/).
ESLLIB	The data sets to be concatenated to existing DFSESL DD statements in the IMS dependent region or IMS control region. This option is required for IMS synchronous ECCR online environments. If a DFSESL DD statement does not already exist in your dependent region or control region, PowerExchange allocates one for you. For more information about the DFSESL DD statement, see the IBM IMS installation procedures.	N/A	When you set this value, follow these guidelines: - Specify the appropriate data set or data sets, enclosed within parentheses. - If you specify multiple data sets, separate them with commas. - You can specify up to five data sets.
IAUPABND	Controls the behavior of IMS online update transactions and online batch jobs in an IMS control region when the CCERR=ABEND option is specified and the PowerExchange Logger for z/OS ends abnormally after the IMS control region is running. This option also controls the behavior of IMS batch DL/I jobs when the PowerExchange Logger is not available when the jobs start. In an online environment, this option does not affect transactions that access the database in read-only mode. In a batch DL/I environment, this option does not affect jobs that use PSBs that do not update any database. In all environments, this option has no effect when CCERR=CONT is specified. If the PowerExchange Logger is down when you try to start the IMS control region, this option is ignored and control region startup fails. **Note:** If the Logger is down when you try to start the IMS control region, this option is ignored and the control region startup fails.	Y	Valid values: - **Y.** In an online environment, all update transactions and online batch jobs abend. In a batch DL/I environment, the batch jobs abend. - **N**. In an online environment, only the transactions and online batch jobs that update registered source segments abend. In a batch DL/I environment, only the batch DL/I jobs that update registered source segments abend.

Option	Description	Default Value	Valid Values
LGWAITTO	The maximum number of seconds that an ECCR waits to write change data records to the PowerExchange Logger queue when CCERR=CONT is specified. Define this option only under the following conditions: - ECCR requests to write change data to the PowerExchange Logger queue are blocked because the queue has become full. The queue might become full, for example, because the PowerExchange Logger does not have enough resources to offload data from its active log data sets. - You prefer for user applications to continue without error, even though some change data loss might occur when the timeout interval is exceeded. - You confirm with Informatica Global Customer Support that this option is appropriate for use in your environment. If you use the VSAM/CICS ECCR, this option can be particularly useful. With this ECCR, a blocked queue can cause the CICS region to stop, which potentially affects many users. If you enter a non-zero value, PowerExchange issues message PWXEDM172895I at ECCR initialization to indicate that this timeout is in effect. When the timeout interval elapses, PowerExchange issues PWXEDM172895I again and discards change records as long as the timeout persists. When the PowerExchange Logger resumes reading records from its queue, PowerExchange issues message PWXEDM172834I.	0 This default value disables the LGWAITTO timeout.	A valid value: - Is a number in the range of 30 to 21600 seconds. - Is rounded to the nearest 10-second multiple, if not a multiple of 10.
LOGGER	Specifies the name of the default PowerExchange Logger. You can specify only one instance of the PowerExchange Logger with this parameter. Consequently, if you use multiple PowerExchange Loggers you must have a separate EDMSDIR for each instance of the PowerExchange Logger. Because you cannot rename EDMSDIR, you must allocate a separate user library, *your*.USERLIB, for each copy of EDMSDIR.	EDML	A valid name has the following characteristics: - Consists of four characters, beginning with a letter, #, @, or $. - Does not conflict with an existing MVS subsystem - Is not the same as the AGENTID value.
LOGRGRP	Indicates whether the PowerExchange Logger is configured for Post-Log Merge.	N	Valid values: - **Y**. Uses the Post-Log Merge configuration. - **N**. Does not use the Post-Log Merge feature.

Option	Description	Default Value	Valid Values
SYSOUT	The default SYSOUT class that any dynamically allocated SYSOUT data sets use.		This value can be any valid SYSOUT class.
TIME	The time format that the PowerExchange CDC components display, for example, in messages.	(24,:)	In the time format, the first value indicates the hours format: - **24**. A 24-hour format, such as military time. - **12**. A 12-hour format. The second value is the separator to use in the time. You can use any character. Default is a colon (:).

Customizing EDMSDIR Module Options

After PowerExchange installation, you can modify the values of EDMSDIR module options.

1. Customize and run the JCL in the SETUPAGT member of the RUNLIB library.
2. Stop any PowerExchange CDC component that specifies the USERLIB library that contains the EDMSDIR module.

   These components include:
   - Environmental Change Capture Routines (ECCRs)
   - PowerExchange Agent
   - PowerExchange Condense jobs
   - PowerExchange Listener
   - PowerExchange Logger for z/OS
3. Modify the EDMSDIR options.
4. Restart the PowerExchange CDC components that you stopped.

Related Topics:

- "EDMSDIR Options Module" on page 40

Configuring AGENTCTL Parameters

The PowerExchange installation process generates the AGENTCTL member that contains the PowerExchange Agent AGENTCTL parameters. This topic describes these parameters.

The EDMSCTL DD statement in the PowerExchange Agent JCL points to the AGENTCTL parameters.

After installation, you can edit the AGENTCTL parameters by editing the AGENTCTL member in the RUNLIB library. If the AGENTCTL member does not exist, view the EDMSCTL DD statement in the PowerExchange Agent JCL to find the member with these parameters.

Note: You must restart the PowerExchange Agent for any change to the AGENTCTL parameters to take effect.

The following table describes the AGENTCTL parameters:

<table>
<tr><th>Parameter</th><th>Description</th><th>Default Value</th><th>Valid Values</th></tr>
<tr><td>AgentID</td><td>Required. The name of the PowerExchange Agent.
You can use the same AgentID for different PowerExchange Agents, if the agents are on different z/OS systems.
This value must match the value of the AGENTID parameter in the EDMSDIR module.</td><td>EDMA</td><td>- Four characters, beginning with a letter, #, @, or $.
- A value that does not conflict with a z/OS subsystem.</td></tr>
<tr><td>CCVACTIVE</td><td>Optional. Specifies whether to activate the Batch VSAM ECCR during startup of the PowerExchange Agent.</td><td>No</td><td>- Yes. Activates the Batch VSAM ECCR during startup.
- No. Does not activate the Batch VSAM ECCR during startup.</td></tr>
<tr><td>CmdAuthCheck</td><td>Optional. Specifies whether to check authorization by issuing a RACROUTE authorization macro when a PowerExchange Agent command is issued.</td><td>No</td><td>- Yes. The PowerExchange Agent checks authorization.
- No. The PowerExchange Agent does not check authorization.</td></tr>
<tr><td>CmdPrefix</td><td>Optional. An MVS command prefix to use for all PowerExchange Agent commands.
This value must not conflict with existing MVS or PowerExchange Agent commands.</td><td>Value of AgentID parameter.</td><td>One to eight characters. The first must be a letter or one of the following symbols:
¢ . < (+ | & !
$ *) - / % _
> ? : # @ ' = "</td></tr>
<tr><td>InitAuthCheck</td><td>Optional. Whether to check authorization by issuing a RACROUTE authorization macro whenever anyone makes a request to initialize a PowerExchange Agent service.</td><td>No</td><td>- Yes. The PowerExchange Agent checks authorization.
- No. The PowerExchange Agent does not check authorization.</td></tr>
<tr><td>LogBuffLimit</td><td>Optional. The data space size to allocate as an integration area for EDMSLOG messages.
PowerExchange stores the message log in a data space and not in common storage.
Estimate the space in terms of number of messages. For each message, allow 216 bytes.</td><td>2000</td><td>A number from 1000 through 10000.</td></tr>
<tr><td>LogClass</td><td>Required. The EDMSLOG SYSOUT class.</td><td>-</td><td>Any valid SYSOUT class.</td></tr>
<tr><td>LogHold</td><td>Optional. Specifies whether the EDMSLOG SYSOUT data is allocated with HOLD=YES.</td><td>No</td><td>- Yes. Uses HOLD=YES.
- No. Does not use HOLD=YES.</td></tr>
<tr><td>LogLimit</td><td>Optional. The EDMSLOG line limit. When this limit is reached, the PowerExchange Agent allocates another log.</td><td>10000</td><td>A number from 5000 through 100000.</td></tr>
</table>

Parameter	Description	Default Value	Valid Values
Refreshsscvt	Optional. Causes the system to build a SSCVT. The parameter specifies the current SSCVT address that you want to refresh because it is no longer usable. Use this parameter if all of the following conditions occur: - PowerExchange issues message PWXEDM172020E. - The STARTUP parameter is set to COLD. - You do not need to IPL because of the failure.	-	An eight-character hexadecimal address that you get from message PWXEDM172020E.
RepositoryDSN	Required. The data set name that the PowerExchange Agent repository uses for either the AGENTREP data set or CCT data set.	-	A valid cataloged data set name.
RepositoryMode	Required. The type of repository.	-	Valid values are DETAIL or EDP. Use DETAIL for PowerExchange CDC.
Startup	Optional. Whether, during startup, the PowerExchange Agent creates a data space or uses an existing data space, if one exists.	WARM	- WARM. Reuses a data space if one exists. - COLD. Create a data space.
TaskLimit	Optional. The amount of data space storage used as an integration area for concurrent PowerExchange Agent tasks. Specify this limit in terms of the maximum number of concurrent task control blocks (TCBs) that can request services from the PowerExchange Agent. Allow 128 bytes for each control block.	500	A number from 150 through 1500.

Configuring AGENTREP Parameters

The AGENTREP data set, which is created during the installation, specifies PowerExchange Agent parameters that are related to controlling the capture registration subtask.

Note: The AGENTREP data set is created as a sequential data set. Do not change it to a PDS member.

The AGENTREP data set name is specified in the RepositoryDSN parameter in the AGENTCTL parameters, as follows:

```
RepositoryDSN=hlq.AGENTREP
```

The *hlq* variable is the PowerExchange high-level qualifier that is specified in the z/OS Installation Assistant during installation.

Alternatively, you can specify the name of the PowerExchange CCT data set in the RepositoryDSN parameter, as follows:

```
RepositoryDSN=hlqvs.CCT
```

The *hlqvs* variable is the PowerExchange high-level qualifier for VSAM, which is specified in the z/OS Installation Assistance.

For improved performance and resource usage, Informatica recommends that you use the AGENTREP data set rather than the CCT data set as the PowerExchange Agent repository.

- If you use the AGENTREP data set as the PowerExchange Agent repository, the PowerExchange Agent only retrieves the capture registrations from the PowerExchange Listener during each registration update interval, when no changes have occurred.
- If you use the CCT data set as the PowerExchange Agent repository, the PowerExchange Agent must read the entire CCT during each registration update interval to determine if any changes have occurred. This activity results in unnecessary I/O activity and CPU overhead in the PowerExchange Agent address space.

The following table describes the AGENTREP parameters:

Parameter	Description
BackToBackDelay	Determines the minimum time interval between update notifications. You can use this parameter to reduce or eliminate the number of registration change messages in environments where repositories are modified frequently. When messages are suppressed, you can use the Repository Display command to display the latest change information. Default is 0, which does not suppress any messages.
Cache1	Copy 1 of the sequential cache data set. No default value.
Cache2	Copy 2 of the sequential cache data set. No default value.
Location	The name of the PowerExchange Listener that is retrieved from the PowerExchange configuration member. No default value.
RestartInterval	Interval at which the Agent subtask that interrogates the PowerExchange Listener for capture registration changes is restarted. This interval is expressed as the number of UpdateInterval intervals. Restarting effectively frees memory that was allocated to the TCP/IP layer. Default is 60.
UpdateInterval	The interval, in minutes, at which PowerExchange checks for registration changes. PowerExchange issues messages in the Agent output when it checks for changes. Default is 1.

Customizing the PowerExchange Agent JCL

The PowerExchange Agent runs as a started task. You must customize the JCL for your installation and copy it to a system procedure library (PROCLIB) for started tasks.

PowerExchange provides sample JCL for the PowerExchange Agent. The XIZZZ998 cleanup job in the RUNLIB library, which runs during PowerExchange installation, moves the PowerExchange Agent JCL to the PowerExchange PROCLIB library.

The name of the PowerExchange Agent JCL member in the PROCLIB library is the value that was specified in the **Agent / Logger Prefix** field in the z/OS Installation Assistant followed by the letter A. Based on the default **Agent / Logger Prefix** value of PWX, the default member name for the PowerExchange Agent JCL in the PROCLIB library is PWXA.

The following table describes the PowerExchange Agent JCL statements and parameters:

JCL Statements	Description
EXEC	The PGM parameter in the EXEC statement must specify the PowerExchange Agent module name EDMSTART.

START	Controls how the PowerExchange Agent starts.
	Include the STARTUP symbolic parameter to control whether the PowerExchange Agent WARM or COLD starts. This parameter overrides the installation option for warm or cold starting the PowerExchange Agent. For a cold start, specify:
	`START` *`agent_proc_name`*`,STARTUP=COLD}`
	The variable *agent_proc_name* is the name that was assigned to the PowerExchange Agent procedure at installation.
	If you start the PowerExchange Agent without the STARTUP parameter, it starts with the options that you specified during installation. For a WARM start, the PowerExchange Agent uses an existing Agent environment, if one exists. For a COLD start, the Agent creates a new Agent environment and completes startup processing that is the same as for a first-time start. Use the following syntax to start the PowerExchange Agent with all of the installation options:
	`START` *`agent_proc_name`*
	To start the PowerExchange Agent with all of the installation options except the option that determines whether the Agent COLD or WARM starts, use the following syntax:
	`START` *`agent_proc_name`*`,STARTUP={COLD|WARM}`

STEPLIB or JOBLIB DD	Includes the PowerExchange load libraries, *hlq*.LOAD and *hlq*.LOADLIB. This statement is required even if you specify the load libraries in the LNKLST concatenation. The PowerExchange Agent loads certain modules from the STEPLIB or JOBLIB.
EDMPARMS DD	Specifies the name of the user library, *your*.USERLIB, that contains the EDMSDIR options module that is associated with the PowerExchange Agent. If you do not include an EDMPARMS DD statement, or if you specify a library that does not contain the options module, PowerExchange uses the STEPLIB concatenation to get the configuration options.
EDMSCTL DD	Specifies the data set that contains the PowerExchange Agent startup parameters. Informatica recommends that you also include the FREE=CLOSE statement so that this data set is deallocated after it is read.
SYSPRINT DD	Specifies the output data set for MVS system messages.

Sample JCL Procedure for the PowerExchange Agent

PowerExchange provides sample JCL for the PowerExchange Agent in the RUNLIB library. The installation process customizes this JCL with the values that you specify in the z/OS Installation Assistant.

The sample PowerExchange Agent PROC is in the AGENTSTP member of the RUNLIB. This member is copied to the PROCLIB library using a member name that consists of the value that you specified in the **PowerExchange Agent / Logger Prefix** field during installation followed by the letter A.

The following sample JCL is for the PowerExchange Agent:

```
//PWXA PROC STARTUP=WARM,HLQ=YOUR.INSTALL.HLQ,
//    RUNLIB=YOUR.INSTALL.HLQ.RUNLIB,
//    LOGGER=PWXL
//* PowerExchange Agent
//*
```

```
//* POSSIBLE VALUES FOR STARTUP= ARE WARM AND COLD
//* CAUTION - USE "COLD" START ONLY FOR PROBLEM RESOLUTION
//*
//PWXAGENT EXEC    PGM=EDMSTART,PARM='STARTUP=&STARTUP',
//           TIME=NOLIMIT,
//           ACCT=XXXX
//STEPLIB  DD DISP=SHR,DSN=&HLQ..LOADLIB
//         DD DISP=SHR,DSN=&HLQ..LOAD
//DTLMSG   DD DISP=SHR,DSN=&HLQ..DTLMSG
//DTLCFG   DD DISP=SHR,DSN=&RUNLIB(DBMOVER)
//DTLKEY   DD DISP=SHR,DSN=&RUNLIB(LICENSE)
//EDMPARMS DD DISP=SHR,DSN=&HLQ..&LOGGER..USERLIB
//EDMSCTL  DD DISP=SHR,DSN=&RUNLIB(AGENTCTL),
//            FREE=CLOSE
//* SYSTCPD EXPLICITLY IDENTIFIES WHICH DATA SET IS TO BE USED TO
//*    OBTAIN THE PARAMETERS DEFINED BY TCPIP.DATA. THIS DD STATEMENT
//*    MIGHT BE NECESSARY IF YOUR CONFIGURATION CANNOT BE FOUND USING
//*    USING THE STANDARD IP SEARCH. CONSULT YOUR NETWORKING SYSTEMS
//*    PROGRAMMER FOR FURTHER INFORMATION.
//*SYSTCPD  DD DSN=YOUR.TCPIP.DATA,DISP=SHR
//DTLLOG   DD SYSOUT=*
//DTLLOG01 DD SYSOUT=*
//SYSPRINT DD SYSOUT=*
//*-------------------------------------------------------------------*
```

Sample Messages from Starting the PowerExchange Agent

The following sample text shows the PowerExchange Agent startup messages:

```
PWXEDM172002I EDMSINI0: ChangeDataMove. Version 2.4.04. Release date: 20031015
PWXEDM172008I EDMSINI0: EDM Agent Configuration Parameters:
PWXEDM172010I EDMSINI0: AgentID=PWXA
PWXEDM172010I EDMSINI0: LogClass=*
PWXEDM172010I EDMSINI0: LogHold=NO
PWXEDM172010I EDMSINI0: LogLimit=5000
PWXEDM172010I EDMSINI0: LogBuffLimit=2000
PWXEDM172010I EDMSINI0: TaskLimit=500
PWXEDM172010I EDMSINI0: LSNPort=0
PWXEDM172010I EDMSINI0: CmdPrefix=PWXA
PWXEDM172010I EDMSINI0: RepositoryDSN=EDMUSR.DETAIL.V811.AGENTREP
PWXEDM172010I EDMSINI0: RepositoryMode=Detail
PWXEDM172010I EDMSINI0: InitAuthCheck=No
PWXEDM172010I EDMSINI0: CmdAuthCheck=No
PWXEDM172010I EDMSINI0: CCVActive=YES
PWXEDM172010I EDMSINI0: SysplexLogDays=0
PWXEDM172010I EDMSINI0: STARTUP=WARM                       <==== PARM ON STARTUP CMD
PWXEDM172010I EDMSINI0: ServiceModule=EDMSDUMY
PWXEDM172010I EDMSINI0: ServiceModule=EDMSGQIO
PWXEDM172010I EDMSINI0: ServiceModule=EDMXCIRQ
PWXEDM172010I EDMSINI0: DelOldPMods=0
PWXEDM172010I EDMSINI0: EDMAgentTrace=off
PWXEDM172010I EDMSINI0: TRACEOPTIONS=NONE                  <==== DEFAULT
PWXEDM172010I EDMSINI0: PATROLKM=NO                        <==== DEFAULT
PWXEDM172010I EDMSINI0: PKDATASPACEINIT=100                <==== DEFAULT
PWXEDM172010I EDMSINI0: PKDATASPACEMAX=500                 <==== DEFAULT
PWXEDM172010I EDMSINI0: MSGPREFIX=PWX                      <==== DEFAULT
PWXEDM172024I EDMSINI2: New SSCVT built for EDM Agent PWXA. Addr=00C16328
PWXEDM172024I EDMSINI2: New SAST built for EDM Agent PWXA. Addr=00C16210
PWXEDM172064I EDMSINI4: EDM Agent Dataspace created.
Name=00001EDM,STOKEN=80001F0100000056,Blocks=234
PWXEDM172069I EDMSEXE0: Subtask ATTACHed. Module=EDMSCCV0,TaskID=CCV,RC=0
PWXEDM172071I EDMSCCV0: Subtask initialization completed. TaskID=CCV
PWXEDM172069I EDMSEXE0: Subtask ATTACHed. Module=EDMSDIS0,TaskID=DIS,RC=0
PWXEDM172023I EDMSCCV0: Active= 1, Inactive= 0.  PWXA
PWXEDM172071I EDMSDIS0: Subtask initialization completed. TaskID=DIS
PWXEDM172069I EDMSEXE0: Subtask ATTACHed. Module=EDMSREP0,TaskID=REP,RC=0
PWXEDM172071I EDMSREP0: Subtask initialization completed. TaskID=REP
PWXEDM172069I EDMSEXE0: Subtask ATTACHed. Module=EDMSDSP0,TaskID=DSP,RC=0
PWXEDM172071I EDMSDSP0: Subtask initialization completed. TaskID=DSP
PWXEDM172069I EDMSEXE0: Subtask ATTACHed. Module=EDMSLOG0,TaskID=LOG,RC=0
```

```
PWXEDM172071I EDMSLOG0: Subtask initialization completed. TaskID=LOG
PWXEDM172256I EDMSEXE0: EDM Agent PWXA has completed initialization
PWXEDM172072I EDMSLOG0: Log file EDMSLOG OPENed. LogClass=*,LogLimit=5000,LogHold=No
PWXEDM181223I DTERIOM : PWX-00607 DTERDI VRM 8.1.1 Build V811_B09 started.
PWXEDM172076I EDMSREP0: Repository file CLOSEd
PWXEDM181207I DTERIOM : Repository Configuration Parameters
(EDMUSR.DETAIL.V811.AGENTREP):
PWXEDM181206I DTERIOM : Location=node1
PWXEDM181206I DTERIOM : Cache1=EDMUSR.DETAIL.V810.C1.CACHE
PWXEDM181206I DTERIOM : Cache2=EDMUSR.DETAIL.V810.C2.CACHE
PWXEDM181206I DTERIOM : RestartInterval=60
PWXEDM181206I DTERIOM : UpdateInterval=1
PWXEDM181206I DTERIOM : BackToBackDelay=0
PWXEDM181212I DTERIOM : Using cached capture registrations (20060721162905)
PWXEDM172119I EDMSREP0: Repository file OPENed. RepositoryDSN=EDMUSR.DETAIL.V811.AGENTREP
PWXEDM181214I DTERIOM : Repository access (re)established
PWXEDM181215I DTERIOM : New capture registrations (20060808161337)
```

PowerExchange Agent Message Log

The PowerExchange Agent message log, EDMSLOG, is a SYSOUT data set that contains messages from the PowerExchange Agent and all PowerExchange CDC components that interact with the PowerExchange Agent. You can configure parameters that control aspects of the message log including its size.

Note: The PowerExchange Agent closes the current log and allocates a new log when it reaches the message log line limit specified in AGENTCTL parameter LogLimit.

The PowerExchange Agent allocates data space storage that acts as an integration area or buffer to the message log. This storage is allocated based on the LogBuffLimit AGENTCTL parameter. The PowerExchange Agent writes to EDMSLOG any messages sent to the integration area.

If you stop the PowerExchange Agent, the other PowerExchange CDC components continue to write messages to the integration area. When you restart the PowerExchange Agent, it checks for any messages written to this data space and writes them to the EDMSLOG.

Warning: If you stop the PowerExchange Agent and the messages written to the data space exceed the value of the LogBuffLimit parameter, additional messages overwrite those at the beginning of the allocated data space, resulting in missed messages. A message in the next EDMSLOG indicates the number of messages that were missed.

Related Topics:

- "Configuring AGENTCTL Parameters" on page 44

Managing the PowerExchange Agent

You can control certain aspects of PowerExchange Agent processing by using MVS commands.

Starting the PowerExchange Agent

To start the PowerExchange Agent, issue the MVS START command with the name of the started task. For example:

```
START PWXA
```

Start the PowerExchange Agent after you start the PowerExchange Listener but prior to starting any other PowerExchange CDC component address spaces.

Stopping the PowerExchange Agent

PowerExchange Agent commands use the MVS command prefix defined by the CmdPrefix statement in the PowerExchange AGENTCTL parameters. To stop the PowerExchange Agent, use the PowerExchange Agent CmdPrefix value followed by SHUTDOWN or SHUTDOWN COMPLETELY. For example:

```
PWXA SHUTDOWN
```

Only use SHUTDOWN COMPLETELY if removing PowerExchange from the system.

Controlling the PowerExchange Agent

You can use commands to control PowerExchange Agent processing. PowerExchange Agent commands use the MVS command prefix defined by the CmdPrefix statement in the PowerExchange Agent configuration parameters.

The following table briefly describes the PowerExchange Agent commands:

Command	Description
DISPLAY	DISPLAY LOCKS displays any PowerExchange Agent locks and their owners.
	DISPLAY JOBS displays all MVS TCBs registered to the PowerExchange Agent for its services.
	DISPLAY MODULES displays all modules that the PowerExchange Agent loads.
	DISPLAY GBLQDSNS displays all global circular queues that are allocated.
DRAIN	Ensures that all tasks using the PowerExchange Agent are completed and no longer in the system. You must issue this command before issuing the SHUTDOWN COMPLETELY command.
LOGCLOSE	Closes the PowerExchange Agent message log, EDMSLOG SYSOUT data set.
LOGOPEN	Opens a new PowerExchange Agent message log, EDMSLOG SYSOUT data set, if one is not currently open.
LOGSPIN	Performs a LOGCLOSE operation and subsequent LOGOPEN operation.
REPCLOSE	Deallocates the current PowerExchange repository data set.
REPOPEN	Allocates the current PowerExchange repository data set if it has been deallocated by either the REPCLOSE or REPOSITORYDSN commands.
REPOSITORYDSN	Deallocates the current PowerExchange repository data set and allocates the data set specified on the command.
REPSTATUS	Displays the current status of the PowerExchange repository.
RESUME	Enables tasks to access the PowerExchange Agent following a DRAIN command.
SHUTDOWN	SHUTDOWN stops the PowerExchange Agent address space.
	SHUTDOWN COMPLETELY shuts down the PowerExchange Agent and removes its data spaces from the system.
START	START DIS starts the DIS subtask, which processes DISPLAY commands.

Command	Description
	START LOG starts the LOG subtask, which writes data from the PowerExchange Agent data space to the EDMSLOG SYSOUT data set.
	START REP starts the REP subtask, which retrieves PowerExchange repository information.
STOP	STOP DIS stops the DIS subtask, which processes DISPLAY commands.
	STOP LOG stops the LOG subtask, which writes data from the PowerExchange Agent data space to the EDMSLOG SYSOUT data set.
	STOP REP stops the REP subtask, which retrieves PowerExchange repository information.

Managing Capture Registration Caching

The PowerExchange Agent caches capture registrations in-storage. Caching capture registrations in-storage enables the PowerExchange Agent to respond as quickly as possible to registration check requests from ECCRs.

By default, the PowerExchange Agent obtains new capture registrations from the PowerExchange Listener and stores the capture registrations in two sequential cache data sets. During startup, the PowerExchange Agent reads the cache data sets to populate the in-storage cache of capture registrations. Then the PowerExchange Agent contacts the PowerExchange Listener and requests all capture registrations. The PowerExchange Agent adds new capture registrations to the in-storage cache and to the cache data sets.

If the PowerExchange Listener is temporarily unavailable for any reason when a real-time system is started, this could cause a problem. The mechanism designed to resolve such a problem involves the use of locally held information stored in two physical sequential data sets to provide resilience. These data sets are refreshed at an interval determined when the installation is configured. You can alter the frequency by changing the UpdateInterval parameter. After any new registrations have been successfully saved into the cache data sets the agent uses them to answer capture queries. If there is any problem obtaining or saving new registrations, the current registrations continue to be used.

Creating the Cache Data Sets

The PowerExchange Agent cache data sets are created during installation when the job in the SETUPCC1 member of the RUNLIB library runs.

Use the following DCB attributes for the cache data sets:

- Record length (LRECL) of 254
- Record format (RECFM) of VB
- Data set organization (DSORG) of PS
- Any valid block size. The SETUPCC1 job specifies BLKSIZE=18452, which results in three records per 3390 track.

REPSTATUS Command

Use the PowerExchange Agent REPSTATUS command to display the status of the repository. The PowerExchange Agent displays messages indicating the name and type of repository and the name of the cache data sets. For example:

```
PWXEDM181216I DTERIOM : Repository status follows:
PWXEDM181217I DTERIOM : PWX-10052 last refresh attempt Tue Jan 22 15:23:39 2008
PWXEDM181217I DTERIOM : PWX-10053 current change identifier 20080122152344
PWXEDM181217I DTERIOM : PWX-10055 configuration type repository AUSQA.PWX.AGENTREP
PWXEDM181217I DTERIOM : PWX-10057 location node1
PWXEDM181217I DTERIOM : PWX-10058 cache (1) AUSQA.PWX.C1.CACHE
PWXEDM181217I DTERIOM : PWX-10058 cache (2) AUSQA.PWX.C2.CACHE
PWXEDM181217I DTERIOM : PWX-10062 memory usage: REGS 193K, VIRT 316K, SYS 296K, EXT
7664K, SYS 12024K
PWXEDM181217I DTERIOM : PWX-10063 memory usage: below the line 3%, above the linne 0%
PWXEDM181218I DTERIOM : End of repository status
```

If the cache data sets are not specified in the AGENTREP parameters, the REPSTATUS command displays <NONE> for the data set names.

Tip: Informatica recommends using cache data sets to prevent possible loss of change data in situations where the PowerExchange Listener is temporarily unavailable.

Adding or Repairing Cache Data Sets

During normal operation, the PowerExchange Agent caches capture registrations in virtual storage. Because registrations are already in storage, you can temporarily disable the PowerExchange Agent repository to add or repair one or more cache data sets.

To add or repair cache data sets:

1. Close the PowerExchange Agent repository using the REPCLOSE command.
2. Repair the datasets as required. Placing the datasets on separate disk storage spindles adds some resilience.
3. Open the PowerExchange Agent repository using the REPOPEN command.

Controlling PowerExchange Agent Resource Usage

You can use Workload Manager (WLM) service classes to control PowerExchange Agent usage of resources, such as storage, CPU, and I/O devices.

For more information, see "Using WLM Service Classes to Prioritize PowerExchange CDC Started Tasks on z/OS" on page 386.

Controlling Security for the PowerExchange Agent

You might need to change the access that you assigned to the PowerExchange Agent services and commands at installation.

Controlling Access to PowerExchange Agent Services

You can restrict access to PowerExchange Agent services.

The hlq.SAMPLIB contains sample commands for the most common mainframe security products. The member #SECURTY directs you to the specific member for the type of security product for your system.

Any job that requests PowerExchange Agent services must be granted read access to this resource. The agent_ID variable is the AgentID specified in the AGENTCTL member and the default options module EDMSDIR.

Note: In the following procedure, replace the variable hlq with the high-level qualifier that you chose when installing PowerExchange.

To control access to PowerExchange Agent services:

1. In the *hlq*.RUNLIB library, locate the AGENTCTL member and verify that the value of the InitAuthCheck parameter is YES.
2. Define the RACF resource profile, or an equivalent security system, named BMCEDM.agent_ID.REGISTER in class FACILITY.

   Defining this resource to RACF, or an equivalent security system, with UACC (READ) effectively disables registration security for PowerExchange Agent services. All RACROUTE macros that the agent issues are successful.

You can also disable registration security with the InitAuthCheck configuration parameter. Set its value to NO to disable security checking.

Controlling Access to PowerExchange Agent Commands

Use this procedure to restrict access to PowerExchange Agent commands.

Any user who needs to use PowerExchange Agent commands requires read access to this resource. The *agent_ID* variable is the AgentID specified in the AGENTCTL member and in the EDMSDIR default options module.

Note: In the following procedure, replace the variable *hlq* with the high-level qualifier that you chose when installing PowerExchange.

To control access to PowerExchange Agent commands:

1. In the *hlq*.RUNLIB library, locate the AGENTCTL member and verify that the value of the CmdAuthCheck parameter is YES.
2. Define the RACF resource profile, or an equivalent security system, called BMCEDM.*agent_ID*.COMMAND.* in class FACILITY.

   You can define control for individual agent commands by replacing the asterisk (*) with the command name. For example, the following FACILITY class resource profile only protects the SHUTDOWN command for AgentID AG01:

   ```
   BMCEDM.AG01.COMMAND.SHUTDOWN
   ```

   Defining this resource to RACF or an equivalent security system with UACC(READ) effectively disables security for PowerExchange Agent commands. All RACROUTE macros that the agent issues are successful.

You can also disable command security with the CmdAuthCheck configuration parameter. Set its value to NO to disable security checking.

Controlling Access to PowerExchange Components

Some PowerExchange components must have system authorization to run. You can limit access to these components through RACF or an equivalent security product. Use this procedure to limit this access.

To control access to PowerExchange components:

1. Get the startup procedure names for the following components:
    - PowerExchange Logger
    - PowerExchange Agent
    - Any PowerExchange component running as a started task
2. Use one of the following methods to provide user authorization for each component:
    - Add the procedure names to the RACF-started procedures table (ICHRIN03), or its equivalent.
    - Create a RACF profile for each procedure name and use the class STARTED.

    This step associates a user ID and group ID with the started tasks. This association provides authorized access to any data set that the tasks use and enables PowerExchange components to pass the authorization-checking process. For more information about the RACF-started procedures table or STARTED class profiles, see the IBM documentation for RACF or an equivalent security product.

CHAPTER 4

PowerExchange Logger for z/OS

This chapter includes the following topics:

PowerExchange Logger for z/OS Overview

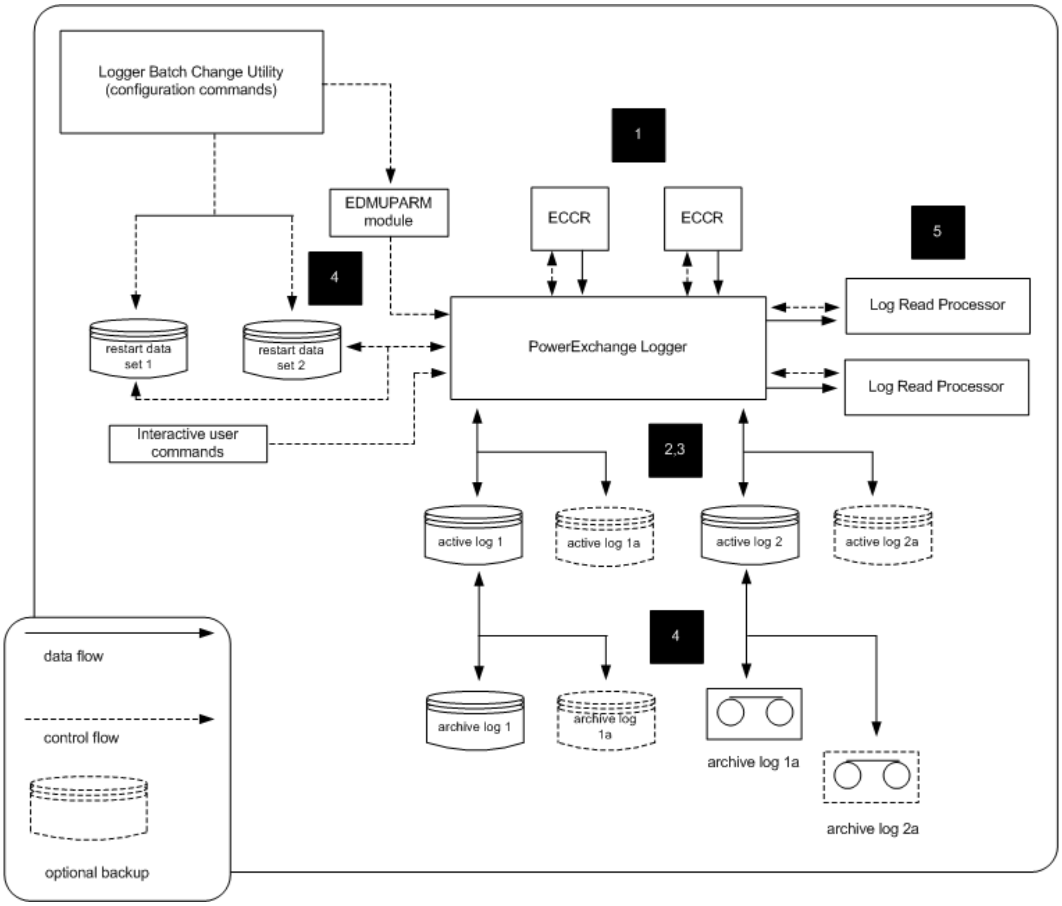
The PowerExchange Logger for z/OS stores all change data captured by connected ECCRs and provides captured change data to real-time mode extractions and to PowerExchange Condense.

The PowerExchange Logger prepares to write data to log files when it receives a message from an ECCR. The PowerExchange Logger retrieves logged data when it receives a request from an log reader that specifies a relative byte address (RBA) as the starting point for data transfer.

When you use real-time extraction mode to read change data, the PowerExchange Listener passes a Resource Interest List that contains the EDMNAMEs of the capture registrations in the extraction process to the PowerExchange Logger. The PowerExchange Logger uses this list to filter out change records for EDMNAMEs that are not included in the extraction process, which reduces the resource consumption of the log read process in the PowerExchange Listener.

The IBM Cross-System Coupling Facility (XCF) controls the connection from other components to the PowerExchange Logger. The number of log readers that can request data from the PowerExchange Logger is limited to the maximum number of members that can join an XCF group. The maximum members in an XCF group is z/OS release dependent and controlled through the XCF MAXMEMBER specification used when defining the SYSPLEX Couple data sets.

The following figure shows the PowerExchange Logger data flow and control flow:



You can control the PowerExchange Logger by running batch change utility procedures that perform the following functions:

- Set system parameters in the EDMUPARM module.
- Modify the restart data set to manage active and archive logs.

You can also issue interactive commands to the PowerExchange Logger.

Multiple Instances of the PowerExchange Logger for z/OS

You can run multiple instances of the PowerExchange Logger for z/OS simultaneously in a single PowerExchange system. The number of instances that you use depends on your performance needs and your data-management processes.

For example, you might want to use separate instances of the PowerExchange Logger to capture changes from different branch offices of an organization.

The following situations are possible reasons for using multiple instances of the PowerExchange Logger:

- High volume of data
- Multiple environments. Although not required, you may want to dedicate a separate PowerExchange Logger for each data-resource type. For example, one for IMS and one for VSAM.
- Application requirements

Up to 50 PowerExchange Loggers can attach to a PowerExchange Agent. The value of the TaskLimit parameter in the AGENTCTL parameters limits the number of PowerExchange Loggers that can attach to a PowerExchange Agent. Each PowerExchange Logger requires a minimum of 12 tasks, and uses additional tasks for log readers and archive processes.

Restriction: A Post-Log Merge group can be comprised of a maximum of eight PowerExchange Loggers.

Planning for the PowerExchange Logger for z/OS

Read the following planning considerations before configuring the PowerExchange Logger for z/OS.

XCF Groups

To optimize the MVS configuration for the PowerExchange Logger, consider increasing the number of cross-coupling facility (XCF) groups.

PowerExchange uses IBM Cross-System Coupling Facility (XCF) services to provide communication between certain PowerExchange CDC components. The couple data set should be sized to accommodate the additional PowerExchange XCF groups and members.

If you use the Post-Log Merge option of the PowerExchange Logger, you need to plan for capacity for four XCF groups for each PowerExchange Logger. Otherwise, a single XCF group is used for a PowerExchange Logger.

Consult your MVS systems programmer to determine the number of existing XCF groups and ensure that additional XCF groups are available. PowerExchange CDC uses at least one, and up to four, XCF groups for each running PowerExchange Logger.

Recall of Archived Log Data Sets

The PowerExchange Logger for z/OS uses the DFSMShsm ARCGIVER module to explicitly recall any archived log data sets that are identified as “migrated" but needed for data set allocation requests.

If ARCGIVER is not available, an allocation request for a migrated data will fail. The ARCHRCAL macro that attempts to invoke ARCGIVER issues an error code, such as 0x806, which is used as a DYNALLOC Info Code (S99INFO).

PowerExchange Logger Configuration Considerations

Before you begin configuration, review the following considerations related to PowerExchange Logger for z/OS configuration.

- A PowerExchange Logger can log data from multiple ECCRs that operate on the same z/OS system. By using Post-Log Merge, you can access changes from multiple z/OS systems as if they were stored in a single PowerExchange Logger environment.
- If you use multiple PowerExchange Loggers, you need a copy of the EDMSDIR default options module for each PowerExchange Logger instance. Because you cannot rename the EDMSDIR module, you must allocate a separate USERLIB for each copy of EDMSDIR. To reduce the chance of data loss, use dual active log data sets and dual archive log data sets.
- If you reinitialize the PowerExchange Logger after you start capturing changes, the RBA is reset to 0 and you lose all of the changes that have been captured but not yet applied.

You must reinitialize the PowerExchange processes that consume data from the PowerExchange Logger. If you restart these processes in the normal manner, PowerExchange uses the last-read PowerExchange Logger RBA to generate the restart point. However, reinitialization of the PowerExchange Logger invalidates the last-read RBA.

- On a z/OS version 1.12 system, PowerExchange Logger active log data sets cannot be larger than 4 GB. Also, you must apply IBM APAR OA34369. Otherwise, the PowerExchange Logger might abend when it tries to use data-in-virtual (DIV) services to access its log data sets.

Configuring the PowerExchange Logger for z/OS

To use the PowerExchange Logger for z/OS for CDC, you must complete the following configuration tasks:

- Configure the EDMUPARM options module.
- Customize the PowerExchange Logger JCL, and copy the JCL to the PROCLIB to run the PowerExchange Logger as a started task.
- Verify that the active log data sets and emergency restart data sets were created at installation.
- Define the active and archive log data sets to the emergency restart data set.

Configuring the EDMUPARM Options Module

You can specify PowerExchange Logger options in the EDMUPARM options module, which is in the USERLIB library.

This module is created by the SETUPCC2 job in the RUNLIB library during PowerExchange installation.

Before you configure the EDMUPARM options module, consider the following issues:

- If you use dual logging and dual emergency restart data sets, allocate the primary and secondary data sets to different volumes. This practice makes data recovery possible when a disk failure occurs.
- To create an effective logging configuration, balance the following guidelines:
  - Size the input and output buffers based on the volume of captured change data.
  - Define the number of active log data sets based on the volume of captured change data and how rapidly the data can be archived. Minimum is 3, and maximum is 31.
  - Size the active log data set based on the volume of change data and the size requirements of the archive media.
  - Size the archive log data set based on the active log data set size, the block size of the archive data sets, and the type of device to which you are archiving.

Related Topics:

- "Size and Number of Active Log Data Sets" on page 73

DEFINE Statement

Use the DEFINE statement to configure PowerExchange Logger system, archive, and logging options. This statement is required.

Syntax:

The DEFINE statement has the following general syntax:

```
DEFINE
  LOGGER_TITLE=name
  [SYSTEM_OPTIONS options]
  [ARCHIVE_OPTIONS options]
  [LOGGING_OPTIONS options]
END
```

Substatements:

The following table describes the substatements:

Substatement	Description
LOGGER_TITLE	Required. Specifies a PowerExchange Logger name of up to 16 characters in length,
SYSTEM_OPTIONS	Optional. Specifies configuration options for the PowerExchange Logger.
ARCHIVE_OPTIONS	Optional. Specifies configuration options for the archive log data sets.
LOGGING_OPTIONS	Optional. Specifies configuration options for the active and archive log data sets.

Usage Notes:

Enter the substatements in a single DEFINE statement. If you omit a substatement, the PowerExchange Logger uses its default value.

The SYSTEM_OPTIONS, ARCHIVE_OPTIONS, and LOGGING_OPTIONS substatements each have unique parameters. You must specify at least one substatement with at least one parameter.

SYSTEM_OPTIONS Parameters

In the SYSTEMS_OPTIONS substatement of the DEFINE statement, you can set PowerExchange Logger system parameters, such as those that control the Logger name, checkpoint processing, and tracing.

Syntax:

```
SYSTEM_OPTIONS
  [LOGGER_NAME=id,]
  [CHKPT_FREQUENCY=nnnn,]
  [START_TRACE=Y|N,]
  [SUFFIX=n,]
  [TIMER_INTERVAL=nnnn,]
  [TIME_CHKPT_FREQ=nn]
```

Parameters:

The following table describes the SYSTEM_OPTIONS parameters:

Parameter	Description	Valid Values
LOGGER_NAME	Specifies the PowerExchange Logger ID.	A string from one to four characters in length. The following rules apply: - The value can begin with and contain alphanumeric characters and the characters #, @, and $. - Because other PowerExchange CDC components use this value to refer to the PowerExchange Logger, the value must match the LOGGER parameter in the PowerExchange Agent EDMSDIR options module and the LOG parameter on LRAPI CAPI_CONNECTION statement in the DBMOVER configuration member. - In a Post-Log Merge environment, all member Loggers must use the same LOGGER_NAME value.
CHKPT_FREQUENCY	Specifies the number of log records to process before taking a checkpoint.	A number from 1 to 2^{31}-1. Default is 10,000.
START_TRACE	Specifies whether the Logger trace is active. For the trace output to be received, the EDMTRACE DD statement must be in the Logger JCL.	One of the following values: - **Y** for yes. - **N** for no. Default is N. **Warning:** The value Y causes additional overhead in the Logger. Enter Y only at the request of Informatica Global Customer Support.
SUFFIX	Specifies the unique suffix for a member in a Post-Log Merge group.	A unique number from 1 through 9.
TIMER_INTERVAL	Specifies how frequently the Logger performs its internal management operations, such as freeing unused virtual storage or detecting inactive tasks that need to be POSTed.	An interval in hundredths of seconds in the following range: - Minimum is 50 (.5 seconds). - Maximum is 6000 (1 minute). Default is 100.
TIME_CHKPT_FREQ	Specifies how frequently time-based checkpoint records are created in a Post-Log Merge environment. This parameter is used only when running Post-Log Merge.	The checkpoint frequency expressed in number of elapsed TIMER_INTERVAL periods. This number must be in the following range: - Minimum is 5. - Maximum is 60. Default is 30. If you use the default TIMER_INTERVAL value of 100 hundredths of a second with the default of 30 for this parameter, a time-based checkpoint record is written every 30 seconds (100 * 1/100 * 30).

Usage Notes:

You must specify at least one parameter.

If you specify multiple parameters, use a comma (,) as a separator character. Do not put a comma at the end of the last parameter.

ARCHIVE_OPTIONS Parameters

In the ARCHIVE_OPTIONS substatement of the DEFINE statement, you can set parameters for allocating and managing archive log data sets.

Syntax:

```
ARCHIVE_OPTIONS
  [PREFIX_COPY1=prefix,]
  [PREFIX_COPY2=prefix,]
  [ARCHIVE_BLKSIZE=number,]
  [ARCHIVE_DACL=sms_dataclas,]
  [ARCHIVE_DACL2=sms_dataclas,]
  [ARCHIVE_MGCL=sms_mgmtclas,]
  [ARCHIVE_MGCL2=sms_mgmtclas,]
  [ARCHIVE_RTPD=number_of_days,]
  [ARCHIVE_RTPD2=number_of_days,]
  [ARCHIVE_STCL=sms_storclas,]
  [ARCHIVE_STCL2=sms_storclas,]
  [ARCHIVE_UNIT=unit_name,]
  [ARCHIVE_UNIT2=unit_name,]
  [ARC_UNIT_CNT=number,]
  [PRIM_SPACE=number,]
  [SEC_SPACE=number,]
  [SPACE_ALLOC=type_of_units]
```

Parameters:

The following table describes the ARCHIVE_OPTIONS parameters:

Parameter	Description	Valid Values
PREFIX_COPY1	Specifies the prefix for the first archive log data set name.	If you use multiple qualifiers, enclose the prefix in quotation marks. The value can be up to 17 alphanumeric characters long and must follow MVS data set name rules. With Post-Log Merge, all member Loggers must have a unique value for this parameter.
PREFIX_COPY2	Specifies the prefix for the second archive log data set name.	If you use multiple qualifiers, enclose the prefix in quotation marks. The value can be up to 17 alphanumeric characters long and must follow MVS data set name rules. If you use this keyword, the value cannot be blank, even if you specified ARCHIVE_LOG_MODE=SINGLE. With Post-Log Merge, all member Loggers must have a unique value for this parameter.
ARCHIVE_BLKSIZE	Specifies the block size of the archive log data set.	The block size must be compatible with the device type you specify in the ARCHIVE_UNIT parameter. The value must be a multiple of 4096 and must be in the range 4096 through 28672. Default is 24576.
ARCHIVE_DACL	Specifies the SMS data class name of the archive log data set.	If this value is omitted, no SMS data class is specified when allocating the primary archive log data set. One might be assigned by your SMS ACS routines.

Parameter	Description	Valid Values
ARCHIVE_DACL2	Specifies the SMS data class name of the second archive log data set.	If this value is omitted, the second archive log takes the data class of the first archive log data set, if specified. Specify ARCHIVE_DACL2=, to prevent a data class name specified for the first archive log data set being used as a default for the second.
ARCHIVE_MGCL	Specifies the SMS management class name of the archive log data set.	If this value is omitted, no SMS management class is specified when allocating the primary archive log data set. One might be assigned by your SMS ACS routines.
ARCHIVE_MGCL2	Specifies the SMS management class name of the second archive log data set.	If this value is omitted, the second archive log takes the management class of the first archive log data set, if one is specified. Specify ARCHIVE_MGCL2=, to prevent a management class name specified for the first archive log data set being used as a default for the second.
ARCHIVE_RTPD	Specifies the number of days to retain the archive log data set.	A number from 0 through 9999. Default is 9999.
ARCHIVE_RTPD2	Specifies the number of days to retain the second archive log data set. Use this parameter only if you want to set the value differently for the second data set.	A number from 0 through 9999. Default is 9999.
ARCHIVE_STCL	Specifies the SMS storage class name of the archive log data set.	If this value is omitted, no SMS storage class is specified when allocating the primary archive log data set. One might be assigned by your SMS ACS routines.
ARCHIVE_STCL2	Specifies the SMS storage class name of the second archive log data set.	If this value is omitted, the second archive log takes the storage class of the first archive log data set, if specified. Specify ARCHIVE_STCL2=, to prevent a storage class name specified for the first archive log data set being used as a default for the second.
ARCHIVE_UNIT	Specifies the device type or unit name of the device used to store the archive log data set.	Specify a device type or unit name up to eight alphanumeric characters long. Informatica recommends that you write the primary archive log data set to DASD.
ARCHIVE_UNIT2	Specifies the device type or unit name of the device used to store the second archive log data set. Use this parameter only if you want to set the value differently for the second data set.	If this value is omitted, the second archive log takes the UNIT value of the first archive log data set. Specify ARCHIVE_UNIT2=, to prevent a unit type specified for the first archive log data set being used as a default for the second Specify a device type or unit name up to 8 alphanumeric characters long.

Parameter	Description	Valid Values
ARC_UNIT_CNT	Specifies the number of DASD units to use for archiving.	Use this parameter in the same way you use the count option of the MVS UNIT parameter. If using SMS, the SMS data class specifies the volume count for SMS-managed data sets. Default is 2 units.
PRIM_SPACE	Specifies the primary space allocation for DASD data sets in the unit type specified by SPACE_ALLOC.	A number greater than 0. Default is 4320 blocks.
SEC_SPACE	Specifies the secondary space allocation for DASD data sets in the unit type that you specify in SPACE_ALLOC.	A number greater than 0. Default is 540 blocks.
SPACE_ALLOC	Specifies the type of units in which primary and secondary space are allocated.	- BLK. Allocates space in blocks. - CYL. Allocates space in cylinders. - TRK. Allocates space in tracks. Default is BLK.

Usage Notes:

You must specify at least one parameter for this statement.

If you specify multiple parameters, use a comma (,) as a separator character. The last parameter must not end in a comma.

LOGGING_OPTIONS Parameters

In the LOGGING_OPTIONS substatement of the DEFINE statement, you can set logging parameters for the PowerExchange Logger.

Syntax:

```
LOGGING_OPTIONS
  [LOG_INBUFF=number,]
  [LOG_OUTBUFF=number,]
  [ACTIVE_LOG_MODE=mode,]
  [ARCHIVE_LOG_MODE=mode,]
  [ERDS_LOG_MODE=mode]
```

Parameters:

The following table describes the LOGGING_OPTIONS parameters:

Parameter	Description	Valid Values
LOG_INBUFF	Defines the number of 4-KB buffers used for reading the active and archive logs.	1 through 60 (decimal). Default is 28.
LOG_OUTBUFF	Specifies the size, in 4-KB buffers, of the output buffer that the PowerExchange Logger uses for writing the active and archive log data sets.	1 through 50 (decimal).

Parameter	Description	Valid Values
ACTIVE_LOG_MODE	Specifies whether the PowerExchange Logger writes to one or two active log data sets at a time.	- **SINGLE**. The PowerExchange Logger uses one active log at a time. - **DUAL**. The PowerExchange Logger writes to a primary log and a secondary backup log simultaneously. Default is DUAL. Informatica strongly recommends that you use dual logging.
ARCHIVE_LOG_MODE	Specifies whether the PowerExchange Logger writes to one or two archive log data sets at a time. The PowerExchange Logger generates archive logs when the active log is off-loaded.	- **SINGLE**. The PowerExchange Logger writes to one archive log at a time. - **DUAL**. The PowerExchange Logger writes to a primary log and a secondary backup log simultaneously. Default is DUAL. Informatica strongly recommends that you use dual logging.
ERDS_LOG_MODE	Specifies whether the PowerExchange Logger writes to one or two PowerExchange restart data sets (ERDS) at a time.	- **SINGLE**. The PowerExchange Logger uses one restart data set at a time. - **DUAL**. The PowerExchange Logger writes to a primary restart data set and a secondary backup restart data set simultaneously. Default is DUAL. Informatica strongly recommends that you use dual logging.

Usage Notes:

You must specify at least one parameter in the statement.

If you specify multiple parameters, use a comma (,) as a separator character. The last parameter must not end in a comma.

END Statement

Use the END statement to indicate the end of input for the DEFINE statement.

This statement has no substatements or parameters.

Verifying That the Active Log and Emergency Restart Data Sets Were Created Correctly

PowerExchange creates the PowerExchange Logger for z/OS active log data sets and emergency restart data sets (ERDS) at installation when you run the SETUPVSM and SETUPCC2 jobs in the RUNLIB library.

The active logs are VSAM linear data sets that are defined by using IDCAMS. The ERDS data sets are VSAM KSDS data sets.

Verify that these data sets exist and were defined in accordance with the following guidelines:

- No secondary space was allocated.
- The VOLUME parameter specified a single VOLSER.
- In an SMS environment, the STORCLAS parameter did not specify GUARANTEED SPACE=YES.
- VSAM record-level sharing (RLS) is not used with linear data sets (LDSs). In an SMS environment, no RLS attributes are associated with LDSs.

Active and Archive Log Entries in the ERDS

Active and archive log data sets must have entries in the ERDS for the PowerExchange Logger for z/OS to access them.

PowerExchange defines the active logs at installation when you run the SETUPCC2 job that is in the RUNLIB library. This job runs the PowerExchange Logger in batch mode to create the EDMUPARM options module and define the active logs to the ERDS.

During archive processing, the PowerExchange Logger automatically defines archive logs to the ERDS.

Also, you can use the DEFINE_LOG command to define the active and archive logs to the ERDS.

Related Topics:

- "Defining Log Data Sets to the ERDS" on page 83

Customizing the PowerExchange Logger JCL

The PowerExchange Logger for z/OS can run as a started task or a batch job. Informatica recommends that you run the PowerExchange Logger as a started task because it is long running. You must customize the PowerExchange Logger JCL for your installation and then copy it to a system PROCLIB library for started tasks.

PowerExchange provides sample JCL for the PowerExchange Logger. The XIZZZ998 cleanup job in the RUNLIB library, which runs during installation, moves the PowerExchange Logger JCL to the PowerExchange PROCLIB library.

The name of the PowerExchange Logger JCL member in the PROCLIB library is the value that you specify for the **PowerExchange Agent / Logger Prefix** field in the z/OS Installation Assistant followed by the letter L. Based on the default **PowerExchange Agent / Logger Prefix** value of PWX, the default name for the PowerExchange Logger JCL member in the PROCLIB library is PWXL.

The PowerExchange Logger JCL includes the following statements and parameters:

EXEC PGM=EDMLC000,PARM='*logger_id*[,BATCH][,,,*smf_id*]'

Invokes the PowerExchange Logger.

The **PARM** parameter can contain the following required and optional positional parameters:

logger_id

The PowerExchange Logger identifier that is specified in the LOGGER_NAME parameter in the EDMUPARM module options. PowerExchange uses this value to locate the PowerExchange Logger options in the EDMUPARM module.

BATCH

Optional. The option for running the PowerExchange Logger in batch mode to perform maintenance activities. Use this option only when you update the EDMUPARM module options or define or delete logs from the ERDS.

smf_id

Optional. For Post-Log Merge configurations, this value overrides the system SMF ID value that PowerExchange appends to the PowerExchange Logger ID to form the XCF group name.

Each PowerExchange Logger XCF group name must be unique within the sysplex.

By default, the PowerExchange Logger uses the SMF ID on the z/OS system where it runs. If this SMF ID value is not unique within the Post-Log Merge group, you can use this parameter to provide a unique SMF ID value.

The following example shows an EXEC card that uses a symbolic parameter, &SMFID, to override the system SMF ID:

```
//LOGGER  EXEC PGM=EDMLC000,REGION=0M,TIME=NOLIMIT,
//        PARM='&LOGNAME,,,,&SMFID',ACCT=XXXX
```

Valid values are 1 through 4 alphanumeric characters in length.

JOBLIB or STEPLIB DD

Defines the LOAD library that contains the PowerExchange Logger load modules. This library must be APF-authorized.

EDMPARMS DD

Defines the user library, USERLIB, that contains the EDMUPARM options module that is associated with the PowerExchange Logger.

If you do not include an EDMPARMS DD statement in the JCL, or if you specify a library that does not contain the EDMUPARM options module, PowerExchange uses the JOBLIB or STEPLIB concatenation to get the Logger configuration options.

ERDS01 DD

Defines the name of the primary emergency restart data set.

ERDS02 DD

Optional. Defines the name of the dual emergency restart data set when DUAL is specified for the ERDS_LOG_MODE parameter in the EDMUPARM options module.

SYSPRINT DD

Defines the output data set for z/OS system messages.

EDMTRACE DD

Defines the output data set for the common services trace.

Include this DD statement only at the request of Informatica Global Customer Support.

Sample JCL Procedure for the PowerExchange Logger

PowerExchange provides a sample PROC for running the PowerExchange Logger for z/OS. The installation process customizes this JCL with the values that you specify in the z/OS Installation Assistant.

The sample PowerExchange Logger PROC is provided in the LOGERSTP member, which is copied to the PROCLIB library. The member name is comprised of the value that was entered in the **PowerExchange Agent / Logger Prefix** field during installation followed by the letter L.

The following sample JCL is for the PowerExchange Logger:

```
//PWXL PROC HLQ=PWX,LOGGER=PWXL,
//   HLQVSM=PWX
//*-----------------------------------------------------
//LOGGER EXEC PGM=EDMLC000,REGION=0M,TIME=NOLIMIT,
//        PARM=&LOGGER,ACCT=XXXX
//STEPLIB  DD  DISP=SHR,DSN=&HLQ..LOAD
//EDMPARMS DD  DISP=SHR,DSN=&HLQ..&LOGGER..USERLIB
//SYSPRINT DD  SYSOUT=*
//SYSUDUMP DD  SYSOUT=*
```

```
//ERDS01    DD  DSN=&HLQVSM..&LOGGER..ERDS01,DISP=SHR
//ERDS02    DD  DSN=&HLQVSM..&LOGGER..ERDS02,DISP=SHR
```

Managing the PowerExchange Logger for z/OS

You can control certain aspects of PowerExchange Logger processing using commands.

Starting the PowerExchange Logger for z/OS

To start the PowerExchange Logger, issue the MVS START command with the name of the started task. For example:

```
START PWXL
```

Start the PowerExchange Logger after you start the PowerExchange Agent but prior to starting any other PowerExchange CDC component address spaces.

Stopping the PowerExchange Logger for z/OS

To stop the PowerExchange Logger, issue the MVS STOP command with the name of the started task. For example:

```
STOP PWXL
```

The PowerExchange Logger does not stop until all reader and writer connections have terminated.

Controlling the PowerExchange Logger for z/OS

Use PowerExchange commands to control the PowerExchange Logger for z/OS and display information about its processing.

Enter a PowerExchange Logger command with the MVS MODIFY (F) command. Use the following syntax:

```
F logger_proc_name,command
```

The following table describes each PowerExchange Logger command:

Command	Description
DEFINE_LOG	Adds PowerExchange Logger log definitions to the restart data set. You can add definitions for the following types of log data sets: - Additional active log definitions - Replacement active log definitions - Replacement archive log definitions
DELETE_LOG	Deletes all information about a specified PowerExchange Logger log data set from the restart data set. Run this command periodically to delete information about obsolete archive log data sets.
DISPLAY OBJECT=CONNECTION	Displays information about tasks connected to the PowerExchange Logger.
DISPLAY OBJECT=LOG	Displays information about the active or archive log data sets.

Command	Description
PRINT	Prints log records to a dynamically allocated SYSOUT data set.
RESOLVE_INDOUBT	Forces the PowerExchange Logger to either commit the log records as valid changes or to discard them.
STOP	Stops the PowerExchange Logger. The MVS STOP command can also be used.

For more information about these commands, including the syntax and parameters, see the *PowerExchange Command Reference*.

Overriding Log-Read API Timed Defaults

After the Log-Read API (LRAPI) sends commands to the PowerExchange Logger for z/OS, it waits a fixed amount of time for a response. In some customer environments, the default wait time for LRAPI commands might be too short. You can override the amount of time that the LRAPI waits for a response to any request type by specifying parameters in the EDMLRPRM DD statement.

EDMLRPRM Parameters

You can specify the EDMLRPRM DD statement in the JCL for the job that issues the Log-Read API (LRAPI) calls to the PowerExchange Logger. The parameters can be specified in-stream or in a sequential data set.

Use the following DCB attributes if you specify the parameters in a sequential data set that is referenced by the EDMLRPRM DD rather than instream:

- RECFM=FB or RECFM=VB
- LRECL less than or equal to 255
- Any valid block size

Specify one parameter statement per record or line. For a comment, enter an asterisk (*) or a hash (#) character in column one. Use the following general syntax for a parameter entry:

```
parameter=parm_value
```

The following table describes the EDMLRPRM parameters:

Parameter	Description
INTLST	Specifies the time LRAPI spends waiting for the PowerExchange Logger to respond to a Resource Interest List command. This wait period starts after the PowerExchange Logger issues the PWXEDM172791I message. Default is 6000 hundredths of seconds (60 seconds).
REQTRN	Specifies the time LRAPI spends waiting for the PowerExchange Logger to start sending data. This wait period starts after the PowerExchange Logger issues the PWXEDM263011I message. Default is 24000 hundredths of seconds (240 seconds).
SIGNON	Specifies the time LRAPI spends trying to connect to the PowerExchange Logger. This time period starts after the PowerExchange Logger issues the PWXEDM263010I message. Default is 6000 hundredths of seconds (60 seconds).

Parameter	Description
STPTRN	Specifies the time LRAPI spends waiting for the PowerExchange Logger to stop sending more data. This wait period starts after the PowerExchange Logger issues the PWXEDM 263014I message. Default is 12000 hundredths of seconds (120 seconds).
TERM	Specifies the time LRAPI spends disconnecting from the PowerExchange Logger. This time period starts after the PowerExchange Logger issues the PWXEDM263012I message. Default is 4500 hundredths of seconds (45 seconds).

Usually, the Request Data Transfer (REQTRN) command is the command that is most likely to require additional time. When processing a REQTRN command, the PowerExchange Logger might have to wait for archive log data sets to be recalled or for a tape mount. If the PowerExchange Logger cannot access the required log data sets in 4 minutes and provide the data to the LRAPI, the LRAPI request times out, returns reason code 0x0A0E0062 (LoggerDidNotRespondToCommand), and ends the extraction request. In some environments, the LRAPI might frequently encounter this situation because of operational issues. In these environments, use the REQTRN command to extend the wait time.

Note: You can set these parameter values in an EDMLRPRM DD statement in the PowerExchange Listener JCL. However, they then affect each instance of the LRAPI, and all extractions use the same values.

The following example specifies a value of 3 minutes for the REQTRN parameter:

```
//*
//* Set REQTRN timeout value to 3 minutes (i.e. 3*60*100 )
//*
//EDMLRPRM DD *
REQTRN=18000
/*
```

Resolving In-Doubt Units of Work

Use the PowerExchange Logger for z/OS RESOLVE_INDOUBT command to resolve in-doubt units of work (UOWs).

UOWs that have not been committed might be left in an in-doubt state, for example when a CICS/VSAM or IMS region abends. When the ECCR for that region reconnects to the PowerExchange Logger, the PowerExchange Logger exchanges information with the CICS, IMS, or DB2 region and attempts to resolve in-doubt UOWs. The PowerExchange Logger generates a message that reports how many in-doubt UOWs were detected and if any UOWs were not resolved.

1. Run the PowerExchange Logger DISPLAY command to determine the data set names and RBAs of the in-doubt UOWs.
2. Access the source environment and determine which UOWs to commit to the target database and which UOWs to abort.
3. In the PowerExchange Logger environment, run the RESOLVE_INDOUBT command for each in-doubt UOW:
   - Run the command with ACTION=COMMIT for UOWs that you want to commit to the source.
   - Run the command with ACTION=ABORT for UOWs that you want to abort.

Controlling PowerExchange Logger Resource Usage

You can use Workload Manager (WLM) service classes to control PowerExchange Logger for z/OS usage of resources, such as storage, CPU, and I/O devices.

For more information, see "Using WLM Service Classes to Prioritize PowerExchange CDC Started Tasks on z/OS" on page 386.

Monitoring the PowerExchange Logger for z/OS

The PowerExchange Logger for z/OS archives active logs when they become full. You must monitor the PowerExchange Logger to ensure that the archiving process keeps pace with the data flow. If the PowerExchange Logger uses all available active log space, PowerExchange change data capture and extraction will be impacted until the PowerExchange Logger archival process makes active log space available. Specifically, PowerExchange ECCRs will be unable to record new change data and extraction operations may be unable to read captured change data.

The PowerExchange Logger issues the following message to allow you to monitor the status of the active log data sets:

`PWXEDM172672I EDM Logger last active log data set is` *nn* `percent full`

The PowerExchange Logger issues this message when the last available active log data set is 75 percent full, and reissues this message after each additional five percent of the remaining data set space is filled. The PowerExchange Logger retries the archive process each time it issues this message.

You should also monitor the PowerExchange Logger for other operational issues that may be unrelated to the active logs and archive log process. For example, if the PowerExchange Logger runs in a Workload Manager (WLM) service class with a lower priority than a highly-active ECCR, the Logger might delay the ECCR because it cannot write change data to the active log data sets fast enough. For more information about WLM service classes, see "Using WLM Service Classes to Prioritize PowerExchange CDC Started Tasks on z/OS" on page 386.

PowerExchange issues the following Write-To-Operator (WTO) messages to allow you to monitor the status of change data recording:

- `PWXEDM172824W EDM Change Capture waiting on [the Logger's queue|the ECCR-to-CIC queue] since` *date time*`. Using EDM Logger` *logger_ID*.
  An ECCR issues the PWXEDM172824W message if it cannot send change data to the PowerExchange Logger because the circular queue is full. For synchronous ECCRs, the transaction or VSAM batch job that encounters the full queue waits until it can log the change data to the circular queue. For asynchronous ECCRs, the ECCR address space waits until it can log the change data to the circular queue.
- `PWXEDM172825W UOWs are waiting on EDM syncpoint; see EDM log`
  The ECCR issues the PWXEDM172825W message if the PowerExchange Logger does not respond to the ECCR within approximately 1 minute after the ECCR sends an end-UOW. This situation can occur if the PowerExchange Logger cannot keep pace with the ECCR or if a transitory PowerExchange Logger slowdown is occurring because of system issues, such as an SVC dump. The accompanying PWXEDM172826W message includes the UOW ID.

  For synchronous ECCRs, the transaction or VSAM batch job waits until the PowerExchange Logger indicates that the end-UOW has been logged to the active log data set. For asynchronous ECCRs, the ECCR address space waits until the end-UOW has been logged.

Performance Rules and Guidelines

To achieve the best the performance for the PowerExchange Logger for z/OS, consider the following rules and guidelines:

- The PowerExchange Logger is a high-performance started task. Assign it to an appropriate Workload Manager (WLM) service class. For more information, see "Using WLM Service Classes to Prioritize PowerExchange CDC Started Tasks on z/OS" on page 386.
- If you anticipate a large volume of captured data, allocate buffers and data sets that are larger than those allocated in the sample startup procedures.
- Consider defining more active log data sets than the number specified in the sample startup procedures.
- Allocate the Logger active logs, emergency restart data sets, and the Archive Log Copy1 on high-performance DASD.
- The PowerExchange Logger is a long-running MVS started task. Therefore, ensure that your existing MVS system parameters or JCL does not cancel the PowerExchange Logger after a specified amount of CPU time or time.

  To prevent cancellation of the PowerExchange Logger after a specified amount of CPU time or time, you need to specify `TIME=1440` or `TIME=NOLIMIT` in the EXEC statement of the PowerExchange Logger startup procedure.

Related Topics:

- "Size and Number of Active Log Data Sets" on page 73

Managing Log and Restart Data Sets

You can manage log data sets, including the archive log and active log data sets. You can also allocate and manage restart data sets.

Related Topics:

- "Archive Log Rules and Guidelines" on page 73
- "Size and Number of Active Log Data Sets" on page 73
- "Data Set Size Determination" on page 74
- "Number of Active Log Data Sets" on page 76
- "Defining Log Data Sets to the ERDS" on page 83
- "Deleting Log Data Sets from the ERDS " on page 85
- "Allocating Restart Data Sets" on page 76
- "Adding Active Log Data Set Definitions to the Restart Data Set" on page 77
- "Changing the Size of Active Log Data Sets" on page 79
- "Formatting Log Data Sets" on page 82
- "Recovering Damaged Restart Data Sets" on page 87
- "Moving Log Data Sets to Other Devices" on page 88

Archive Log Rules and Guidelines

Use the following rules and guidelines when you manage archive logs:

- Archive log data sets are dynamically allocated. When you install or reconfigure the PowerExchange Logger, you specify the data set name prefix, block size, unit name, and DASD sizes needed for allocation.
- The emergency restart data sets (ERDS) contains approximately 1,000 entries for the archive log data sets. When the PowerExchange Logger reaches the last entry, it wraps to the beginning, overwriting the oldest entry.
- Define dual archive logs to prevent potential data loss if one copy is corrupted or accidentally deleted.
- Configure the Logger parameters so at least the first archive log copy is created on DASD. The second archive log copy can be placed on tape.
- You can archive DASD archive logs to tape provided that the storage management system automatically restores them to DASD when they are dynamically allocated.
- You can specify that your secondary archive log data sets be stored on a different device and device type from that used to store your primary archive log data sets. You can also specify different SMS classes for your primary and secondary archive logs.
- If you archive data to tape, adjust the size of the log data sets so that each set contains the amount of space that can be stored on a tape volume. Doing so minimizes tape handling and volume mounts and maximizes the use of tape resources.
- Because archive log data sets written to DASD cannot extend to another volume, make the primary space allocation (both quantity and block size) large enough to contain all of the data coming from the active log data sets. Allocate primary space with the PRIM_SPACE option of the DEFINE statement.
- As each active log becomes full, the PowerExchange Logger off loads the log data to an active archive log. If the rate of changes flowing into the Logger fills all the active logs before the Logger finishes off loading to an archive, the Logger stops accepting changes for two minutes. During the pause, the Logger attempts to finish its current archive log. The PowerExchange Logger continues in this mode until it completes off loading data to an archive, or until you stop the PowerExchange Logger manually.
- When the PowerExchange Logger abends due to data set out-of-space conditions, the PowerExchange Logger action depends on the abend code:
  - If the abend code is B37, the PowerExchange Logger increments the primary and secondary allocations by 25 using the units you specified in your definition and attempts to continue archiving.
  - If the abend code is D37 or E37, examine your system configuration (particularly the volumes that your PowerExchange active logs use) and determine the reason for the lack of space. If you fix the problem, the PowerExchange Logger continues attempting to archive until it is successful. If you do not fix the problem, you must use the MVS CANCEL command to cancel the PowerExchange Logger.

Warning: Do not place both archive log copies on tape. This limits the number of log readers to a single reader per archive log and allows only two concurrent extractions.

Related Topics:

- "ARCHIVE_OPTIONS Parameters " on page 62

Size and Number of Active Log Data Sets

The PowerExchange installation process allocates three active log data sets with minimum size requirements. Use the information in this section to determine whether you need to increase the size of the data sets, and whether you should allocate additional log data sets. When you define your active log data sets, consider the system capacity and your change data requirements, including archiving and performance issues.

After the PowerExchange Logger is active, you can change the log data set configuration as necessary.

You must balance the following variables:

- Data set size
- Number of data sets
- Amount of archiving

Configure the log data set based on the following factors:

- Resource availability requirements
- Performance requirements
- Type of PowerExchange installation: whether you are running near-real-time or batch replication
- Data recovery requirements

The Logger format utility (EDMLUTL0) formats only the primary space allocation. This means that the Logger does not use secondary allocation. This includes Candidate Volumes and Space, such as that allocated by SMS when using a STORCLAS with the Guaranteed Space attribute.

Data Set Size Determination

Use these criteria to determine the size of the active log data sets.

The maximum size of an active log data set is 2,912 cylinders on 3390 DASD and 3,495 cylinders on a 3380 DASD.

The maximum size of an active log data set is limited by the maximum size of the associated data space. The maximum size of a data space is approximately 2 GB.

Factors Affecting Data Set Size

When determining the size of active log data sets, consider the following factors:

- Informatica recommends that you use the same size for all log data sets. If the PRILOG and SECLOG data sets in the selected active log pair are not the same size, the amount of data that the PowerExchange Logger writes is limited to the size of the smallest data set in the log pair.
- An inverse relationship exists between the size of the log data sets and the archiving frequency. A large data set needs to be archived less often than a small data set. However, the archiving of a small data set takes less time.
- The PowerExchange header adds to the size of change records. For the header size in each record, use approximately 300 bytes plus the key length.
- You should include an overhead rate of 5-10 percent to log data set size. This overhead rate provides space for control information and recovery-related information such as system checkpoints. You can control the frequency of system checkpoints by setting the PowerExchange Logger CHKPT_FREQUENCY parameter.
- The type of change transaction affects if PowerExchange CDC captures a before-image, after-image, or both:
  - For a DELETE, PowerExchange captures the before-image.
  - For an INSERT, PowerExchange captures the after-image.
  - For an UPDATE, PowerExchange captures both the before- and after-images.
- For some data sources such as IMS and VSAM, PowerExchange CDC captures the entire object that contains a change. For example, if a field in an IMS segment changes, PowerExchange captures the entire segment.

Calculating the Data Set Size

Use the following formulas to estimate the size of each active log data set in bytes and then convert that value to tracks and cylinders for space allocation:

- **Formula 1**. To estimate the active log data set size in bytes:

  ```
  active log data set size in bytes = (average change record size in bytes
                                      x number of changes captured per hour
                                      x hours between archiving)
                                        x (1 + overhead rate)
  ```

  For the overhead rate, use 5-10 percent.

- **Formula 2**. To convert the active log data set size from bytes to tracks:

  ```
  active log data set size in cylinders = active log data set size in tracks
                                          / number of tracks per cylinder
  ```

- **Formula 3**. To convert the active log data set size from tracks to cylinders:

  ```
  active log data set size in tracks = active log data set size in bytes
                                       / number of usable bytes per track
  ```

The number of tracks per cylinder and the number of usable bytes per track depend on the type of DASD you use.

The following table provides these values for 3390 and 3380 DASD devices:

Space Information	Model 3390	Model 3380
Tracks per cylinder	15	15
Usable bytes per track	49,152	40,960

Note: This table applies only to the PowerExchange Logger and is based on the fact that the PowerExchange Logger writes 4 KB blocks.

Example: Calculating the Total Space for Each Active Log Data Set

This example uses 3390 DASD and the following assumptions:

- Average change record size including the PowerExchange header = 600 bytes
- Number of changes captured per hour = 40,000
- Hours between archiving = 12
- Overhead rate = 5%
- Number of tracks per cylinder = 15

To calculate the total space for each active log data set:

1. Use Formula 1 to calculate the size of each active log data set in bytes:

   ```
   600 x 40,000 x 12 x (1 + .05) = 302,400,000 bytes
   ```

2. Use Formula 2 and Formula 3 to calculate the number of tracks and cylinders to allocate:

   ```
   302,400,000 / 49,152 = 6,152 tracks
   6,152 / 15 = 410 cylinders
   ```

Number of Active Log Data Sets

You must specify between 2 and 31 active log data sets.

When determining the number of active log data sets, use the following guidelines:

- Each active log is held on a single data space. After an active log is opened, it remains open as long as the PowerExchange Logger for z/OS is active. The more active logs are allocated, the more data spaces are opened while the PowerExchange Logger is active.
- If PowerExchange must be available continuously for near-real-time replication, use a small number of active log data sets.
- If you are not concerned about controlling the amount of archiving, use a larger number of active data sets. Archiving will occur more frequently but take less time.

Allocating Restart Data Sets

The installation process creates at least one PowerExchange restart data set (ERDS). You can use this procedure to expand the restart data sets.

Define dual restart data sets and allocate them to different DASD volumes to ensure recovery in case of a disk failure. The restart data set names must match the data set names that you specify in the ERDS01 and ERDS02 DD statements in the PowerExchange Logger EDMUPARMS options module. To help distinguish restart data sets for different PowerExchange Logger subsystems, include the Logger ID as part of these data sets.

Use the following sample JCL in the #DEFRDS member of the *hlq*.SAMPLIB library, where *hlq* is the high-level qualifier that you specified at installation, to define the restart data set in dual mode:

```
//         JOB
//*-------------------------------------------------------------------*
//* PowerExchange Change Data Capture - ALLOCATE LOGGER RESTART DATASETS
//*-------------------------------------------------------------------*
//* REPLACE THE FOLLOWING ITEMS WITH PROPER INSTALLATION VALUES
//* 1. JCL DATA SET NAMES
//* 2. IDCAMS COMMAND SPECIFICATIONS
//* 3. REPLACE ???? WITH YOUR LOGGER NAME. USING THE LOGGER NAME AS A
//*    DATA SET NAME QUALIFIER PROVIDES A STANDARD TO INDICATE WHICH
//*    DATA SET BELONGS TO WHICH LOGGER.
//*-------------------------------------------------------------------*
//ALLOCRDS EXEC PGM=IDCAMS,REGION=4M
//SYSPRINT DD SYSOUT=*
//SYSUDUMP DD SYSOUT=*
//SYSIN    DD *
  DELETE (YOUR.????.ERDS01) ERASE
  DELETE (YOUR.????.ERDS02) ERASE
  SET MAXCC = 0
  DEFINE CLUSTER                          -
           (NAME(YOUR.????.ERDS01)        -
           VOLUMES(VVVVVV)                -
           SHAREOPTIONS(2,3)              -
         DATA                             -
           (NAME(YOUR.????.ERDS01.DATA)   -
           RECORDS(200)                   -
           RECORDSIZE(4089 4089)          -
           CONTROLINTERVALSIZE(4096)      -
           FREESPACE(0 20)                -
           KEYS(4 0) )                    -
         INDEX                            -
           (NAME(YOUR.????.ERDS01.INDEX)  -
           RECORDS(5 5)                   -
           CONTROLINTERVALSIZE(1024) )
  DEFINE CLUSTER                          -
           (NAME(YOUR.????.ERDS02)        -
```

```
                VOLUMES(VVVVVV)                -
                SHAREOPTIONS(2,3)              -
              DATA                             -
                (NAME(YOUR.????.ERDS02.DATA)   -
                RECORDS(200)                   -
                RECORDSIZE(4089 4089)          -
                CONTROLINTERVALSIZE(4096)      -
                FREESPACE(0 20)                -
                KEYS(4 0) )                    -
              INDEX                            -
                (NAME(YOUR.????.ERDS02.INDEX)  -
                RECORDS(5 5)                   -
                CONTROLINTERVALSIZE(1024) )
//*-------------------------------------------------------------------*
```

To allocate restart data sets:

1. Make a working copy of the sample #DEFRDS member. Then edit the copy as required.

   The following table lists the required JCL statements:

JCL Statement	Description
EXEC	Specifies the IDCAMS program.
SYSPRINT DD	Specifies the output data set for MVS system messages.
SYSIN DD	Specifies the IDCAMS commands DELETE, SET MAXCC, and DEFINE. For more information about these utility commands, see your IBM documentation.

2. Run the JCL procedure to create and configure the restart data sets.

Related Topics:

- "Data Set Size Determination" on page 74

Adding Active Log Data Set Definitions to the Restart Data Set

The installation process creates definitions for at least three active log data sets. With three data sets allocated, two are active and one is always available for selection. The startup procedure for the PowerExchange Logger dynamically allocates the active log data sets named in the restart data sets. Use this procedure to create additional data set definitions as required for your site. You can have a maximum of 31 active logs.

First determine the size and number of active log data sets required for your organization.

To help distinguish log data sets from different PowerExchange Logger subsystems, include the subsystem name in the high-level qualifiers of these data sets. Use the IDCAMS parameters to define the active log data sets. Adjust the CYL parameters for the active log data sets according to the expected volume of logging.

Use the following sample JCL in the #ADDLOGS member of the *hlq*.SAMPLIB library, where *hlq* the high-level qualifier that you specified during installation, to add active log data sets:

```
//         JOB
//*-------------------------------------------------------------------*
//* PowerExchange CDC - DEFINE ACTIVE LOG DATA SETS TO LOGGER
//*-------------------------------------------------------------------*
//* REPLACE THE FOLLOWING ITEMS WITH PROPER INSTALLATION VALUES
//* 1. JCL DATA SET NAMES
//* 2. REPLACE ???? WITH YOUR LOGGER NAME. USING THE LOGGER NAME AS A
//*    DATA SET NAME QUALIFIER PROVIDES A STANDARD TO INDICATE WHICH
```

```
//*    DATA SET BELONGS TO WHICH LOGGER.
//*-----------------------------------------------------------------*
//DEFLOG   EXEC PGM=EDMLC000,PARM='????,BATCH'
//STEPLIB  DD DISP=SHR,DSN=HLQ.LOAD                <=== PWX LOAD
//EDMPARMS DD DISP=SHR,DSN=YOUR.USERLIB            <=== EDMSDIR,EDMUPARM
//ERDS01   DD DISP=SHR,DSN=YOUR.????.ERDS01        <=== PRI RESTART DSN
//ERDS02   DD DISP=SHR,DSN=YOUR.????.ERDS02        <=== SEC RESTART DSN
//SYSPRINT DD SYSOUT=*
//SYSIN    DD *
DEFINE_LOG
    DSNAME=YOUR.????.PRILOG.DS03,
    COPY=PRILOG
END
DEFINE_LOG
    DSNAME=YOUR.????.SECLOG.DS03,
    COPY=SECLOG
END
/*
```

Note: In this JCL, HLQ and YOUR represent high-level qualifiers that you specified during installation. The question marks represent the PowerExchange Logger ID associated with the log data sets.

To add active log data set definitions to the restart data set:

1. Make a working copy of the sample #ADDLOGS member. Then, edit the copy as required.

   The following table describes the JCL statements:

JCL Statement	Description
EXEC	Specify the EDMLC000 program.
PARM	Include the Logger name, followed by BATCH.
STEPLIB DD	Include the PowerExchange CDC load library. If you added the load library to your system's LNKLST concatenation, you do not need to add it to the STEPLIB.
EDMPARMS DD	Specify the name of the user library (YOUR.USERLIB) that contains the PowerExchange Logger EDMUPARMS module options associated with the PowerExchange Logger that uses these data sets.
ERDS01 DD	Specify the data set name of the primary restart data set. Make sure that this name matches the name you used when you created this data set.
ERDS02 DD	Specify the data set name of the backup restart data set. Ensure that this name matches the name you used when you created this data set.
SYSPRINT DD	Specify the output data set for MVS system messages.
SYSIN DD	Specify the PowerExchange Logger command, DEFINE_LOG.

2. Stop the PowerExchange Logger.
3. Run the JCL procedure to define the active log data sets.
4. Restart the PowerExchange Logger.

Related Topics:

- "Sample JCL Procedure for the PowerExchange Logger" on page 67
- "Size and Number of Active Log Data Sets" on page 73

Changing the Size of Active Log Data Sets

You can change the size of existing active log data sets.

First estimate the average active log data set size and the space to allocate for each of these data sets.

To resize the data sets, use the JCL in the #SIZELOG member of the *hlq*.SAMPLIB member, where *hlq* the high-level qualifier that you specified during installation. This member contains IDCAMS DEFINE statements for allocating space for the resized active log data sets, such as:

```
DEFINE CLUSTER -
       (NAME (hlq.EDML.PRILOG.DS01)       -
        LINEAR                            -
        VOLUMES(volser)                   -
        SHAREOPTIONS(2,3)                 -
        CYL(nnn) )                        -
    DATA                                  -
       (NAME(hlq.EDML.PRILOG.DS01.DATA) )
```

Note: You must shut down the PowerExchange Logger and stop all capture and extraction tasks.

1. Make a copy of the sample #SIZELOG member in the *hlq*.SAMPLIB library. This member contains JCL for changing the size of log data sets.
2. Edit the JCL statements in the copy of the #SIZELOG member, as needed.

   The following table describes the JCL statements for the IBM IDCAMS program:

JCL Statement	Description
EXEC	Specify the IDCAMS program so that you can run the IDCAMS ALTER, DEFINE, and REPRO commands, which are specified in the SYSIN DD.
SYSPRINT DD	Specify the output data set for MVS system messages.
SYSIN DD	Specify the IDCAMS commands ALTER, DEFINE, and REPRO. For more information about these commands, see your IBM documentation.

   The following table describes the JCL statements for the PowerExchange EDMUTIL0 program:

JCL Statement	Description
EXEC	Specify the EDMLUTL0 program. This program formats the expanded portions of the active log data sets for the PowerExchange Logger.
STEPLIB DD	Add the PowerExchange CDC load library to the STEPLIB DD concatenation unless you added it to the system LNKLST concatenation.
PRILOG DD	Specify the active log data set name that you used to create the log data set.

3. Stop all PowerExchange jobs and tasks for which the PowerExchange Logger writes data to or reads data from the active log data sets. These jobs and tasks include the PowerExchange Listener, all ECCRs associated with the PowerExchange Logger, PowerExchange Condense tasks, and PowerExchange netport jobs.
4. After all log reader and writer threads stop, stop the PowerExchange Logger.
5. Customize and run the JCL in the #DISPLOG member of the *hlq*.SAMPLIB sample library. This JCL uses the PowerExchange Logger batch interface to display the “in-use” active log data sets.

If you want to display only the active log data sets, without the archive data sets, include the following TYPE parameter in the DISPLAY OBJECT=LOG command:

```
DISPLAY OBJECT=LOG,TYPE=ACTIVE,DSNAME=* END
```

When you run the batch job, the following output is written to the EDMMSG data set:

```
L O G   S T A R T
PWXEDM172502I EDM Logger BATCH initialization in-progress product level V2.4.04
10/15/2003
PWXEDM172638I EDM Logger system timestamp for ERDS = 2006.241 16:08:25.95
DISPLAY OBJECT=LOG,TYPE=ACTIVE,DSNAME=* END
PWXEDM172572I EDM Logger input commands accepted execution started
PWXEDM172679I EDM Logger LOG ACTIVE report follows:
              *Start RBA      End  RBA          Log Dsname            Status
               000001FA4000  000002A2FFFF  EDMUSR.PWX.PRILOG.DS01      REUS
               000002A30000  0000034BBFFF  EDMUSR.PWX.PRILOG.DS02      REUS,IN-USE
               000001518000  000001FA3FFF  EDMUSR.PWX.PRILOG.DS03      REUS
               000001FA4000  000002A2FFFF  EDMUSR.PWX.SECLOG.DS01      REUS
               000002A30000  0000034BBFFF  EDMUSR.PWX.SECLOG.DS02      REUS,IN-USE
               000001518000  000001FA3FFF  EDMUSR.PWX.SECLOG.DS03      REUS
PWXEDM172506I EDM Logger BATCH Shutdown in progress
PWXEDM172508I EDM Logger #### TASK EDMLIPC0 COMPLETE RC=00
PWXEDM172508I EDM Logger #### TASK EDMLCKP0 COMPLETE RC=00
PWXEDM172508I EDM Logger #### TASK EDMLRLM0 COMPLETE RC=00
PWXEDM172508I EDM Logger #### TASK EDMLLLG0 COMPLETE RC=00
PWXEDM172509I EDM Logger BATCH shutdown complete
```

Note: The PRILOG and SECLOG data sets that have the status of REUS,IN-USE are the in-use active log data sets.

6. To change the size of the active log data sets, run the customized #SIZELOG job.
7. Review the specifications for ARCHIVE_OPTIONS in the SETUPCC2 member of the *hlq*.RUNLIB library. Make any necessary adjustment to accommodate the new size of the active log data sets.

   An archive log data set requires the same amount of space as the active log from which it was created. If you increase the size of the active log data sets and you archive these logs to disk, you might also need to increase the space for the archive log data sets. You specify the amounts of primary and secondary space for archive log data sets in the ARCHIVE_OPTIONS parameter of the EDMUPARM options module. If you change these space amounts, update the corresponding values in the SETUPCC2 member.

   Tip: To change the archive log data set size, run only the first step of the job in the SETUPCC2 member. You do not need to run the second step, which defines the active log data sets to the PowerExchange Logger.
8. Restart the PowerExchange Logger.
9. Restart all of the PowerExchange jobs and tasks that you stopped in step 3.

   Note: If you issue the PowerExchange Logger DISPLAY OBJECT=LOG command immediately after this procedure, the RBA range that is displayed for the active log data sets might not reflect the increased data set size. The PowerExchange Logger does not adjust the RBA ranges to account for additional space until it nears the end of the in-use active log data sets.

Related Topics:

- "Data Set Size Determination" on page 74

Example #SIZELOG Member

The following example #SIZELOG member contains JCL that resizes two PRILOG and SECLOG pairs of active log data sets:

```
//PWXLOGR  JOB (MYJOB),'EXPAND LOGS',CLASS=A,MSGCLASS=X,
//         MSGLEVEL=(1,1),NOTIFY=&SYSUID
```

```
//*-------------------------------------------------------------------*
//RENAME   EXEC PGM=IDCAMS,REGION=0M
//SYSPRINT DD SYSOUT=*
//SYSIN    DD  *
  ALTER PWX.PRILOG.DS01 -
        NEWNAME(PWX.TEMPLOG1.DS01)
  ALTER PWX.PRILOG.DS01.DATA -
        NEWNAME(PWX.TEMPLOG1.DS01.DATA)
  ALTER PWX.SECLOG.DS01 -
        NEWNAME(PWX.TEMPLOG2.DS01)
  ALTER PWX.SECLOG.DS01.DATA -
        NEWNAME(PWX.TEMPLOG2.DS01.DATA)

  ALTER PWX.PRILOG.DS02 -
        NEWNAME(PWX.TEMPLOG1.DS02)
  ALTER PWX.PRILOG.DS02.DATA -
        NEWNAME(PWX.TEMPLOG1.DS02.DATA)
  ALTER PWX.SECLOG.DS02 -
        NEWNAME(PWX.TEMPLOG2.DS02)
  ALTER PWX.SECLOG.DS02.DATA -
        NEWNAME(PWX.TEMPLOG2.DS02.DATA)
/*
//*------------------------------------------------------------------*
//ALLOCLOG EXEC PGM=IDCAMS,REGION=0M,COND=(0,LT)
//SYSPRINT DD SYSOUT=*
//SYSIN    DD  *
  DEFINE CLUSTER -
          (NAME(PWX.PRILOG.DS01) -
          LINEAR -
          STORCLAS(SMSPOOL) -
          CYL(300)) -
         DATA -
          (NAME(PWX.PRILOG.DS01.DATA) )
  DEFINE CLUSTER -
          (NAME(PWX.SECLOG.DS01) -
          LINEAR -
          STORCLAS(SMSPOOL) -
          CYL(300)) -
         DATA -
          (NAME(PWX.SECLOG.DS01.DATA) )

  DEFINE CLUSTER -
          (NAME(PWX.PRILOG.DS02) -
          LINEAR -
          STORCLAS(SMSPOOL) -
          CYL(300)) -
         DATA -
          (NAME(PWX.PRILOG.DS02.DATA) )
  DEFINE CLUSTER -
          (NAME(PWX.SECLOG.DS02) -
          LINEAR -
          STORCLAS(SMSPOOL) -
          CYL(300)) -
         DATA -
          (NAME(PWX.SECLOG.DS02.DATA) )
/*
//*------------------------------------------------------------------*
//REPROLOG EXEC PGM=IDCAMS,REGION=0M,COND=(0,LT)
//SYSPRINT DD SYSOUT=*
//SYSIN    DD  *
  REPRO INDATASET(PWX.TEMPLOG1.DS01) -
        OUTDATASET(PWX.PRILOG.DS01)
  REPRO INDATASET(PWX.TEMPLOG2.DS01) -
        OUTDATASET(PWX.SECLOG.DS01)

  REPRO INDATASET(PWX.TEMPLOG1.DS02) -
        OUTDATASET(PWX.PRILOG.DS02)
  REPRO INDATASET(PWX.TEMPLOG2.DS02) -
        OUTDATASET(PWX.SECLOG.DS02)
/*
//*------------------------------------------------------------------*
```

```
//* NOTE:
//*   THE FOLLOWING STEPS WILL *NOT* DESTROY THE DATA THAT WAS JUST
//*   COPIED INTO THE LOG DATASETS. INSTEAD, THE UTILITY DETECTS
//*   WHETHER ANY PART OF THE DATASETS HAVE BEEN ALLOCATED BUT NOT
//*   YET FORMATTED, AND ONLY FORMATS *THOSE* PARTS OF THE DATASETS.
//*-------------------------------------------------------------------*
//FORMATP  EXEC PGM=EDMLUTL0,REGION=0M,COND=(0,LT)
//STEPLIB  DD DISP=SHR,DSN=PWX.LOAD
//PRILOG   DD DISP=OLD,DSN=PWX.PRILOG.DS01
//*-------------------------------------------------------------------*
//FORMATS  EXEC PGM=EDMLUTL0,REGION=0M,COND=(0,LT)
//STEPLIB  DD DISP=SHR,DSN=PWX.LOAD
//PRILOG   DD DISP=OLD,DSN=PWX.SECLOG.DS01
//*-------------------------------------------------------------------*
//FORMATP  EXEC PGM=EDMLUTL0,REGION=0M,COND=(0,LT)
//STEPLIB  DD DISP=SHR,DSN=PWX.LOAD
//PRILOG   DD DISP=OLD,DSN=PWX.PRILOG.DS02
//*-------------------------------------------------------------------*
//FORMATS  EXEC PGM=EDMLUTL0,REGION=0M,COND=(0,LT)
//STEPLIB  DD DISP=SHR,DSN=PWX.LOAD
//PRILOG   DD DISP=OLD,DSN=PWX.SECLOG.DS02
//*-------------------------------------------------------------------*
```

Formatting Log Data Sets

You must format the log data sets as you create them. PowerExchange CDC provides a utility, EDMLUTL0, that you can use to format the log data sets.

Use the following sample JCL in the #EDMLFMT member of the *hlq*.SAMPLIB library. This JCL formats four log data sets: two primary data sets and two secondary data sets.

```
//*-------------------------------------------------------------------*
//* PowerExchange CDC - FORMAT ACTIVE LOG DATA SETS FOR LOGGER
//*-------------------------------------------------------------------*
//* REPLACE THE FOLLOWING ITEMS WITH PROPER INSTALLATION VALUES
//* 1. JCL DATA SET NAMES
//*-------------------------------------------------------------------*
//DEFLOGP1 EXEC PGM=EDMLUTL0
//STEPLIB  DD DISP=SHR,DSN=HLQ.LOAD                   <=== PWX LOAD
//PRILOG   DD DISP=SHR,DSN=YOUR.????.PRILOG.DS01      <=== PRI LOG #1
//*-------------------------------------------------------------------*
//DEFLOGS1 EXEC PGM=EDMLUTL0
//STEPLIB  DD DISP=SHR,DSN=HLQ.LOAD                   <=== PWX LOAD
//PRILOG   DD DISP=SHR,DSN=YOUR.????.SECLOG.DS01      <=== SEC LOG #1
//*-------------------------------------------------------------------*
//DEFLOGP2 EXEC PGM=EDMLUTL0
//STEPLIB  DD DISP=SHR,DSN=HLQ.LOAD                   <=== PWX LOAD
//PRILOG   DD DISP=SHR,DSN=YOUR.????.PRILOG.DS02      <=== PRI LOG #2
//*-------------------------------------------------------------------*
//DEFLOGS2 EXEC PGM=EDMLUTL0
//STEPLIB  DD DISP=SHR,DSN=HLQ.LOAD                   <=== PWX LOAD
//PRILOG   DD DISP=SHR,DSN=YOUR.????.SECLOG.DS02      <=== SEC LOG #2
```

Note: In this JCL, HLQ and YOUR represent high-level qualifiers that you specified during installation. The question marks represent the PowerExchange Logger ID associated with the log data sets.

To format log data sets:

1. Make a copy of the sample #EDMLFMT JCL procedure, and edit the copy as required.

The following table describes the statements that you must specify for each log data set:

JCL Statement	Description
EXEC	Specify the utility EDMLUTL0. This utility processes the log data sets so that they are formatted for change capture.
STEPLIB DD	Include the PowerExchange CDC load library. If you added the load library to your system's LNKLST concatenation, you do not need to add it to the STEPLIB statement.
PRILOG	Specify one of the log data set names that you used when you created the log data sets.

For example, if your system uses dual logging and two active logs, include four job steps in the utility JCL, one for each primary log and one for each secondary log. Include the subsystem name in a log data set name to distinguish between the log data sets.

2. Repeat Step 1 until you have defined all of the log data sets that you want to format.
3. Run the job.

   The utility processes each data set, formatting it for change capture. The utility formats the data sets according to the following conditions:

   - If the data set is empty when the format utility processes it, the utility formats the entire data set, from the beginning of the data set to the highest-allocated RBA for the log.
   - If the data set contains data when the format utility processes it, the utility formats the data set from the highest used log RBA to the highest allocated log RBA. The utility does not format the existing data in the log data set. This is useful if you want to format a data set when you move or copy it to a different physical location.

Defining Log Data Sets to the ERDS

The PowerExchange Logger for z/OS requires entries for active and archive logs in the emergency restart data set (ERDS) to access the log data sets.

Use the DEFINE_LOG command to define active and archive logs to the ERDS.

Also, PowerExchange defines the active logs at installation when you run the SETUPCC2 job in the RUNLIB library. This jobs runs the PowerExchange Logger in batch mode to create the EDMUPARM options module and define the active logs to the ERDS.

DEFINE_LOG Command

The DEFINE_LOG command adds log definitions to the emergency restart data set.

Use the DEFINE_LOG command to perform the following tasks:

- Add a definition for a new active log to the restart data set.
- Add a definition for a replacement active log to the restart data set.
- Add a definition for a replacement archive log to the restart data set.

The DEFINE_LOG command has the following syntax for active logs:

```
DEFINE_LOG
   DSName=data_set_name,
   COPY={PRILOG|SECLOG},
   [STARTRBA=X'start_rba',ENDRBA=X'end_rba']
END
```

The DEFINE_LOG command has the following syntax for archive logs:

```
DEFINE_LOG DSName=data_set_name,
COPY1VOL|COPY2VOL=volser,UNIT=unit_name,
STARTRBA=X'start_rba',ENDRBA=X'end_rba'
END
```

You can also run the DEFINE_LOG command interactively: for active and archive logs. The following example shows how to define an active PRILOG data set:

```
F procname,DEFINE_LOG DSNAME=data_set_name,COPY=PRILOG
```

For the interactive form of the DEFINE_LOG command, if the length of the command is greater than 110 characters, you can split the command over two lines. You must use a comma at the end of the first line, which indicates to the logger that the command is not yet complete, and to wait for more input before processing the command.

For example, to define the first copy of an archive log, you can enter the following command:

```
F procname,DEFINE_LOG DSNAME=data_set_name,COPY1VOL=volser,UNIT=unit_name,
```

```
F procname,STARTRBA=X'start_rba_value',ENDRBA=X'end_rba_value'
```

The following table describes the DEFINE_LOG parameters:

Parameter	Definition	Valid Values
DSNAME	Specifies a log data set name.	The data set name can be up to 44 characters long.
COPY	Specifies which copy of the active log you are defining. This parameter is valid only when you are specifying active log options.	- **PRILOG** indicates that you are defining a primary log data set for the PowerExchange Logger to use. - **SECLOG** indicates that you are defining a secondary log (backup copy).
COPY1VOL | COPY2VOL	Specifies which copy of the archive log you are creating.	The six-character volume name where the archive log resides.
STARTRBA	Specifies the log RBA of the beginning of either the replacement active log data set or the replacement archive log data set volume specified by data_set_name. You can obtain the start RBA from messages or by using the PowerExchange Logger DISPLAY command. You must enter this parameter for archive log definitions. It is optional for active log definitions.	Enter 12 hexadecimal digits for the rba value preceding them with the character X and enclosing them in single quotation marks. For active logs, use this parameter only for replacement log data sets. For archive logs, this parameter is required.
UNIT	Specifies the z/OS unit name of the archive log you are creating.	The z/OS unit name that matches the volume name you specified in the COPY1VOL or COPY2VOL parameter.

Parameter	Definition	Valid Values
ENDRBA	Specifies the log RBA of the end of either the replacement active log data set or the replacement archive log data set volume specified by data_set_name. You can obtain the end RBA from messages or by using the PowerExchange Logger DISPLAY command. You must enter this parameter for archive log definitions. For active log definitions, this parameter is required if you specified STARTRBA.	Enter 12 hexadecimal digits for the rba value preceding them with the character X and enclosing them in single quotation marks. For active logs, use this parameter only for replacement log data sets. For archive logs, this parameter is required.
END	Indicates that the input for this command is complete.	This parameter is required.

Related Topics:

- "Adding Active Log Data Set Definitions to the Restart Data Set" on page 77

Deleting Log Data Sets from the ERDS

The DELETE_LOG command deletes all information about a specified log data set from the emergency restart data set (ERDS).

You can run the DELETE_LOG command as part of a batch job or interactively, whenever you need to delete a log. For example, run this command to delete outdated archive log data sets.

Syntax

To issue the DELETE_LOG command with the MVS MODIFY command, use the following syntax:

```
F proc_name,DELETE_LOG DSNAME=log_dataset_name
```

To issue the DELETE_LOG command as part of a batch job, use the following syntax:

```
DELETE_LOG DSNAME=log_dataset_name END
```

The following table describes the DELETE_LOG parameters:

Parameter	Description	Valid Values
DSNAME	Specifies the fully qualified data set name for the log data set for which to delete information from the ERDS.	A data set name up to 44 characters in length.
END	Indicates that the input for this command is complete. Required if you include the command in a batch job.	Not applicable.
proc_name	Specifies the PowerExchange Logger procedure name. Required if you issue the command interactively.	A valid proc name.

Usage Notes

- If you use the MVS MODIFY command to run the DELETE_LOG command in interactive mode, the PowerExchange Logger can continue running.

- If you run the DELETE_LOG command as part of a batch job, you must stop the PowerExchange Logger before the batch job runs. Also stop any ECCR that is running against data sources for which the PowerExchange Logger logs changes.

Sample JCL

The following sample JCL deletes an archive log data set in batch mode. Replace the question marks (????) with the PowerExchange Logger ID.

```
//jobname JOB
//DEFLOG   EXEC PGM=EDMLC000,PARM='????,BATCH'
//STEPLIB  DD DISP=SHR,DSN=HLQ.LOAD              <=== PWX LOAD
//EDMPARMS DD DISP=SHR,DSN=YOUR.USERLIB          <=== EDMSDIR,EDMUPARM
//ERDS01   DD DISP=SHR,DSN=YOUR.????.ERDS01      <=== PRI RESTART DSN
//ERDS02   DD DISP=SHR,DSN=YOUR.????.ERDS02      <=== SEC RESTART DSN
//SYSPRINT DD SYSOUT=*
//SYSIN    DD *
DELETE_LOG
    DSNAME=archive_log_dataset_name
END

/*
```

Recovering Damaged Active Log Data Sets

To recover damaged active log data sets, you can delete the damaged set and replace it with a copy of the corresponding backup log data set. Use this procedure only if you defined dual logging to create a backup.

Before you run the procedure to recover the damaged data sets, you must stop the PowerExchange Logger. After recovery, restart the PowerExchange Logger.

Use the following sample JCL in the #RCOVADS member of the *hlq*.SAMPLIB library, where *hlq* is the high-level qualifier that you specified at installation, to recover damaged active log data sets:

```
//         JOB
//*-------------------------------------------------------------------*
//* PowerExchange Change Data Capture - RECOVER PRIMARY LOG FROM SECONDARY LOG
//*-------------------------------------------------------------------*
//* REPLACE THE FOLLOWING ITEMS WITH PROPER INSTALLATION VALUES
//* 1. JCL DATA SET NAMES
//* 2. IDCAMS COMMAND SPECIFICATIONS
//* 3. REPLACE ???? WITH YOUR LOGGER NAME. USING THE LOGGER NAME AS A
//*    DATA SET NAME QUALIFIER PROVIDES A STANDARD TO INDICATE WHICH
//*    DATA SET BELONGS TO WHICH LOGGER.
//*-------------------------------------------------------------------*
//ALLOCLOG EXEC PGM=IDCAMS,REGION=0M
//SYSPRINT DD SYSOUT=*
//SYSIN    DD  *
   DELETE (YOUR.????.PRILOG.DS01) ERASE
   SET MAXCC = 0
   DEFINE CLUSTER                        -
          (NAME(YOUR.????.PRILOG.DS01) -
           LINEAR                        -
           VOLUMES(VVVVVV)               -
           CYL(CC) )                     -
       DATA                              -
          (NAME(YOUR.????.PRILOG.DS01.DATA) )
/*
//*-------------------------------------------------------------------*
//REPROLOG EXEC PGM=IDCAMS,REGION=0M
//SYSPRINT DD SYSOUT=*
//SYSIN    DD  *
  REPRO INDATASET(YOUR.????.SECLOG.DS01) -
        OUTDATASET(YOUR.????.PRILOG.DS01)
//*-------------------------------------------------------------------*
//* NOTE: THE NEXT STEP WILL *NOT* DESTROY THE DATA THAT WAS JUST
//*       COPIED INTO THE PRILOG DATASET. INSTEAD, THE UTILITY DETECTS
```

```
//*        WHETHER ANY PART OF THE DATASET HAS BEEN ALLOCATED, BUT NOT
//*        YET FORMATTED, AND ONLY FORMATS *THAT* PART OF THE DATASET.
//*-------------------------------------------------------------------*
//FORMATLOG EXEC PGM=EDMLUTL0,REGION=0M
//STEPLIB   DD DISP=SHR,DSN=HLQ.LOAD                  <=== CDM LOADLIB
//PRILOG    DD DISP=OLD,DSN=YOUR.????.PRILOG.DS01     <=== LOG DATASET
//*-------------------------------------------------------------------*
```

To recover damaged active log data sets:

1. Make a working copy of the sample #RCOVADS member. Then edit the copy as required.

   The following table describes the JCL statements in this member.

JCL Statement	Description
EXEC	For the allocation step and the REPRO command, specify the IDCAMS program. To format the active log data sets for the PowerExchange Logger, specify the EDMLUTL0 program.
STEPLIB DD	Include the PowerExchange CDC load library. If you added the load library to your system's LNKLST concatenation, you do not need to add it to the STEPLIB concatenation.
SYSPRINT DD	Specify the output data set for MVS system messages.
SYSIN DD	Specify the IDCAMS commands DELETE, SET, DEFINE, and REPRO. For more information about these IDCAMS utility commands, see your IBM documentation.
PRILOG DD	Specify the log data set names you used when you created the log data sets.

2. Stop the PowerExchange Logger.
3. Run the JCL procedure or job.
4. Restart the PowerExchange Logger.

Recovering Damaged Restart Data Sets

If a restart data set is damaged, delete it and then copy and rename the corresponding backup restart data set to create a replacement data set.

Use the following sample JCL in the #RCOVRDS member of the *hlq*.SAMPLIB library to delete the damaged restart data set and copy the backup:

```
//         JOB
//*-------------------------------------------------------------------*
//* PowerExchange Change Data Capture - RECOVERING A RESTART DATA SET
//*-------------------------------------------------------------------*
//* REPLACE THE FOLLOWING ITEMS WITH PROPER INSTALLATION VALUES
//* 1. JCL DATA SET NAMES
//* 2. IDCAMS COMMAND SPECIFICATIONS
//* 3. REPLACE ???? WITH YOUR LOGGER NAME. USING THE LOGGER NAME AS A
//*    DATA SET NAME QUALIFIER PROVIDES A STANDARD TO INDICATE WHICH
//*    DATA SET BELONGS TO WHICH LOGGER.
//*-------------------------------------------------------------------*
//ALLOCRDS EXEC PGM=IDCAMS,REGION=0M
//SYSPRINT DD SYSOUT=*
//SYSIN    DD  *
   DELETE (YOUR.????.ERDS01) ERASE
   SET MAXCC = 0
```

```
  DEFINE CLUSTER                       -
         (NAME(YOUR.????.ERDS01)    -
          VOLUMES(volser)              -
          SHAREOPTIONS(2 3) )          -
      DATA                             -
         (NAME(YOUR.????.ERDS01.DATA) -
          RECORDS(100)                 -
          RECORDSIZE(4089 4089)        -
          CONTROLINTERVALSIZE(4096)    -
          FREESPACE(0 20)              -
          KEYS(4 0) )                  -
     INDEX                             -
        (NAME(YOUR.????.ERDS01.INDEX) -
         RECORDS(5 5)                  -
         CONTROLINTERVALSIZE(1024) )
/*
//*-------------------------------------------------------------------*
//REPRORDS  EXEC PGM=IDCAMS,REGION=0M
//SYSPRINT  DD SYSOUT=*
//SYSIN     DD  *
 REPRO INDATASET(YOUR.????.ERDS02) -
       OUTDATASET(YOUR.????.ERDS01)
/*
```

To recover damaged restart data sets:

1. Make a working copy of the sample #RCOVRDS member, and edit the copy as required.

   The following table describes the JCL statements in this member.

JCL Statement	Description
EXEC	Specify the IDCAMS program.
SYSPRINT DD	Specify the output data set for MVS system messages.
SYSIN DD	Specify the IDCAMS commands DELETE, SET, DEFINE, and REPRO. For more information about these IDCAMS utility commands, see your IBM documentation.
PRILOG DD	Specify the log data set names you used when you created the log data sets. You created these data sets during installation.

2. Stop the PowerExchange Logger.
3. Run the #RCOVRDS job.
4. Restart the PowerExchange Logger.

Moving Log Data Sets to Other Devices

You can move PowerExchange Logger for z/OS log data sets to another device if necessary.

You must configure a job that allocates space on the target device and moves the data sets. PowerExchange provides sample JCL in the #MOVELOG member of the *hlq*.SAMPLIB library, where *hlq* is the high-level qualifier that you specified at installation.

1. Make a working copy of the sample #MOVELOG member. Then edit the copy.

   The sample member includes the following JCL statements:

```
//          JOB
//*-------------------------------------------------------------------*
```

```
//* PowerExchange Change Data Capture - MOVING A LOG DATA SET
//*-------------------------------------------------------------------*
//* REPLACE THE FOLLOWING ITEMS WITH PROPER INSTALLATION VALUES
//* 1. JCL DATA SET NAMES
//* 2. IDCAMS COMMAND SPECIFICATIONS
//* 3. REPLACE ???? WITH YOUR LOGGER NAME. USING THE LOGGER NAME AS A
//*    DATA SET NAME QUALIFIER PROVIDES A STANDARD TO INDICATE WHICH
//*    DATA SET BELONGS TO WHICH LOGGER.
//*-------------------------------------------------------------------*
//ALTERLOG EXEC PGM=IDCAMS,REGION=0M
//SYSPRINT DD SYSOUT=*
//SYSIN    DD  *
  ALTER  YOUR.????.PRILOG.DS01 -
   NEWNAME(YOUR.????.TEMPLOG.DS01)
  ALTER  YOUR.????.PRILOG.DS01.DATA -
   NEWNAME(YOUR.????.TEMPLOG.DS01.DATA)
/*
//*-------------------------------------------------------------------*
//ALLOCLOG EXEC PGM=IDCAMS,REGION=0M
//SYSPRINT DD SYSOUT=*
//SYSIN    DD  *
  DEFINE CLUSTER                   -
          (NAME(YOUR.????.PRILOG.DS01) -
           LINEAR                   -
           VOLUMES(VVVVVV)          -
           CYL(CC) )                -
       DATA                         -
          (NAME(YOUR.????.PRILOG.DS01.DATA) )
/*
//*-------------------------------------------------------------------*
//REPROLOG EXEC PGM=IDCAMS,REGION=0M
//SYSPRINT DD SYSOUT=*
//SYSIN    DD  *
 REPRO INDATASET(YOUR.????.TEMPLOG.DS01) -
       OUTDATASET(YOUR.????.PRILOG.DS01)
/*
//*-------------------------------------------------------------------*
//* NOTE: THE NEXT STEP WILL *NOT* DESTROY THE DATA THAT WAS JUST
//*       COPIED INTO THE PRILOG DATASET. INSTEAD, THE UTILITY DETECTS
//*       WHETHER ANY PART OF THE DATASET HAS BEEN ALLOCATED, BUT NOT
//*       YET FORMATTED, AND ONLY FORMATS *THAT* PART OF THE DATASET.
//*-------------------------------------------------------------------*
//FORMATLG EXEC PGM=EDMLUTL0,REGION=0M
//STEPLIB  DD  DISP=SHR,DSN=HLQ.LOAD               <=== CDM LOADLIB
//PRILOG   DD  DISP=OLD,DSN=YOUR.????.PRILOG.DS01     <=== LOG DATASET
//*-------------------------------------------------------------------*
```

The following table describes the JCL statements:

JCL Statement	Description
EXEC	For the ALTER, DEFINE, and REPRO commands, specify the IDCAMS program. To format the active log data sets for the PowerExchange Logger, specify the EDMLUTL0 program.
STEPLIB DD	Include the PowerExchange Change Data Capture load library. If you added the load library to your system's LNKLST concatenation, you do not need to add it to the STEPLIB concatenation.
SYSPRINT DD	Specify the output data set for z/OS system messages.

JCL Statement	Description
SYSIN DD	Specify the IDCAMS commands ALTER, DEFINE, and REPRO. For more information about these IDCAMS utility commands, see your IBM documentation.
PRILOG DD	Specify the log data set names that you used when you created the log data sets.

2. Stop the PowerExchange Logger.
3. Run the job that you configured in Step 1 to move the log data sets.
4. Restart the PowerExchange Logger.

Using Post-Log Merge

In a multi-system z/OS environment with shared DASD, changes can be written to a database or VSAM data set on any z/OS system. To use PowerExchange CDC in this type of environment, changes must be captured from all z/OS systems. Also, the changes that are captured from multiple z/OS systems for the same database or data set must be merged to reserve the chronological context of the change.

For example, the online CICS system runs on one z/OS system but an overnight batch job, which updates the same VSAM data sets, runs on a different z/OS system. In this example, the VSAM data sets are being changed on multiple z/OS systems but in a serial fashion, either through CICS or batch processing. It is also possible to change the same database or data set at the same time, or nearly the same time, on multiple z/OS systems. For example, changes are made to an IMS database from multiple z/OS systems at the same time.

Post-Log Merge is a PowerExchange Logger configuration option that allows the change data that has been captured and logged to multiple Loggers on multiple z/OS systems to be merged and extracted as if the data had been captured on a single system.

The multi-Logger merge process is performed by the Post-Log Merge job or task. This job or task extracts logged data from each of the member PowerExchange Loggers and merges this data in the proper chronological order for use by the PowerExchange extraction process. This process results in a single merged change stream, which is provided to the extraction process.

Post-Log Merge System Requirements

The collection of all of the member Loggers is referred to as the Post-Log Merge group. To use Post-Log Merge to merge logged data from multiple Loggers running on multiple MVS systems, the following criteria must be met:

- All of the MVS systems running member Loggers in the Post-Log Merge group must be a part of the same base sysplex (parallel sysplex is not required).
- There must be sufficient available XCF groups to support the Post-Log Merge environment. Each member Logger creates an XCF group. The Post-Log Merge job creates an XCF group, which is named by using the PowerExchange Logger ID value. All member Loggers join the Post-Log Merge XCF group.

  Therefore, the total number of XCF groups that PowerExchange requires is the sum of all of the member Loggers plus one for the Post-Log Merge XCF group. For example, if you have three member Loggers on three MVS systems, there are four XCF groups created.

- Each PowerExchange Logger XCF group name must be unique within the sysplex. PowerExchange creates the name for the member Logger XCF group by appending the SMF ID of the MVS system to PowerExchange Logger ID value from the LOGGER_NAME parameter in the EDMUPARM module options.

  If the SMF ID value for the MVS system on which a member Logger runs is not unique within the Post-Log Merge group, you can specify a unique value to override the SMF ID in the PARM parameter of the EXEC JCL card for the member Logger.
- The Logger emergency restart data sets (ERDS*nn*) and the active log data sets for all member Loggers in the Post-Log Merge group must be on shared DASD.
- If the archive logs are on DASD, they must also be on shared DASD. If the archive logs are on TAPE, the tapes must be accessible to the system on which the Post-Log Merge job runs. This applies to all member Loggers in the Post-Log Merge group.

All PowerExchange MVS capture sources that support multi-system access and update can utilize Post-Log Merge. You must run the appropriate capture source ECCR (along with the Agent and the Logger) on each MVS system for which you want the Post-Log Merge job to merged changes.

Note: DB2 data sharing does not require Post-Log Merge. The DB2 IFI 306 interface calls utilized by the DB2 ECCR result in all changes being captured from a database on any system in the data sharing group. Running multiple DB2 ECCRs in a DB2 data sharing group results in changes being captured numerous times.

Post-Log Merge Restrictions

The following restrictions apply to CDC environments that use Post-Log Merge:

- Change capture for synchronous data sources must run on the z/OS system where the changes are made. Synchronous data sources include IMS, Batch VSAM, and CICS/VSAM.

  Run the ECCR for a synchronous data source on each z/OS system in the sysplex where the changes are made. Also run a PowerExchange Agent on each system where the ECCR runs, and run a Post-Log Merge member Logger on one of the z/OS systems. The minimum capture environment on any one system includes a PowerExchange Agent, PowerExchange Logger, and an ECCR.
- All log readers must run on the same z/OS system as the Post-Log Merge job. Log readers include the PowerExchange Listener, netport jobs, Condense jobs, and the DTLUAPPL utility.
- For the DTLUAPPL utility and Condense jobs, ensure that the Post-Log Merge member Logger runs on the same system as the Post-Log Merge job.

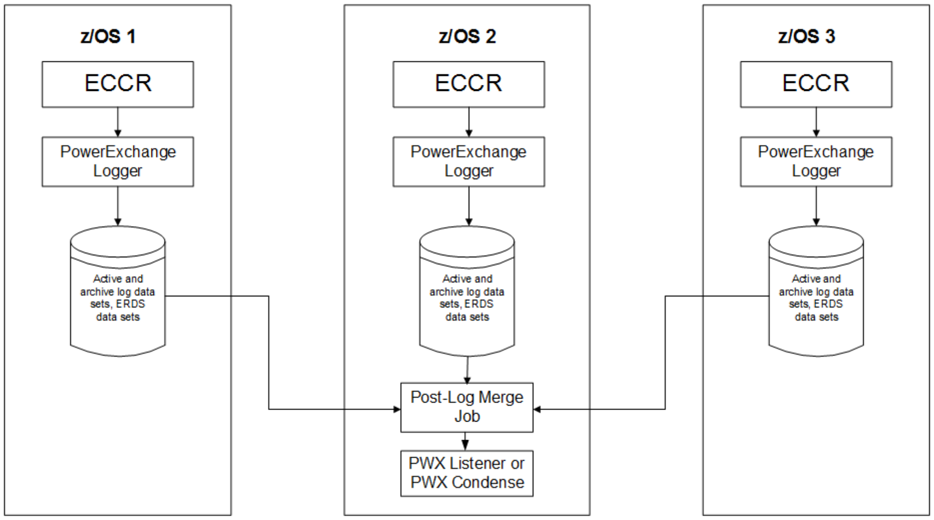
Post-Log Merge Configuration

There are differences in the Logger setup when using Post-Log Merge. To set up Post-Log Merge on your system, you must make changes to the default PowerExchange installation. In addition to changes to the Logger installation, you must also configure a Post-Log Merge job. The Post-Log Merge job provides the merged view of all of the data captured in the member Loggers.

You should configure your system to use the Post-Log Merge configuration during the initial installation of the Loggers on each system. The Logger id for all member Loggers must be the same.

Note: You cannot change an existing Logger environment that isn't configured for Post-Log Merge to the Post-Log Merge configuration without losing data captured in your Logger.

The following figure shows an example of Post-Log Merge environment:



Configuring Post-Log Merge

The following steps detail the necessary changes required to the installation to create a Post-Log Merge environment.

To configure post-log merge:

1. Define unique Logger data sets for each system.

   Members SETUPVSM and SETUPCC2 in RUNLIB defines the Logger data sets. Ensure that the Logger active logs and ERDS data sets defined are unique for each Logger that are a part of the Post-Log Merge group.

2. Ensure a unique USERLIB data set is created.

   Member SETUPCC1 in RUNLIB creates the USERLIB data set. The default data sets name created is &HLQ..&LOGGER..USERLIB. This pattern might not create a unique USERLIB data set for each Logger. If necessary, change this name to ensure it is unique.

   Note: RUNLIB contains many members that refer to this USERLIB and they also need to be changed as well.

3. Create an EDMSDIR module for each USERLIB data set.

   Member SETUPAGT in RUNLIB creates the EDMSDIR member in USERLIB. This member contains specifications that should be reviewed and changed where required:

   - LOGRGRP= must be changed from N (no Post-Log Merge) to Y (Post-Log Merge)
   - LOGGER= must be the Logger name. This Logger name must be the same for all member Loggers in the Post-Log Merge group.

4. Create a unique EDMUPARM for each USERLIB data set.

   Member SETUPCC2 in RUNLIB creates the EDMUPARM member in USERLIB. This member contains specifications that should be reviewed and changed where required:

   - SUFFIX= in SYSTEM_OPTIONS must be a unique number for each member Logger of the Post-Log Merge group
   - LOGGER_NAME= in SYSTEM_OPTIONS must be the Logger name. This Logger name must be the same for all member Loggers in the Post-Log Merge group.

- PREFIX_COPY1= and PREFIX_COPY2= in ARCHIVE_OPTIONS must be specify unique high-level qualifiers (HLQ) for the archive logs of each member Logger of the Post-Log Merge group.
- TIME_CHKPT_FREQ= in SYSTEM_OPTIONS should be reviewed and changed if necessary.
- TIMER_INTERVAL= in SYSTEM_OPTIONS should be reviewed and changed if necessary.

Note: In environments with member Loggers that are occasional less active than others, you need to carefully consider the values specified for TIME_CHKPT_FREQ= and TIMER_INTERVAL=. Lower values reduce extraction latency in a Post-Log Merge environment.

5. Customize the PowerExchange Logger JCL, as necessary.

   If your MVS systems do not have unique SMF IDs, update the PowerExchange Logger JCL for those systems to override the non-unique SMF ID with a unique value.

This completes the additional installation customization required for Post-Log Merge.

Related Topics:

- "SYSTEM_OPTIONS Parameters" on page 60
- "Customizing the PowerExchange Logger JCL" on page 66
- "Performance Considerations" on page 94

Creating the Post-Log Merge Job

Each Post-Log Merge group requires a single Post-Log Merge job. This is a long-running job (just like the Logger) and is generally best setup as a Started Task. This job (or started task) can run on any MVS system within the sysplex.

Note: All log readers (PowerExchange Listener, netport, and Condense jobs) connect to the Post-Log Merge job, which means that they must run on the same MVS system as the Post-Log Merge job. Log writers like ECCRs connect to member Loggers rather than the Post-Log Merge job.

Sample JCL for the Post-Log Merge job can be found in the PowerExchange SAMPLIB data set in member #POSTLOG. This JCL needs to be customized for your environment. The following example shows sample JCL for this job where the Post-Log Merge group is comprised of three member Loggers.

Sample JCL Statements for a Post-Log Merge Job:

```
//         JOB
//*-------------------------------------------------------------------*
//* POST LOG MERGE
//*-------------------------------------------------------------------*
//* WARNING: DO NOT PLACE THE SECONDARY ERDS IN THE JOB OR INCORRECT
//*          RESULTS WILL OCCUR.
//*-------------------------------------------------------------------*
//* REPLACE THE FOLLOWING ITEMS WITH PROPER INSTALLATION VALUES
//* 1. JCL DATA SET NAMES
//* 2. PRIMARY ERDS FROM EACH LOGGER
//*-------------------------------------------------------------------*
//READER   EXEC PGM=EDMLCTRD,PARM='TRACEE'
//STEPLIB  DD DISP=SHR,DSN=<HLQ>.LOAD           <=== LOAD modules
//EDMPARMS DD DISP=SHR,DSN=<HLQ>.USERLIB        <=== EDMSDIR,EDMUPARM
//ERDS01   DD DISP=SHR,DSN=YOUR.SYSTEM1.ERDS    <=== ERDS OF SYSTEM 1
//ERDS02   DD DISP=SHR,DSN=YOUR.SYSTEM2.ERDS    <=== ERDS OF SYSTEM 2
//ERDS03   DD DISP=SHR,DSN=YOUR.SYSTEM3.ERDS    <=== ERDS OF SYSTEM 3
//SYSPRINT DD SYSOUT=*
//SYSUDUMP DD SYSOUT=*
//*-------------------------------------------------------------------*
```

Use the USERLIB that has been created for the MVS system on which the Post-Log Merge job runs.

For the DDNAME of the ERDS, you must use the following format:

```
//ERDSnn
```

The variable *nn* represents a two-digit value from 01 to 99. When you set up the Post-Log Merge job, specify only one ERDS*nn* DD statement, usually the primary one, for each PowerExchange Logger.

Performance Considerations

Post-Log Merge does not degrade the performance of the change data capture process. Each ECCR connects to the member PowerExchange Logger for z/OS on the local z/OS system to pass captured changes to the Logger.

During change data extraction, if the member Logger or the z/OS system on which the member Logger resides is running slowly, the log-merge processing that the Post-Log Merge task performs for the log readers might be degraded. The change extraction process must wait until the Post-Log Merge task merges the change data from the all member Loggers on the z/OS systems, including the slowest Logger or slowest system, and present the change records in the proper chronological order.

The Post-Log Merge task reads change records from the active log data set of each member Logger as the records are written. You can tune Post-Log Merge performance in the following ways:

- Configure the time-based checkpoint frequency for any inactive member Logger by using the TIME_CHKPT_FREQ parameter in the SYSTEM_OPTIONS statement of the EDMUPARM options module.
- Assign the the Post-Log Merge job to an appropriate Workload Manager (WLM) service class. For more information, see "Using WLM Service Classes to Prioritize PowerExchange CDC Started Tasks on z/OS" on page 386.

Timed Checkpoint Considerations for Dormant Member Loggers

There are configurations where you should consider increasing the frequency of time-based checkpoint records by reducing the values of TIME_CHKPT_FREQ= and TIMER_INTERVAL= parameters set in EDMUPARM. These parameters control the frequency with which a member Logger produces time-based checkpoint records that are written to the Logger's active log data set.

To understand why this is necessary and determine appropriate values for these parameters, you must first understand the concept of dormant and quiesced member Loggers.

A member Logger is quiesced if no ECCRs are connected to it because either no ECCR was started or all ECCRs have shut down. In this situation, the member Logger notifies the Post-Log Merge task that it is being quiesced. PowerExchange writes message PWXEDM172552I in the EDMMSG of the member Logger when the Logger enters a quiesced state and writes message PWXEDM172544I when logging is resumed.

A member Logger is dormant if ECCRs are connected to the Logger but they are not supplying any change data to be logged. For example, if the member Logger is running on a system that has only one active CICS/VSAM ECCR but no transactions are running, the member Logger is dormant.

The Post-Log Merge task does not wait for data from quiesced member Loggers. It does, however, wait for data from dormant member Loggers. The active ECCRs that are connected to the dormant member Loggers can send data at any time. The only records written to the active log are time-based checkpoint records.

Time-based checkpoint records are not produced if there are active ECCRs that are writing change data to the member Logger. The record-based checkpoints, referred to as extended checkpoints, are still written to the active log when change data is being recorded. Time-based checkpoint records are produced only in dormant Loggers.

Reducing the TIME_CHKPT_FREQ and, if necessary, TIMER_INTERVAL values can reduce the latency of data that is being extracted from active member Loggers in the Post-Log Merge environment. The default values are TIME_CHKPT_FREQ=30 and TIMER_INTERVAL=100 hundredths of a second, or 1 second. This means that the member Logger produces time-based checkpoint records every 30 seconds if the Logger is dormant.

If you have member Loggers that are occasionally dormant, you should consider at least reducing the TIME_CHKPT_FREQ to a value less than 30. The minimum value for TIME_CHKPT_FREQ is 5, and the minimum value for TIMER_INTERVAL is 50 hundredths of a second. This results in a time-based checkpoint frequency of 2.5 seconds. This lower value reduces the latency of extractions in this type of Post-Log Merge environment.

Note: All checkpoints (time-based or record-based) cause records to be generated in the Logger's active log data set. In the case of frequently dormant Loggers, you need to balance the space consumed by frequent time-based checkpoints with the desired extraction latency.

Recovery Scenarios

When you run Post-Log Merge, you need to consider the recovery options for the Post-Log Merge job as well as the other PowerExchange CDC components. Consider the following types of recovery scenarios:

- PowerExchange CDC component failures
- MVS system failures

PowerExchange CDC component failures might interrupt capture or extraction processing.

The following table lists the components that are involved in the Post-Log Merge environment and describes the result of component failure:

Component	Result If the Component Fails	Recovery
ECCR	Capture for that ECCR is interrupted.	Restart the ECCR.
PowerExchange Agent	Capture registrations cannot be verified.	Restart the PowerExchange Agent.
PowerExchange Condense	No new CDC data condensed.	Restart PowerExchange Condense.
PowerExchange Logger	The ECCRs that reside on the same system as the failed PowerExchange Logger also fail.	Restart the PowerExchange Logger and then the ECCRs.
PowerExchange Listener	The member Loggers and the Post-Log Merge job continue to run. Real-time extraction CDC sessions fail.	Restart the PowerExchange Listener and then restart the failed CDC sessions.
Post-Log Merge job	The member Loggers continue to run but real-time extraction CDC sessions fail.	Restart the Post-Log Merge job and then restart the failed CDC sessions.

Recovery from z/OS System Failures

If a z/OS system fails, all PowerExchange components on the system are unavailable. After you IPL the z/OS system, normal operation usually resumes. In certain circumstances, you might need to move the PowerExchange CDC components from the failed z/OS system to another z/OS system, called the destination z/OS system.

To quickly reestablish the ability to perform change data extractions, you can move the PowerExchange components that relate to extraction to another z/OS system in the sysplex. If you also want to capture new change data, you must move all of PowerExchange CDC components and usually the source database system or region. For example, to move the PowerExchange CICS/VSAM capture environment to another system, you must also move CICS region in which the CICS/VSAM ECCR runs.

The following table describes considerations for moving extraction components in a Post-Log Merge environment to another z/OS system in the sysplex:

Component	Considerations
PowerExchange Listener	- If a PowerExchange Listener runs on the destination z/OS system and uses the same PowerExchange CDC environment, edit the NODE statement that points to the failed z/OS system in the dbmover.cfg file on the Integration Service machine to point to the PowerExchange Listener on the destination z/OS system. - If you move the PowerExchange Listener from the failed system, you must either redirect network traffic for the failed z/OS system to the destination z/OS system or edit the NODE statement for the failed z/OS system in the dbmover.cfg file on the Integration Service machine to point to the destination z/OS system. - To restart extraction CDC sessions, you must also move the Post-Log Merge job.
Post-Log Merge Job	- The Post-Log Merge job can be restarted on any z/OS system in the sysplex, including systems that do not currently run a member Logger. - Move the PowerExchange Agent if there is not one running on the destination z/OS system. - To restart extraction CDC sessions, you must either move the PowerExchange Listener and redirect network traffic for that PowerExchange Listener or change the NODE statement in the dbmover.cfg file on the Integration Service machine to point to a PowerExchange Listener that runs on the destination z/OS system.

The following table describes considerations for moving capture components in a Post-Log Merge environment to another z/OS system in the sysplex:

Component	Considerations
ECCR	- Only move a synchronous ECCR to another z/OS system if the source database region or workload moves. In this case, a PowerExchange Agent and a member Logger must be available on the destination z/OS system. If a member Logger of the same Post-Log Merge group runs on the destination z/OS system, do not move the PowerExchange Agent and PowerExchange Logger from the failed system. - For the Adabas, Datacom table-based, IDMS log-based, and IMS log-based ECCRs, the PowerExchange Agent and PowerExchange Logger from the failed z/OS system must be moved to the destination z/OS system. The destination system cannot run another PowerExchange Logger that has the same Logger name or is part of the same Post-Log Merge group. The destination z/OS system must also run the Post-Log Merge job and the PowerExchange Listener used for change data extraction. - For a DB2 ECCR that attaches to a data sharing group, you can only move the ECCR to a destination z/OS system that does not have a member Logger that is a part of the same Post-Log Merge group. Then move the member Logger from the failed system. The destination system must also have a DB2 subsystem that is a member of the same data sharing group. This DB2 subsystem can be the subsystem that is moved from the failed system or the one that normally runs on the destination system. - For a DB2 subsystem that attaches to a non-data sharing DB2 subsystem, the related PowerExchange Agent and PowerExchange Logger must be available on the destination z/OS system. The destination z/OS system cannot run another PowerExchange Logger that has the same Logger name or is part of the same Post-Log Merge group. You must also move the DB2 subsystem to the destination system.
PowerExchange Agent	None
PowerExchange Condense	- A PowerExchange Logger that is part of the Post-Log Merge group must run on the destination z/OS system. - The destination z/OS system must also run the Post-Log Merge job.

Component	Considerations
PowerExchange Logger	- If no PowerExchange Logger runs on the destination z/OS system, you must also move the related PowerExchange Agent from the failed z/OS system. - If a member Logger in the same Post-Log Merge group runs on the destination z/OS system, do not move another member Logger to that system.
PowerExchange Listener	If you use the PowerExchange Listener on the failed z/OS system to extract change data, also move the Post-Log Merge job to the destination z/OS system.

Post-Log Merge Job Commands

You can issue commands against the Post-Log Merge job to interrogate the status of the Log Reader process, stop the Post-Log Merge job, or instigate traces for problem determination.

The standard format of these commands uses the MVS operator command MODIFY (which can be abbreviated as F) as follows:

```
MODIFY job_name,DISPLAY
f job_name,DISPLAY
```

The *job_name* is the Post-Log Merge JOB name.

Also, you can use the MVS STOP command (STOP *job_name*). It has the same effect as the following MODIFY command:

```
MODIFYjob_name,QUIT
```

The following table describes the commands that you can use to manage a Post-Log Merge job:

Command	Description
DISPLAY or DIS	Displays information about Log Reader processes that are connected to the Post-Log Merge task, including what Loggers are being merged, and what the current read location is within each Logger's data. Information is displayed in the Log.
STATUS or STAT	Same as for DISPLAY.
QUIT	Causes Post-Log Merge to terminate. Any active Log Reader processes end abnormally.
STOP	Same as for QUIT.
TRACEE	Disables tracing for the Post-Log Merge task.
TRACES	Activates short-form tracing. No more than 32 bytes of data for each trace entry are produced.
TRACEL	Activates long-form tracing, which causes the entire trace entry to be produced.

CHAPTER 5

PowerExchange Condense

This chapter includes the following topics:

PowerExchange Condense Overview

PowerExchange Condense captures change data from PowerExchange Logger for z/OS log files and writes that data to condense files. You can make the change data in the condense files available for extraction processing at user-defined intervals.

PowerExchange Condense can perform full or partial condense processing. You specify the type of condense processing when you create a capture registration in the PowerExchange Navigator by setting the **Condense** option to one of the following values:

Full

Full condense processing. During a full condense cycle, PowerExchange Condense records only the latest image of the change data to keyed VSAM condense data sets. If multiple changes are made to the same record, later changes supersede earlier changes, leaving only the latest change. Use full condense processing only for tables or data maps that specify key columns. You cannot use full condense processing for Adabas and IDMS log-based CDC. Full condense processing does not maintain transactional integrity, but it can decrease the amount of change records that are processed and extracted.

Note: If a change is recorded for a row in a full condense file and then a condense file switch occurs while additional changes for that row are pending, you might get a change record for the row in both condense files. This situation depends on the file switch parameters and the level of change activity in your environment.

Part

Partial condense processing. During a partial condense cycle, PowerExchange Condense writes successfully completed changes to sequential condense files, in chronological order based on end time.

PowerExchange Condense does not eliminate any of the changes. This condense type maintains transactional integrity.

Tip: Instead of using PowerExchange Condense partial condense processing, you can use the PowerExchange Logger for Linux, UNIX, or Windows to offload condense processing from the z/OS system. For more information about remote logging, see the *PowerExchange CDC Guide for Linux, UNIX, and Windows*.

Also, you can run a PowerExchange Condense job in batch mode or continuous mode.

CDC sessions extract change data from the condense files in batch extraction mode.

Configuring PowerExchange Condense

To configure PowerExchange Condense, you must define a CAPTPARM configuration member for each source type and instance that is defined in a registration group.

Also, verify that the **Condense** option is set to **Part** or **Full** in the capture registrations for all source tables. For the **Full** option to be selectable, the source table or data map must identify at least one column as a key column.

Restriction: PowerExchange does not support full condense processing for Adabas or IDMS log-based CDC.

If you want PowerExchange Condense to create separate condense files for one or more groups of tables, create a PowerExchange group definition file that defines groups of capture registrations for the tables.

Related Topics:

- "PowerExchange Condense Job" on page 100
- "Condense Operational Modes" on page 100
- "Configuring PowerExchange Condense JCL" on page 102
- "Condense Input Files" on page 102
- "Configuring PowerExchange Condense Parameters" on page 107
- "Configuring Condense Group Definitions" on page 127
- "Enabling Capture Registrations for PowerExchange Condense Use" on page 99

Enabling Capture Registrations for PowerExchange Condense Use

PowerExchange Condense captures and logs change data only for capture registrations that have a status of **Active** and a **Condense** setting of **Part** or **Full**.

1. In the PowerExchange Navigator, open the capture registration.
2. In the Resource Inspector, select **Active** from the **Status** list.
3. From the **Condense** list, select **Part** or **Full**.
4. Click **Apply**.
5. Click **File** > **Save** to save the capture registration. Alternatively, press CTRL+S.

You must refresh or recycle the ECCR that captures changes for the data source, and recycle the PowerExchange Condense job if it is running.

If PowerExchange Condense does not find any active capture registration, it issues the error message PWX-06427 and ends.

PowerExchange Condense Job

The PowerExchange Condense job can run as a batch job or started task. A batch job is used to run PowerExchange Condense in batch mode and can be submitted by a job scheduling system. A started task is used to run PowerExchange Condense in continuous mode.

A PowerExchange Condense job is composed of the following unique tasks and subtasks:

- **Controller**. This task s the job step task. It controls the address space and starts the Command Handler and Condense subtasks.
- **Command Handler.** This subtask provides the command interface to the Condense job.
- **Condense**. This subtask is responsible for writing change records to condense files and taking checkpoints.

The PowerExchange log contains messages that indicate when the tasks start and end and that include the type of task that issued the message.

Condense Operational Modes

You can run a PowerExchange Condense job in batch mode or continuous mode. You specify the mode in the COLL_END_LOG parameter of the CAPTPARM member.

Batch Mode

In batch mode, after a single condense operation completes, the PowerExchange Condense tasks shut down.

Running the Condense job in batch mode is well suited for batch applications. For example, you could insert a single condense job into an automated schedule at an appropriate point after your batch update jobs.

The following sample message output is for a Condense job that ran in batch mode and then shut down after the fist condense run completed:

```
PWX-09967 CAPI i/f: End of log for time 16/05/18 14:55:24 reached
PWX-06415 Condense: Condense completed. Total Records=2198, Data=1878, UOWs =131
PWX-06416 Condense: Shutting down because Single Condense run completed
PWX-06418 Condense: Closed file
          ABCD.D1010Q.CND.CP160518.T1455003
PWX-06418 Condense: Closed file
          ABCD.D1010Q.CND.CF160518.T1455002
PWX-06136 Checkpoint taken to file=ABCD.D1010Q.CHKPTV0
          time=16/05/18 14:56:02
PWX-06420 Condense: Checkpoint done.
          Sequence=00000A86EB970000000000000A86EB9700000000
          PowerExchange Logger=D8C1C8D3404000000A86DA7B00000000
PWX-06414 Condense: Closing down CAPI
PWX-10780 CAPI: INFO: Extraction return counts: no data 2,commits 132, inserts 1659,
          updates 191, deletes 47.
PWX-10781 CAPI: INFO: Extraction subordinate read counts:
          no data 0, commits 133, inserts 1659, updates 191, deletes 47, backouts 0.
PWX-10782 CAPI: INFO: Extraction resource maximums: memory cache 1028 KB, spill files 1.
PWX-10746 CAPI: INFO: Last data returned: timestamp 2016/05/18 15:25:41,
          sequence 00000A86EB970000000000000A86EB9700000000.
PWX-10743 CAPI: INFO: No noteworthy transactions.
PWX-10749 CAPI: INFO: + Current subordinate sequence number 00000A86EB9700000000.
PWX-10757 CAPI: INFO: Spill file 1 was deallocated. File name DD:SYS00131.
PWX-06401 Condense: Ending successfully.
PWX-06110 Unloaded module 2 (CONDENSE).
PWX-06453 Command Handler: shutting down.
PWX-06454 Command Handler: has stopped.
PWX-06110 Unloaded module 1 (COMMAND_HANDLER).
PWX-06060 Controller: subtask Command Handler ended.
PWX-06060 Controller: subtask Condense ended.
PWX-06107 Controller: All subtasks shut down.
```

```
PWX-06065 Controller: Condensing ended. Last checkpoint time 16/05/18 14:56:02.
PWX-06039 Controller: Ending.
```

In this example, message PWX-06416 indicates that the first condense operation of the batch job finished and shutdown processing is beginning.

Continuous Mode

On a z/OS system, a Condense job in continuous mode can run for a long period, such as 24x7. After each condense cycle, the Condense subtask sleeps until it is triggered again.

The next condense cycle is triggered by one of the following events:

- The number of minutes defined by the NO_DATA_WAIT parameter elapses.
- A CONDENSE command is issued from the command line, or a pwxcmd condense command is issued from a remote Linux, UNIX, or Windows system.
- A FILESWITCH command is issued from the command line, or a pwxcmd fileswitch command is issued from a remote Linux, UNIX, or Window system.
- A SHUTCOND command is issued from the command line, or a pwxcmd shutcond command is issued from a remote Linux, UNIX, or Windows system.

  Note: In continuous mode, the Condense job does not shut down automatically. To shut down the Condense job down, you must issue the SHUTDOWN or SHUTCOND command.

PowerExchange performs a file switch when the file switch criteria defined by the FILE_SWITCH_CRIT and FILE_SWITCH_VAL parameters are met or when you issue a FILESWITCH command. File switch processing closes open condense files if they contain data and then opens a new set of condense files for new changes. After a file switch, the closed condense files become available to change data extraction processes.

Note: A file switch does not occur if the current condense file does not contains data. PowerExchange next tries the file switch when the FILE_SWITCH_CRIT and FILE_SWITCH_VAL criteria are met. If the condense file still does not contain data, PowerExchange Condense continues retrying the file switch at the set intervals until data is available.

The following sample message output shows the Condense task reaching the end of log and then starting the wait interval of 5 minutes:

```
PWX-06455 Command Handler: received CAPTURE_STARTUP_COMPLETE event.
PWX-06417 Condense: Start to Condense because initialisation complete
PWX-09957 CAPI i/f: Read times out after 60 seconds
PWX-06419 Condense: Doing file switch. Records=658 Reason=Records criteria met Cdcts=48
          CPU: TotMs=232640 Diff=232640
PWX-06418 Condense: Closed file ABCDEF1.v101.I.CND.CP160520.T2039001
PWX-06136 Checkpoint taken to file=ABCDEF1.v101.I.CHKPTV1 time=16/05/20 20:39:46
PWX-06420 Condense: Checkpoint done. Sequence=0000000AE744000000000000000AE74400000000
          PowerExchange Logger=E2C2F2D340400000000015E200000000
PWX-06419 Condense: Doing file switch. Records=502 Reason=Records criteria met Cdcts=58
          CPU: TotMs=488039 Diff=255399
PWX-06418 Condense: Closed file ABCDEF1.v101.I.CND.CP160520.T2039002
PWX-06136 Checkpoint taken to file=ABCDEF1.v101.I.CHKPTV2 time=16/05/20 20:39:48
PWX-06420 Condense: Checkpoint done. Sequence=000000101BE800000000000000101BE800000000
          PowerExchange Logger=E2C2F2D340400000000015E200000000
PWX-09967 CAPI i/f: End of log for time 16/05/20 20:39:41 reached
PWX-06415 Condense: Condense completed. Total Records=2476, Data=2314, UOWs =118
PWX-06421 Condense: 16/05/20 20:40:53 Starting wait on commands for 5 minute
```

Key messages in this example are:

- Message PWX-06420 indicates that PowerExchange Condense processed changes and has taken a checkpoint.
- Message PWX-06415 indicates that the condense cycle completed with the reported processing statistics.

- Message PWX-06421 indicates that PowerExchange Condense is starting the NO_DATA_WAIT interval of 5 minutes.

Configuring PowerExchange Condense JCL

The PowerExchange installation provides sample Condense jobs in the RUNLIB library.

- **CONDDB2**. Runs the Condense job as a batch job.
- **PCNDDB2**. Runs the Condense job as a started task.

The following example JCL is from the PCNDDB2 member in RUNLIB:

```
//PCNDDB2  PROC SCERUN=CEE.SCEERUN,
//        HLQ=YOUR_HLQ,
//        LOGGER=PWXL,
//        HLQVS=YOUR_HLQVS,
//        RUNLIB=YOUR_HLQ.RUNLIB
//RUN      EXEC PGM=DTLCACON,PARM=('')
//*
//STEPLIB  DD DISP=SHR,DSN=&HLQ..LOADLIB
//         DD DISP=SHR,DSN=&HLQ..LOAD
//         DD DISP=SHR,DSN=&SCERUN
//*
//EDMPARMS DD DISP=SHR,DSN=&HLQ..&LOGGER..USERLIB
//* SYSTCPD EXPLICITLY IDENTIFIES WHICH DATA SET IS TO BE USED TO
//*    OBTAIN THE PARAMETERS DEFINED BY TCPIP.DATA. THIS DD STATEMENT
//*    MIGHT BE NECESSARY IF YOUR CONFIGURATION CANNOT BE FOUND USING
//*    USING THE STANDARD IP SEARCH. CONSULT YOUR NETWORKING SYSTEMS
//*    PROGRAMMER FOR FURTHER INFORMATION.
//*SYSTCPD  DD DSN=YOUR.TCPIP.DATA,DISP=SHR
//*
//* CDC DATASETS FOLLOW - WITH SPECIFIC PARMS
//*
//DTLAMCPR  DD DISP=SHR,DSN=&HLQVS..CCT
//DTLCACDE  DD DISP=SHR,DSN=&HLQVS..CDEP
//DTLCACDC  DD DISP=SHR,DSN=&HLQVS..CDCT
//DTLCAMAP  DD DISP=SHR,DSN=&HLQVS..DTLCAMAP
//DTLCACFG  DD DISP=SHR,DSN=&RUNLIB(CAPTDB2)
//*
//DTLMSG    DD DISP=SHR,DSN=&HLQ..DTLMSG
//DTLCFG    DD DISP=SHR,DSN=&RUNLIB(DBMOVER)
//DTLKEY    DD DISP=SHR,DSN=&RUNLIB(LICENSE)
//DTLSGN    DD DISP=SHR,DSN=&RUNLIB(SIGNON)
//DATAMAP   DD DISP=SHR,DSN=&HLQVS..DATAMAPS
//DTLLOG    DD SYSOUT=*
//DTLLOG01  DD SYSOUT=*
//SYSUDUMP  DD SYSOUT=*
//SYSOUT    DD SYSOUT=*
//SYSPRINT  DD SYSOUT=*
//CEEDUMP   DD SYSOUT=*
//EDMNOCAP  DD DUMMY
```

Condense Input Files

The following topics discuss the DD statements in the PowerExchange Condense JCL that point to input files used by the Condense job to read capture registrations and change data.

DTLAMCPR

This DD statement points at the *hlqvs*.CCT, which is a VSAM KSDS data set containing the capture registrations defined using the Navigator. When the Condense job is started, it processes all active registrations in the CCT requesting condense processing, which match the CAPTPARM parameters DB_TYPE and DBID. For example, if the CAPTPARM specifies DB_TYPE=DB2 and DBID=DSN1, the Condense uses all active DB2 registrations with condense of either Part or Full with an instance name of DSN1.

Note: The value for DBID is the value specified when the Registration Group is created. The name of the field in the Registration Group varies based on DB_TYPE. In the case of DB2, the field is called Database Instance. When opening an existing Registration Group in the Navigator, this value is contained in the Instance field in the Registration Group tab in Resource Inspector.

The CCT pointed to by the Condense DTLAMCPR DD statement must be the same CCT pointed to by the PowerExchange Listener, which was used when the capture registration was created.

The CCT must also be the same CCT that is read on behalf of or by the PowerExchange Agent. The recommended Agent setup is to process registrations through the PowerExchange Listener but it is possible for the Agent to read the CCT directly. In either case, this must be the same CCT as used by the Condense job.

EDMPARMS

This DD statement points to the *hlq.logger*.USERLIB data set, which is created during the installation of PowerExchange. This data set contains the EDMSDIR module, which defines the default Agent ID and Logger name and is used to initialize services required by the Log Read API. PowerExchange uses the Log Read API (LRAPI) to access the change data captured by the DB2 ECCR and recorded by the PowerExchange Logger.

DTLCFG

This DD statement points at the DBMOVER member of the *hlq*.RUNLIB data set, which is created during the installation of PowerExchange. The DBMOVER member contains the PowerExchange configuration parameters.

The DBMOVER member includes the CAPI_CONNECTION statements used by the Log Read API (TYPE=LRAP) and the UOW Cleanser (TYPE=UOWC).

The Log Read API (LRAPI) CAPI_CONNECTION statement defines the Agent ID and Logger name to which it connects. PowerExchange uses the UOW Cleanser in conjunction with the LRAPI to reconstruct the UOWs read from the Logger into complete UOWs in the proper chronological order.

The Logger specified in the CAPI_CONNECTION for the LRAPI must be the same that the DB2 ECCR uses (in the EDMSDIR pointed to by the EDMPARMS DD statement) to capture the change data.

Condense Output Files

The following topics describe PowerExchange Condense output files, including the condense files, checkpoint files, CDCT file, and message data sets.

DTLCACDC (CDCT)

The Condense task writes tracking information about condense files to the *hlqvs*.CDCT file, which is a VSAM KSDS data set. The PowerExchange Listener reads the CDCT file on behalf of extraction processes so that the processes can determine from which condense files to extract change data.

During installation, PowerExchange creates the CDCT file and initializes it with a high values (9s) record.

After each file switch, PowerExchange Condense performs the following processing:

1. Closes the condense files.

2. Inserts keyed tracking records with information about each condense file into the CDCT file. These records contain the following information:
   - The condense file name
   - Whether the file is a partial or full condense file
   - The start and end times
   - Whether before images are included
   - The number of records in the file
   - The source instance, registration tag, and sequence token fields.
   - Other control information
3. Writes a new checkpoint to the checkpoint file. Also writes the CDCT tracking records to the checkpoint file.

Each time a Condense job warm starts, PowerExchange Condense synchronizes the tracking records in the checkpoint file to the CDCT file. If necessary, PowerExchange Condense inserts tracking records into the CDCT file or removes tracking records from the CDCT file to ensure that the checkpoint file and CDCT file match.

Condense Files

Condense files are created as a part of the condense process in the condense job.

They contain the change data for the active registrations found by the condense job during initialization.

The EXT_CAPT_MASK and CONDF_FULL_FILE_CTL parameters in the CAPTPARM file determine the names of these data sets.

The following table lists the data set type and the format of the data set name for each type of condense file:

Condense File Type	Data Set Type	Format of the Data Set Name
Partial	Variable-blocked sequential	The data set name has the following format: `hlq.CND.CPyymmdd.Thhmmssn` Where: - *hlq* is an EXT_CAPT_MASK value - *yymmdd* is a date - *hhmmss* is a time - *n* is a sequence number, starting at 1, to establish a unique ID
Full	VSAM KSDS	The cluster data set name has the following format: `hlq.CND.CFyymmdd.Thhmmssn` Where: - *hlq* is an EXT_CAPT_MASK value - *yymmdd* is a date - *hhmmss* is a time - *n* is a sequence number, starting at 1, to establish a unique ID

The PowerExchange Listener or a netport job uses the CAPX access method to read condense files. You can use the PowerExchange Navigator to view the data in closed condense files. Run a database row test against the extraction map in the appropriate extraction group.

You can use a variety of methods, including PowerCenter sessions and workflows, to extract and process the condense change data.

Checkpoint Files

The checkpoint files are VSAM KSDS data sets.

Checkpoint file names are based on the prefix specified in the CHKPT_BASENAME parameter and on the suffix, if specified, in the template to which the CHKPT_FILE_CTL parameter points. These parameters are specified in the CAPTPARM configuration member.

You can run PowerExchange Condense with a single checkpoint file. However, this practice is not advisable because it can compromise future restarts of PowerExchange Condense. Informatica recommends that you use at least nine checkpoint files so that you are likely to have enough checkpoint files from which to reconstruct the CDCT file, if necessary. Specify the number of checkpoint files in the CHKPT_NUM parameter in the CAPTPARM member. The default is 3.

The checkpoint files contain several types of records. The following table describes these records:

Checkpoint Record Type	Description
ERT records	Records that store the registration tags and restart tokens. The restart tokens indicate the point at which PowerExchange Condense starts receiving records from the PowerExchange Logger log files.
DCT records	Records that describe the completed condense files. This information is also stored in the CDCT file. The purpose of this record type is to be able to restore the CDCT file to a consistent point during either a warm start or cold start. This information is periodically purged based on the retention period defined in the COND_CDCT_RET_P parameter in the CAPTPARM member. This parameter is also used to purge records from the CDCT file.
RET records	Compressed records that contain only the source instance, registration tag, condense file name, and retention expiry information and that are used to delete CDCT records that exceed the COND_CDCT_RET_P_retention period. PowerExchange Condense creates RET records based on the number of checkpoint files. For example, if you have nine checkpoint files, the formula is: `(2 * 9 ) - 1 = 17` This formula indicates that full uncompressed information is held in the checkpoint file records for the last 17 checkpoints. Information from all earlier checkpoints has been compressed into RET records, which includes a subset of the information.
SRT record	A single record in the checkpoint file that defines system-wide information.

During initialization of the Condense job, PowerExchange Condense takes a new checkpoint and issues the following message, which includes the checkpoint file name and time stamp:

```
PWX-06136 Checkpoint taken to file=hlq.CHKPTVn time=yy/mm/dd hh:mm:ss
```

For a warm start, this checkpoint information reflects the results of merging the current registrations from the CCT file with the information from the last checkpoint of the previous run. For a cold start, no data is merged because previous checkpoint files are not available.

PowerExchange Condense takes another checkpoint after each FILESWITCH or SHUTDOWN command.

At each checkpoint, the following PWX-06420 message is issued to display the current restart tokens:

```
PWX-06420 Condense: Checkpoint done. Sequence=sequence_restart_token
Logger=logger_restart_token
```

Synchronization of the Checkpoint File to the CDCT File

During a warm start of PowerExchange Condense, PowerExchange checks whether the records in the currrent checkpoint file that track the condense files match the records in the CDCT file with the same key fields. If the records in these files do not match, PowerExchange Condense synchronizes the CDCT file with the checkpoint file. Synchronization occurs during the PowerExchange Condense initialization phase only.

During synchronization, if a record is absent from the CDCT file and is present in the checkpoint file, the record from the checkpoint file is added to the CDCT file. However, if a record is absent from the CDCT file and the only corresponding record in the checkpoint file is a compressed RET record, PowerExchange cannot add the missing record to the CDCT file.

Note: RET records are compressed records that contain only fields for the source instance, registration tag, condense file name, and retention information. They are used to delete CDCT records that reach the expiration threshold that is specified in the COND_CDCT_RET_P parameter in the CAPTPARM configuration member.

For each missing CDCT record that the synchronization process detects, PowerExchange issues warning message PWX-06446 and optionally issues the operator reply message PWX-06449. You must reply Y or N to the operator reply message to indicate whether to continue or end PowerExchange Condense processing. If PowerExchange Condense continues, some change data will not be extracted because the extraction processes will not be able to find all of the condense files based on the CDCT records. If you do not need to extract change data for the registrations and time stamps reported in the PWX-06446 messages for missing CDCT records, you can suppress the operator reply messages by setting the OPER_WTOR_ENABLED parameter to N in the CAPTPARM configuration member.

Under normal circumstances, the checkpoint file and CDCT file match. However, if the synchronization process detects that the records in these files differ, the records in the checkpoint file take precedence until a subsequent PowerExchange Condense warm start resynchronizes the files. In the following atypical situations, resynchronization might be necessary:

- You want to use an older checkpoint file to restart PowerExchange Condense.
- You restored the CDCT file from an older CDCT backup file and now want to bring the CDCT up to date.
- You deleted all records for a particular instance from the CDCT file.

PowerExchange Message Data Sets

The Condense job prints important information to the following message data sets, which are defined by DD statements in the JCL:

- DTLLOG
- DTLLOG*nn* (if alternative logging is used)
- DTLOUT
- EDMMSG

The following information assumes that alternative logging, which is the default during the installation of PowerExchange, is being used.

DTLLOG

With alternative logging, DTLLOG only contains messages up until the point that the alternative logging subtask is successfully initialized. For the Condense job, this means that it generally only contains the print of the DTLCFG DD statement parameters (DBMOVER).

DTLLOG*nn* (PowerExchange Alternative Logging)

With alternative logging, the standard PowerExchange run-time message information is sent to the alternative log data sets.

These can be DD statements in the JCL of the form DTLLOG*nn*, where *nn* is a number from 01 to 99. or dynamically allocated data sets if no DD statements are provided.

DTLOUT

When alternative logging is used, the DTLOUT DD statement only contains messages if there are errors allocating condense files. Without alternative logging, it contains a subset of the messages written to the DTLLOG DD statement.

EDMMSG

The EDMMSG DD statement is dynamically allocated if it is not included in the JCL. It contains messages from the Log Read API, which connects to the PowerExchange Logger to read the captured change data.

These messages indicate to which PowerExchange Logger and PowerExchange Agent the Condense job attaches as well as the starting point at which to begin, which is passed to the Logger.

Configuring PowerExchange Condense Parameters

Configure PowerExchange Condense parameters in the CAPTPARM configuration member for your data source type. Also, ensure that the DTLCACFG DD statement in the PowerExchange Condense job or started task JCL points to this member.

The following table identifies the CAPTPARM configuration member that is available for each data source type in the RUNLIB library:

Data Source	Member
Adabas	CAPTADA1
DB2 for z/OS	CAPTDB2
Datacom	CAPTDCOM
IDMS log-based	CAPTIDML
IMS	CAPTIMSS
VSAM	CAPTVSM

If you plan to run multiple PowerExchange Condense jobs, each job must use a unique CAPTPARM member and have unique checkpoint file and condense file names.

Parameter Descriptions

In the CAPTPARM member, you can define PowerExchange Condense parameters.

The following table summarizes the PowerExchange Condense parameters:

Parameter	Description
CAPT_IMAGE	The data image type that PowerExchange Condense captures to condense files.
CHKPT_BASENAME	The high-level data set name qualifiers for generating the checkpoint data sets.
CHKPT_FILE_CTL	The template file that contains the IDCAMS DEFINE CLUSTER control statements for the checkpoint files.
CHKPT_NUM	The number of checkpoint data sets.
CHKPT_PRIM_ALLOC	The primary space allocation for checkpoint files.
CHKPT_SCND_ALLOC	The secondary space allocation for checkpoint files.
CHKPT_VOLSERS	The DASD volume serial numbers (VOLSERs) where checkpoint data sets are allocated.
COLL_END_LOG	The operational mode of the Condense job.
COND_CDCT_RET_P	The number of days to keep CDCT records and condense files.
CONDENSE_SHUTDOWN_TIMEOUT	The maximum number of seconds that PowerExchange Condense waits after receiving a SHUTDOWN command before stopping.
CONDENSENAME	The name for the command-handling service for a PowerExchange Condense process to which pwxcmd commands are issued.
CONDF_FULL_FILE_CTL	The template file that contains the IDCAMS DEFINE CLUSTER control statements for the full condense files.
CONDF_PART_BLKSZ	The block size for partial condense files.
CONDF_PART_BUFNO	Indicates whether the PowerExchange Condense system can incrementally increase the number of block buffers to improve I/O processing of partial condense files.
CONDF_PART_DATACLAS	The SMS DATACLAS value for partial condense files.
CONDF_PART_LRECL	The logical record length (LRECL) value for partial condense files.
CONDF_PART_MGMTCLAS	The SMS MGMTCLAS value for partial condense files.
CONDF_PART_STORCLAS	The SMS STORCLAS value for partial condense files.
CONDF_PRIM_ALLOC	The primary space allocation for condense files.
CONDF_SCND_ALLOC	The secondary space allocation for condense files.
CONDF_TYPE	The space unit type for condense files.

Parameter	Description
CONDF_UNIT	The unit for condense files.
CONDF_VOL	The VOLSER for condense files.
CONN_OVR	The CAPI_CONNECTION name to use when running PowerExchange Condense.
DB_TYPE	The data source type.
DBID	The instance name. When used with DB_TYPE, it defines selection criteria for capture registrations in the CCT file.
EXT_CAPT_MASK	The unique high-level qualifier (HLQ) that PowerExchange Condense uses to allocate condense data sets.
FILE_SWITCH_CRIT	Controls whether to use minutes or records for determining when to do an automatic file switch.
FILE_SWITCH_VAL	The number of FILE_SWITCH_CRIT units at which to do a file switch.
GROUPDEFS	The fully qualified data set name for the Condense Group Definitions file that defines condense groups.
KEY_CHANGE_ALW	Controls whether changes to the source key columns are allowed for full condense.
NO_DATA_WAIT	The number of minutes to wait between condense operations when running in continuous mode.
NO_DATA_WAIT2	The number of seconds to wait for additional data to be received after the end-of-log is reached, indicated by the PWX-09967 message.
OPER_WTO	Controls whether condense file close WTO messages are issued.
OPER_WTOR_ENABLED	Controls whether the PWX-06449 WTOR message is issued whenever PowerExchange Condense detects missing resources in the CDCT file that cannot be restored from the checkpoint file during checkpoint-to-CDCT synchronization.
RESTART_TOKEN	The restart point for starting change data processing when PowerExchange Condense is cold started.
SEQUENCE_TOKEN	The restart point for starting change data processing when PowerExchange Condense is cold started.
SIGNALLING	Controls whether PowerExchange Condense handles abnormal end conditions, such as ABEND 0C4, SIGSEGV, SIGABEND.
VERBOSE	Controls whether PowerExchange Condense issues verbose or terse messages for frequent condense activities such as cleanup, checkpoint, condense, and file switch processing.

CAPT_IMAGE Parameter

The type of data image that PowerExchange Condense captures to condense files.

PowerExchange Condense can capture after images only or both before and after images. The capture image type must be consistent with the image type delivered to the target during extraction processing.

Syntax:

```
CAPT_IMAGE={AI|BA}
```

Valid Values:

- **AI**. After images only.

  If you enter this value, the following limitations apply:

  - You cannot extract before images to the target.
  - You cannot use DTL_BI columns in extraction maps.
  - If you add DTL_CI columns to extraction maps, any insert or delete operations result in Null values in these columns.

- **BA**. Before and after images.

  Informatica recommends that you specify this value so that you have the flexibility to use either **AI** or **BA** for the PowerCenter **Image Type** connection attribute for extraction processing.

The z/OS Installation Assistant adds the recommended value of BA to the configuration member unless you specify another value. If you do not define this parameter, the default of AI is used.

CHKPT_BASENAME Parameter

The high-level qualifier for generating PowerExchange Condense checkpoint data set names.

Checkpoint data sets are VSAM KSDS clusters. To create the full checkpoint VSAM KSDS cluster name, PowerExchange appends V*n* to the last qualifier, where *n* is a number from 0 to the value of CHKPT_NUM-1. By default, the names of the index and data components of the checkpoint VSAM KSDS clusters are the full cluster names with the suffix .D or .I.

Related Parameters: CHKPT_NUM

Syntax:

```
CHKPT_BASENAME=hlq
```

Value: For the *hlq* variable, enter a high-level qualifier for generating checkpoint data sets.

Maximum length is calculated as 41 - (CHKPT_NUM-1).

Example: Enter the following high-level qualifier:

```
INFA.D.CHKPT
```

PowerExchange appends V0:

```
INFA.D.CHKPTV0
```

PowerExchange also appends .D because the name is for a data component of the VSAM KSDS cluster:

```
INFA.D.CHKPTV0.D
```

CHKPT_FILE_CTL Parameter

The template file that contains the IDCAMS DEFINE CLUSTER control statements for PowerExchange Condense checkpoint files. The template file can also optionally specify the suffix for the checkpoint file names.

PowerExchange supplies a sample template, TMLCHKPT, in the RUNLIB library.

Syntax:

```
CHKPT_FILE_CTL={dataset_name|"pds_member"}
```

Valid Values: A fully qualified sequential data set name, or a PDS member name that is enclosed in double quotation marks (").

Usage Notes: If you use this parameter, do not also specify the following parameters:

- CHKPT_PRIM_ALLOC
- CHKPT_SCND_ALLOC
- CHKPT_VOLSERS

CHKPT_NUM Parameter

The number of PowerExchange Condense checkpoint files.

Related Parameters: CHKPT_BASENAME

Syntax:

```
CHKPT_NUM={number|3}
```

Value: For the *number* variable, enter a number from 1 to 999999.

Default is 3.

Usage Notes:

- Informatica recommends that you use at least nine checkpoint files so that you are likely to have enough checkpoint files from which to reconstruct the CDCT file, if necessary.
- After running PowerExchange Condense, if you decrease the CHKPT_NUM value and then warm start PowerExchange Condense, PowerExchange Condense might restart from an incorrect location in the Logger log files. In this situation, perform a cold start.

CHKPT_PRIM_ALLOC Parameter

The amount of primary space that is allocated for PowerExchange Condense checkpoint files.

Related Parameters: CHKPT_SCND_ALLOC, CHKPT_VOLSERS

Syntax:

```
CHKPT_PRIM_ALLOC=number
```

Value: For the *number* variable, enter a number greater than 0.

Usage Notes: If you specify this parameter, do not also specify the CHKPT_FILE_CTL parameter.

CHKPT_SCND_ALLOC Parameter

The amount of secondary space that is allocated for PowerExchange Condense checkpoint files.

Related Parameters: CHKPT_PRIM_ALLOC, CHKPT_VOLSERS

Syntax:

```
CHKPT_SCND_ALLOC=number
```

Value: For the *number* variable, enter a number greater than 0.

Usage Notes: If yo specify this parameter, do not also specify the CHKPT_FILE_CTL parameter.

CHKPT_VOLSERS Parameter

The DASD volume serial numbers (VOLSERs) where PowerExchange Condense checkpoint data sets are allocated.

Syntax:

```
CHKPT_VOLSERS=volser1,volser2,volser3
```

Valid Values: The *volser1*, *volser2*, and *volser3* variables are valid MVS VOLSER values on your system. You must define all three variables, even if they specify the same value.

Example: The following statement specifies three valid VOLSERs on your system:

```
CHKPT_VOLSERS=DSK100,DSK101,DSK102
```

COLL_END_LOG Parameter

The operational mode of the PowerExchange Condense job.

Syntax:

```
COLL_END_LOG={0|1}
```

Valid Values:

- **0**. Continuous mode. After each Condense run, PowerExchange Condense waits for the number of minutes that is specified in the NO_DATA_WAIT parameter before staring another Condense cycle.
- **1**. Batch mode. PowerExchange Condense shuts down after a single Condense run. For example, use batch mode if Condense is scheduled to run after a particular batch update job and then shut down.

Default is 0.

COND_CDCT_RET_P Parameter

The number of days to retain CDCT records, condense files, and the DCT records that describe completed condense files in the checkpoint files.

Syntax:

```
COND_CDCT_RET_P={days|60}
```

Condense files that are older than this retention period and their corresponding CDCT records and checkpoint DCT records are automatically deleted the next time cleanup processing occurs. Cleanup processing occurs at each checkpoint and fileswitch and during PowerExchange Condense startup and shutdown.

Value: For the *days* variable, enter a number greater than 0.

The z/OS Installation Assistant enters a value of 50 in the PowerExchange Condense configuration member unless you specify another value. If this parameter is not defined, the default of 60 is used.

Usage Notes:

Enter a time interval that is long enough for change data to be extracted from condense files before the files are deleted.

CONDENSE_SHUTDOWN_TIMEOUT Parameter

The maximum number of seconds that PowerExchange Condense waits after receiving a SHUTDOWN command before it stops the shutdown process and fails.

Syntax:

```
CONDENSE_SHUTDOWN_TIMEOUT={seconds|600}
```

Value: For the *seconds* variable, enter a number from 0 to 2147483647.

Default is 600.

Usage Note: Set this value based on your environment. You might need to use a value greater than the default value if you have a large number of tables for PowerExchange Condense to process.

CONDENSENAME Parameter

The user-defined name of the command-handling service for a PowerExchange Condense process to which you issue pwxcmd commands.

Syntax:

```
CONDENSENAME=service_name
```

Value: For the *service_name* variable, enter a value that matches the service name specified in the associated SVCNODE statement in the DBMOVER configuration file.

The service name can be up to 12 characters in length, which is the maximum length of the service name that you can specify in the SVCNODE statement.

No default value.

CONDF_FULL_FILE_CTL Parameter

The template file that contains the IDCAMS DEFINE CLUSTER control statements for PowerExchange Condense full condense files.

PowerExchange supplies a sample template, TMLCONF, in the RUNLIB library.

Syntax:

```
CONDF_FULL_FILE_CTL={dataset_name|"pds_member_name"}
```

Valid Values: A fully qualified sequential data set name, or a PDS member name that is enclosed in double quotation marks (").

Usage Notes:

- Do not specify the CONDF_FULL_FILE_CTL parameter with the CONDF_UNIT or CONDF_VOL parameter for a full condense. If you do, PowerExchange issues error message PWX-06308.
- Do not specify both the CONDF_FULL_FILE_CTL and CONDF_PART_STORCLAS parameters with either the CONDF_UNIT or CONDF_VOL parameter for a full or partial condense. If you do, PowerExchange issues error message PWX-06308.

CONDF_PART_BLKSZ Parameter

The block size for PowerExchange Condense partial condense files.

Syntax:

```
CONDF_PART_BLKSZ={number|0}
```

Value: For the *number* variable, enter a number from 0 to 32760.

Default is 0.

CONDF_PART_BUFNO Parameter

Indicates whether the PowerExchange Condense system can incrementally increase the number of block buffers to improve I/O processing of partial condense files. When this parameter is enabled, PowerExchange Condense can use up to 32 buffers.

Syntax:

```
CONDF_PART_BUFNO={N|Y}
```

Valid Values:

- **N**. Do not allow PowerExchange to increase the number of block buffers for partial condense files.
- **Y**. Allow PowerExchange Condense to increase the number of block buffers for partial condense files. This option might increase memory usage.

Default is N.

CONDF_PART_DATACLAS Parameter

The SMS data class for PowerExchange Condense partial condense files.

Syntax:

```
CONDF_PART_DATACLAS=sms_dataclas
```

Value: For the *sms_dataclas* variable, enter a valid SMS DATACLAS value.

CONDF_PART_LRECL Parameter

The logical record length (LRECL) for PowerExchange Condense partial condense files.

Syntax:

```
CONDF_PART_LRECL=bytes
```

Value: For the *bytes* variable, enter a number of bytes from 4044 to 147444. Default is one of the following values:

- 32756 if a value for the CONDF_PART_BLKSZ parameter is not specified
- The difference that results from `CONDF_PART_BLKSZ-4` if CONDF_PART_BLKSZ is specified.

If you enter 32756 or less, PowerExchange Condense uses RECFM=VB to create the condense files. You can then read the condense files by using the Interactive System Productivity Facility (ISPF) and standard IBM utilities such as IDCAMS.

If you enter a value greater than 32756, PowerExchange Condense uses RECFM=VS to create the condense files. You can then read the condense files only by using specialized utilities such as the IBM Data Interfile Transfer, Testing and Operations Utility (DITTO) with the DB command.

Usage Notes:

- Although the maximum value for this parameter is 147444, Informatica recommends that you use a value less than 32756. Record lengths less than 32 KB are optimal for reading and writing data on disk. This strategy works because PowerExchange is able to split row data into multiple physical records.
- If you have 3390 disks, you can usually achieve efficient disk space usage by 1) setting CONDF_PART_BLKSZ=27998 to write two blocks per track and 2) setting the CONDF_PART_LRECL parameter to 27994 or a value greater than 32756.

- Informatica recommends the following additional guidelines for setting the parameter based on the maximum record size:
  - If the maximum record size is 27994 bytes or less, set the CONDF_PART_LRECL parameter to 27994. This value causes RECFM=VB to be used.
  - If the maximum record size is greater than 32756 bytes, which might occur with Adabas spanned data, set the CONDF_PART_LRECL parameter to 147444. This value causes RECFM=VS format to be used.
  - If the maximum record size is a value from 27995 to 32756 bytes, use one of the following settings:
    - Set CONDF_PART_LRECL=32764 to use RECFM=VS.
    - Set CONDF_PART_LRECL=27994 and CONDF_PART_BLKSZ=27998 to use RECFM=VB. With this setting, PowerExchange handles spanned records.

CONDF_PART_MGMTCLAS Parameter

The SMS management class for PowerExchange Condense partial condense files.

Syntax:

```
CONDF_PART_MGMTCLAS=sms_mgmtclas
```

Value: For the *sms_mgmtclas* variable, enter a valid SMS MGMTCLAS.

CONDF_PART_STORCLAS Parameter

The SMS storage class for PowerExchange Condense partial condense files.

Syntax:

```
CONDF_PART_STORCLAS=sms_storclas
```

Value: For the *sms_storclas* variable, enter a valid SMS STORCLAS.

Usage Notes:

- Do not specify the CONDF_PART_STORCLAS parameter with the CONDF_UNIT or CONDF_VOL parameter for a partial condense. If you do, PowerExchange issues error message PWX-06308.
- Do not specify both the CONDF_PART_STORCLAS and CONDF_FULL_FILE_CTL parameters with either the CONDF_UNIT or CONDF_VOL parameter for a full or partial condense. If you do, PowerExchange issues error message PWX-06308.

CONDF_PRIM_ALLOC Parameter

The amount of primary space that is allocated for PowerExchange Condense condense files. The CONDF_TYPE parameter indicates whether the units are cylinders or tracks.

Related Parameters: CONDF_FULL_FILE_CTL and CONDF_TYPE

Syntax:

```
CONDF_PRIM_ALLOC={1|number}
```

Value: For the *number* variable, enter a number greater than 0.

The z/OS Installation Assistant enters 10 for this parameter in the PowerExchange Condense configuration member unless you specify another value. If this parameter is not defined, the default of 1 is used.

Usage Notes: If you specify the CONDF_FULL_FILE_CTL parameter, the CONDF_PRIM_ALLOC parameter is ignored for full condense files.

CONDF_SCND_ALLOC Parameter

The amount of secondary space that is allocated for PowerExchange Condense condense files. The CONDF_TYPE parameter indicates whether the units are cylinders or tracks.

Related Parameters: CONDF_FULL_FILE_CTL and CONDF_TYPE

Syntax:

```
CONDF_SCND_ALLOC={1|number}
```

Value: For the *number* variable, enter a number greater than 0.

Default is 1.

Usage Notes: If you specify the CONDF_FULL_FILE_CTL parameter, the CONDF_SCND_ALLOC parameter is ignored for full condense files.

CONDF_TYPE Parameter

The unit type for defining primary space and secondary space for PowerExchange Condense condense files.

Related Parameters: CONDF_PRIM_ALLOC, CONDF_SCND_ALLOC, and CONDF_FULL_FILE_CTL

Syntax:

```
CONDF_TYPE={CYL|TRK}
```

Valid Values:

- **CYL**. Cylinders.
- **TRK**. Tracks.

Default is CYL.

Usage Notes: If you specify the CONDF_FULL_FILE_CTL parameter, the CONDF_TYPE parameter is ignored for full condense files.

CONDF_UNIT Parameter

The unit name of the device where PowerExchange Condense condense files reside.

Related Parameters: CONDF_FULL_FILE_CTL

Syntax:

```
CONDF_UNIT=unit_name
```

Value: For the *unit_name* variable, enter a valid z/OS generic or esoteric unit name, such as 3390 or SYSDA.

Usage Notes:

- Do not specify the CONDF_UNIT parameter with the CONDF_FULL_FILE_CTL parameter for a full condense. If you specify both parameters, PowerExchange issues error message PWX-06308.
- Do not specify the CONDF_UNIT parameter with CONDF_PART_STORCLAS parameter for a partial condense. If you specify both parameters, PowerExchange issues error message PWX-06308.

CONDF_VOL Parameter

The volume serial number (VOLSER) for condense files.

Related Parameters: CONDF_FULL_FILE_CTL

Syntax:

```
CONDF_VOL=volser
```

Value: For the *volser* variable, enter a z/OS VOLSER.

Usage Notes:

- Do not specify the CONDF_VOL parameter with the CONDF_FULL_FILE_CTL parameter for a full condense. If you specify both parameters, PowerExchange issues error message PWX-06308.
- Do not specify the CONDF_VOL parameter with the CONDF_PART_STORCLAS parameter for a partial condense. If you specify both parameters, PowerExchange issues error message PWX-06308.

CONN_OVR Parameter

The CAPI_CONNECTION name to use when you run PowerExchange Condense.

Syntax:

```
CONN_OVR=capi_connection_name
```

Value: For the *capi_connection_name* variable, enter a valid source CAPI connection name.

If you do not specify this name, PowerExchange Condense uses the default connection.

DB_TYPE Parameter

For PowerExchange Condense, the data source type.

Related Parameters: DBID

Syntax:

```
DB_TYPE=database_type
```

Valid Values: For the *database_type* variable, enter one of the following values:

- **ADA** for Adabas
- **DB2** for DB2 for z/OS
- **DCM** for Datacom
- **IDL** for IDMS log-based
- **IMS** for IMS
- **VSM** for VSAM

DBID Parameter

For PowerExchange Condense, the instance name for capture registrations. When used with the DB_TYPE parameter, it defines selection criteria for capture registrations in the CCT file.

Related Parameters: DB_TYPE

Syntax:

```
DBID=instance_name
```

Value: For the *instance_name* variable, enter the instance name for capture registrations.

Usage Notes:

- This value must match the instance name that is displayed in the PowerExchange Navigator for the registration group that contains the capture registrations.

- For DB2, this value is either a DB2 subsystem ID (SSID) or the name of a data-sharing group.

EXT_CAPT_MASK Parameter

The unique high-level qualifier (HLQ) that PowerExchange Condense uses to allocate condense data sets.

Syntax:

```
EXT_CAPT_MASK=hlq
```

Value: For the *hlq* variable, enter a high-level qualifier (HLQ) value. Verify that this HLQ does not match data sets other than condense data sets on the system. PowerExchange considers any data sets that match this HLQ to be condense data sets, even if they are unrelated to condense processing.

Maximum length is 21 characters.

To create condense data sets, PowerExchange appends the following information for VSAM full condense data sets:

```
.CND.CFyymmdd.Thhmmnnn
```

PowerExchange appends the following information for sequential partial condense data sets:

```
.CND.CPyymmdd.Thhmmnnn
```

Where:

- *yy* is year.
- *mm* is month.
- *dd* is day.
- *hh* is hour.
- *mm* is minutes.
- *nnn* is a sequence number starting from 001.

Example: For example, you might specify the following HLQ:

```
EXT_CAPT_MASK=INFA.D
```

For sequential partial condense data sets, PowerExchange appends the following additional information to the mask:

```
INFA.D.CND.CP080718.T1545001
```

Warning: Do not use the same EXT_CAPT_MASK value for multiple Condense tasks. Otherwise, a Condense task might corrupt condense data sets that another Condense task is using. Also, do not reuse an EXT_CAPT_MASK value until the Condense task has finished processing all condense data sets that match the mask.

FILE_SWITCH_CRIT Parameter

For PowerExchange Condense, defines whether to use minutes or records for determining when to do an automatic file switch.

Related Parameters: FILE_SWITCH_VAL

Syntax:

```
FILE_SWITCH_CRIT={M|R}
```

Valid Values:

- **M**. Minutes.

- **R**. Records.

Default is M.

FILE_SWITCH_VAL Parameter

For PowerExchange Condense, the number of FILE_SWITCH_CRIT units at which to do a file switch.

Related Parameters: FILE_SWITCH_CRIT

Syntax:

```
FILE_SWITCH_VAL={number|30}
```

Value: For the *number* variable, enter any number greater than 0.

Default is 30.

Example: To configure the Condense task to complete a file switch every 30 records, define the following parameters:

```
FILE_SWITCH_VAL=30
FILE_SWITCH_CRIT=R
```

To configure the Condense task to complete a file switch every 30 minutes, define the following parameters:

```
FILE_SWITCH_VAL=30
FILE_SWITCH_CRIT=M
```

Usage Notes: If a condense file contains no data when the FILE_SWITCH_VAL limit is reached, the file switch does not occur.

GROUPDEFS Parameter

The fully qualified data set name for the Condense Group Definitions file that defines condense definition groups for PowerExchange Condense.

To use condense definition groups, this parameter is required.

Syntax:

```
GROUPDEFS={dataset_name|"pds_member_name"}
```

Valid Values:

- *dataset_name*. Any fully qualified sequential data set name or PDS member name.
- *pds_member_name*. Any fully qualified PDS member name enclosed in quotation marks (").

  For example:

  ```
  GROUPDEFS="DTLUSR.V810.RUNLIB(CONDGRP)"
  ```

KEY_CHANGE_ALW Parameter

Controls whether Condense jobs fail or continue when PowerExchange Condense detects a change to the source key columns during full condense processing.

This parameter applies only to full condense processing, which is enabled by selecting **Full** for the **Condense** option in the capture registration.

Syntax:

```
KEY_CHANGE_ALW={N|Y}
```

Valid Values:

- **N**. The Condense job fails when the change to the key columns is detected.
- **Y**. The Condense job ignores the change to the key during full condense processing and continues.

Default is N.

Usage Notes:

- If you have a DB2 for z/OS source, you can do an update operation to change any or all key columns in a row.
- This parameter does not apply to partial condense processing.

NO_DATA_WAIT Parameter

When PowerExchange Condense runs in continuous mode, the number of minutes that it waits before starting the next condense cycle.

Related Parameters: FILE_SWITCH_VAL

Syntax:

```
NO_DATA_WAIT={minutes|60}
```

Value: For the *minutes* variable, enter a number greater than 0.

The z/OS Installation Assistant enters 5 for this parameter in the PowerExchange Condense configuration member unless you specify another value. If this parameter is not defined, the default of 60 is used.

Usage Notes:

- If the FILE_SWITCH_CRIT parameter is set to M, for minutes, and the FILE_SWITCH_VAL parameter value is less than the NO_DATA_WAIT parameter value, PowerExchange Condense uses the FILE_SWITCH_VAL value instead.
- If the COLL_END_LOG parameter is set to 1, PowerExchange Condense runs in batch mode and the NO_DATA_WAIT parameter is ignored.

NO_DATA_WAIT2 Parameter

The number of seconds that PowerExchange Condense waits after it reaches the end-of-log to receive more data.

This parameter sets the Consumer API (CAPI) interface timeout value, which appears in message PWX-09967.

Syntax:

```
NO_DATA_WAIT2={seconds|600}
```

Value: For the *seconds* variable, enter any number greater than 0.

The z/OS Installation Assistant enters 60 for this parameter in the ECCR configuration member unless you specify another value. If this parameter is not defined, the default of 600 is used.

Usage Notes:

- The completion of a condense cycle occurs when the number of seconds specified in the NO_DATA_WAIT2 parameter expires and PowerExchange Condense has not received any data from the PowerExchange Logger.

- The optimal value for the parameter varies according to change data activity on the system:
  - If you set the parameter too low, the Condense operation might end prematurely causing a delay in capturing all available changes to a condense file so they can be extracted.
  - If you set the parameter too low and the PowerExchange Logger encounters a large unit of work for a source that is not being condensed, the condense operation might also end prematurely because no data is being returned.
  - If you set the parameter too high, an individual condense operation might never end.

OPER_WTO Parameter

Defines whether PowerExchange Condense issues WTO messages when a condense file closes.

Syntax:

```
OPER_WTO={N|Y}
```

Value:

- **N**. When a condense file closes, PWX-06418 messages are written to the PowerExchange log.
- **Y**. When a condense file closes, PWX06418I WTOs are issued. You can use these messages with an automation product. The PWX-06418 messages are also written to the PowerExchange log.

Default is N.

Usage Notes: File switch processing does not occur for empty condense files.

OPER_WTOR_ENABLED Parameter

Controls whether PWX-06449 WTOR messages are issued when PowerExchange Condense detects that a record is missing from the CDCT file after synchronization of the checkpoint file to the CDCT file. This message requires a user reply of Y or N.

Synchronization occurs at PowerExchange Condense initialization, after a warm start of a PowerExchange Condense job. During synchronization, if any record in the checkpoint file does not match a record in the CDCT file based on the key fields, the checkpoint file record is not added to the CDCT file. The CDCT file is then missing a record that points to a condense file from which to extract change data for a registered source object and time stamp. For each record that is missing from the CDCT file, PowerExchange issues the following PWXX-06446 warning message followed by the optional PWX-06449 WTOR message:

```
PWX-06446 Checkpoint to CDCT synchronization not done for time stamp "time_stamp" tag
"registration_tag" number record_count reason.
PWX-06449 The CDCT cannot be fully synchronized with the checkpoint file because of
missing resources. Continue? (Y/N)
```

You must respond Y or N to the PWX-06449 message to indicate whether to continue or end PowerExchange Condense processing. Use this parameter to suppress these WTOR messages if you want PowerExchange Condense to continue and if the loss of some change data during extraction processing is tolerable for the reported time stamps and registrations.

Syntax:

```
OPER_WTOR_ENABLED={N|Y}
```

Valid Values:

- **Y**. When PowerExchange Condense detects missing records in the CDCT file after checkpoint-to-CDCT synchronization, PWX-06449 messages are displayed as WTOR messages and written to the

PowerExchange message log. You must reply Y or N to each of these messages to indicate whether PowerExchange Condense processing should continue without the CDCT records or stop.

  - If you reply Y, PowerExchange Condense continues processing. In this case, extraction processes will not be able to find some condense files based on the CDCT file for data extraction. Skipping some change data might be acceptable if the condense files contain old data or if the CDC workflow already processed these condense files. Use the time stamps reported in the PWX-06446 messages to determine if the data is old. If you need to extract the data, you must cold start the CDC session from an earlier point in time.
  - If you reply N, PowerExchange Condense stops.

- **N**. When PowerExchange Condense detects missing records in the CDCT file, PWX-06449 messages are suppressed. PowerExchange Condense processing continues uninterrupted without the PWX-06449 WTOR messages.

Default is Y.

RESTART_TOKEN Parameter

A token value that works with the SEQUENCE_TOKEN value to define the restart point for PowerExchange Condense change data processing when you cold start PowerExchange Condense.

Related Parameters: SEQUENCE_TOKEN

Syntax:

```
RESTART_TOKEN=restart_token
```

Valid Values:

- A specific restart token value.
- Zeroes for the entire 32-digit token value. For example:

  ```
  RESTART_TOKEN=00000000000000000000000000000000
  ```

- Not specified.

Usage Notes: Based on how you set the RESTART_TOKEN and SEQUENCE_TOKEN parameters, PowerExchange Condense processing starts from one of the following restart points during a cold start:

- If you enter specific restart token and sequence token values other than all zeroes, processing starts from the restart point that these token values specify.
- If you enter only zeroes for both parameters, processing starts from the beginning of the PowerExchange Logger for z/OS active log files.
- If you do not specify these parameters, processing starts from the current end-of-log position.

SEQUENCE_TOKEN Parameter

A token value that works with the RESTART_TOKEN value to define the restart point for PowerExchange Condense change data processing when you cold start PowerExchange Condense.

Related Parameters: RESTART_TOKEN

Syntax:

```
SEQUENCE_TOKEN=sequence_token
```

Valid Values:

- A specific sequence token value.

- Zeroes for the entire 40-digit token value. For example:

```
SEQUENCE_TOKEN=0000000000000000000000000000000000000000
```

- Not specified.

Usage Notes: Based on how you set the SEQUENCE_TOKEN and RESTART_TOKEN parameters, PowerExchange Condense processing starts from one of the following restart points during a cold start:

- If you enter specific restart token and sequence token values other than all zeroes, processing starts from the restart point that these token values specify.
- If you enter only zeroes for both parameters, processing starts from the beginning of the PowerExchange Logger for z/OS active log files.
- If you do not specify these parameters, processing starts from the current end-of-log position.

SIGNALLING Parameter

Defines whether PowerExchange Condense handles abnormal end conditions, such as an ABEND 0C4, SIGSEGV, and SIGABEND.

Syntax:

```
SIGNALLING={N|Y}
```

Valid Values:

- **N**. PowerExchange Condense does no automatic trapping of errors. Instead, the default error handling of the operating system is used. This error handling usually reports the offending program line and dump memory.
- **Y**. PowerExchange Condense takes automatic action in the event of certain abnormal end conditions such as memory corruption and S0C4 abends and attempts to shut down in an orderly manner.

Default is N.

VERBOSE Parameter

Defines whether PowerExchange Condense issues verbose or terse messages for frequent PowerExchange Condense activities such as cleanup, checkpoint, condense, and file switch processing.

Syntax:

```
VERBOSE={N|Y}
```

Value:

- **Y**. For each condense cycle and file switch, PowerExchange Condense logs multiple messages.
- **N**. For each condense cycle and file switch, PowerExchange Condense amalgamates information into a single terse message.

Default is Y.

Usage Notes: If a condense file contains no data when the VERBOSE limit is reached, the file switch does not occur.

Controlling Allocation Attributes of Condense Data Sets

You can set parameters in the CAPTPARM configuration member to define allocation attributes for the data sets that the Condense job creates.

You can set parameters that control the allocation of checkpoint files and of partial or full condense files.

Checkpoint Files

The allocation attributes of the checkpoint files can be controlled in two ways in the CAPTPARM parameters:

- Specifying the data set prefix, space allocation, and volumes using the following parameters:
  - CHKPT_BASENAME
  - CHKPT_VOLSERS
  - CHKPT_PRIM_ALLOC
  - CHKPT_SCND_ALLOC
- Specifying the IDCAMS DEFINE CLUSTER control statements using the CHKPT_FILE_CTL parameter.

Note: The CHKPT_BASENAME parameter is still used to provide the data set prefix for the checkpoint files.

With the exception of CHKPT_BASENAME, the various parameters of the two options are mutually exclusive. This means that you cannot specify the parameters noted in #1 if you specify CHKPT_FILE_CTL. The reverse is also true.

Using the CHKPT_FILE_CTL Parameter

Use the CHKPT_FILE_CTL parameter to specify the template file that contains the IDCAMS DEFINE CLUSTER control statements for checkpoint files.

You can customize DEFINE CLUSTER control statements to control allocation attributes for checkpoint files. For example, you might want to customize the following control statements:

- If you use SMS, customize the DATACLASS, STORAGECLASS, and MANAGEMENTCLASS statements based on the SMS data classes, storage classes, and management classes that are defined at your site.
- To change the default suffix of .D for the Data component, customize the DATA statement.
- To change the default suffix of .I for the Index component, customize the INDEX statement.
- To override the default control interval size of 32768, customize the CONTROLINTERVALSIZE statement.

The following sample template is provided in the TMLCHKPT member in the RUNLIB library:

```
/* template for PowerExchange chkpt definition                  */
/* max 35 lines cols 2-80 only, Lines of comments do not count  */
/* NAME(<<name>> should occur three times                       */
/* must otherwise be valid define of cluster                    */
/* KEYS(40 0) is required for smooth running                    */
DEFINE CLUSTER -
                (NAME(<<name>>)       -
                     KEYS(40 0)          -
                     RECORDSIZE(4096 32756) -
                     DATACLASS(dataclas)    -
                     STORAGECLASS(storclas)     -
                     MANAGEMENTCLASS(mgmtclas)    -
                     TRACKS   (5 5)         -
                     VOLUMES(volser)    -
                     REUSE                  -
                     FREESPACE  (20 20)     -
                     SHAREOPTIONS  (2 3))   -
           DATA -
                (NAME(<<name>>.D))   -
           INDEX -
                (NAME(<<name>>.I))
```

Note: The PowerExchange installer adds the initial DATACLASS, STORAGECLASS, MANAGEMENTCLASS, and VOLUMES values based on the values that you enter in the z/OS Installation Assistant. You can customize these values in the TMLCHKPT member.

If you customize the template, use the following guidelines:

- Make sure that the DEFINE CLUSTER control statements are valid IDCAMS control statements because PowerExchange passes these statements to IDCAMS as is, with the exception of the NAME control statements.
- Use uppercase to define the DEFINE CLUSTER control statements.
- Do not start control statements in column 1.

  The maximum number of lines is 35 lines.
- You must define the <<*name*>> variable in the NAME parameter of the DEFINE CLUSTER, DATA, and INDEX control statements. PowerExchange populates this variable with the value that you specify in the EXT_CAPT_MASK parameter of the CAPTPARM member. Make sure that the EXT_CAPT_MASK prefix, when combined with any changes made to the suffix for the DATA and INDEX statements, does not exceed 44 characters.
- Specify the KEYS parameter exactly as shown in the template.
- Start comments with a forward slash and an asterisk (/*) and consistently place them before or after the control statements.

Partial Condense Files

The allocation attributes of the partial condense files, which are variable-blocked (VB) sequential data sets, are controlled by the following parameters:

- EXT_CAPT_MASK
- CONDF_PART_DATACLAS
- CONDF_PART_STORCLAS
- CONDF_PART_LRECL
- CONDF_PART_BLKSZ
- CONDF_PRIM_ALLOC
- CONDF_SCND_ALLOC
- CONDF_VOL
- CONDF_UNIT
- CONDF_TYPE

The only required parameter is EXT_CAPT_MASK. Any combination of the remaining parameters is allowed. The following parameters have default values provided by PowerExchange:

- CONDF_PART_LRECL. Default is (blocksize - 4).
- CONDF_PART_BLKSZ. Default is 0.
- CONDF_PRIM_ALLOC. Default is from DBMOVER SPACE= parameter, if specified.
- CONDF_SCND_ALLOC. Default is from DBMOVER SPACE= parameter, if specified.
- CONDF_TYPE. Default is CYL.

If some or all volume and space allocation parameters are omitted, the partial condense file allocations may still succeed, depending upon the MVS/SMS configuration on the system.

It is also possible for the data set allocation to succeed but for the data set to be unusable. For example, if no space allocation parameters are provided in CAPTPARM or DBMOVER, none is passed on the dynamic allocation request. If the MVS system on which this occurs does not have space allocation defaults defined, the data set is created with a primary and secondary space allocation value of 0. The data set is successfully created but when the Condense job attempts to write to this data set, it fails.

Full Condense Files

You can control the allocation of full condense files by specifying allocation parameters in the CAPTPARM configuration member or in a file that is referenced from the CAPTPARM member.

Use the following methods to define allocation attributes:

- Specify the following allocation parameters in the CAPTPARM configuration member:
  - EXT_CAPT_MASK. The high-level qualifier for the full condense data sets.
  - CONDF_PRIM_ALLOC. The primary space allocated for condense files. Default is 1.
  - CONDF_SCND_ALLOC. The secondary space allocated for condense files. Default is 1.
  - CONDF_VOL. A volser. If you omit this parameter, allocation of full condense files might succeed based on the z/OS and SMS system configuration.
  - CONDF_TYPE. Type of space allocation units. Default is CYL for cylinders.
- Specify IDCAMS DEFINE CLUSTER control statements in the TMLCONDF template file, and use the CONDF_FULL_FILE_CTL parameter in the CAPTPARM member to point to this file.

For both methods, EXT_CAPT_MASK is a required parameter. Use any combination of the other parameters and statements.

Using the CONDF_FULL_FILE_CTL Parameter

Use the CONDF_FULL_FILE_CTL parameter to specify the template file that contains the IDCAMS DEFINE CLUSTER control statements for the full condense files.

You can customize DEFINE CLUSTER control statements to control allocation attributes for full condense files. For example, you might want to customize the following control statements:

- If you use SMS, customize the DATACLASS, STORAGECLASS, and MANAGEMENTCLASS statements based on the SMS data classes, storage classes, and management classes that are defined at your site.
- To change the default suffix of .D for the Data component, customize the DATA statement.
- To change the default suffix of .I for the Index component, customize the INDEX statement.
- To override the default control interval size of 32768, customize the CONTROLINTERVALSIZE statement.

The following sample template is provided in the TMLCONDF member in the RUNLIB library:

```
/* template for PowerExchange full condense data files              */
/* max 35 lines cols 2-80 only, Lines of comments do not count       */
/* do not put parameters after comments on any line                  */
/* NAME(<<name>> should occur three times                            */
/* must otherwise be valid define of cluster                         */
/* KEYS(246 0) is required for smooth running                        */
DEFINE CLUSTER -
                (NAME(<<name>>)        -
                     KEYS(246 0)          -
                     RECORDSIZE(400 32756) -
                     DATACLASS(dataclas)    -
                     STORAGECLASS(storclas)    -
                     MANAGEMENTCLASS(mgmtclas)    -
                     TRACKS   (5 5)          -
                     VOLUMES(volser)    -
                     REUSE                   -
                     FREESPACE   (20 20)     -
                     SHAREOPTIONS (2 3))     -
           DATA -
                (NAME(<<name>>.D))   -
           INDEX -
                (NAME(<<name>>.I))
```

Note: The PowerExchange installer adds the initial DATACLASS, STORAGECLASS, MANAGEMENTCLASS, and VOLUMES values based on the values that you enter in the z/OS Installation Assistant. You can customize these values in the TMLCONDF member.

If you customize the template, use the following guidelines:

- Make sure that the DEFINE CLUSTER control statements are valid IDCAMS control statements because PowerExchange passes these statements to IDCAMS as is, with the exception of the NAME control statements.
- Use uppercase to define the DEFINE CLUSTER control statements.
- Do not start control statements in column 1.

  The maximum number of lines is 35 lines.
- You must define the <<*name*>> variable in the NAME parameter of the DEFINE CLUSTER, DATA, and INDEX control statements. PowerExchange populates the variable with the value that you specify in the EXT_CAPT_MASK parameter of the CAPTPARM member.

  Make sure that the EXT_CAPT_MASK prefix, when combined with any changes made to the suffix for the DATA and INDEX statements, does not exceed 44 characters.
- Specify the KEYS parameter as shown in the template.
- Start comments with a forward slash and an asterisk (/*).

  Place comments before or after the IDCAMS control statements.

Configuring Condense Group Definitions

If you want PowerExchange Condense to create separate sets of condense files for groups of data, create a group definition file. The file groups data based on groups of capture registrations.

When you use a group definition file, CDC sessions can extract change data more efficiently by targeting a more specific set of condense files.

To use a group definition file with z/OS data sources, you must set the **Condense** option to **Part** in the capture registrations. You cannot use the **Full** condense option.

Also, you must specify the fully qualified data set name for the group definition file in the GROUPDEFS parameter in the CAPTPARM configuration member.

Without a group definition file, PowerExchange Condense processes data for all tables that are registered with the **Condense** option set to **Full** or **Part**. All changes are written to a single set of condense files, not taking into account file-switching. To extract change data from a table with low level of change activity, the extraction process might need to read a lot of data before finding the changes of interest.

Condense Group Definition File

PowerExchange Condense group definitions are defined in a sequential file, called the *group definition file*.

For PowerExchange Condense to create separate sets of condense files for the groups you define, you must enter the path and file name of the group definition file in the GROUPDEFS parameter in the CAPTPARM configuration member.

A group definition file contains one or more GROUP statements, each with one or more REG statements.

The following table describes the GROUP and REG statements:

Statement	Positional Parameter	Type (Length)	Description
GROUP	*group_name*	VARCHAR(255)	Identifier for the Condense group.
	external_capture_mask	VARCHAR(21)	Fully-qualified prefix for the name of the data set to contain the condense files for the data group.
REG	*registration_name*	VARCHAR(8)	Full or wild-carded registration name (has to be the prefix). Registration names are case sensitive.

The following rules and guidelines apply:

- Each *group_name value* must be unique.
- Each *external_capture_mask* value must be unique.
- Each REG statement applies to the single preceding GROUP statement.
- If a REG statement without a preceding GROUP statement is found, a syntax error is generated.
- You must not specify the same REG statement for more than one GROUP statement.
- If a REG statement is not specified for a group, all of the registrations that belong to that group will be considered for condense processing, as if REG=* had been specified.

Condense Group Definition Example

Use this example to learn how you might use a group definition file.

The following table lists the registrations and tables that this example uses:

Registration	Table Name
regemp1	COMPANY.EMPLOYEES
regemp2	COMPANY.EXEMPLOYEES
regmgr	COMPANY.MANAGERS
regloc1	COMPANY.UK_LOCATIONS
regloc2	COMPANY.US_LOCATIONS
regloc3	COMPANY.JAPAN_LOCATIONS
regdept1	COMPANY.DEPTS

Based on these registrations, the following example group definition file creates separate sets of condense files for the groups called Personnel, Locations, and Departments:

```
GROUP=(Personnel,DTLUSR.PERSCOND)
REG=regemp*
REG=regmgr
GROUP=(Locations,DTLUSR.LOCCOND)
REG=regloc*
GROUP=(Departments,DTLUSR.DEPTCOND)
REG=regdept1
```

In this definition file, the asterisk (*) is used a wildcard character. Consequently, the REG=regemp* specification includes both the regemp1 and regemp2 registrations. The REG=regloc* specification includes the regloc1, regloc2, and regloc3 registrations.

Output Files

Condense files for data groups are written to data sets that have data set names with the prefix values that are specified by the *external_capture_mask* parameters of the GROUP statements.

Extraction processes can then extract the change data from the condense files in those data sets.

Starting and Stopping PowerExchange Condense

Different methods of starting and stopping PowerExchange Condense are available. Choose the method that best suits your needs in a given situation.

Starting Condense

On z/OS, you can run the Condense job as a batch job or a started task.

Generally, you use a started task to run a Condense task in continuous mode for a long time, and use a batch job to run a Condense job in batch mode as part of a scheduled batch job.

To start a Condense job as a batch job, submit the job to the MVS Job Scheduler by using products such as TSO/E, a job scheduler, or automation. PowerExchange provides sample JCL for running Condense as a batch job in the RUNLIB(CONDDB2) member.

To run the Condense job as a started task, place its PROC into the system PROCLIB. Then use the MVS START command to start the Condense started task. PowerExchange provides sample JCL for running Condense as a started task in the RUNLIB(PCNDDB2) member.

Note: You cannot use the pwxcmd program to start a Condense job.

Before you start the Condense job, verify that the following conditions are met:

- The PowerExchange Logger and Agent are started.
- The checkpoint files are in the correct state for the start type:
  - For a cold start, verify that no checkpoint files exist with the CHKPT_BASENAME mask that is defined in the CAPTPARM member.
  - For a warm start, verify that all of the checkpoint files from the last Condense job exist and are available.
- The capture registrations that are required for the Condense run are defined for the DBTYPE and DBID in the PowerExchange Navigator. If required, you can delete or deactivate registrations in the PowerExchange Navigator.

Cold Start Processing

When you start the Condense job, it checks for existing checkpoint files that have the high-level qualifier that is specified by the CHKPT_BASENAME parameter in the CAPTPARM member.

Note: The DTLCACFG DD statement points to the CAPTPARM member.

If the Condense job does not find a checkpoint file, it cold starts and issues the following Write-To-Operator-with-Reply (WTOR) message:

```
*nn PWX06101A No checkpoint files, cold start from specified restart point restart_point
(Y/N)
```

To continue with the cold start, reply Y to the PWX06101A message. The Condense job then issues the following WTOR message to indicate that the request to cold start was accepted:

```
PWX06103I Cold Start accepted
```

To cancel the cold start, reply N to PWX06101A message. The Condense job ends immediately with the following message:

```
PWX06104W Cold Start declined
```

Note: The Condense job writes messages to the PowerExchange DTLLOG member of the LOG file in the PowerExchange *datalib* library, by default. If alternative logging is enabled, Condense writes messages to a DTLLOG*nn* log member in the JOB*job_number* file in the *datalib* library.

For each checkpoint file, the Condense job writes the following message to the PowerExchange message log:

```
PWX-06365 Warning: Checkpoint file chkpt_basenameVn could not be read and was ignored:
Checkpoint FILE chkpt_basenameVn Does not exist. OPEN retcodes 268/4/5896
```

This message indicates that the Condense job ignored the specified checkpoint file because it does not exist.

The point from which the Condense job starts getting change data from the PowerExchange Logger depends on the RESTART_TOKEN and SEQUENCE_TOKEN parameters in CAPTPARM member. Based on the values of these parameters, the following processing occurs:

- If the RESTART_TOKEN and SEQUENCE_TOKEN parameters are not present in the CAPTPARM member, PowerExchange Condense starts from the current end-of-log position in the PowerExchange Logger logs.
- If the RESTART_TOKEN and SEQUENCE_TOKEN parameters are set to all zeroes, PowerExchange Condense starts from the earliest available point in the PowerExchange Logger log files. In a Post-Log Merge environment, the PowerExchange Logger goes back to the oldest available RBA or timestamp. This process might be time-consuming depending on the number and size of available Logger archive logs.

  The following messages are written to the PowerExchange message log to indicate that only zeroes are specified for the restart tokens:

  ```
  PWX-06100 Sequence token 0000000000000000000000000000000000000000
  PWX-06100 Logger   token 00000000000000000000000000000000
  ```
- If the RESTART_TOKEN and SEQUENCE_TOKEN parameters are set to specific token values to define a specific restart point, PowerExchange Condense starts getting data from this restart point if it is a valid restart point in the Logger log files. The following messages in the PowerExchange message log identify the restart token values:

  ```
  PWX-06100 Sequence token sequence_token_value
  PWX-06100 Logger   token restart_token_value
  ```

  To determine the specific restart token values to use, you can use the DTLUAPPL or DTLUCDEP utility or review previous Condense job runs. In error recovery situations, Informatica Global Customer Support might provide these token values.

At this point in the initialization process, the Controller task starts the Command Handler and Condense subtasks of the Condense job.

PowerExchange Condense issues the following message to echo the restart tokens that are being used to define the start point for data extraction from the PowerExchange Logger:

```
PWX-06413 Condense: Highest Restart Token. Sequence=sequence_token_value
PowerExchange Logger=restart_token_value
```

After the restart point is established, PowerExchange Condense cleans up condense files and CDCT entries that have expired as a result of the cold start and writes checkpoint information to the current checkpoint file. Initialization is then complete as indicated by the following messages in the PowerExchange log:

```
PWX-06111 Controller: All tasks initialization complete.
PWX-06455 Command Handler: received CAPTURE_STARTUP_COMPLETE event.
```

PowerExchange Condense then triggers the first condense operation.

Warm Start Processing

When the Condense job is started, it checks for existing checkpoint files using the prefix specified in CHKPT_BASENAME in the CAPTPARM member pointed to by the DTLCACFG DD statement. If at least one checkpoint file is found, the Condense job warm starts. The following message is written to the PowerExchange log (DTLOG or DTLLOG*nn* if using alternative logging) for each Checkpoint data set that is found:

```
PWX-06038 Checkpoint file chkpt_basenameVn has time yy/mm/dd hh:mm:ss.
```

This message indicates the latest checkpoint time in that checkpoint file. You may also see the following message if some of the data sets defined by the CHKPT_NUM do not exist:

```
PWX-06365 Warning: Checkpoint file chkpt_basenameVn could not be read and was ignored:
Checkpoint FILE chkpt_basenameVn Does not exist. OPEN retcodes 268/4/5896
```

Warning: Do not change CHKPT_NUM to a lower value and warm start Condense. This action can cause incorrect warm start processing and duplicate data being condensed. The Condense job only verifies as many checkpoint files as specified in CHKPT_NUM. For example, if the latest checkpoint is in V3 and CHKPT_NUM is changed to 3, only checkpoint files V0, V1, and V2 are checked to determine the latest checkpoint.

After the existing checkpoint file have been read and the latest checkpoint has been determined, the following message indicates which checkpoint file is being used for Condense restart:

```
PWX-06040 Checkpoint restart using file chkpt_basenameVn.
```

The capture registrations eligible for Condense are processed (as indicated by the PWX-06118 messages) and the warm start complete message is issued:

```
PWX-06048 Controller: Warm start complete. Tables restored from checkpoint file.
```

At this point in the initialization process, the Controller task starts the Command Handler and Condense subtasks of the Condense job. The restart tokens that are to be used as the starting point for data extraction from the PowerExchange Logger are echoed in the PowerExchange log with the following message:

```
PWX-06413 Condense: Highest Restart Token. Sequence=sequence_token_value
PowerExchange Logger=restart_token_value
```

After the restart point is established, cleanup processing occurs for condense files and CDCT entries that are being expired as a result of the cold start, a checkpoint is taken to the current checkpoint file, and the initialization process is now complete. This is indicated by the following messages in the PowerExchange log:

```
PWX-06111 Controller: All tasks initialisation complete.
PWX-06455 Command Handler: received CAPTURE_STARTUP_COMPLETE event.
```

Then, the first condense operation is triggered.

Note: When a condense operation is in progress, you can shut down the Condense job by issuing the SHUTDOWN command from the command line. The SHUTDOWN command might cause an incomplete UOW being written to the final condense file. When the Condense job is restarted, this is detected and a file switch is done when an end UOW record is encountered. The following messages are issued to indicate this has occurred:

```
PWX-06414 Condense: Checkpoint ERT shows incomplete UOW on previous partial Condense
PWX-06419 Condense: Doing file switch. Records=nn Reason=1st EndUOW after previous file
switch Cdcts=nn CPU: TotMs=nnnnnn Diff=nnnnnn
```

Shutting Down Condense

You can use the following commands to shut down the Condense job:

SHUTDOWN

The SHUTDOWN command causes a shutdown event to be passed to the other subtasks and the Controller. The condense subtask closes any open condense files, writes the CDCT records, and takes a checkpoint that contains the latest restart tokens. All of the other subtasks shut down. Each of these subtasks report when shutdown is complete. Finally, the Controller shuts down, ending the Condense job.

Alternatively, issue a pwxcmd shutdown command from a Linux, UNIX, or Windows system to a PowerExchange Condense process running on a z/OS system.

SHUTCOND

The SHUTCOND command performs the same processing as the SHUTDOWN command, except it performs a final condense operation before passing the shutdown event to the other subtasks.

Alternatively, on a Linux, UNIX, or Windows system, you can issue a pwxcmd shutcond command to a PowerExchange Condense process running on a z/OS system.

Issue these commands by using the MVS MODIFY (F) command.

Using the MVS STOP Command

The Condense job, specifically the Command Handler subtask, does not accept or process the MVS STOP (P) command.

Canceling the Condense Job

If the Condense job is canceled, it resumes at the most recent complete checkpoint, which have been taken either at start up or at the last file switch. All processing since that checkpoint is rolled back.

The unwanted CDCT records are deleted and unwanted Condense files are deleted. Some processing time is lost, but data integrity is preserved.

Condense Job Message Output

Review PowerExchange Condense job messages in the message log to determine the status of Condense processing.

The following example messages are for a Condense job that uses continuous extraction mode. The job ran and then was cold started from the earliest point in the change stream, as indicated by the restart tokens that are composed only of zeroes.

```
PWX-21605 Connection selected CHANGES found from covr< > tag< > type< IMS> int< FALSE>
method< CONN_NAME>.
PWX-06365 Warning: Checkpoint file ABCDEF1.v101.I.CHKPTV0 could not be read and was ignored:
Checkpoint FILE ABCDEF1.v101.I.CHKPTV0 Does not exist. OPEN retcodes 268/4/5896
PWX-06365 Warning: Checkpoint file ABCDEF1.v101.I.CHKPTV1 could not be read and was ignored:
Checkpoint FILE ABCDEF1.v101.I.CHKPTV1 Does not exist. OPEN retcodes 268/4/5896
```

```
PWX-06365 Warning: Checkpoint file ABCDEF1.v101.I.CHKPTV2 could not be read and was ignored:
Checkpoint FILE ABCDEF1.v101.I.CHKPTV2 Does not exist. OPEN retcodes 268/4/5896
PWX-06100 Sequence token 0000000000000000000000000000000000000000
PWX-06100 Logger   token 00000000000000000000000000000000
PWX-06103 Cold Start accepted
PWX-06121 Registration loaded: DBName: EDMA RegName: activ.1 Condense: Part20150923184534
Creator: FDPVF2 Table: ACTIV
PWX-06121 Registration loaded: DBName: EDMA RegName: address.1 Condense: Part20080225032112
Creator: HALADDR Table: ADDRESS
PWX-06121 Registration loaded: DBName: EDMA RegName: aprbin.1 Condense: Part20110820135824
Creator: APRNUM01 Table: APRBIN
PWX-06121 Registration loaded: DBName: EDMA RegName: aprchar.1 Condense: Part20110820135409
Creator: APRNUM01 Table: APRCHAR
PWX-06119 Controller: added new registration tag IMLEDMAactiv100000
PWX-06119 Controller: added new registration tag IMLEDMAaddress100000
PWX-06119 Controller: added new registration tag IMLEDMAaprbin100000
PWX-06119 Controller: added new registration tag IMLEDMAaprchar100000
PWX-06049 Controller: Cold start complete.

PWX-06112 Controller: Starting the capture subtasks.

PWX-06076 Starting Subtask program DTLCCMD0.
PWX-06450 Command Handler: Starting.
PWX-32533 The Service name or type is not available to the PWXCMD command handler. PWXCMD
input is disabled.
PEV_CMDH_INIT_COMPLETE received

PWX-06076 Starting Subtask program DTLCCND3.
PWX-06400 Condense: Starting. Instance=EDMA.
PWX-06412 Condense: Registration Tag=IMLEDMAactiv100000
PWX-06412 Condense: Registration Tag=IMLEDMAaddress100000
PWX-06412 Condense: Registration Tag=IMLEDMAaprbin100000
PWX-06412 Condense: Registration Tag=IMLEDMAaprchar100000

PWX-06413 Condense: Highest Restart Token. Sequence=0000000000000000000000000000000000000000
PowerExchange Logger=00000000000000000000000000000000
PWX-09970 CAPI i/f: Changed 4 sources to earliest sequence token
PWX-09959 CAPI i/f: Earliest UOW restart tokens:
Sequence=0000000000000000000000000000000000000000
PowerExchange Logger=E2C2F2D34040EFFFFFFFFFFFFFFFFFFF
PWX-09950 CAPI i/f: Connect OK. Sources = 4
PWX-06111 Controller: All tasks initialization complete.
PWX-06136 Checkpoint taken to file=ABCDEF1.v101.I.CHKPTV0 time=16/05/20 20:39:44
PWX-06111 Controller: All tasks initialization complete.
CMD Handler. Ignored Event 8 CONDENSE_INIT_COMPLETE
PWX-06455 Command Handler: received CAPTURE_STARTUP_COMPLETE event.
PWX-06417 Condense: Start to Condense because initialisation complete
PWX-09957 CAPI i/f: Read times out after 60 seconds
PWX-06419 Condense: Doing file switch. Records=658 Reason=Records criteria met Cdcts=48
          CPU: TotMs=232640 Diff=232640
PWX-06418 Condense: Closed file ABCDEF1.v101.I.CND.CP160520.T2039001
PWX-06136 Checkpoint taken to file=ABCDEF1.v101.I.CHKPTV1 time=16/05/20 20:39:46
PWX-06420 Condense: Checkpoint done. Sequence=0000000AE744000000000000000AE74400000000
PowerExchange Logger=E2C2F2D340400000000015E200000000
PWX-06419 Condense: Doing file switch. Records=502 Reason=Records criteria met Cdcts=58
          CPU: TotMs=488039 Diff=255399
PWX-06418 Condense: Closed file ABCDEF1.v101.I.CND.CP160520.T2039002
PWX-06136 Checkpoint taken to file=ABCDEF1.v101.I.CHKPTV2 time=16/05/20 20:39:48
PWX-06420 Condense: Checkpoint done. Sequence=000000101BE800000000000000101BE800000000
PowerExchange Logger=E2C2F2D340400000000015E200000000
PWX-06419 Condense: Doing file switch. Records=525 Reason=Records criteria met Cdcts=75
          CPU: TotMs=742393 Diff=254354
PWX-06418 Condense: Closed file ABCDEF1.v101.I.CND.CP160520.T2039003
PWX-06136 Checkpoint taken to file=ABCDEF1.v101.I.CHKPTV0 time=16/05/20 20:39:49
PWX-06420 Condense: Checkpoint done. Sequence=000000173E7C00000000000000173E7C00000000
PowerExchange Logger=E2C2F2D340400000000015E200000000
PWX-06419 Condense: Doing file switch. Records=503 Reason=Records criteria met Cdcts=140
          CPU: TotMs=1057980 Diff=315587
PWX-06418 Condense: Closed file ABCDEF1.v101.I.CND.CP160520.T2039004
PWX-06136 Checkpoint taken to file=ABCDEF1.v101.I.CHKPTV1 time=16/05/20 20:39:50
PWX-06420 Condense: Checkpoint done. Sequence=0000003183F2000000000000003183F200000000
```

```
PowerExchange Logger=E2C2F2D340400000002FF5BB00000000
PWX-09967 CAPI i/f: End of log for time 16/05/20 20:39:41 reached
PWX-06415 Condense: Condense completed. Total Records=2476, Data=2314, UOWs =118
PWX-06421 Condense: 16/05/20 20:40:53 Starting wait on commands for 5 minute
PWX-26011 Command handler received command "SHUTDOWN"
PWX-06463 Command Handler: Close Condense request is now queued.
PWX-06464 Command Handler: Shutdown will occur shortly.
PWX-06453 Command Handler: shutting down.
PWX-06454 Command Handler: has stopped.
PWX-06110 Unloaded module 1 (COMMAND_HANDLER).
PWX-06416 Condense: Shutting down because SHUTDOWN event received
PWX-06418 Condense: Closed file ABCDEF1.v101.I.CND.CP160520.T2039005
PWX-06136 Checkpoint taken to file=ABCDEF1.v101.I.CHKPTV2 time=16/05/20 20:45:41
PWX-06420 Condense: Checkpoint done. Sequence=0000003411E2000000000000003411E200000000
PowerExchange Logger=E2C2F2D340400000002FF5BB00000000
PWX-06414 Condense: Closing down CAPI
PWX-10780 CAPI: INFO: Extraction return counts: no data 2, commits 118, inserts 1708,
updates 44, deletes 562.
PWX-10781 CAPI: INFO: Extraction subordinate read counts: no data 0, commits 406, inserts
1828, updates 59, deletes 786, backouts 10.
PWX-10782 CAPI: INFO: Extraction resource maximums: memory cache 433 KB, spill files 0.
PWX-10746 CAPI: INFO: Last data returned: timestamp 2016/05/13 17:44:28, sequence
0000003411E2000000000000003411E200000000.
PWX-10743 CAPI: INFO: No noteworthy transactions.
PWX-10749 CAPI: INFO: + Current subordinate sequence number 0000007A5F5100000000.
PWX-06401 Condense: Ending successfully.
PWX-06110 Unloaded module 2 (CONDENSE).
PWX-06060 Controller: subtask Command Handler ended.
PWX-06060 Controller: subtask Condense ended.
PWX-06107 Controller: All subtasks shut down.
PWX-06065 Controller: Condensing ended. Last checkpoint time 16/05/20 20:45:41.
PWX-06039 Controller: Ending.
```

The following table describes key messages in the output in ascending order by message ID:

Message	Description
PWX-06039	Reports that the Controller task is ending.
PWX-06060, PWX-6107	Indicates that the Controller detects that the Command Handler and Condense subtasks have shut down.
PWX-06065	Reports that condense processing is ending and provides the timestamp of the final checkpoint.
PWX-06076	Indicates that the DTLCCMD0 or DTLCCND3 subtask program for the Command Handler or Condense is starting. **Note:** The Controller starts the Command Handler. After Command Handler startup is complete, the Controller starts the Condense subtask
PWX-06100	Shows the sequence token and restart token that were used for the PowerExchange Condense restart. Because both token values are all zeroes, PowerExchange Condense processing starts from the beginning of the PowerExchange Logger for z/OS active log files.
PWX-06103	Indicates that the operator responded Y to the PWX06101A WTOR message to confirm a cold start.
PWX-06110	Reports that the Command Handler or Condense module has been unloaded.
PWX-06111	Reports that Command Handler and Condense subtasks completed initialization.
PWX-06112	Reports that the Controller task is starting the Command Handler and Condense subtasks.
PWX-06119	Issued for each capture registration that the Controller task added for PowerExchange Condense processing. Reports the registration tag name.

Message	Description
PWX-06121	Issued for each capture registration that is loaded for processing. Reports the database name, registration name, Condense option, and source table name and creator.
PWX-06136	Reports that a checkpoint was taken. Includes the checkpoint file name and the date and time at which the checkpoint was taken.
PWX-06365	Indicates that none of the checkpoint data sets were found.
PWX-06400	Reports that the Condense subtask is starting for the instance that is specified in the DBID parameter in the CAPTPARM member.
PWX-06401	Indicates that the Condense subtask successfully shut down after closing open condense files and taking a final checkpoint.
PWX-06412	Issued for each capture registration that the Condense subtask will process. Reports the registration tag name.
PWX-06413	Lists the highest PowerExchange Condense restart tokens across all registration tags. Reports the following token types: - **Sequence**. A 20-byte token value that includes UOW and sub-UOW sequences. - **Logger**. A 16-byte token value that includes the PowerExchange Logger for z/OS started task name and the RBA of the last successfully processed UOW.
PWX-06414	Reports that the Condense subtask is closing the CAPI.
PWX-06415	Indicates the end of the condense cycle. Reports the total number of records processed, the number of insert, update, and delete records processed, and the number of UOWs processed. If no records were processed, this message is not issued.
PWX-06416	Reports that the Condense subtask received a PowerExchange Condense SHUTDOWN or pwxcmd shutdown command.
PWX-06417	Indicates that Condense processing is beginning.
PWX-06418	Indicates that the Condense subtask closed the specified condense file.
PWX-06419	Indicates that the Condense subtask is performing a condense file switch. Reports the number of records being processed, the reason for the file switch, number of different capture registrations for which PowerExchange Condense processed changes since the last file switch, CPU time used (in milliseconds), and the CPU time differential (in milliseconds) between this file switch and the last file switch. Reasons for the file switch include: - **Records criteria was met**. A file switch occurred because the number of records that is specified by the FILE_SWITCH_VAL parameter was reached and the FILE_SWITCH_CRIT parameter is set to R for records. - **Minutes criteria met**. A file switch occurred because the number of minutes that is specified by the FILE_SWITCH_VAL parameter was reached and the FILE_SWITCH_CRIT parameter is set to M for minutes. - **FILESWITCH request was received**. A FILESWITCH command or pwxcmd fileswitch command was received.
PWX-06420	Indicates that the Condense subtask completed the checkpoint. Reports the PowerExchange Condense restart tokens in hexadecimal format.
PWX-06421	Indicates that the Condense task is going into a sleep state. Condense waits for the NO_DATA_WAIT period to expire or until a CONDENSE or pwxcmd condense command is received before starting the next condense cycle.

Message	Description
PWX-06450	Indicates that the Condense subtask is starting.
PWX-06453	Reports that the Command Handler is shutting down.
PWX-06454	Reports that the Command Handler has stopped.
PWX-06455	Reports that the Command Handler was notified that capture startup is complete.
PWX-06463, PWX-06404	Indicates that a SHUTDOWN or pwxcmd shutdown command was issued and is being processed.
PWX-09950	Reports that a connection to the CAPI was established and the number of registration tags.
PWX-09959	Reports the CAPI restart tokens in hexadecimal format for the earliest UOW.
PWX-09967	Indicates that PowerExchange Condense read all of the changes up to the end-of-log (EOL) for the specified date and time, when the condense cycle started. The NO_DATA_WAIT2 wait interval now takes effect. If PowerExchange Condense receives no additional changes, the condense task stops. Use this message to determine if PowerExchange Condense has captured committed changes for registered tables of interest. Look for this message if a condense file does not receive change data within the time period you expect. Delays can occur for various reasons.
PWX-09970	Reports that the Consumer API (CAPI) will use the earliest restart tokens to extract data for the specified number of registered sources. The CAPI uses the earliest restart tokens because the PowerExchange Condense restart tokens are all zeroes.
PWX-10743	Reports that no long-outstanding or large transactions were active at the end of the statistics interval.
PWX-10749	Provides information about the transaction that is associated with a spill file that the UOW Cleanser allocated while processing an IMS Fast Path cascade delete operation on segments.
PWX-10780, PWX-10781, PWX-10782	Provides extractions statistics from the CAPI.
PWX-21605	Indicates the CAPI_CONNECTION statement that is used. In the example message, the covr value is blank, which indicates the CONN_OVR parameter in not used. Instead, the CAPI_CONNECTION statement is taken from the DBMOVER file that the DTLCFG DD points to.
PWX-26011	Reports that the Command Handler subtask received a PowerExchange Condense SHUTDOWN or pwxcmd shutdown command.
PWX-32533	Indicates that a pwxcmd command handler cannot be started to handle pwxcmd commands for PowerExchange Condense that are issued from a remote machine. The required pwxcmd configuration tasks probably have not been completed correctly. To configure pwxcmd command handling, in the CAPTPARM configuration member, add a CONDENSENAME statement to define a name for the PowerExchange Condense command-handling service. Also, in the DBMOVER configuration file, add a SVCNODE statement that associates a port with the command-handling service.

Controlling PowerExchange Condense

You can use the PowerExchange Condense commands to control PowerExchange Condense processing or display the status of PowerExchange Condense tasks.

The following table describes these commands:

Command	Description
CONDENSE	Starts a condense operation instead of waiting for the sleep time to elapse.
DISPLAY STATUS	Displays the status of the PowerExchange Condense tasks, including the Controller task.
FILESWITCH	Closes the current log file or files and starts new ones.
SHUTCOND	Stops a PowerExchange Condense task running in continuous mode without first performing a final condense operation.
SHUTDOWN	Shuts down a Condense job after a PowerExchange performs a final condense operation.

Issue these commands by using the MODIFY (F) command on the z/OS system.

Alternatively, use the pwxcmd program to issue condense, displaystatus, fileswitch, shutdown, or shutcond commands from a Linux, UNIX, or Windows system to a PowerExchange Condense process on a z/OS system.

Backing Up PowerExchange Condense Output Files

Periodically, back up PowerExchange Condense CDCT data set, checkpoint files, and condense files. If the existing files become damaged or deleted, you can then use the backups to restore the files.

Informatica recommends that you back up the checkpoint files followed by the CDCT file and then the condense files. Back up the files during a period of low activity.

The CDCT file must be backed up in coordination with the checkpoint files. For every (2*n*-1) condense cycles completed, where *n* is the number of checkpoint files that you use, you must back up the CDCT at least once. If you do not back up the CDCT file in coordination with the checkpoint files and file corruption occurs, the CDCT file and the condense files to which the CDCT file points might no longer be synchronized.

For example, if you use eight checkpoint files and perform a file switch every 20 minutes, back up the CDCT file at least every ((2 * 8) - 1) * 20 = 300 minutes. Back up the checkpoint files before they are overwritten by a later condense cycle.

The frequency with which you back up the condense files is at your discretion.

Controlling PowerExchange Condense Resource Usage

You can use Workload Manager (WLM) service classes to control PowerExchange Condense usage of resources, such as storage, CPU, and I/O devices.

For more information, see "Using WLM Service Classes to Prioritize PowerExchange CDC Started Tasks on z/OS" on page 386.

Part III: CDC Sources Configuration and Management

This part contains the following chapters:

CHAPTER 6

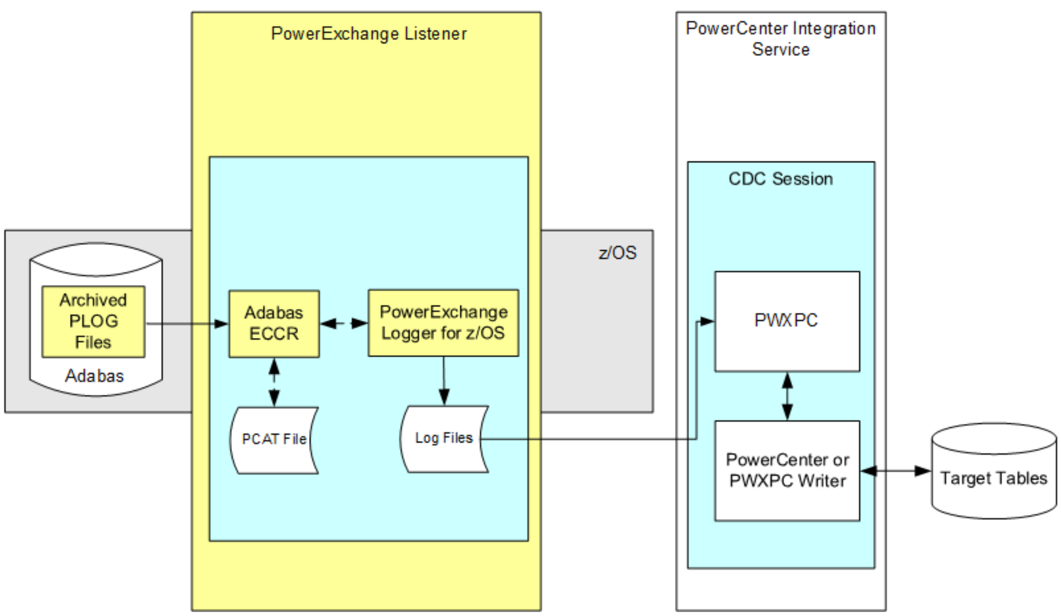
Adabas Change Data Capture

This chapter includes the following topics:

Adabas CDC Overview

PowerExchange change data capture (CDC) for Adabas captures change data from Adabas archived PLOG data sets. PowerExchange maintains a catalog, called the PCAT file, of the PLOG data sets from which change data is captured.

The following figure shows the general architecture of Adabas CDC:



The Adabas ECCR, PowerExchange Logger for z/OS, and PowerExchange Agent must run on the same z/OS system.

The PowerExchange Adabas ECCR reads change data from archived PLOG data sets that have entries in the PowerExchange PCAT file. The ECCR calls the Adabas ADASEL utility to extract records from the PLOG files and decompress the records. The PCAT utility, DTLCCADW, runs concurrently with the ECCR to keep the PCAT file up-to-date.

The ECCR passes the change data to the PowerExchange Logger for z/OS. The ECCR must log all changes to a single PowerExchange Logger. The PowerExchange Logger stores the change data in its log files. If you use the optional PowerExchange Condense component, PowerExchange Condense reads the change data from the Logger log files and writes it to condense files.

When you run a CDC session in PowerCenter, PowerExchange works with PWXPC and PowerCenter to extract change data from the PowerExchange Logger log files or PowerExchange Condense files and to write that data to one or more targets.

To configure Adabas CDC in the PowerExchange Navigator, you must first create a data map to get metadata for the Adabas database. Then, create a capture registration for each Adabas source file. PowerExchange generates a corresponding extraction map.

If you use PowerExchange Condense, you must configure PowerExchange Condense parameters in the RUNLIB(CAPTPARM) member. Because PowerExchange Condense does not support Full condense processing for Adabas sources, you must select **Part** for the **Condense** option in the Adabas capture registrations. You can use either continuous extraction mode or batch extraction mode.

Before you start the Adabas ECCR, customize the ECCR JCL and ADAECRP1 options member. Also, populate the PCAT file with information about the latest archived PLOG data sets. To populate the PCAT file, customize the sample JCL in the SAMPUEX2 member and perform a PLOG file switch. The JCL runs the PCAT DTLCCADW utility internally to populate the PCAT file.

If you want to capture change data for spanned records in an Adabas 8.2.2 or later database, you must complete some additional configuration tasks.

Planning and Implementation Considerations

Review the following topics to plan your CDC implementation.

Gathering Information About Your CDC Environment

When planning your CDC implementation, gather the following information about your CDC environment:

- How often do PLOG switches occur?
- How often do you need to extract change data?
- What is the volume of changes on the Adabas source database?
- Do you need to capture changes from spanned records in an Adabas 8.2.2 or later database?
- How will you complete the initial target load prior to starting CDC?

Operational Considerations

Review the following Adabas CDC operational considerations:

- PowerExchange imports Long Alpha (LA) fields with a default length of 1,024 bytes. You can override this default length by editing the data map in the PowerExchange Navigator. Open the Record view of an Adabas file and then open the **Field Properties** dialog box for the LA field. In the **Length** field, you can enter an override value of up to 16,381.
- The PowerExchange PCAT utility, DTLCCADW, can read archived Adabas PLOG records from tape data sets, including data sets that have a block size greater than 32,760. The Adabas ECCR can then capture change data from those PLOG records.
- If the Adabas File Description Table (FDT) for a source file is password protected in Adabas, the Adabas FDT password is required for a database row test of the Adabas extraction map and for connecting to the Adabas source file during a PowerCenter CDC session. Enter the Adabas FDT password at the following locations:
  - In the PowerExchange Navigator, enter the password in the **ADABAS File Password** field of the **CAPXRT Advanced Parameters** dialog box for a row test.
  - In PowerCenter Task Manager, edit the session. On the **Mapping** tab of the **Edit Tasks** dialog box, under **Sources**, click the Adabas source. In the right pane, under **Properties**, enter the FDT password in the **ADABAS Password** attribute.
- Starting with Adabas 8.2.2, PowerExchange can capture change data from Adabas spanned records up to their maximum size. The Adabas maximum size depends on the device type.

  Tip: If you capture change data from Adabas spanned records larger than 32 KB, PowerExchange might allocate a large number of spill files during the extraction of change data, depending on the MEMCACHE parameter setting in the UOWC CAPI_CONNECTION statement of the DBMOVER member. This situation can slow down subsequent extraction processing. To reduce the number of spill files, increase the MEMCACHE parameter value in the UOWC CAPI_CONNECTION statement.
- PowerExchange Logger operational issues can cause the Adabas ECCR to enter a wait state, which stalls change data capture until the Logger issues are resolved. After the Logger issues are resolved, the Adabas ECCR can resume change data capture without losing change data.

  Tip: Monitor the PowerExchange Logger carefully so that change data capture can proceed without interruption.

Change Capture from Multiple Adabas Databases

To capture changes from multiple Adabas databases, configure an Adabas ECCR for each database.

The JCL for each Adabas ECCR must reference unique versions of the following files and data sets:

- The PowerExchange Adabas ECCR configuration file to which the DTLCACFG DD statement in the JCL points
- The PowerExchange PLOG Catalog (PCAT) file to which the DTLADKSD DD statement in the JCL points
- The Adabas database data sets to which the DDASSOR1, DDDATAR1, and DDWORKR1 DD statements in the JCL point

Change Capture from Adabas Spanned Records

Starting with Adabas 8.2.2, the Adabas ECCR can capture changes from Adabas spanned records.

A spanned record is a logical record that is composed of a single physical primary record and up to four physical secondary records. Each record is stored in a separate data storage block. The block size depends on the Adabas device type.

Before you start the Adabas ECCR, perform the following PowerExchange and Adabas configuration tasks that are required to capture change data from source files with spanned records:

- In the PowerExchange Adabas ECCR JCL, add the following PARM to the EXEC statement:

  ```
  EXEC PGM=DTLCCADA,PARM=(ADA82)
  ```

  The ECCR JCL is usually in the PROCLIB member named *prefix*AD1EC, which was created during installation. If you do not include PARM=(ADA82), the ECCR does not capture changes for the sources files that contain spanned records.
- Apply the following Adabas SAG ZAPs to your Adabas load libraries:
  - AU823101 (ADA823)
  - AU824072 (ADA824)
  - AU825047 (ADA825)
  - AU826017 (ADA826)
- In Adabas, specify the following SRLOG=ALL parameter for the Adabas nucleus:

  ```
  ADARUN SRLOG=ALL
  ```

  The SRLOG=ALL parameter causes Adabas to log before and after images for the entire primary record and the entire secondary records that contain changes to the PLOG data sets.
- In Adabas, verify that record spanning is explicitly enabled for each Adabas file.

To check if an Adabas file contains spanned records, you can generate a report by using one of the following Adabas utilities:

- If you use Adabas 8.2.3 or later, use the ADAREP utility to generate a database report that indicates whether the Spanned Record option is set for the database and whether a specific file contains spanned records.
- Use the ADADBS utility SPANCOUNT function to display counts of primary records, secondary records, and non-spanned records for a file.

Configuring Adabas PLOG Archiving JCL

PowerExchange provides sample members to configure the Adabas PLOG archiving JCL. When this JCL runs, PowerExchange populates the PCAT file with information about the last archived PLOG data set.

Use one of the following sample members in the DTLEXPL library:

- SAMPUEX2. Contains PLOG archiving JCL that is submitted from within the Adabas UEX2 exit. If you use this JCL, the Adabas DBA must modify, assemble, link, stop, and start the Adabas nucleus.
- SAMPEXTU. Contains PLOG archiving JCL that you can submit as a job, outside of the Adabas UEX2 exit.

Note: PowerExchange creates the PCAT file during installation if you select **Adabas CDC** on the Data Sources page in the z/OS Installation Assistant.

1. If you use SAMPUEX2, complete the following steps:
   a. Customize the Adabas ADARUN parameters for your environment.

      For example:

      ```
      ADARUN DB=200,DE=3390,SVC=249,PROG=ADASEL
      ```
   b. Customize the contents of SAMPUEX2 and use it to modify your current UEX2 exit.
   c. Perform an Adabas PLOG file switch.

      Adabas calls the UEX2 exit, and PowerExchange adds the former PLOG to the PCAT file.
2. If you use SAMPEXTU, complete the following steps:
   a. Modify your current PLOG archiving JCL to reflect the contents of SAMPEXTU.
   b. Verify that the Adabas ADARUN parameters in the user JCL reflect the correct settings for your environment.

      For example:

      ```
      ADARUN DB=dbid,DE=3390,SVC=249,PROG=ADASEL
      ```

      The *dbid* variable is the database identifier.

Customizing the PowerExchange Sample SAMPUEX2 Exit

If you use the sample SAMPUEX2 exit for populating the PCAT file, use these directions to customize it.

1. In the JCL for PROLOG flips, before the comment block `* CLOSE THE INTERNAL READER`, add the following highlighted statements:

```
         CLI   0(4),EOJ                 LAST CARD PROCESSED ?
         BNE   SUBMIT1
*                                                             *STR-01*
* End of cards spotted - if this copy is for Command Log, finish -
* but if it's a Protection Log, continue to submit further cards to
* register PLOG into the plog control file...
*                                                             *STR-01*
         CLI   CASE,C'P'                                      *STR-01*
         BNE   CLOSE                    i.e. it's a CLOG      *STR-01*
         LA    4,1(,4) Skip over first EOJ mark               *STR-01*
SUBMIT2  DS    0H                                             *STR-01*
         MVC   CARD(50),0(4)                                  *STR-01*
         PUT   INTRDR2,CARD                                   *STR-01*
         LA    4,50(,4)                                       *STR-01*
         CLI   0(4),EOJ                 LAST CARD PROCESSED ? *STR-01*
         BNE   SUBMIT2                                        *STR-01*
*
* CLOSE THE INTERNAL READER
*
CLOSE    DS    0H                                             *STR-01*
         CLOSE (INTRDR2)                CLOSE INTERNAL READER.
```

2. Immediately before the comment `* READER DCB`, add the following JCL cards:

```
* BELOW ARE PWX ADDITIONAL CARDS
         DC    CL50'//PLOGCNTL EXEC PGM=DTLCCADW,COND=(4,LT),'
         DC    CL50'//   PARM=(A)'
         DC    CL50'//STEPLIB    DD DSN=sceerun,DISP=SHR'
         DC    CL50'//           DD DSN=hlq.LOADLIB,DISP=SHR'
         DC    CL50'//DTLCCPLG   DD DSN=*.COPY.DDSIAUS1,DISP=SHR'
         DC    CL50'//DTLCCADA   DD DSN=hlq.DBdbid.PCAT,'
         DC    CL50'//           DISP=SHR'
         DC    CL50'//DTLCFG     DD DSN=hlq.RUNLIB(DBMOVER),'
         DC    CL50'//           DISP=SHR'
         DC    CL50'//DTLMSG     DD DSN=hlq.DTLMSG,'
```

```
         DC    CL50'//           DISP=SHR'
         DC    CL50'//DTLKEY     DD DSN=hlq.RUNLIB(LICENSE),'
         DC    CL50'//           DISP=SHR'
         DC    CL50'//DTLSGN     DD DSN=hlq.RUNLIB(SIGNON),'
         DC    CL50'//           DISP=SHR'
         DC    CL50'//DTLLOG     DD SYSOUT=*'
         DC    CL50'//SYSUDUMP   DD DUMMY'
         DC    CL50'//SYSPRINT   DD SYSOUT=*'
ENDALL   DC    AL1(EOJ)
* END OF PWX ADDITIONAL CARDS
```

Configuring the Adabas ECCR

To configure the Adabas ECCR, configure the ECCR parameters and the ECCR JCL. Then test the ECCR installation.

Configuring the Adabas ECCR Parameters

Configure the Adabas ECCR parameters in the RUNLIB(ADAECRP1) member to which the DTLCACFG DD statement in the ECCR JCL points.

Based on your input during installation, the z/OS Installation Assistant adds values for some parameters to the ADAECRP1 member. You can change these values if necessary.

The ADAECRP1 member can contain the following parameters:

```
DBID=ADAcollection_id
DB_TYPE=ADA
ECCRNAME=AD1EC
[NO_DATA_WAIT=minutes]
[NO_DATA_WAIT2=seconds]
[COLL_END_LOG=<xx_collendlog_ada>]
[ADASEL_DSN=data_set_name]
[CAPT_STATS={Y|N}
[CAPT_STATS_INTVL=minutes]
[CAPT_STATS_TERSE={Y|N}]
[COLDSTART={Y|N}]
[ETID_DATE={Y|N}]
[IGNORENOCHANGEUPDATES={Y|N}]
[ON_SUSPENSION_ERROR_CONTINUE={Y|N}]
[REFRESH_ALLOWED={Y|N}]
```

The following table summarizes the Adabas ECCR parameters:

Parameter	Required or Optional	Description
DBID	Required	The collection ID for the Adabas source. This parameter is customized by the z/OS Installation Assistant.
DB_TYPE	Required	The database type, which must be ADA for Adabas.
ECCRNAME	Required	The Adabas ECCR name.

Parameter	Required or Optional	Description
ETID_DATE	Optional	Controls whether the Adabas ECCR entirely replaces values that begin x'40' in the ETID field of the ADASEL-expanded PLOG files with all x'40' values when writing the ETID values to the temporary PowerExchange file that stores commit information for source UOWs. The x'40' values represent blank spaces.
NO_DATA_WAIT	Optional	The number of minutes that the Adabas ECCR waits after processing all PLOG entries in the PCAT file before next checking for new PLOG entries to process. If the ECCR finds no new entries, the NO_DATA_WAIT2 wait interval takes effect. This parameter can be customized by the z/OS Installation Assistant.
NO_DATA_WAIT2	Optional	After the NO_DATA_WAIT interval is no longer in effect, the number of seconds that the ECCR waits after processing all PLOG entries in the PCAT before checking for new PLOG entries. If COLL_END_LOG is set to 0 and NO_DATA_WAIT is set to a value greater than 0, the NO_DATA_WAIT2 wait and retry cycle remains in effect as long as no new entries are found. This parameter can be customized by the z/OS Installation Assistant.
COLL_END_LOG	Optional	Controls whether the ECCR must process a specific number of PLOGs before it can shut down. Used in conjunction with NO_DATA_WAIT and NO_DATA_WAIT2. This parameter can be customized by the z/OS Installation Assistant.
ADASEL_DSN	Required	The name of a data set that contains the Adabas ADASEL parameters.
CAPT_STATS	Optional	Controls whether PowerExchange writes ECCR capture statistics messages to the DTLLOG and DTLOUT data sets and WTO messages to the system operator console when the Adabas log-based ECCR finishes processing a PLOG.
CAPT_STATS_INTVL	Optional	The interval, in minutes, for which the Adabas log-based ECCR collects and reports the number of inserts, deletes, updates, and commits that were captured. The ECCR also reports the timestamp in the log up to which changes were processed.
CAPT_STATS_TERSE	Optional	Controls whether the Adabas log-based ECCR prints PWX-06153 messages with capture statistics only for registered sources for which the ECCR captured changes.
COLDSTART	Optional	Controls whether the Adabas ECCR cold starts or warm starts.
IGNORENOCHANGEUPDATES	Optional	Controls whether the Adabas ECCR ignores records for which update operations did not change data.

Parameter	Required or Optional	Description
ON_SUSPENSION_ERROR_CONTINUE	Optional	If you use the PWXUCREG utility to suspend and reactivate capture registrations, controls whether the ECCR ends or continues when a UOW that contains change records to be discarded or captured started at an invalid point in the change stream relative to the suspension window.
REFRESH_ALLOWED	Optional	Controls whether you can use the REFRESH command after adding or deleting capture registrations or after suspending or reactivating capture registrations with the PWXUCREG utilty. The REFRESH command refreshes the list of registered Adabas files that the ECCR uses for change capture processing.

Note: If a parameter has a default value or is not required, it is marked as optional. A default value is the value that PowerExchange uses if the parameter is not defined. For some parameters, the z/OS Installation Assistant provides recommended values, which you can accept or change.

More detailed parameter descriptions follow.

ADASEL_DSN Parameter

The name of a data set that contains the Adabas ADASEL utility parameters.

The Adabas ECCR calls ADASEL to read the PLOGs. When the DTLCCADA function of the DTLCCADW utility updates the PCAT file with the last archived PLOG, PowerExchange prepends the ADASEL parameters to the parameters that the DTLCCADA function generates.

Syntax:

```
ADASEL_DSN=dsn
```

Value: For the *dsn* variable, enter the data set name that contains the ADASEL parameters.

CAPT_STATS Parameter

Controls whether PowerExchange writes ECCR capture statistics messages to the DTLLOG and DTLOUT data sets and WTO messages to the system operator console when the Adabas log-based ECCR finishes processing a PLOG.

The ECCR issues PWX-06153 statistics messages that report the number of inserts, deletes, and updates that were captured for each registration, grouped by PLOG. The WTO messages notify the system operator that a PLOG was closed and also provide capture counts.

Regardless of the CAPT_STATS setting, the ECCR always reports the total number of inserts, deletes, updates, and commits across all of the PLOGs at the end of the ECCR run.

Related Parameters: CAPT_STATS_INTVL, CAPT_STATS_TERSE

Syntax:

```
CAPT_STATS={N|Y}
```

Valid Values:

- **N**. Do not write the ECCR capture statistics messages to the DTLLOG and DTLOUT data sets and WTO capture count messages when the ECCR finishes processing a PLOG.

- **Y**. Write the ECCR capture statistics messages to the DTLLOG and DTLOUT data sets and WTO capture count messages when the ECCR finishes processing a PLOG.

Default is N.

Usage Notes:

- If you do not set the global CAPT_STATS parameter to Y, you can issue to STATISTICS ON command after the ECCR is started to enable statistics reporting for each PLOG.
- If you also specify the CAPT_STATS_INTVL parameter or run the STATISTICS *minutes*, the ECCR also reports the total number of inserts, deletes, updates, and commits for the each interval.

For more information about the STATISTICS command and its parameters, see the *PowerExchange Command Reference*.

CAPT_STATS_INTVL Parameter

The interval, in minutes, for which the Adabas log-based ECCR collects and reports change capture statistics.

If you specify an interval, the ECCR prints a PWX-06181 message each time the interval elapses. The message reports the total number of inserts, deletes, updates, and commits that the ECCR processed during the interval and the last log position.

You can use this ECCR parameter to print statistics messages at a specific frequency, for example, every 60 minutes.

For the ECCR to print capture statistics, you must set the CAPT_STATS parameter to Y in the RUNLIB(ADAECRP1) member or run the ECCR STATISTICS ON command.

Related Parameters: CAPT_STATS, CAPT_STATS_TERSE

Syntax:

```
CAPT_STATS_INTVL=minutes
```

Value: For the *minutes* variable, enter a number from 1 through 1440. No default is provided.

Usage Notes:

- If you set the CAPT_STATS_INTVL parameter to 0, PowerExchange issues the error message PWX-00967.
- After you start the ECCR, message PWX-07805 identifies the collection interval that is defined.
- If you issue the `STATISTICS minutes` command, the number of minutes that is specified in the command overrides the CAPT_STATS_INTVL value for the duration of the ECCR run.

CAPT_STATS_TERSE Parameter

Controls whether the Adabas log-based ECCR prints PWX-06153 messages only for registered sources for which the ECCR captured changes. If no inserts, updates, or deletes occurred on a registered source, the ECCR does not report capture counts for it.

A PWX-06153 message reports the number of inserts, deletes, and updates that were captured for a registered source. The message is printed when the ECCR finishes processing a PLOG and at the end of the ECCR run.

For the ECCR to print statistics, you must set the CAPT_STATS=Y parameter in the RUNLIB(ADAECRP1) member or run the ECCR STATISTICS ON command.

Related Parameters: CAPT_STATS, CAPT_STATS_INTVL

Syntax:

```
CAPT_STATS_TERSE={N|Y}
```

Valid Values:

- **N**. Print statistics for all registered sources, including sources without any change activity.
- **Y**. Print statistics only for registered sources for which the ECCR captured changes.

Default is N.

Usage Notes:

- If you set the CAPT_STATS_TERSE parameter to N and then issue the STATISTICS SINCE TERSE command, the command overrides the CAPT_STATS_TERSE setting for the SINCE period. PWX-06153 messages are then printed only for registered sources for which changes were captured.

COLDSTART Parameter

Controls whether the Adabas ECCR cold starts or warm starts.

Syntax:

```
COLDSTART={N|Y}
```

Valid Values:

- **N**. The ECCR warm starts. The change capture process starts from where it last left off without loss of change data.
- **Y**. The ECCR cold starts. The change capture process starts from the oldest log in the PCAT.

Default is N.

Usage Notes: Regardless of how you set the COLDSTART parameter, the ECCR cold starts in the following circumstances:

- You use a new PowerExchange Logger to which the Adabas ECCR has not previously connected.
- You change the ECCRNAME value in the RUNLIB(ADAECRP1) member.

COLL_END_LOG Parameter

Controls whether the Adabas ECCR shuts down after a specific number of PLOGs are processed. Used in conjunction with the NO_DATA_WAIT and NO_DATA_WAIT2 parameters.

Related Parameters: NO_DATA_WAIT and NO_DATA_WAIT2

Syntax:

```
COLL_END_LOG={0|number}
```

Valid Values:

- **0**. The number of PLOGs processed does not affect when the ECCR shuts down.
- A *number* greater than 0. The minimum number of PLOGs that the ECCR must process before it shuts down.

The z/OS Installation Assistant enters 1 for this parameter in the ECCR configuration member unless you specify another value. If this parameter is not defined, the default of 0 is used.

DB_TYPE Parameter

Required. The database type.

Related Parameters: DBID

Syntax:

```
DB_TYPE=ADA
```

Value: The value must be "ADA" for the Adabas ECCR.

DBID Parameter

Required. The collection ID for the Adabas source.

Related Parameters: DB_TYPE

Syntax:

```
DBID=collection_ID
```

Value: For the *collection_ID* variable, enter the collection ID that you entered for the registration group.

Usage Note: In conjunction with the DB_TYPE parameter, this parameter controls the registrations in the CCT file that the ECCR uses.

ECCRNAME Parameter

Required. A name for the Adabas ECCR.

Syntax:

```
ECCRNAME={eccr_name|PWXAD1EC}
```

Value: For the *eccr_name* variable, enter a 1- to 8-character alphanumeric string.

No default. However, the z/OS Installation Assistant generates an ECCR name that begins with the **PowerExchange Agent / Logger Prefix** value followed by AD1EC, for example, PWXAD1EC.

Usage Notes:

- The Adabas ECCR uses this parameter value for the following purposes:
  - To connect to the PowerExchange Logger to write change data
  - As the member name that joins the XCF group of the PowerExchange Logger
  - As part of the ECCR-UOW field in the control information for each change record written to PowerExchange Logger log files
- The ECCR name value must be unique within a PowerExchange Logger group.
- If you change the ECCRNAME value, the ECCR cannot warm start from where it last left off.
- Informatica recommends that you use the same value for the ECCRNAME parameter and the Adabas ECCR started task or job name. This practice lets you to easily identify the Adabas ECCR when reviewing messages and data from the PowerExchange Logger.

ETID_DATE Parameter

Controls whether the Adabas ECCR entirely replaces values that start with x'40' in the ETID field in ADASEL-expanded PLOG files with all x'40' values when writing the ETID values to the temporary PowerExchange file that stores commit information for source UOWs. The x'40' values represent blank spaces.

When processing PLOG files, the ECCR performs the following steps:

- Uses the ADASEL utility to expand the PLOG files to read Insert, Update, and Delete change records.
- Reads the expanded PLOG files to get the Begin UOW and End UOW records to determine where UOW commits occur, and then writes this commit information to a temporary file that PowerExchange uses internally.
- Matches the change records from the PLOG files to the commit records in the temporary PowerExchange file by using several fields, including the ETID field that stores the userid.

In the ADASEL-expanded PLOG files, the ETID userid can be expressed as either an actual user ID or a timestamp value. The ADASEL utility can produce ETID timestamp values in hexadecimal timestamp format, for example, x'400015321F404040', or replace timestamp values entirely with x'40' values, for example, x'4040404040404040'.

The ADASEL utility writes internally generated values that begin with x'40' to the ETID field in the PLOG records, unless the user application provides a specific user ID in the call to Adabas. You can use this parameter to cause the ECCR to write the internally generated values as all x'40' values.

Syntax:

```
ETID_DATE={Y|N}
```

Valid Values:

- **N**. The ECCR replaces ETID values that begin with x'40' entirely with x'40' values when writing these ETID values to the temporary PowerExchange commit file. This behavior is acceptable if the ADASEL utility produces ETID timestamp values as all x'40' values in the expanded PLOG files. The ECCR can still match the change records in PLOG files with the commit records in the PowerExchange commit file to determine where UOW commits occur.
  However, if the ADASEL-expanded PLOG files contain ETID values in hexadecimal timestamp format or in ADASEL-generated internal format and the ECCR replaces these values with all x'40' values, the ECCR will not be able match the change records from the PLOGs to the commit records. In this case, UOWs might remain open, causing the PowerExchange Logger for z/OS to generate many spill files. Also, spill file allocation errors and CDC session failures might occur.
- **Y**. The ECCR does not replace ETID values that begin with x'40' entirely with x'40' values when writing these ETID values to the temporary PowerExchange commit file. The ECCR writes the values exactly as read from the expanded PLOG files to the PowerExchange commit file. Use this option if the ADASEL utility writes ETID values in hexadecimal timestamp format or in the ADASEL-generated internal format to the PLOG files. In these cases, this option can prevent a large number of outstanding UOWs, spill file allocation errors, and session failures.

Default is Y.

IGNORENOCHANGEUPDATES Parameter

Controls whether the Adabas ECCR ignores records for which update operations did not change the data.

Syntax:

```
IGNORENOCHANGEUPDATES={N|Y}
```

Valid Values:

- **N**. The Adabas ECCR passes all records to the PowerExchange Logger, including the records with unchanged data.
- **Y**. The Adabas ECCR checks the before image and after image of the source data to determine if the data changed and then passes only the changed records to the PowerExchange Logger. The ECCR ignores records for which data did not change. Use this setting to reduce the number of records that are sent to the PowerExchange Logger.

Default is N.

Usage Notes:

- Use this parameter to configure the Adabas ECCR to ignore the many unchanged records that the ADAORD utility typically produces for online reorder operations.
- When you REORDER Adabas files, Adabas logs the before and after images of unchanged records to PLOG files. Unless you configure the ECCR to ignore these records, the ECCR captures the unchanged records from the PLOG files.

NO_DATA_WAIT Parameter

The number of minutes that the Adabas ECCR waits after processing all PLOG entries in the PCAT file before it next checks for new PLOG entries to process. If the ECCR finds no new entries, the NO_DATA_WAIT2 wait interval takes effect.

Related Parameters: COLL_END_LOG and NO_DATA_WAIT2

Syntax:

```
NO_DATA_WAIT={60|minutes}
```

The z/OS Installation Assistant enters 5 for this parameter in the ECCR configuration member unless you specify another value. If this parameter is not defined, the default of 60 is used.

Valid Values:

- **0**. Shuts down the ECCR after it processes all PLOG entries in the PCAT.
- A *number* greater than 0. Specifies the number of minutes that the ECCR waits before checking for new PCAT entries. After this initial wait period expires without new changes, the NO_DATA_WAIT2 parameter controls subsequent waiting.

NO_DATA_WAIT2 Parameter

After the NO_DATA_WAIT interval is no longer in effect, the number of seconds that the Adabas ECCR waits after processing all PLOG entries in the PCAT file before checking for new PLOG entries to process.

If the COLL_END_LOG parameter is 0 and the NO_DATA_WAIT parameter is greater than 0, the Adabas ECCR retries the NO_DATA_WAIT2 wait and retry cycle on a continuing basis, until the ECCR is shut down or finds new entries in the PCAT.

Related Parameters: COLL_END_LOG and NO_DATA_WAIT

Syntax:

```
NO_DATA_WAIT2={seconds|600}
```

Value: For the *seconds* variable, enter a number greater than 0.

The z/OS Installation Assistant enters 60 for this parameter in the ECCR configuration member unless you specify another value. If this parameter is not defined, the default of 600 is used.

ON_SUSPENSION_ERROR_CONTINUE Parameter

Optional. If you use the PWXUCREG utility to suspend and reactivate capture registrations, controls whether the Adabas ECCR ends or continues when a UOW that contains change records to be discarded or captured started at an invalid point in the change stream relative to the suspension window.

Syntax:

```
ON_SUSPENSION_ERROR_CONTINUE={N|Y}
```

Valid Values:

- **N**. The ECCR issues an error message and ends.
- **Y**. The ECCR issues a warning and continues processing.

Default is N.

Usage Notes: If you use the PWXUCREG utility, this parameter controls whether the ECCR ends or continues in the following situations:

- When discarding change records for a suspended registrations, the ECCR determines that the associated UOW started before the beginning of the suspension window.
- When capturing change records for an activated registration, the ECCR determines that the associated UOW started before the end of the suspension window.

The suspension window is the time period between the suspension timestamp and reactivation timestamp. For more information about the PWXUCREG utility, see the *PowerExchange Utilities Guide*.

REFRESH_ALLOWED Parameter

Controls whether PowerExchange users can issue the ECCR REFRESH command. This command refreshes the list of Adabas files with active capture registrations that the Adabas log-based ECCR uses to capture change data.

When this parameter is set to Y, users can issue the REFRESH command after adding or deleting capture registrations or after suspending or reactivating capture registrations with the PWXUCREG utilty. The REFRESH command updates the list of registered sources that the ECCR uses, without shutting down and restarting the ECCR.

Syntax:

```
REFRESH_ALLOWED={N|Y}
```

Valid Values:

- **N**. Do not allow users to issue the REFRESH command. This option is intended for users of PowerExchange versions earlier than 9.5.0, when the REFRESH command was not available. This option maintains the previous behavior, which requires a restart of the ECCR after registration changes.
- **Y**. Allow users to issue the REFRESH command.

Default is N.

Configuring the Adabas ECCR JCL

You can run the Adabas ECCR as a started task or batch job. PowerExchange supplies a sample PROC for running the ECCR as a started task.

The sample ECCR PROC is in the ECCRADA member of the RUNLIB library. The XIZZZ998 installation job copies the ECCRADA member to the PowerExchange PROCLIB library as *xxx*AD1EC. The *xxx* variable is the **PowerExchange Agent / Logger Prefix** value that you specified in the z/OS Installation Assistant.

To configure the PROC for your environment, you must customize some of the DD statements in the PROCLIB(*xxx*AD1EC) member and the ADARUN parameters in the RUNLIB(ADACARD1) member.

Note: You must configure a separate Adabas ECCR for each Adabas database from which you capture change data.

1. In the RUNLIB(ADACARD1) member, verify that the ADARUN parameters reflect the correct settings for your environment.

   For example:

   ```
   ADARUN DB=dbid,DE=3390,SVC=249,PROG=ADASEL
   ```

   The *dbid* variable is the database ID.

2. In the PROCLIB(*xxx*AD1EC) member, complete the following steps:

   a. Customize the following DD statements for the data sets that the ECCR started task requires:

      ```
      //DTLCACFG DD DISP=SHR,DSN=&RUNLIB(ADAECRP1)
      //DTLADKSD DD DISP=SHR,DSN=&HLQVS..DBdbid.PCAT
      //DDASSOR1 DD DISP=SHR,DSN=adabas.ASSOR
      //DDDATAR1 DD DISP=SHR,DSN=adabas.DATA
      //DDWORKR1 DD DISP=SHR,DSN=adabas.WORK
      ```

   b. If you plan to capture changes from Adabas spanned records, enter the the PARM=(ADA82) option in the EXEC statement:

      ```
      EXEC PGM=DTLCCADA,PARM=(ADA82)
      ```

      Note: If you do not specify this PARM value, PowerExchange does not capture changes from the source files that include spanned records.

3. In the RUNLIB(ADAECRP1) member, verify that the Adabas ECCR DBID parameter value is correct.

   The DBID value must match the collection identifier that is specified in the registration group that includes the capture registrations for the CDC sources.

4. If you use PowerExchange Condense, verify that the DBID parameter in the RUNLIB(CAPTADA1) member is correct.

   The DBID parameter must match the collection identifier that is specified in the registration group.

Testing Adabas CDC Installation and Configuration

After you install and configure Adabas CDC, test it.

1. Update the Adabas file that you registered in the PowerExchange Navigator.
2. Complete a PLOG switch.
3. Review the PLOG switch job output to verify that condition code 0 was received on both the PLOG Copy and PCAT population steps.

   Record the name of the newly created archived PLOG data set name.

4. Review the Adabas ECCR job output to verify that change data occurred. In particular, look for message PWXEDM172808I in the EDMMSG data set.

   Note: The ECCR captures change from archived PLOGs and move the data to the PowerExchange Logger if new PCAT entries exist when the following events occur:

   - The ECCR is first started.
   - The NO_DATA_WAIT or NO_DATA_WAIT2 interval elapses.

5. Review the PowerExchange Logger output to verify that the ECCR read an archived PLOG.

Look for message PWXEDM172774I in the EDMMSG data set:

```
PWXEDM172774I Writer eccr_name Event Mark generated:
Finished with Plog copy ADABAS.DB00199.PLOG.G0022V00, last time timestamp
```

Note the archived PLOG data set name.

6. If you do not use PowerExchange Condense, run a database row test in the PowerExchange Navigator:
    a. Open the extraction map.
    b. Click **File** > **Database Row Test**.
    c. In the **DB_Type** field, enter **CAPXRT**.
    d. In the **Application** field, enter an application name.
    e. Click **Go**.
7. If you use PowerExchange Condense, complete the following steps:
    a. Enter the fileswitch command to make the condense file available for extraction processing.
    b. Review the PowerExchange Condense job output to determine if records were added to the condense file.
    c. Review the PowerExchange message log file. Look for message PWX-06415, which contains information about the c
    d. In the PowerExchange Navigator, run a database row test.

        Enter **CAPX** in **DB_Type** field.

Managing Adabas CDC

You can manage the Adabas ECCR and PCAT files.

Starting the Adabas ECCR

To start the Adabas ECCR, issue the MVS START command with the name of the started task, such as:

```
START PWXAD1EC
```

The Adabas ECCR can also be run as a batch job.

Start the Adabas ECCR after starting the PowerExchange, Listener, PowerExchange Agent, and PowerExchange Logger. The Adabas ECCR terminates with a return code 8 if there are no active Adabas capture registrations. PowerExchange issues messages about active registrations to the PowerExchange log file.

The Adabas ECCR issues message DTL07901 as a WTOR to the MVS operator console, requesting confirmation for cold start processing in the following cases:

- The ECCR is being started for the first time
- The ECCRNAME statement in the Adabas ECCR parameters specifies a new name for the Adabas ECCR
- COLDSTART=Y is specified in the Adabas ECCR parameters

Stopping the Adabas ECCR

To stop the Adabas ECCR, issue the MVS STOP command with the name of the started task or batch job, such as:

```
STOP PWXAD1EC
```

Adding an Adabas Capture Registration

You might need to add a capture registration for a new or existing Adabas file from which you want to start capturing change data. In this case, you can use the REFRESH command to refresh the list of registered Adabas files for the Adabas log-based ECCR, without restarting the ECCR.

Before you begin, ensure that REFRESH_ALLOWED=Y is specified in the RUNLIB(ADAECRP1) member to which the DTLCACFG DD statement in the ECCR JCL points.

1. If you need to begin capturing changes for the new registration from a specific point, stop any change activity on the source file.
2. In the PowerExchange Navigator, create the capture registration and set the **Status** field to **Active**.
3. If you use PowerExchange Condense, ensure that PowerExchange Condense has processed all of the captured changes. Then shut down PowerExchange Condense.
4. Enter the ECCR REFRESH command using the MVS MODIFY (F) command:

   ```
   F eccr_task_name,REFRESH
   ```

   The newly registered source is added to the list of registered sources for the ECCR.
5. Enable change activity on the source to resume.
6. If you use PowerExchange Condense, restart it.

Deleting an Adabas Capture Registration

You might need to delete a capture registration that has been used for change capture processing. In this case, you can use the REFRESH command to refresh the list of registered Adabas files for the Adabas log-based ECCR, without restarting the ECCR.

Before you begin, ensure that REFRESH_ALLOWED=Y is specified in the RUNLIB(ADAECRP1) member to which the DTLCACFG DD statement in the ECCR JCL points.

1. Stop applications and other activities that update the source file that is associated with the registration that you are deleting.
2. Ensure that the ECCR has processed all of the Adabas PLOGs that contain changes for the source that is associated with the registration that you are deleting. Also ensure that the source data has been extracted and applied to the target. Then stop all workflows that extract change data for the source.

   Note: The ECCR cannot access an active PLOG until it is closed.
3. If you use PowerExchange Condense, ensure that PowerExchange Condense has processed all of the captured changes. Then shut down PowerExchange Condense.
4. In the PowerExchange Navigator, open the capture registration and set the **Status** field to **History**. Then delete the registration.
5. Enter the ECCR REFRESH command using the MVS MODIFY (F) command:

   ```
   F eccr_task_name,REFRESH
   ```
6. Enable change activity on the source to resume.
7. If you use PowerExchange Condense, restart it.
8. Restart extraction processing.

Suspending Change Capture for Registered Adabas Sources Temporarily

Use this task flow to suspend change capture processing for registered Adabas sources temporarily.

You perform some tasks with the PWXUCREG utility and other tasks outside of the utility on the z/OS system.

Before you begin, ensure that the REFRESH_ALLOWED=Y parameter is specified in the RUNLIB(ADAECRP1) member to which the DTLCACFG DD statement in the ECCR JCL points. You must have the authority to issue a REFRESH command after each registration status change.

1. Stop database activity for the registered source or sources for which you want to suspend capture registrations.
2. To suspend the capture registrations, use the PWXUCREG utility to issue the SUSPEND_REGISTRATION command.

   The suspension window opens. The utility sets the suspension timestamp to the current system time without any adjustment for the local time. Also, the utility issues message PWX-03716 to the DTLLOG log to report the registration status change.

   For each suspended registration, the PowerExchange Navigator Resource Inspector displays **Suspended** in the **Status** field and the suspension timestamp in the **Suspend Time** field. The **Suspend Time** value is not adjusted for the local time.
3. Perform a PLOG switch.

   This step ensures that all of the changes up to the point of the PLOG switch are captured for the active registration.
4. Enter the ECCR REFRESH command with the MVS MODIFY (F) command:

   ```
   F eccr_task_name,REFRESH
   ```

   The ECCR becomes aware of the registration status change and suspension timestamp. When the ECCR encounters the first change record to discard, it issues message PWX-07752. The ECCR discards change records that have a timestamp later than the suspension timestamp.
5. Run the jobs or processes that generate the changes that you do not want to capture for the source or sources that are associated with the suspended registrations.
6. To reactivate the capture registrations, use the PWXUCREG utility to issue the ACTIVATE_REGISTRATION command.

   The suspension window closes. The utility sets the activation timestamp to the current system time without any adjustment for the local time. Also, the utility issues message PWX-03716 to the DTLLOG log to report the registration status change.

   For each reactivated registration, the PowerExchange Navigator Resource Inspector displays **Active** in the **Status** field and the activation timestamp in the **Active Time** field. The **Active Time** value is not adjusted for the local time.
7. Perform a PLOG switch.

   This step ensures that all of the changes that occur during the suspension window up to the PLOG switch are discarded for the suspended registration.
8. Enter the ECCR REFRESH command with the MVS MODIFY (F) command again.

   The ECCR becomes aware of the registration status change and activation timestamp.
9. Enable database activity to resume on the registered source or sources.

   The ECCR starts capturing change records that have timestamps later than the activation timestamp. The ECCR issues message PWX-07753 when it encounters the first change record in the change stream after the end of the suspension window.

Note: You can automate this processing if appropriate for your environment.

Using the Adabas PCAT Utility (DTLCCADW) to Manage the PCAT File

The Adabas PCAT Utility, DTLCCADW, provides functions for populating, reporting on, and manipulating the PCAT file. The PCAT file stores information about the Adabas PLOG files for CDC.

PowerExchange uses the utility functions internally. However, occasionally, you might need to manually override the default DTLCCADW processing. For assistance in determining when to use the utility, contact Informatica Global Customer Support.

The PCAT utility is controlled by parameters on the PARM option in the EXEC statement. PowerExchange provides example JCL for each DTLCCADW function in the DTLEXPL library. The example member names have the format DTLCCAD*x*, where *x* corresponds to a function identifier.

For more information about the utility, see the *PowerExchange Utilities Guide*.

CHAPTER 7

Batch VSAM Change Data Capture

This chapter includes the following topics:

Batch VSAM CDC Overview

PowerExchange batch change data capture (CDC) for VSAM synchronously captures changes made to registered VSAM data sets by batch jobs.

PowerExchange captures changes made to registered VSAM data sets when the batch job is configured to run the batch VSAM ECCR. The batch VSAM ECCR captures changes from GET, PUT, and ERASE requests for registered VSAM data sets.

The batch VSAM ECCR runs in the same address spaces as the batch job that makes changes to VSAM data sets. It captures changes as they occur using a VSAM JRNAD exit and passes the changes to the PowerExchange Logger for z/OS for logging. After the batch program opens the VSAM data set, PowerExchange records a single unit of work (UOW) in the PowerExchange Logger for all changes that the batch program makes to that VSAM data set. PowerExchange commits the UOW that contains the changes for the VSAM data set when the batch program closes the VSAM data set.

ECCR Relationships with Other PowerExchange Components

The batch VSAM ECCR interacts with PowerExchange components such as the PowerExchange Logger for z/OS and PowerExchange Agent to perform CDC.

Consider the following the following relationships:

- The batch VSAM ECCR, PowerExchange Logger, and PowerExchange Agent must run on the same z/OS system.
- The batch VSAM ECCR must log all changes to a single PowerExchange Logger.

- If you use the Post-Log Merge option of the PowerExchange Logger, you can capture changes that originate on different z/OS systems. In this case, you must run a PowerExchange Logger on each z/OS system where changes to the source VSAM data sets occur.
- PowerExchange Logger operational issues can cause the batch CDC job to enter a wait state, which could prevent further capture and recording of change data. After you resolve the Logger operational issues, PowerExchange continues to capture and record change data without data loss.

  Tip: Carefully monitor the PowerExchange Logger to ensure that change data capture can proceed without interruption.

Related Topics:

- "Monitoring the PowerExchange Logger for z/OS" on page 71
- "Using Post-Log Merge" on page 90

Batch VSAM ECCR Restrictions

Batch VSAM ECCR processing is subject to the following restrictions:

- The batch VSAM ECCR does not capture change data for the following items:
  - Environments with multiple task control blocks (TCBs)
  - Natively updated alternate indexes
  - Records that are larger than 32,660 bytes
  - Spanned ESDSs
  - Paths defined over ESDSs
  - Control interval (CI) mode updates
  - VSAM data sets that are opened with record-level sharing (RLS) protocols
  - Applications that use request parameter lists (RPLs) that are coded with OPTCD=ASY for asynchronous processing for VSAM files

    If you use these applications, unpredictable results can occur.
- The batch VSAM ECCR uses an internal exclude table to exclude VSAM data sets that have certain names or prefixes from change data capture. The exclude table contains the following types of entries:
  - Complete load module names
  - Prefixes for load module names
  - Prefixes for data set names

  Based on the exclude table, the batch VSAM ECCR does not capture change data for the following VSAM data sets:
  - Data sets that begin with any data set prefix in the internal exclude table.
  - Data sets that are opened by load modules that match the specific load module names or prefixes in the internal exclude table.

The following table lists the load module names and prefixes in the internal exclude table:

Load Module Name or Prefix	Generic or Specific	Excludes Product, Component, or Data Set
$CRLFSM	Specific	ASG Software Solutions ASG-TMON
$TMONTMP	Specific	ASG Software Solutions ASG-TMON
ACF2	Generic	Data sets prefixed with ACF2
ARC	Generic	IBM DFSMShsm
BNJLINTX	Specific	IBM Tivoli NetView for z/OS
DFH	Generic	IBM CICS Transaction Server
DFSMVRC0	Specific	IBM IMS - Online control region
DSI	Generic	IBM Tivoli NetView for z/OS
DSN	Generic	IBM DB2 for z/OS
DUIFT000	Specific	IBM Tivoli NetView for z/OS
EDML	Generic	PowerExchange Logger
EDMSTART	Specific	PowerExchange Agent
EKGTC000	Specific	IBM Tivoli NetView for z/OS
ERB	Generic	IBM Resource Measurement Facility (RMF)
FDR	Generic	Innovation Data Processing FDR
GIM	Generic	IBM SMP/E for z/OS
IEFIIC	Specific	IBM z/OS - MVS Initiator
JMPMAINT	Specific	BMC Software JOURNAL MANAGER PLUS
LANDMARK	Specific	ASG Software Solutions ASG-TMON
RPCMAINT	Specific	BMC Software RECOVERY PLUS for CICS/VSAM
SYS1	Generic	Data sets prefixed with SYS1
TMVSMSTR	Specific	IBM TMON for MVS
UCC1	Generic	Data sets with the prefix UCC1

Configuring Batch VSAM Jobs for CDC

For batch jobs to use the batch VSAM ECCR, you must edit the batch job JCL to add the PowerExchange libraries and to activate the batch VSAM ECCR interface.

Making the Batch VSAM ECCR Available to Batch Jobs

To make the batch VSAM ECCR available to batch jobs, make the following updates to the batch job JCL:

- Add the PowerExchange LOAD library to the STEPLIB concatenation in every step of any batch jobs that update VSAM data sets registered for capture. Alternatively, you can add the LOAD library to the JOBLIB DD of the batch job.
- Add the EDMPARMS DD statement in every step of any batch jobs that update VSAM data sets registered for capture. The EDMPARMS DD statement references the PowerExchange USERLIB library that contains the EDMSDIR module options. For example:

  ```
  //EDMPARMS DD DISP=SHR,DSN=hlq.logger_name.USERLIB
  ```

  If the EDMSDIR module is included in the LOAD library or if the USERLIB library is include in the JOBLIB or STEPLIB concatenation, you do not need to add the EDMPARMS DD statement.

MVS LNKLST Concatenation

Informatica strongly recommends against including the PowerExchange libraries in the MVS LNKLST concatenation as unexpected abends can occur. When PowerExchange software is included in the LNKLST concatenation, PowerExchange gets control during OPEN processing for all VSAM data sets. PowerExchange does a registration check to determine if the VSAM data set is registered for capture. The registration check process requires that the PowerExchange Agent be active.

If site standards require that the PowerExchange libraries are included in the LNKLST concatenation, the following rules apply:

- The library containing the EDMSDIR module must also be included in the LNKLST concatenation.
- EDMSDIR should specify the option CCERR=CONT as OPEN processing for any VSAM data set causes PowerExchange to get control. If CCERR=ABEND is coded, VSAM OPEN requests fail if the PowerExchange Agent is not active.

  Source for EDMSDIR is supplied in member SETUPAGT in the RUNLIB library. Change and rerun this job if changing the CCERR parameter is necessary.
- To override the EDMSDIR included in the LNKLST concatenation and use CCERR=ABEND for VSAM batch jobs, add the EDMPARMS DD statement to the VSAM batch jobs updating VSAM data sets registered for capture. Specify a different data set name in the EDMPARMS DD statement than is specified in the LNKLST concatenation, and include an EDMSDIR module that specifies CCERR=ABEND.
- If you add the PowerExchange LOAD library to the LNKLST concatenation, you can stop an ECCR from capturing changes for a specific job by including the following DD statement:

  ```
  //EDMNOCAP DD DUMMY
  ```

Activating and Loading the Batch VSAM ECCR Interface

To use the Batch VSAM ECCR, you must first activate the batch VSAM ECCR interface using the PowerExchange Agent. You can activate the Batch VSAM ECCR interface automatically when the PowerExchange Agent starts. Alternatively, you can manually activate Batch VSAM ECCR by using a command after the PowerExchange Agent starts.

Note: Activating the Batch VSAM ECCR interface in one PowerExchange Agent makes it active globally on the MVS system. If you are running multiple PowerExchange Agents on a single MVS image, only one PowerExchange Agent needs to activate the batch VSAM ECCR interface.

Activate the Batch VSAM ECCR Interface Automatically

To activate the batch VSAM ECCR interface whenever the PowerExchange Agent starts, set the PowerExchange Agent AGENTCTL parameter CCVACTIVE to YES before you start the PowerExchange Agent.

Activate the Batch VSAM ECCR Interface Manually

Enter the following command to manually activate the batch VSAM ECCR interface:

```
cmd_prefix START VSAMECCR
```

For *cmd_prefix*, use the MVS command prefix specified in the CmdPrefix parameter in the PowerExchange Agent AGENTCTL parameters. The EDMSCTL DD statement in the PowerExchange Agent JCL points to the AGENTCTL parameters.

Restoring VSAM Data Sets When Using the Batch VSAM ECCR

The batch VSAM ECCR captures changes from VSAM batch jobs and passes the changes to the PowerExchange Logger to be recorded. If the VSAM batch job step terminates abnormally, PowerExchange aborts any open units of work in the PowerExchange Logger for that job step. When you extract change data, PowerExchange provides only successfully committed units of work and skips aborted units of work.

Note: If the batch job closes the VSAM data set registered for capture before it terminates abnormally, the PowerExchange Logger unit of work containing the changes for that VSAM data set is successfully committed. When you extract changes for this VSAM data set, PowerExchange provides the changes from the failed batch job because the UOW was successful even though the batch job ultimately failed.

If you restart batch VSAM processing from the point of failure rather than restoring the data set and restarting the batch job from the beginning, you must change the default PowerExchange operation to capture change data properly. To change the default PowerExchange processing, add the following DD statement in each batch VSAM job where you restart processing from the point of failure:

```
//EDMCMUOW DD DUMMY
```

When you use the EDMCMUOW DD statement and the batch VSAM job step terminates abnormally, PowerExchange commits all open units of work (UOWs) generated by the batch VSAM job. Consider the following points before using the EDMCMUOW DD statement:

- Depending upon the failure circumstances, the batch VSAM ECCR may not get control to commit the open units of work. If so, any uncommitted units of work from the failed VSAM batch job are left in IN-DOUBT status. You must use the PowerExchange Logger RESOLVE_INDOUBT command to commit these uncommitted units of work.
- Do not use EDMCMUOW if you have specified full condense in the capture registration for a VSAM data set.

Managing Batch VSAM Change Data Capture

Controlling the Batch VSAM ECCR

You can control the batch VSAM ECCR interface by using PowerExchange Agent commands.

These commands have the following syntax:

```
cmd_prefix keyword VSAMECCR
```

Where:

- The *cmd_prefix* variable is the command prefix for the PowerExchange Agent. You specify this prefix in the CmdPrefix statement in the PowerExchange Agent AGENTCTL parameters.
- The *keyword* variable is one of the valid controlling keywords.

The following table describes these keywords:

Keyword	Description
DISPLAY	Displays the number of active and inactive batch VSAM ECCR interface modules that have been loaded on this z/OS system.
START	Activates the Batch VSAM ECCR interface regardless of the value specified in the CCVActive statement in the PowerExchange Agent control parameters (AGENTCTL). Use VSAMECCR/RELOAD to load a new batch VSAM ECCR interface module into Extended Common Storage Area (ECSA). The module is placed at the beginning of the LPA queue in an active state. **Warning:** This command affects all Batch VSAM ECCRs on the same z/OS system.
STOP	Deactivates the Batch VSAM ECCR interface regardless of the value specified in the CCVActive statement in the PowerExchange Agent control parameters (AGENTCTL). To stop capture for a particular VSAM data set, inactivate the capture registration using the PowerExchange Navigator. **Warning:** This command affects all Batch VSAM ECCRs on the same z/OS system.

Output from the Batch VSAM ECCR

When you start the batch VSAM ECCR by opening a VSAM data set, PowerExchange generates a report that shows the default options that are in effect for the ECCR. After the batch VSAM ECCR ends, the report indicates the number of captured changes. You can find this report in the EDMMSG SYSOUT data set.

The following is a sample report:

```
PWXEDM172852I Options in effect:
              Load Library containing EDMSDIR. . . . . : EDM.AUSL.USERLIB
              EDMSDIR assembly date/time . . . . . . . : 20070406 18.19
              EDP Rollup . . . . . . . . . . . . . . . : V1020_HF1B05_20180606
              Product distribution date. . . . . . . . : 20060831
              Product distribution level . . . . . . . : 2.4.05
              Agent Id . . . . . . . . . . . . . . . . : AUSA
              Logger Id. . . . . . . . . . . . . . . . : AUSL
              SYSOUT class . . . . . . . . . . . . . . : *
              Action if ECCR error encountered . . . . : Continue
PWXEDM172818I Joined XCF group 'AUSL' as member 'AUSVSUPD'
PWXEDM172841I EDM ECCR AUSVSUPD connected to EDM Logger AUSL, Log RBA=X'0000560078040000'
PWXEDM172808I Change Capture active for Tag VSAMAUSQA.VSAM.VSMDEMO1 VSAM file
AUSQA.VSAM.VSMDEMO1
PWXEDM172809I Change Capture counts for AUSQA.VSAM.VSMDEMO1: Insert=0, Update=5, Delete=0
PWXEDM172841I EDM ECCR AUSVSUPD disconnected from EDM Logger AUSL, Log
RBA=X'0000560084DD0000'
PWXEDM172818I Left XCF group 'AUSL' as member 'AUSVSUPD'
PWXEDM172829I EDM ECCR sent 5 records to Logger AUSL (5 change records)
```

Note: This report also includes message PWXEDM172886I, which indicates any load module replacements that have been applied.

Stopping Change Data Capture for VSAM Sources

You can stop change data capture for all VSAM data sets or a specific data set.

To stop change capture processing for all VSAM data sets, stop the batch VSAM ECCR interface.

To stop change capture processing for a specific registered VSAM data set, deactivate or delete the capture registration and close the data set.

Warning: When you stop the change data capture process without stopping updates to the source, you lose change data. To avoid losing change data and rematerializing the target tables, stop updates to the source instead of stopping the batch VSAM ECCR interface.

Stopping the Batch VSAM ECCR

Closing a VSAM Data Set

When you close a source data set, the batch VSAM ECCR no longer captures changes associated with that source. Closing data sets with the batch VSAM ECCR generally means stopping the batch job, which also stops the batch VSAM ECCR.

Stopping a Batch VSAM ECCR Job

When you stop a batch VSAM ECCR job, PowerExchange no longer captures change data for any VSAM data sets in that batch job. The batch VSAM ECCR running in the batch job disconnects from the PowerExchange Logger and displays a set of messages, including the number and type of changes captured since the last time the VSAM data sets were opened. For example:

```
PWXEDM172818I Joined XCF group 'AUSL' as member 'AUSVSUPD'
PWXEDM172841I EDM ECCR AUSVSUPD connected to EDM Logger AUSL, Log RBA=X'0000560078040000'
PWXEDM172808I Change Capture active for Tag VSAMAUSQA.VSAM.VSMDEMO1 VSAM file
AUSQA.VSAM.VSMDEMO1
PWXEDM172809I Change Capture counts for AUSQA.VSAM.VSMDEMO1: Insert=0, Update=5, Delete=0
PWXEDM172841I EDM ECCR AUSVSUPD disconnected from EDM Logger AUSL, Log
RBA=X'0000560084DD0000'
PWXEDM172818I Left XCF group 'AUSL' as member 'AUSVSUPD'
PWXEDM172829I EDM ECCR sent 5 records to Logger AUSL (5 change records)
```

Stopping the Batch VSAM ECCR Interface

Stop the batch VSAM ECCR interface by using the PowerExchange Agent STOP command. This command disables the batch VSAM ECCR interface for the entire z/OS system. After the batch VSAM ECCR interface stops, PowerExchange does not capture changes for any VSAM data set that is subsequently opened. Change data capture activity that is in progress continues until the data sets are closed.

To stop the VSAM batch ECCR, enter the following command:

```
cmd_prefix STOP VSAMECCR
```

The *cmd_prefix* variable is the command prefix for the PowerExchange Agent. You specify this prefix in the CmdPrefix statement in the PowerExchange Agent AGENTCTL parameters.

For more information about batch VSAM ECCR interface commands, see the *PowerExchange Command Reference*.

Refreshing the Batch VSAM ECCR

The batch VSAM ECCR does not refresh capture registrations once it starts. You must rerun the batch job to activate new or changed capture registrations for VSAM data sets in that batch job.

Note: If the capture registrations specify condense processing, you must also recycle PowerExchange Condense.

Application Recovery Considerations

Consider these batch execution and recovery issues for PowerExchange CDC.

You might need to change some operational recovery procedures to accommodate change data propagation.

Point-in-Time Recovery

Point-in-time recovery invalidates the change data that the PowerExchange Logger logged and that the batch job recorded.

Standard point-in-time recovery does not indicate that the PowerExchange Logger data is invalid to the processors of that data.

A processor of PowerExchange Logger data must perform the following processing if you need to use point-in-time recovery:

- Recover the source to the correct point-in-time.
- Recover the target to the correct point-in-time. This recovery might require rematerialization of the targets. If you use PowerExchange Condense, wait until the Condense process captures all outstanding changes from the PowerExchange Logger. Then regenerate the restart tokens for the PowerCenter CDC sessions that update the targets.
- Reset the change processor to restart processing when the recovery is complete.

DFSMSdfp Checkpoint/Restart

PowerExchange for VSAM CDC does not support DFSMSdfp Checkpoint/Restart.

Managing VSAM Schema Changes

If the record layout of the VSAM source data set changes, use the following procedures to ensure that data previously captured remains available for use.

To manage VSAM schema changes:

1. Stop updates to the VSAM source file.
2. If you are using PowerExchange Condense, ensure that PowerExchange Condense has extracted all captured change data from the PowerExchange Logger.
3. Extract all captured changes using the existing extraction map.
4. In the VSAM capture registration, set the **Status** option to **History**.
5. Change the VSAM file structure as needed.
6. Delete the extraction map.
7. Create a data map for the new VSAM data structure.

8. Create capture registration using the new data map.
9. Allow changes to the altered VSAM file.

CHAPTER 8

CICS/VSAM Change Data Capture

This chapter includes the following topics:

CICS/VSAM CDC Overview

PowerExchange change data capture (CDC) for CICS/VSAM synchronously captures changes that CICS transactions make to registered VSAM data sets.

The CICS/VSAM ECCR runs in the CICS region. To capture changes, the ECCR uses CICS global user exits (GLUE) and a PowerExchange task-related user exit (TRUE).

The ECCR passes captured changes to the PowerExchange Logger for z/OS. The PowerExchange Logger logs the changes in its log files. PowerExchange, in conjunction with PWXPC and PowerCenter workflows, can then extract the changes from the PowerExchange Logger log files for propagation to targets in near real time.

Review the CDC configuration and management information that is specific to CICS/VSAM data sources. For other implementation tasks, see "Summary of CDC Implementation Tasks" on page 24. For example, you must create data maps and capture registrations in the PowerExchange Navigator, and define a PWX NRDB connection in PowerCenter.

Planning for CICS/VSAM CDC

Before you configure CICS/VSAM CDC, review this planning information.

CICS/VSAM CDC Requirements and Restrictions

Before implementing CICS/VSAM CDC, consider its requirements and restrictions.

- The CICS/VSAM ECCR can capture changes only from local VSAM ESDS, KSDS, RRDS, or VRRDS data sets and CICS-maintained data tables.
- If you specify CCERR=ABEND in the EDMSDIR options module and the ECCR abends or encounters an error during initialization, PowerExchange performs one of the following actions to ensure data integrity:
  - Ends and backs out in-flight CICS transactions on VSAM source files during syncpoint processing.
  - If necessary, shuts down the CICS region, as if you had issued the CICS command CEMT PERFORM SHUTDOWN IMMEDIATE NORESTART.

  Tip: In production environments where data integrity is important, specify CCERR=ABEND. If you specify CCERR=CONTinue instead, data integrity might not be maintained.
- In CICS, define VSAM source data sets as recoverable by using the RECOVERY(BACKOUTONLY) or RECOVERY(ALL) option. Alternatively, you can define VSAM data sets other than ESDS data sets as nonrecoverable by using the RECOVERY(NONE) option under either of the following circumstances:
  - You specify CCERR=CONTinue in the EDMSDIR options module and specify the AllowRecoveryNone option in the INITPARM statement for the EDMKOPER module.
  - You specify CCERR=ABEND in the EDMSDIR options module.

  Note: You must define ESDS data sets as recoverable for the ECCR to properly handle backouts of WRITE requests during CDC processing. If you define an ESDS file with the RECOVERY(NONE) option and specify the AllowRecoveryNone option in the INITPARM statement, the ECCR captures change data for the ESDS data set but cannot process backouts. CICS does not perform backout processing for nonrecoverable data sets when a transaction abend occurs or a SYNCPOINT ROLLBACK request is made.
- The CICS/VSAM ECCR must be active in each CICS region that owns VSAM files from which you capture changes.
- If a CICS transaction updates CICS/VSAM files and other data sources outside of the CICS region in the same unit of work, for example, DB2 tables or IMS databases, the CICS/VSAM ECCR captures only the changes to the CICS/VSAM files.
- To apply changes from multiple data source types to targets in the order that the changes were made by a CICS transaction, use a staging table. For each data source type, extract the changes and insert them into the staging table. Include the PowerExchange-generated DTL__CAPXTIMESTAMP column. Then, extract changes from the staging table, in sequential order based on the DTL__CAPXTIMESTAMP values, and apply the changes to the target tables in that order.
- The CICS/VSAM ECCR can capture change data from ESDS data sets that use both the 32-bit relative bye addressing (RBA) and 64-bit extended relative byte addressing (XRBA). However, the ECCR does not capture change data for the following types of ESDS items:
  - Spanned ESDSs
  - Paths defined over ESDSs
  - An alternate Index (AIX) that points to an ESDS base cluster

    Note: In the log records that the ECCR generates, the RBA is always stored right-justified in an 8-byte field, regardless if it is a 4-byte 32-bit address RBA or an 8-byte long 64-bit extended RBA.

CICS/VSAM CDC Use of CICS Global and Task-Related Exit Points

PowerExchange uses several CICS global exit points and a single task-related user exit point during CICS/VSAM CDC.

CICS Global Exit Points

PowerExchange uses the following global exit points:

XFCFRIN

Exit point for invoking the PowerExchange EDMKIR*nn* exit program before a CICS File Control Domain request such as READ, WRITE, DELETE, or REWRITE. This exit program enables the CICS/VSAM ECCR to capture changes to VSAM files that are registered for CDC. Use the XFCFRIN exit point with the XFCFROUT exit point.

Note: The suffix *nn* in each EDMKIR*nn* exit program name corresponds to the second and third digits of the CICS TS internal release level for the CICS TS version. For example, the program EDMKIR71 corresponds to CICS TS internal release level of 0710, which is for CICS TS 5.4.

If the EDMKIR*nn* exit program at the XFCFRIN exit point detects any DELETE operation that uses the RIDFLD operand, the exit program reads the record as an UPDATE and then issues another DELETE without the RIDFLD operand. The exit program at the XFCFROUT exit point can then capture and log all of the required information for the deletion.

The XFCFRIN and XFCFROUT exit points do not support the processing of backouts for recoverable ESDS data sets. For backout processing of ESDS data sets, use the XFCLDEL and XFCBOUT exit points.

XFCFROUT

Exit point for invoking the PowerExchange EDMKIR*nn* exit program after a CICS File Control Domain request. This exit program enables the CICS/VSAM ECCR to capture changes to VSAM files that are registered for CDC and transmit the changes to the PowerExchange Logger for z/OS. Use the XFCFROUT exit point with the XFCFRIN exit point.

The XFCFROUT and XFCFRIN exit points do not support the processing of backouts for recoverable ESDS data sets. For backout processing of ESDS data sets, use the XFCLDEL and XFCBOUT exit points.

XFCSREQ

Exit point for the PowerExchange exit program that is called before a data set OPEN request is processed. At this CICS exit point, the CICS/VSAM ECCR determines whether the data set that is being opened is registered for change data capture. If the data set is registered, change data capture will be active for this data set.

XFCSREQC

Exit point for the PowerExchange exit program that is called after a successful file OPEN or CLOSE request with a return code of 4 or lower and after a failed OPEN request. If an OPEN request is successful and the data set is registered for change data capture, the exit program retains the Change Capture Directory entry for the data set. If the OPEN request fails, the exit program removes the Change Capture Directory entry for the data set.

XFCLDEL

Required only for recoverable ESDS source data sets in an online CICS TS environment. Exit point for the following exit programs that are required to process transaction backouts for a recoverable ESDS data set that is registered for change data capture, when a transaction abend or syncpoint rollback occurs:

- A *user-defined* program that marks the backout records as logically deleted and then writes them back to the ESDS data set. You must logically delete backout records because CICS TS does not provide a mechanism to directly delete these records from an ESDS data set. To define this program, you can customize the IBM-supplied sample program in the DFH$LDEL member of the CICS SAMPLIB library. Then install the customized backout exit program at the XFCLDEL exit point using the TBEXITS system initialization parameter. Typically, a logical deletion is indicated by setting the first character (or byte) of the record to X'FF'. When a record is marked as logically deleted, the CICS/VSAM ECCR is able to determine that the before and after images of the record are different and generate an appropriate change record. The change record is then sent to the Power Exchange Logger for z/OS.
  Alternatively, use the sample program EDMKLD*nn* that PowerExchange provides in the SAMPLIB library. The *nn* suffix in the sample program name corresponds to the actual CICS TS release level, for example, "54" for CICS TS V5.4. This PowerExchange sample program is similar to the IBM-supplied sample program DFH$LDEL.
- The PowerExchange EDMKLD*nn* program that is invoked whenever a WRITE operation on a VSAM ESDS data set is backed out. In this program name, *nn* represents the CICS TS version. The program retrieves the after image of the backed-out record that was logically deleted and then generates an UPDATE record that contains both the before and after images. The generated record is written to the Change Capture Log. In this manner, the CICS/VSAM ECCR processes the logically deleted record as an UPDATE to prevent transaction backout failures and the generation of numerous error messages. This processing avoids data integrity issues in the CDC environment that are caused by backout failures.

  Important: This exit program must be the last program enabled at the XFCLDEL exit point. You can use the EDMC XPGM command to verify that this program is last.

Use the XFCLDEL exit point with the XFCBOUT exit point.

XFCBOUT

Required only for recoverable ESDS source data sets in an online CICS TS environment. At CICS/VSAM ECCR initialization in the CICS region, the EDMKBO*nn* program is installed at this global exit point. In the program name, *nn* represents the CICS TS version. This program captures the before image of each record in a recoverable ESDS data set that is to be backed out because of a transaction abend or syncpoint rollback. The program runs before CICS attempts to back out each record. PowerExchange CDC uses the EDMKBO*nn* program at the XFCBOUT exit point with the EDMKLD*nn* program at the XFCLDEL exit point to get both the before and after images for the backed out record.

The following considerations apply to using these global exit points:

- To enable and activate all of the PowerExchange CDC exit programs at the global exit points at CICS initialization, you can specify an entry for the EDMKOPER program in the CICS PLTPI system initialization parameter. The EDMKOPER program enables these exit programs during the second phase of program load table (PLT) processing at CICS startup.
- All of the PowerExchange CDC exit programs at the global exit points can process only uncompressed data records.
- If you issue the CICS/VSAM ECCR command EDMC INIT, the EDMC transaction both initializes the ECCR and dynamically installs the appropriate CICS/VSAM CDC exit programs at the XFCFRIN, XFCFROUT, XFCSREQ, XFCREQC, XFCSREQC, XFCBOUT, and XFCLDEL exit points.

- If other exit programs in the CICS region are installed at the same global exit points that CICS/VSAM CDC uses, the PowerExchange-supplied exits might not get control in the correct order. In this case, the CICS/VSAM ECCR might not capture change data properly. Ensure that the other exits do not affect the processing of the PowerExchange-supplied exits.

  Note: CICS gives control to the exits based on the order in which they are enabled in CICS.

- To determine whether the CICS region has other exit programs installed at one of these global exit points, use the CICS CECI transaction with the following system commands to browse the exit list:

  ```
  INQUIRE EXITPROGRAM EXIT(global_exit_point_identifier) START
  INQUIRE EXITPROGRAM NEXT
  INQUIRE EXITPROGRAM END
  ```

  For more information about the CECI transaction and INQUIRE EXITPROGRAM command, see the IBM CICS Transaction Server system programming reference.

  Alternatively, you can use the CICS/VSAM ECCR command EDMC XPGM or EDMC EXITPGMS to display the global exit points and task-related user exit points that are used by the PowerExchange exit programs and any other exit programs that are enabled at the same exit points. For more information, see the *PowerExchange Command Reference*.

- If the CICS/VSAM ECCR captures change data from a recoverable ESDS data set and you use multiple exit programs at the CICS XFCLDEL global exit point, ensure that the EDMKLD*nn* exit program is last. The EDMKLD*nn* exit program must be the last exit program called at this exit point by the CICS services.

- When multiple exit programs are defined at the XFCLDEL exit point for a registered ESDS data set, the EDMKLD*nn* exit program sets the return code to UERCLDEL instead of percolating any return codes from prior exit programs.

CICS Task-Related User Exit

CICS/VSAM CDC uses a single CICS task-related user exit (TRUE) to capture relevant syncpoints and UOW information for each task that updates a registered data set. The ECCR uses this information to coordinate syncpoint processing with the PowerExchange Logger for z/OS and to handle ECCR requirements related to CICS shutdown processing.

You can use the CICS/VSAM ECCR command EDMC XPGM or EDMC EXITPGMS to display the task-related user exit points and global user exit points that are used by the PowerExchange exit programs and any other exit programs that are enabled at these same exit points. For more information, see the *PowerExchange Command Reference*.

Related Topics:

- “Using the EDMC Transaction and Keywords to Manage the CICS/VSAM ECCR” on page 178

CICS/VSAM ECCR Relationships with Other PowerExchange Components

The CICS/VSAM ECCR works with other PowerExchange components such as the PowerExchange Logger for z/OS and the PowerExchange Agent to propagate change data.

Consider the following operational issues:

- The CICS/VSAM ECCR sends changes to a single PowerExchange Logger.
- The CICS/VSAM ECCR must run on the same z/OS system as the PowerExchange Logger and PowerExchange Agent.

  However, if you use the Post-Log Merge option of the PowerExchange Logger, you can capture changes that originate from different z/OS systems. In this case, run a PowerExchange Logger on each z/OS system from which CICS transactions write changes to the VSAM source data sets.

- Operational issues in the PowerExchange Logger, such as waits for tape mounts, can cause CICS transactions to enter a wait state and hold up all CICS tasks. After you resolve the PowerExchange Logger issues and CICS transactions resume processing, PowerExchange resumes capturing and recording change data without any data loss.

  To ensure that change data capture proceeds without interruption, monitor PowerExchange Logger processing.

Related Topics:

- "Monitoring the PowerExchange Logger for z/OS" on page 71
- "Using Post-Log Merge" on page 90

Configuring CICS for CDC

To capture changes that CICS transactions make to VSAM data sets, edit the JCL and startup procedures for the CICS region. Also define the CICS/VSAM ECCR programs and transaction to CICS.

1. Edit the CICS JCL.
   a. Specify the PowerExchange LOAD library in the DFHRPL DD and STEPLIB DD statements.

      Note: If you included the LOAD library in the MVS LNKLST concatenation, add the library to the DFHRPL DD only.

   b. Add the EDMPARMS DD statement. Include a DSN option that points to the PowerExchange Logger USERLIB library, for example:

      ```
      //EDMPARMS DD DISP=SHR,DSN=hlq.logger_name.USERLIB
      ```

      The *hlq* variable is the high-level qualifier that you specified at installation.
2. To initialize the CICS/VSAM ECCR during the third stage of CICS initialization, add the EDMKOPER module name to the second part of CICS PLTPI list, after the DFHDELIM entry.

   Note: Informatica recommends that you add EDMKOPER to the CICS initialization list to reduce the possibility of missing changes in a high-volume production environment. However, you can use the EDMC transaction with the INIT keyword to manually initialize the ECCR. For more information, see the *PowerExchange Command Reference*.
3. Add the //EDMKOVRD DD statement to the CICS startup procedure to override default capture settings or to activate change data capture for ESDS data sets in an online CICS TS environment.

   In the //EDMKOVRD DD statement or in the data set to which the DD statement points, specify options that selectively enable or disable CDC by VSAM data set type or for individual VSAM data sets. You can disable CDC even for data sets that are registered for change capture. Also, you can specify options for handling backouts for recoverable ESDS data sets.
   Options are:

   CAPTURE_ESDS={ON|OFF}

   Enables or disables change data capture for ESDS data sets. You must explicitly enter ON to enable CDC for ESDS data sets. Default is OFF.

   CAPTURE_KSDS={ON|OFF}

   Enables or disables change data capture for KSDS data sets. Enter OFF if you need to disable CDC for KSDS data sets. Default is ON.

CAPTURE_RRDS={ON|OFF}

Enables or disables change data capture for RRDS and VRDS data sets. Enter OFF if you need to disable CDC for RRDS and VRDS data sets. Default is ON.

CAPTURE_CMDT={ON|OFF}

Enables or disables change data capture for CICS-maintained data tables. Enter OFF if you need to disable CDC for CICS-maintained data tables. Default is ON.

BACKOUTRC={OVERRIDE|NOOVERRIDE}

For recoverable ESDS data sets, controls whether to override the return codes from any other active exit programs that are invoked at the XFCLDEL global exit point prior to the PowerExchange EDMKLD*nn* exit program for processing backouts as logical deletions. Options are:

- **OVERRIDE**. Override the return codes from any prior exit programs at the XFCLDEL global exit point with the UERCLDEL return code from the EDMKLD*nn* program.
- **NOOVERRIDE**. Percolate the return codes from any prior exit programs at the XFCLDEL global exit point. In this case, the return code of a prior exit program might supercede the return code from the EDMKLD*nn* program. With this option, the ESDSFAIL option is ignored.

ESDSFAIL={YES|NO}

For recoverable ESDS data sets from which change data is captured, controls whether backouts are allowed to fail after a transaction abend or synpoint rollback. By default, the PowerExchange exit programs that you define at the XFCBOUT and XFCLDEL global exit points handle backouts as logical deletions with before and after images so that the change can be processed during CDC. If you capture change data from recoverable ESDS data sets, set this option to NO. If you enter ESDSFAIL=YES, backouts will fail with many error messages.
If you specified BACKOUTRC=NOOVERRIDE, this option is ignored.

DSN=*dataset_name*[,*option*]…

To enter optional overrides for a specific VSAM source data set, specify the fully qualified data set named followed by one or more of the following options:

- **{CAPTURE|NOCAPTURE}**. Enter CAPTURE to enable change data capture for the specified data set, or enter NOCAPTURE to exclude the data set from CDC processing. If you specify NOCAPTURE, the BACKOUTOVERRIDE and BACKOUTFAIL options are ignored.
- **{BACKOUTOVERRIDE|NOBACKOUTOVERRIDE}**. For a recoverable ESDS data set, controls whether to override the return codes from any other active exit programs that are invoked at the XFCLDEL global exit point prior to the PowerExchange EDMKLD*nn* exit program. Enter BACKOUTOVERRIDE to override the return codes from any prior exit programs with the UERCLDEL return code from the EDMKLD*nn* exit program. Enter NOBACKOUTOVERRIDE to percolate the return codes from prior exit programs. If you specify NOBACKOUTOVERRIDE, do not specify NOBACKOUTFAIL.
- **BACKOUTFAIL|NOBACKOUTFAIL}**. For a recoverable ESDS data set, controls whether backouts are allowed to fail after a transaction abend or syncpoint rollback. Enter BACKOUTFAIL to allow backouts to fail, or enter NOBACKOUTFAIL to allow the PowerExchange exit programs that you define at the XFCBOUT and XFCLDEL global exit points to handle backouts as logical deletions with before and after images and continue CDC processing.

If you enter multiple options, separate them from one another with a comma. Do not use a space instead. For example:

```
DSN=EDM.VSAM.ESDS4,CAPTURE,BACKOUTOVERRIDE,NOBACKOUTFAIL
```

Note: You can use the options in the DSN statement to override the CAPTURE_*vsam_source_type*, BACKOUTRC, and ESDSFAIL settings for a specific data set only. To activate the override options, issue the EDMC REFRESH command.

4. Verify that you use a unique CICS/VSAM ECCR name for each CICS region that connects to PowerExchange and that each ECCR name is also unique within a PowerExchange Logger group.

   PowerExchange uses an ECCR name for the following purposes:

   - As the member name to join the XCF group that the PowerExchange Logger uses
   - As part of the ECCR-UOW control information for each change record that the ECCR sends to PowerExchange Logger log files

   The default ECCR name is the CICS SYSID value that is specified in the SYSIDNT parameter in the CICS system initialization table (SIT).

   To override the default name, enter the INITPARM statement for the EDMKOPER module in the SIT or a SIT override:

   ```
   INITPARM=(EDMKOPER='option')
   ```

   The following table lists the valid options and their substitution values:

Option	Substitution Value
*SYSID	The CICS SYSID value
*JOBNAME	The CICS job or started task name
*APPLID	The VTAM application control block (ACB) name
1 through 8 alphanumeric characters	No substitution

   When EDMKOPER processes the *option* value, it translates lowercase characters to uppercase characters.

   Tip: Informatica recommends that you use the CICS job or started task name as the ECCR name. This practice makes it easier to identify the ECCR in PowerExchange Logger messages and output.

5. Define the CICS/VSAM ECCR programs and transaction to CICS.

   To perform this step, use the sample members in the PowerExchange SAMPLIB library for the supported CICS Transaction Server (TS) versions.

   The following table identifies these sample members:

CICS TS Version	Member Name
4.1	#CICSV66
4.2	#CICSV67
5.1	#CICSV68
5.2	#CICSV69
5.3	#CICSV70
5.4	#CICSV71

CICS TS Version	Member Name
5.5	#CICSV72
5.6	#CICSV73

Note: In each member name, the suffix *nn* corresponds to the second and third digits of the CICS TS internal release level for the CICS TS version.

Copy the sample member for your CICS TS version, and then edit the copy.

Use the CICS DFHCSDUP utility program or RDO commands to add the CICS/VSAM ECCR programs and transaction to the CICS system definition.

By default, the transaction name is EDMC. However, you can use another name.

If you need to change the ECCR name, you must either cold start the CICS region or enter NEWSIT=YES in the EXEC PARM option of the JCL or in the SIT or SIT override.

Starting the CICS/VSAM ECCR

The CICS/VSAM ECCR can start automatically during the third stage of CICS initialization, or you can manually start it.

Before you start ECCR, verify that the following prerequisites are met:

- PowerExchange supports your CICS/TS version and maintenance level for CDC.
- The CICS file control table (FCT) entries for VSAM source data sets specify RECOVERY(BACKOUTONLY) or RECOVERY(ALL). If the FCT entries specify RECOVERY(NONE), you must specify CCERR=CONTINUE in the EDMSDIR options module and AllowRecoveryNone in the INITPARM statement for the EDMKOPER module, or specify CCERR=ABEND in the EDMSDIR options module.
- The PowerExchange Agent and then the PowerExchange Logger are currently running.

▶ To start the ECCR, use one of the following methods:

- If you added the EDMKOPER module name to the PLT initialization list (PLTPI), as recommended, start the CICS region.
  The ECCR starts during the third stage of CICS initialization.
- From a CICS terminal or operator console, manually enter the CICS transaction name for the ECCR followed by the INIT keyword. If you use the default transaction name of "EDMC," the syntax is:

  ```
  EDMC INIT
  ```

After you start the ECCR, review the message output in the EDMMSG data set to confirm that change capture successfully initialized. In the following example, message PWXEDM172820I indicates that initialization was successful:

```
Log start
PWXEDM172852I Options in effect:
   Load Library containing EDMSDIR. . . . . : PWXUMB1.DEV.PWXL.USERLIB
   EDMSDIR assembly date/time . . . . . . . : 20131205 20.43
   EDP Rollup . . . . . . . . . . . . . . . : V1020_HF1B05_20180606
   Product distribution date. . . . . . . . : 20180515
   Product distribution level . . . . . . . : 2.4.05
   Agent Id . . . . . . . . . . . . . . . . : PWXA
   Logger Id. . . . . . . . . . . . . . . . : PWXL
   SYSOUT class . . . . . . . . . . . . . . : *
   Action if ECCR error encountered . . . . : Continue
PWXEDM172886I The following Load Module replacements have been installed:
    0----+----1----+----2----+----3----+----4----+----5----+----6----+----7----+----8----+----9----+----
    $$+$$$$+$$$$$$$$$$$$$$$$$$$$$$+$+$$$$+$$$$$$$$$$+$$$$$$$$$$$$$$$$$+$$$$$$$$$$$$$$$$$$$$$$$$$$$$$+$$$
```

```
    100----+----1----+----2----+----3----+----4----+----5----+----6----+----7----+----8----+----9----+----
      $$$$$$$$$$$$$$+$$$$$$$$$$$$+$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
    200----+----1----+----2----+----3----+----4----+----5----+
      $ $+$+$$$$$$+$$$$$$$$$$$$$+$$$$$$$$$$$$$$$$+$++++ ++++++
PWXEDM172818I Joined XCF group 'PWXL' as member 'WB54'
PWXEDM172841I EDM ECCR WB54 connected to EDM Logger PWXL, Log RBA=X'0000040C2E340000'
PWXEDM172820I Change Capture initialized for CICS/VSAM on CICS/TS V5.4.0
PWXEDM172808I Change Capture active for Tag VSAMPWXUMB1.VSAM.EDMVES02 VSAM file PWXUMB1.VSAM.EDMVES02
PWXEDM172808I Change Capture active for Tag VSAMPWXUMB1.VSAM.EDMVES03 VSAM file PWXUMB1.VSAM.EDMVES03
PWXEDM172808I Change Capture active for Tag VSAMPWXUMB1.VSAM.EDMVES04 VSAM file WBRUMB1.VSAM.EDMVES04
PWXEDM172808I Change Capture active for Tag VSAMPWXUMB1.VSAM.EDMVES05 VSAM file WBRUMB1.VSAM.EDMVES05
PWXEDM172841I EDM ECCR WB54 disconnected from EDM Logger PWXL, Log RBA=X'0000040C34A00000'
PWXEDM172818I Left XCF group 'PWXL' as member 'WB54'
PWXEDM172829I EDM ECCR sent 0 records to Logger PWXL (0 change records)
Log end
```

Managing CICS/VSAM CDC

After the CICS/VSAM CDC system is running, you might need to perform occasional management and maintenance tasks to keep CDC running smoothly.

The following list identifies some common tasks:

- Review CICS/VSAM ECCR output.
- Display the VSAM files that are participating in change data capture.
- Stop the CICS/VSAM ECCR .
- Manually reinitialize the CICS/VSAM ECCR after stopping it .
- Stop change capture for all or selected VSAM source data sets.
- Refresh capture registrations for the ECCR after you add or change them.
- Manage VSAM schema changes.

Output from the CICS/VSAM ECCR

The EDMMSG SYSOUT data set contains messages that report some startup options, ECCR processing status, and the number of captured change records by change type at ECCR termination.

The following information is a sample of this report:

```
PWXEDM172852I Options in effect:
              Load Library containing EDMSDIR. . . . . : EDM.AUSL.USERLIB
              EDMSDIR assembly date/time . . . . . . . : 20070406 18.19
              EDP Rollup . . . . . . . . . . . . . . . : V1020_HF1B05_20180606
              Product distribution date. . . . . . . . : 20060831
              Product distribution level . . . . . . . : 2.4.05
              Agent Id . . . . . . . . . . . . . . . . : EDMA
              Logger Id. . . . . . . . . . . . . . . . : EDML
              SYSOUT class . . . . . . . . . . . . . . : *
              Action if ECCR error encountered . . . . : Continue
PWXEDM172830I  CICGLB loaded at 0F2873A8
PWXEDM172811I  XCF is in local mode only
PWXEDM172818I  Joined XCF group 'EDML' as member 'VSM3'
PWXEDM172841I  EDM ECCR VSM3 connected to DETAIL Logger EDML, Log RBA=X'00000001D5E'
PWXEDM172808I  Change Capture active for Tag SOURCE.EDMNAME.VCC1 VSAM file CCV.EDM.VCC1
PWXEDM172841I  EDM ECCR VSM3 disconnected from DETAIL logger EDML,
               Log RBA=X'0000000AED19
PWXEDM172818I  Left XCF group 'EDML' as member 'VSM3'
PWXEDM172829I  EDM ECCR sent 11 records to logger EDML (5 change records)
PWXEDM172809I  Change Capture counts for CCV.EDM.VCC1: Insert=5, Update=0, Delete=0
```

Note: This report can also include message PWXEDM172886I, which identifies any load module replacements that were applied.

Using the EDMC Transaction and Keywords to Manage the CICS/VSAM ECCR

Use the CICS transaction for the CICS/VSAM ECCR with the appropriate keyword to manage the ECCR. By default, the transaction name is "EDMC."

EDMC Syntax

To enter the EDMC transaction from a CICS terminal or operator console, use the following syntax:

```
EDMC keyword
```

EDMC Keyword Descriptions

The following table describes the EDMC keywords that you can specify and their functions:

Keyword	Description
DISPLAY or DISP	Displays the names of the VSAM data sets that are registered for change data capture and that have been opened since the CICS/VSAM ECCR initialized. You can issue the EDMC transaction with this keyword only from a CICS terminal. This information is then displayed at the terminal.
EXITPGMS or XPGM	Lists all of the exit programs that are defined at the CICS task-related exit point and global user exit points that PowerExchange uses for CICS/VSAM CDC.
HELP	Displays a help panel that describes the valid EDMC keywords for the CICS/VSAM ECCR. You can issue the EDMC transaction with the HELP keyword only from a CICS terminal. This information is then displayed at the terminal.
INITIALIZE or INIT	Initializes CICS/VSAM ECCR in the CICS region. Also dynamically adds the PowerExchange exit programs that run at the CICS task-related user exit point and global user exit points that PowerExchange uses for CICS/VSAM CDC. Usually, the ECCR is started by adding the EDMKOPER module name to the PLT initialization list. The ECCR then starts automatically in the third stage of CICS initialization. **Warning:** If you have exit programs that run at the same CICS global exit points as the CICS/VSAM ECCR exit programs, do not use the INIT keyword. Otherwise, the CICS/VSAM ECCR exit programs might get control in the improper order, causing change capture problems.
OPTIONS or OPTS	Displays the CICS/VSAM CDC override options that are currently specified in the EDMKOVRD DD statement in the CICS region startup JCL or in the data set to which this DD statement points.
REFRESH or REFR	Refreshes the display of the CICS/VSAM CDC override options that are currently specified in the EDMKOVRD DD statement in the CICS region startup JCL or in the data set to which this DD statement points. Also validates these options and identifies any syntax errors. Use this keyword after you change the override options to identify any syntax errors.
RESTART or REST	Re-initializes the CICS/VSAM ECCR in the CICS region by issuing the EDMC TERM command followed by the EDMC INIT command. Use this keyword after changing any of the CDC override options in the EDMKOVRID DD statement or data set for your changes to take effect.
TERMINATE or TERM	Immediately stops the CICS/VSAM ECCR that is running in the CICS region, thereby stopping change data capture for all of the open VSAM source data sets. Also dynamically removes the PowerExchange exit programs that run at the CICS task-related user exit point and global use exit points that PowerExchange uses for CICS/VSAM CDC. **Tip:** If you need to stop capturing changes only for a single VSAM file, deactivate or delete the corresponding capture registration. Then close and reopen the VSAM file in CICS.

For more information, see the *PowerExchange Command Reference*.

RELATED TOPICS:

- "CICS/VSAM CDC Use of CICS Global and Task-Related Exit Points" on page 170

Displaying the VSAM Data Sets from Which Changes Are Captured

Use the EDMC transaction with the DISPLAY or DISP keyword to display the VSAM data sets from which changes are being captured.

From a CICS terminal, enter the transaction:

```
EDMC DISP
```

The following sample output indicates that no VSAM files are participating in change data capture:

```
EDMC DISP           PWXEDM CICS/VSAM Change Capture         Init Date: 09/15/16
ID: CT41              Participating Files Display                Time: 01:14:56
                                                                 (During
PLTPI)
 File Name     Dataset Name                         Type   Warn/Error

 No files are currently participating in CICS/VSAM Change Capture
```

The following sample output indicates that six VSAM data sets that are participating in change capture, but three data sets are not participating because the `DSN=dataset_name,NOCAPTURE` override is specified for them in the EDMKOVRD DD data set:

```
EDMC DISP            PWXEDM CICS/VSAM Change Capture        Init Date: 02/22/17
ID: CT52               Participating Files Display               Time: 23:27:53

File Name     Data set Name                             Type   Warn/Error
DFHCSD        <<EDM File Open currently in progress>>
EDMFIL01      PWX.VSAM.EDMVES01                         ESDS
EDMFIL02      PWX.VSAM.EDMVES02                         KSDS   NoCapture
EDMFIL03      PWX.VSAM.EDMVES03                         ESDS
EDMFIL05      PWX.VSAM.EDMVES05                         KSDS   NoCapture
EDMFIL06      PWX.VSAM.EDMVES06                         KSDS   NoCapture
EDMFIL07      PWX.VSAM.EDMVES07                         ESDS
EDMFIL08      PWX.VSAM.EDMVES08                         ESDS
EDMFIL09      PWX.VSAM.EDMVES09                         ESDS
EDMFIL10      PWX.VSAM.EDMVES10                         ESDS   Rcv(None)
```

This PWXEDM CICS/VSAM Change Capture report includes the following fields:

- **Init Date**. The date, in mm/dd/yy format, on which the ECCR initialized.
- **ID**. The ECCR name.
- **Time**. The time, in hh:mm:ss format, at which the ECCR initialized.
- **File Name**. The names of the VSAM files that participate in change data capture.
- **Dataset Name**. The fully-qualified data set names of the VSAM source data sets that participate in change data capture.
- **Type**. The type of VSAM data set. Valid values are:
  - **KSDS**. A key-sequenced data set.
  - **ESDS**. An entry-sequenced data set.
  - **RRDS**. A relative record data set (RRDS) or variable-length relative record data set (VRRDS).
  - **Path**. An alias path to a VSAM data set.
  - **P/AX**. A CICS alternate index (AIX) path to a VSAM data set.

- **Warn/Error**. A warning or error flag. Valid values are:
  - **(During PLTPI)**. Indicates the ECCR automatically initialized during the third stage of CICS initialization because you specified the EDMKOPER module name in the PLT initialization list.
  - **NoCapture**. Indicates that the data set is not participating in change capture because the `DSN=`*`dataset_name`*`,NOCAPTURE` or `CAPTURE_`*`vsam_dataset_type`*`=OFF` override option is specified in the EDMKOVRD DD statement in the CICS region startup JCL or in the data set to which the DD statement points.
  - **Rcv (None)**. Indicates that the VSAM file was defined as RECOVERY(NONE). This RECOVERY option is allowable if you specify CCERR=CONTINUE in the EDMSDIR options module and AllowRecoveryNone in the INITPARM for EDMKOPER, or if you specify CCERR=ABEND in the EDMSDIR options module.
  - **Reg Err**. Indicates that the change capture status of the VSAM data set cannot be determined. The capture registration for the VSAM data set might have an error.

Changing CDC Override Options for VSAM Data Sets

You can change the CDC override options in the //EDMKOVRD DD statement in the CICS startup JCL or in the data set to which the DD statement points while the CICS/VSAM ECCR is active.

For example, you might want to enable or disable change data for a VSAM data set type or a specific data set.

For KSDS and RRDS data sets and CICS-maintained tables, change data capture is enabled by default. You can disable change data capture for any of these source types, even if data sets of the specified type are registered for CDC, by specifying OFF for the following options:

- CAPTURE_KSDS
- CAPTURE_RRDS
- CAPTURE_CMDT

For ESDS data sets, change data capture is disabled by default. To enable change data capture for ESDS data sets, you must specify CAPTURE_ESDS=ON. You can also customize ECCR handling of backouts for ESDS data sets by specifying the optional BACKOUTRC and ESDSFAIL override options.

For a specific VSAM data set, you can use the DSN option to enable or disable change data capture or override the default backout handling.

For more information about all of these options, see "Configuring CICS for CDC" on page 173.

After you change CDC override options, issue the EDMC REFRESH command to validate the syntax. If syntax errors are reported, correct them.

Then issue the EDMC RESTART command to re-initialize the CICS/VSAM ECCR so that the ECCR can start using the updated CDC override options.

Note: After you issue the RESTART command, the CICS/VSAM ECCR will be momentarily inactive between ECCR termination and re-initialization. If you issue the command during a period of high file I/O activity, the ECCR might miss some change data, which can damage data integrity.

Migrating an ESDS Data Set from VSAM Batch CDC to CICS/VSAM CDC

If you previously used PowerExchange batch VSAM CDC to capture change data from VSAM ESDS data sets, you can migrate these data sets to CICS/VSAM CDC to capture change data records in an online CICS Transaction Server environment.

Perform the following migration steps:

1. In the PowerExchange Navigator, create a capture registration for the source ESDS data set.
2. Verify that the RDO definitions for the CICS fields that are associated with the registered ESDS data set are defined with RECOVERABLE(BACKOUTONLY) or RECOVERABLE(ALL) option.
3. Define CICS/VSAM ECCR override options, as needed, in the //EDMKOVRD DD statement of the CICS startup procedure or in the data set to which this DD statement points. To capture data from ESDS data sets, you must at least define the CAPTURE_ESDS=ON option.
4. Restart the CICS/VSAM ECCR in one of the following ways:
   - Restart the CICS region.
   - Issue the EDMC RESTART command.
   - Issue the EDMC REFRESH command.

Stopping the CICS/VSAM ECCR

Use the EDMC transaction with the TERM keyword to stop the CICS/VSAM ECCR.

To enter the transaction from a CICS terminal or operator console, use the following syntax:

```
EDMC TERM
```

The ECCR stops immediately and no longer captures changes for all VSAM source data sets in the CICS environment.

The EDMMSG SYSOUT data set displays messages that report the number of records sent to the PowerExchange Logger and the number of change operations by type that the were captured since the last time the VSAM data set was opened.

Stopping Change Capture for a Specific VSAM Data Set

To stop change data capture for a specific VSAM source data set, deactivate or delete its capture registration and close the VSAM data set.

1. Stop updates to the VSAM source data set.
   If you do not stop update activity, you might lose in-flight changes when you close the VSAM data set.
2. Close the VSAM data set in the CICS region.
3. Delete the capture registration and associated extraction map, or set the **Status** option in the registration to **History**.

   Note: You cannot reactivate the registration for change capture later.

The CICS/VSAM ECCR no longer captures changes for the data set.

Refreshing Capture Registrations for the ECCR

If you add or change capture registrations for VSAM sources, you must refresh the registrations for the CICS/VSAM ECCR to use them.

1. Close and reopen the VSAM file.

   Note: If you defined the file to open when it is referenced, the registrations in the CICS/VSAM ECCR are refreshed the next time the VSAM file is referenced.
2. If you configured the capture registrations to use PowerExchange Condense, start or restart the PowerExchange Condense task.

Managing VSAM Schema Changes

If you need to change the record layout of a VSAM source data set, use this procedure to retain access to previously captured data while capturing data of the new format.

1. Stop updates to the VSAM source file.
2. Close the VSAM file in the CICS region.
3. If you use PowerExchange Condense, verify that PowerExchange Condense has extracted all data from the PowerExchange Logger log files.
4. Complete extraction processing of all captured changes based on the existing extraction map.
5. In the VSAM capture registration, set the **Status** option to **History**.
6. Change the VSAM file structure.
7. Delete the extraction map.
8. Create a data map for the altered VSAM data set.
9. Create a capture registration using the new data map.
10. Open the VSAM file in the CICS region.
11. Allow updates to be made the VSAM data set again.

CHAPTER 9

Datacom Table-Based Change Data Capture

This chapter includes the following topics:

Datacom Table-Based CDC Overview

PowerExchange table-based change data capture (CDC) for Datacom captures changes asynchronously from Datacom CDC tables.

PowerExchange works with the Datacom Change Data Capture feature. When Change Data Capture is enabled in Datacom, Datacom records changes in its CDC tables, TSN and MNT. The table-based ECCR listens for changes to the CDC tables and writes the change data to the PowerExchange Logger for z/OS.

Relationships with Other PowerExchange Components

The Datacom table-based ECCR uses other PowerExchange components such as the PowerExchange Logger and the PowerExchange Agent. Consider the following requirements:

- The Datacom table-based ECCR logs all changes to a single PowerExchange Logger. The PowerExchange Logger and PowerExchange Agent must run on the same MVS system as the Datacom table-based ECCR.
- The PowerExchange Logger stores the changes in its log files. The PowerExchange Logger archives active logs when they become full. You must monitor the PowerExchange Logger to ensure that the archiving process keeps pace with the data flow.

  If the PowerExchange Logger uses all available active log space, the Datacom table-based ECCR enters a wait state until the PowerExchange Logger archival process makes active log space available.

Implementing Datacom Table-Based CDC

Complete the following tasks to implement Datacom table-based CDC:

1. "Configuring Datacom for CDC" on page 185.
2. "Configuring the Datacom Table-Based ECCR" on page 186.
3. "Starting the Datacom Table-Based ECCR" on page 198.

Architectural Overview

This overview describes the Datacom and PowerExchange components that are involved in Datacom table-based CDC.

Datacom CDC Components

The following Datacom components are involved in CDC:

- Source Multi-User Facility (MUF) in which the transactions occur.
- Target MUF that contains the Datacom CDC tables, if different from the source MUF.
- Datacom CDC tables with the change data.
- Programs that capture change data and monitor CDC execution.

For more information about these components, see the *CA Datacom/DB Database and System Administrator Guide*.

Source MUF

The source MUF is the Datacom MUF in which the inserts, updates, and deletes occur and are written to the Log Area (LXX) file.

For CDC purposes, any MUF configuration that shares a single LXX file is considered a source MUF, including the following types of MUFs:

- A single MUF
- A MUFPLEX consisting of multiple MUFs that share a single LXX file
- A MUF with a shadow MUF

Target MUF

The target MUF contains the CDC tables. A program supplied with Datacom captures the changes in the LXX file in the source MUF and records the changes in the CDC tables in the target MUF.

The target MUF can match, or differ from, the source MUF.

Datacom CDC Tables

Datacom provides the following tables for CDC:

- TSN (transaction sequence number). Each row of the TSN table defines the boundaries of a unit of work.
- MNT (maintenance records). The rows of the MNT table contain the change data.

Datacom CDC Programs

Datacom provides or defines the following programs for CDC:

- CDC listener program (CDCL). This program monitors the LXX in the source MUF and writes the change data to the CDC tables in the target MUF. The program runs within the target MUF address space. This program is provided with Datacom.
- CDC user listener program (CDCU). This program detects, processes, and deletes committed records in the TSN and MNT tables. PowerExchange uses this program interface to capture change data.
- CDC monitor program (CDCM). This program monitors the CDCL and the CDCU. The task runs within the source MUF address space. This program is provided with Datacom.

Datacom Table-Based ECCR

The Datacom table-based ECCR is a PowerExchange component that functions as the Datacom CDCU program.

The Datacom table-based ECCR performs the following functions:

- Reads change data from the TSN and MNT tables.
- Writes change data to the PowerExchange Logger for z/OS.
- Removes records from the CDC tables that have been committed to the PowerExchange Logger for z/OS.

The PowerExchange CDC components run in a separate address space from the target MUF.

Configuring Datacom for CDC

Before PowerExchange can capture changes to Datacom tables, you must configure the following Datacom MUF startup options:

CDC

Enables the Datacom Change Data Capture feature and defines this MUF as a source MUF. By default, this option also starts the CDCM subtask in the MUF. You can specify this option during MUF startup only. You cannot specify CDC through the console.

CDC_BASE

Enables the specified database or databases for CDC. You can specify CDC_BASE during MUF startup or through the console.

CDC_TABLE

Enables the specified database or databases for CDC. You can specify CDC_TABLE during MUF startup or through the console.

CDCL

Enables the CDCL task. Specify the following parameters:

- *name* specifies the MUF in which CDCL is enabled, the CDC target MUF.
- *control_ID* specifies the version identifier of the Datacom CDC tables. If you specify a value other than A, specify the same value for the CDC_ID ECCR parameter.

  You can specify this option during MUF startup only. You cannot specify CDCL through the console.

CDCL_DBID

Specifies the database ID where the CDCL runs. If you specify a value other than 2009, be sure to specify the same value for the CDC_BASE ECCR parameter. You can specify CDCL_DBID during MUF startup or through the console.

For more information about MUF startup options, console commands, and Datacom CDC operation, see the *CA Datacom/DB Database and System Administrator Guide*.

Note: Before starting CDC, ensure that the CDC tables are adequately sized for your environment. For more information, see your CA Datacom documentation.

Configuring the Datacom Table-Based ECCR

Before starting the Datacom table-based ECCR, you must configure the ECCR parameters and JCL.

Datacom Table-Based ECCR Parameters

Configure parameters for the Datacom table-based ECCR in the RUNLIB(ECCRDCMP) member to which the DTLCACFG DD statement in the ECCR JCL points.

Based on your input during installation, the z/OS Installation Assistant adds values for some parameters to the ECCRDCMP member. You can change these values if necessary.

The ECCRDCMP member can contain the following parameters:

```
MUF=muf_name
[REG_MUF=registered_muf_name]
[NO_DATA_WAIT=seconds]
[NO_DATA_WAIT2=seconds]
ECCRNAME=eccr_name
DB_TYPE=DCM
[COLDSTART={Y|N}]
[CLEANUP={Y|N}]
[CLEANUP_INTERVAL=seconds]
[CDC_BASE=dbid]
[CDC_ID=A]
[CAPT_STATS={Y|N}]
[CAPT_STATS_INTVL=minutes]
[CAPT_STATS_TERSE={Y|N}]
[CLEANUP_STATISTICS={Y|N}]
[LOCAL_TIME={Y|N}]
[MONITOR={Y|N}]
[MONITOR_INTERVAL=seconds]
[ON_SUSPENSION_ERROR_CONTINUE={N|Y}]
[REFRESH_ALLOWED={Y|N}]
[RESTART_ADVANCE_ACTIVE=number_of_records]
```

The following table summarizes the Datacom table-based ECCR parameters:

Parameter	Required or Optional	Description
MUF	Required	The name of the Datacom MUF for which change data is captured. This parameter is customized by the z/OS Installation Assistant.
REG_MUF	Optional	The Datacom MUF name that is defined in the registration group for the Datacom source. Use this parameter if you want to use the capture registrations defined for a MUF other than the one specified in the MUF parameter. This parameter can be customized by the z/OS Installation Assistant.
NO_DATA_WAIT	Optional	The number of seconds that the ECCR waits after reading the Datacom CDC tables and finding no new change records before starting the next read operation. If the ECCR completes the next read operation without having read new changes, the NO_DATA_WAIT2 parameter takes effect. This parameter can be customized by the z/OS Installation Assistant.
NO_DATA_WAIT2	Optional	After the NO_DATA_WAIT interval is no longer in effect, the number of seconds that the Datacom table-based ECCR waits after reading the Datacom CDC tables and finding no new change records before trying the read again. The NO_DATA_WAIT2 wait and retry cycle remains in effect as long as no changes are received. This parameter can be customized by the z/OS Installation Assistant.
ECCRNAME	Required	The ECCR name.
DB_TYPE	Required	The database type, which must be DCM for Datacom.
COLDSTART	Optional	Controls whether the ECCR cold starts or warm starts.
CLEANUP	Optional	Controls whether the PowerExchange cleanup subtask periodically removes changes that were committed to the PowerExchange Logger from the Datacom CDC tables. This parameter can be customized by the z/OS Installation Assistant.
CLEANUP_INTERVAL	Optional	The number of seconds that the cleanup subtask waits before removing committed changes from the Datacom CDC tables. This parameter can be customized by the MVS Installation Assistant.
CDC_BASE	Optional	The database identifier (DBID) for the source database. This parameter can be customized by the z/OS Installation Assistant.
CDC_ID	Optional	The version identifier of the Datacom CDC tables.

Parameter	Required or Optional	Description
CAPT_STATS	Optional	Controls whether PowerExchange writes ECCR statistics messages to the DTLLOG and DTLOUT data sets and WTO messages to the system operator console when the Datacom table-based ECCR reaches the end of the change stream in the Datacom CDC tables.
CAPT_STATS_INTVL	Optional	The interval, in minutes, for which the Datacom table-based ECCR collects and reports the number of inserts, deletes, updates, and commits that were captured from the change stream. The ECCR also reports the current point in the change stream.
CAPT_STATS_TERSE	Optional	Controls whether the Datacom table-based ECCR prints PWX-06153 statistics messages only for registered sources for which the ECCR captured changes.
CLEANUP_STATISTICS	Optional	Controls whether the PowerExchange cleanup subtask issues detailed messages with statistics that help you determine the progress of the cleanup process relative to the main CDC reader process.
LOCAL_TIME	Optional	Controls whether the time stamps that the ECCR assigns to change records use the local time instead of the Coordinated Universal Time (UTC) time that Datacom uses.
MONITOR	Optional	Controls whether the ECCR starts another process to monitor and detect a hang in the CA Datacom API in the main ECCR reader process or in the ECCR cleanup process. Also, if cleanup is active, the monitor process detects any hang that might occur in the ECCR cleanup wait routine.
MONITOR_INTERVAL	Optional	If you set MONITOR to Y, the number of seconds between each monitoring check.
ON_SUSPENSION_ERROR_CONTINUE	Optional	If you use the PWXUCREG utility to suspend and reactivate capture registrations, controls whether the ECCR ends or continues when a UOW that contains change records to be discarded or captured started at an invalid point in the change stream relative to the suspension window.
REFRESH_ALLOWED	Optional	Controls whether you can use the REFRESH command after adding or deleting capture registrations or after suspending or reactivating capture registrations with the PWXUCREG utilty. The REFRESH command refreshes the list of registered Datacom records that the ECCR uses for change capture processing.
RESTART_ADVANCE_ACTIVE	Optional	The number of change records that an active Datacom ECCR processes after a special restart UOW before writing another updated special UOW to the PowerExchange Logger.

Note: If a parameter has a default value, it is marked as optional. A default value is the value that PowerExchange uses if the parameter is not defined. For some parameters, the z/OS Installation Assistant provides recommended values, which you can accept or change.

More detailed parameter descriptions follow.

CAPT_STATS Parameter

Controls whether PowerExchange writes ECCR statistics messages to the DTLLOG and DTLOUT data sets and WTO messages to the system operator console when the Datacom table-based ECCR reaches the end of the change stream in the Datacom CDC tables.

The ECCR issues PWX-06153 messages that report the number of inserts, deletes, and updates that were captured for each registration, grouped change stream read. The WTO messages indicate that the end of the change stream was reached and provide the capture counts.

Related Parameters: CAPT_STATS_INTVL, CAPT_STATS_TERSE

Syntax:

```
CAPT_STATS={N|Y}
```

Valid Values:

- **N**. Do not write the ECCR capture statistics messages to the DTLLOG and DTLOUT data sets and WTO capture count messages when the ECCR finishes processing the change stream.
- **Y**. Write the ECCR capture statistics messages to the DTLLOG and DTLOUT data sets and WTO capture count messages when the ECCR finishes processing the change stream.

Default is N.

Usage Notes:

- If you do not set the global CAPT_STATS parameter to Y, you can issue to STATISTICS ON command after the ECCR is started to enable statistics reporting for each ECCR change stream read of the Datacom CDC tables.
- If you also specify the CAPT_STATS_INTVL parameter or run the STATISTICS *minutes*, the ECCR also reports the total number of inserts, deletes, updates, and commits for the each interval.

For more information about the STATISTICS command and its parameters, see the *PowerExchange Command Reference*.

CAPT_STATS_INTVL Parameter

The interval, in minutes, for which the Datacom table-based ECCR collects and reports change capture statistics.

If you specify an interval, the ECCR prints a PWX-06181 message each time the interval elapses. The message reports the total number of inserts, deletes, updates, and commits that the ECCR processed during the interval.

You can use this ECCR parameter to print statistics messages at a specific frequency, for example, every 60 minutes.

For the ECCR to print capture statistics, you must set the CAPT_STATS parameter to Y in the RUNLIB(ECCRDCMP) member or run the ECCR STATISTICS ON command.

Related Parameters: CAPT_STATS, CAPT_STATS_TERSE

Syntax:

```
CAPT_STATS_INTVL=minutes
```

Value: For the *minutes* variable, enter a number from 1 through 1440. No default is provided.

Usage Notes:

- If you set the CAPT_STATS_INTVL parameter to 0, PowerExchange issues the error message PWX-00967.

- After you start the ECCR, message PWX-07805 identifies the collection interval that is defined.
- If you issue the `STATISTICS minutes` command, the number of minutes that is specified in the command overrides the CAPT_STATS_INTVL value for the duration of the ECCR run.

CAPT_STATS_TERSE Parameter

Controls whether the Datacom table-based ECCR prints PWX-06153 messages only for registered sources for which the ECCR captured changes. If no inserts, updates, or deletes occurred on a registered source, the ECCR does not report capture counts for it.

A PWX-06153 message reports the number of inserts, deletes, and updates that were captured for a registered source. The message is printed when the ECCR reaches the end of the change stream in the Datacom CDC tables and at the end of the ECCR run.

For the ECCR to print statistics, you must set the CAPT_STATS=Y parameter in the RUNLIB(ECCRDCMP) member or run the ECCR STATISTICS ON command.

Related Parameters: CAPT_STATS, CAPT_STATS_INTVL

Syntax:

```
CAPT_STATS_TERSE={N|Y}
```

Valid Values:

- **N**. Print statistics for all registered sources, including sources without any change activity.
- **Y**. Print statistics only for the registered sources for which the ECCR captured changes.

Default is N.

Usage Notes:

- If you set the CAPT_STATS_TERSE parameter to N and then issue the STATISTICS SINCE TERSE command, the TERSE option in the command overrides the CAPT_STATS_TERSE setting for the SINCE period. PWX-06153 messages are then printed only for registered sources for which changes were captured.

CDC_BASE Parameter

The database identifier for the Datacom database that contains the change data to capture.

Syntax:

```
CDC_BASE={2009|dbid}
```

Value: For the *dbid* variable, enter a Datacom database identifier. This value must match the value that you specify in the CDCL_DBID startup option.

Default is 2009. This is the DBID that Datacom uses by convention. If you use a DBID other than 2009 at your site, use the Datacom MUF CDCL_DBID startup option to assign the DBID to the CDC database.

CDC_ID Parameter

The version identifier for the Datacom CDC tables.

Syntax:

```
CDC_ID={A|version_id}
```

Value: For the *version_id* variable, enter the version identifier of the Datacom CDC tables. This value must match the value that you specify in the Datacom MUF CDCL startup option.

Default is A.

Usage Notes: If the format of the Datacom CDC tables changes in a later Datacom release, you must assign the new version identifier.

CLEANUP Parameter

Controls whether the PowerExchange cleanup subtask starts at a specified interval to remove changes from the Datacom CDC MNT and TSN tables that were committed to the PowerExchange Logger logs.

Related Parameters: CLEANUP_INTERVAL

Syntax:

```
CLEANUP={N|Y}
```

Valid Values:

- **Y**. Starts the cleanup subtask after the interval that is specified in the CLEANUP_INTERVAL parameter.
- **N**. The cleanup subtask does not start.

Default is Y.

Usage Notes: Use this parameter to prevent the Datacom CDC tables from becoming full.

CLEANUP_INTERVAL Parameter

The number of seconds that the cleanup subtask waits before removing change data from the Datacom CDC tables that has been committed to the PowerExchange Logger logs.

You must also define `CLEANUP=Y` for the cleanup subtask to connect to the Datacom MUF and remove change data from the Datacom CDC tables that has been committed to the PowerExchange Logger logs. The cleanup subtask then waits for the CLEANUP_INTERVAL interval again before doing another cleanup run.

Related Parameters: CLEANUP

Syntax:

```
CLEANUP_INTERVAL={300|seconds}
```

Value: For the seconds variable, enter a number of seconds greater than 0.

Default is 300.

CLEANUP_STATISTICS Parameter

Controls whether the PowerExchange cleanup subtask issues detailed messages with statistics that help you determine the progress of the cleanup process relative to the main CDC reader process.

Related Parameters: MONITOR, MONITOR_INTERVAL

Syntax:

```
CLEANUP_STATISTICS={Y|N}
```

Valid Values:

- **Y**. Issue detailed messages about the progress of the cleanup task.
- **N**. Do not issue detailed messages about the progress of the cleanup task.

Default is N.

Usage Notes: This parameter helps you determine the progress of the cleanup process relative to the main CDC reader process, that is, how far behind the cleanup process it. Use this parameter if you have concerns with the performance of the ECCR cleanup task or if the ECCR appears to hang.

COLDSTART Parameter

Controls whether the Datacom table-based ECCR cold starts or warm starts.

Syntax:

```
COLDSTART={N|Y}
```

Valid Values:

- **N**. The ECCR warm starts. Change capture starts from where it last left off without loss of data.
- **Y**. The ECCR cold starts. Change capture starts from the oldest record in the Datacom CDC tables.

Default is N.

DB_TYPE Parameter

Required. The database type.

Syntax:

```
DB_TYPE=DCM
```

Value: The value must be "DCM" for the Datacom table-based ECCR.

ECCRNAME Parameter

Required. A name for the Datacom table-based ECCR.

Syntax:

```
ECCRNAME=eccr_name
```

Value: For the *eccr_name* variable, enter a 1- to 8-character alphanumeric string.

No default. However, the z/OS Installation Assistant generates an ECCR name that begins with the **PowerExchange Agent / Logger Prefix** value followed by DCMEC, for example, PWXDCMEC.

Usage Notes:

- The ECCR uses this parameter value for the following purposes:
  - To connect to the PowerExchange Logger to write change data
  - As the member name that joins the XCF group of the PowerExchange Logger
  - As part of the ECCR-UOW field in the control information for each change record that is written to PowerExchange Logger log files
- If you change the ECCRNAME value, the ECCR cannot warm start from where it last left off.
- The ECCR name must be unique within a PowerExchange Logger group.
- Informatica recommends that you use the same value for the ECCRNAME parameter and the Datacom ECCR started task or job name. This practice lets you to easily identify the Datacom ECCR when reviewing messages and data from the PowerExchange Logger.

LOCAL_TIME Parameter

Optional. Controls whether the time stamps that the Datacom table-based ECCR uses to indicate when database changes occurred use the local time or Coordinated Universal Time (UTC) time.

ECCR time stamps indicate when changes were made in the database. They do not indicate when the ECCR captured the changes.

Syntax:

```
LOCAL_TIME={N|Y}
```

Valid Values:

- **N**. The ECCR time stamps use UTC time values based on the Datacom UTC time stamps in change records.
- **Y**. The ECCR time stamps use local time values based on the Datacom SQL time stamps in the change records.

Default is N.

MONITOR Parameter

The MONITOR parameter controls whether the ECCR starts another process to monitor and detect a hang in CA Datacom or in the ECCR cleanup wait routine.

Related Parameters: CLEANUP_STATISTICS, MONITOR_STATISTICS

Syntax:

```
MONITOR={Y|N}
```

Valid Values:

- **Y**. Starts the monitoring process.
- **N**. The monitoring process is not started.

Default is N.

Usage Notes: The monitoring process monitors and detects the following critical events:

- A hang in CA Datacom when the Datacom API is invoked from the cleanup process
- A hang in CA Datacom when the Datacom API is invoked from the main CDC reader process
- A hang in the ECCR cleanup wait routine

MONITOR_INTERVAL Parameter

If monitoring is enabled, MONITOR_INTERVAL specifies the number of seconds between each monitor check.

If you define `MONITOR=Y`, the MONITOR_INTERVAL parameter specifies the number of seconds between each monitor check.

Related Parameters: CLEANUP_STATISTICS, MONITOR

Syntax:

```
MONITOR_INTERVAL={600|seconds}
```

Value: For the seconds variable, enter a number of seconds greater than 0.

Default is 600, which is twice the default value of CLEANUP_INTERVAL. If you specify a value for MONITOR_INTERVAL that is less than twice the value of CLEANUP_INTERVAL, the ECCR assigns

MONITOR_INTERVAL the value of twice the CLEANUP_INTERVAL value. This precaution prevents the monitoring process from falsely detecting a hang situation.

MUF Parameter

Required. The name of the Datacom MUF for which change data is captured.

Related Parameters: REG_MUF

Syntax:

```
MUF=muf_name
```

Value: For the *muf_name* variable, enter the name of the Datacom MUF from which the ECCR captures change data.

This name must match the internal MUF name that is recorded as part of the key data in the Datacom CDC TSN table. This value also must match the MUF name in the registration group that you defined in the PowerExchange Navigator, unless the REG_MUF parameter specifies a different MUF value.

No default.

NO_DATA_WAIT Parameter

The number of seconds that the Datacom table-based ECCR waits after it reads the Datacom CDC tables and finds no new changes before starting the next read operation.

During the next read operation, if the ECCR still finds no changes, the NO_DATA_WAIT2 interval takes effect.

Related Parameters: NO_DATA_WAIT2

Syntax:

```
NO_DATA_WAIT={60|seconds}
```

Value: For the *seconds* variable, enter a number of seconds greater than 0.

Default is 60.

Usage Notes: During the wait interval, the ECCR waits simultaneously for console input.

NO_DATA_WAIT2 Parameter

After the NO_DATA_WAIT interval is no longer in effect, the number of seconds that the Datacom table-based ECCR waits after reading the Datacom CDC tables and finding no new change records before doing another read operation.

During a subsequent read operation, if the ECCR finds changes, the NO_DATA_WAIT interval takes effect again. If the ECCR does not find changes, it waits for the NO_DATA_WAIT2 interval and then tries the read again. The ECCR continues to wait for the NO_DATA_WAIT2 interval and retry the read on an ongoing basis, as long as no changes are available.

Related Parameters: NO_DATA_WAIT

Syntax:

```
NO_DATA_WAIT2={600|seconds}
```

The z/OS Installation Assistant enters 999 for this parameter in the ECCR configuration member unless you specify another value. If this parameter is not defined, the default of 600 is used.

Value: For the *seconds* variable, enter a number of seconds greater than 0.

Default is 600.

Usage Notes: During the wait interval, the ECCR waits simultaneously for input from the console.

ON_SUSPENSION_ERROR_CONTINUE Parameter

Optional. If you use the PWXUCREG utility to suspend and reactivate capture registrations, controls whether the Datacom table-based ECCR ends or continues when a UOW that contains change records to be discarded or captured started at an invalid point in the change stream relative to the suspension window.

Syntax:

```
ON_SUSPENSION_ERROR_CONTINUE={N|Y}
```

Valid Values:

- **N**. The ECCR issues an error message and ends.
- **Y**. The ECCR issues a warning and continues processing.

Default is N.

Usage Notes: If you use the PWXUCREG utility, this parameter controls whether the ECCR ends or continues in the following situations:

- When discarding change records for a suspended registrations, the ECCR determines that the associated UOW started before the beginning of the suspension window.
- When capturing change records for an activated registration, the ECCR determines that the associated UOW started before the end of the suspension window.

The suspension window is the time period between the suspension timestamp and reactivation timestamp. For more information about the PWXUCREG utility, see the *PowerExchange Utilities Guide*.

REG_MUF Parameter

The Datacom MUF name that you specified in the registration group for the Datacom source.

This parameter value can be the same as or different from the MUF parameter value. The ECCR uses the REG_MUF parameter to read capture registrations, and uses the MUF parameter to read change data from the Datacom CDC tables.

Related Parameters: MUF

Syntax:

```
REG_MUF=registered_muf_name
```

Value: For the *registered_muf_name* variable, enter the name of the Datacom MUF that you entered in the registration group from the PowerExchange Navigator.

Default is the MUF parameter value.

Usage Notes: Define the REG_MUF parameter if you want to use capture registrations that were created for one MUF to capture changes from a different MUF. For example, if you have test and production MUFs that have capture active for the same tables, you can use the same registrations for those tables.

REFRESH_ALLOWED Parameter

Controls whether PowerExchange users can issue the ECCR REFRESH command. This command refreshes the list of Datacom records with active capture registrations that the Datacom table-based ECCR uses to capture change data.

When this parameter is set to Y, users can issue the REFRESH command after adding or deleting capture registrations or after suspending or reactivating capture registrations with the PWXUCREG utilty. The REFRESH command updates the list of registered sources that the ECCR uses, without shutting down and restarting the ECCR.

Syntax:

```
REFRESH_ALLOWED={N|Y}
```

Valid Values:

- **N**. Do not allow users to issue the REFRESH command. This option is intended for users of PowerExchange versions earlier than 9.5.0, when the REFRESH command was not available. This option maintains the previous behavior, which requires a restart of the ECCR after registration changes.
- **Y**. Allow users to issue the REFRESH command.

Default is N.

RESTART_ADVANCE_ACTIVE Parameter

The number of change records that an active Datacom table-based ECCR processes after a special restart UOW, before it writes another updated special UOW to the PowerExchange Logger.

This value can affect how far back the PowerExchange Logger searches for the restart point when the ECCR is restarted.

Syntax:

```
RESTART_ADVANCE_ACTIVE=number
```

Valid Values: Enter a number from 1 to 10000. Default is 10000.

Usage Notes: When the ECCR is inactive and waiting for work, PowerExchange updates the special UOW before each NO_DATA_WAIT2 cycle.

JCL for the Datacom Log-Based ECCR

To configure the JCL for the Datacom log-based ECCR, edit the ECCRDCM member in the PowerExchange RUNLIB data set.

The JCL in the ECCRDCM member contains the following statements:

```
//*********************************************************************
//*                                                                   *
//* RUN DETAIL DATACOM TABLE BASED ECCR                               *
//*                                                                   *
//*********************************************************************
//ECCRAD1  EXEC PGM=DTLCCDCR,REGION=50M
//STEPLIB   DD  DISP=SHR,DSN=&HLQ..LOADLIB
//          DD  DISP=SHR,DSN=&HLQ..LOAD
//          DD DSN=&DCOMCAI,
//          DISP=(SHR)
//          DD DSN=&DCOMSPL,
//          DISP=(SHR)
//          DD DSN=&DCOMLOAD,
//          DISP=(SHR)
//          DD DSN=&DCOMCUST,
//          DISP=(SHR)
//          DD DSN=&DCOMIPC,
```

```
//          DISP=(SHR)
//CXX       DD DSN=&DCOMCXX,
//          DISP=(SHR)
//EDMPARMS  DD  DISP=SHR,DSN=&HLQEDM..&LOGGER&SUFFIX..USERLIB
//DTLCFG    DD  DISP=SHR,DSN=&RUNLIB(DBMOVER)
//DTLKEY    DD  DISP=SHR,DSN=&RUNLIB(LICENSE)
//DTLCACFG  DD  DISP=SHR,DSN=&RUNLIB(ECCRDCMP)
//DTLAMCPR  DD  DISP=SHR,DSN=&HLQVS..CCT
//DTLMSG    DD  DISP=SHR,DSN=&HLQ..DTLMSG
//* IF USING MESSAGE OVERRIDE THEN CUSTOMIZE BELOW
//*DTLMSGO DD DISP=SHR,DSN=&RUNLIB(DTLMSGO)
//*
//DTLLOG    DD  SYSOUT=*
//DTLLOG01  DD  SYSOUT=*
//SYSUDUMP  DD  SYSOUT=*
//SYSOUT    DD  SYSOUT=*
//SYSPRINT  DD  SYSOUT=*
//EDMMSG    DD  SYSOUT=*
//CEEDUMP   DD  SYSOUT=*
```

Statement Descriptions:

EXEC

Specifies the ECCR program name (DTLCCDCR).

STEPLIB DD

Includes the PowerExchange load libraries (LOADLIB and LOAD). If you added the load libraries to the system LNKLST concatenation, you do not need to add it to the STEPLIB statement.

EDMPARMS

Specifies the name of the PowerExchange USERLIB library that contains the default options module (EDMSDIR) associated with the PowerExchange Agent and PowerExchange Logger that you are using.

If you do not include an EDMPARMS statement, or if the library that you specify does not contain the options modules, PowerExchange CDC uses the STEPLIB concatenation to obtain the configuration options.

DTLCFG

Specifies the DBMOVER configuration file for PowerExchange. Some of the parameters are applicable to the Datacom table-based ECCR.

DTLKEY

Specifies the PowerExchange license key file, which contains the license key for the PowerExchange options that you use.

DTLCACFG

Points to the Datacom ECCR configuration member ECCRDCMP.

DTLAMCPR

Points to the data set that contains the capture registrations.

DTLMSG

Specifies the output data set for PowerExchange messages.

DTLLOG

Specifies the PowerExchange log file for messages. This SYSOUT file contains various messages that report the status and events for the Datacom table-based ECCR.

Managing Datacom Table-Based CDC

PowerExchange provides commands to start and stop the Datacom table-based ECCR.

Starting the Datacom Table-Based ECCR

You can run the Datacom table-based ECCR as a started task or batch job.

Before starting the ECCR, complete the following prerequisites:

1. Start the PowerExchange Listener, PowerExchange Agent, and PowerExchange Logger, in this order.
2. Configure the Datacom table-based ECCR.
3. To run the ECCR as a started task, convert the ECCRDCM JCL to a PROC and copy the PROC to the system PROCLIB library for started tasks.
4. Configure the Datacom source MUF startup options.
5. Start the Datacom source and target MUFs.

To start the ECCR, use one of the following methods:

- To start the ECCR as a started task, use the MVS START (S) command, for example:
  ```
  START DTLCCDCR
  ```
- To start the ECCR as a batch job, submit the ECCRDCM JCL that you configured.

Tip: If you need to run the ECCR continuously over a long period, run it as a started task.

Stopping the Datacom Table-Based ECCR

To stop the Datacom table-based ECCR, use the MVS STOP (P) command.

Enter the command followed by the name of the started task or batch job, for example:

```
STOP DTLCCDCR
```

Adding a Datacom Capture Registration

You might need to add a capture registration for a new or existing Datacom record from which you want to start capturing change data. In this case, you can use the REFRESH command to refresh the list of registered Datacom records for the Datacom table-based ECCR, without restarting the ECCR.

Before you begin, ensure that REFRESH_ALLOWED=Y is specified in the RUNLIB(ECCRDCMP) member to which the DTLCACFG DD statement in the ECCR JCL points.

1. If you need to begin capturing changes for the new registration from a specific point, stop any change activity on the source record.
2. In the PowerExchange Navigator, open the capture registration and set the **Status** field to **Active**.
3. If you use PowerExchange Condense, ensure that PowerExchange Condense has processed all of the captured changes. Then shut down PowerExchange Condense.
4. Enter the ECCR REFRESH command using the MVS MODIFY (F) command:
   ```
   F eccr_task_name,REFRESH
   ```
   The newly registered source is added to the list of registered sources for the ECCR.
5. Enable change activity on the source to resume.
6. If you use PowerExchange Condense, restart it.

Deleting a Datacom Capture Registration

You might need to delete a capture registration that has been used for change capture processing. In this case, you can use the REFRESH command to refresh the list of registered Datacom records for the Datacom table-based ECCR, without restarting the ECCR.

Before you begin, ensure that REFRESH_ALLOWED=Y is specified in the RUNLIB(ECCRDCMP) member to which the DTLCACFG DD statement in the ECCR JCL points.

1. Stop applications and other activities that update the source record that is associated with the registration that you are deleting.
2. Ensure that the ECCR has captured all of the change data from the Datacom CDC tables for the source that is associated with the registration that you are deleting. Also ensure that the source data has been extracted and applied to the target. Then stop all workflows that extract change data for the source.
3. If you use PowerExchange Condense, ensure that PowerExchange Condense has processed all of the captured changes. Then shut down PowerExchange Condense.
4. In the PowerExchange Navigator, open the capture registration and set the **Status** field to **History**. Then delete the registration.
5. Enter the ECCR REFRESH command using the MVS MODIFY (F) command:

   ```
   F eccr_task_name,REFRESH
   ```
6. Enable change activity on the source to resume.
7. If you use PowerExchange Condense, restart it.
8. Restart extraction processing.

Suspending Change Capture for Registered Datacom Sources Temporarily

Use this task flow to suspend change capture processing for registered Datacom table-based CDC sources temporarily.

You perform some tasks with the PWXUCREG utility and other tasks outside of the utility on the z/OS system.

Before you begin, ensure that the REFRESH_ALLOWED=Y parameter is specified in the RUNLIB(ECCRDCMP) member to which the DTLCACFG DD statement in the ECCR JCL points. You must have the authority to issue a REFRESH command after each registration status change.

1. Stop database activity for the registered source or sources for which you want to suspend capture registrations.
2. To suspend the capture registrations, use the PWXUCREG utility to issue the SUSPEND_REGISTRATION command.

   The suspension window opens. The utility sets the suspension timestamp to the current system time without any adjustment for the local time. Also, the utility issues message PWX-03716 to the DTLLOG log to report the registration status change.

   For each suspended registration, the PowerExchange Navigator Resource Inspector displays **Suspended** in the **Status** field and the suspension timestamp in the **Suspend Time** field. The **Suspend Time** value is not adjusted for the local time.
3. Enter the ECCR REFRESH command with the MVS MODIFY (F) command:

   ```
   F eccr_task_name,REFRESH
   ```

   The ECCR becomes aware of the registration status change and suspension timestamp. When the ECCR encounters the first change record to discard, it issues message PWX-07752. The ECCR discards change records that have a timestamp later than the suspension timestamp.

4. Run the jobs or processes that generate the changes that you do not want to capture for the source or sources that are associated with the suspended registrations.
5. After the jobs or processes complete, use the PWXUCREG utility to issue the ACTIVATE_REGISTRATION command to reactivate the capture registrations.

   The suspension window closes. The utility sets the activation timestamp to the current system time without any adjustment for the local time. Also, the utility issues message PWX-03716 to the DTLLOG log to report the registration status change.

   For each reactivated registration, the PowerExchange Navigator Resource Inspector displays **Active** in the **Status** field and the activation timestamp in the **Active Time** field. The **Active Time** value is not adjusted for the local time.
6. Enter the ECCR REFRESH command with the MVS MODIFY (F) command again.

   The ECCR becomes aware of the registration status change and activation timestamp.
7. Enable database activity to resume on the registered source or sources.

   The ECCR starts capturing change records that have timestamps later than the activation timestamp. The ECCR issues message PWX-07753 when it encounters the first change record in the change stream after the end of the suspension window.

Note: You can automate this processing if appropriate for your environment.

Changing a Datacom Source Table Definition

If you change the structure of a Datacom table that is registered for change data capture, use this procedure to retain access to previously captured change data and capture data under the new structure definition.

1. Stop all update activity on the Datacom database.
2. Ensure that PowerExchange processes all changes that occurred under the old schema.
3. Change the Datacom table schema, and restart Datacom.
4. Create a new PowerExchange capture registration that reflects the schema changes.
5. Restart the Datacom table-based ECCR.
6. Allow update activity to the Datacom database to resume.

CHAPTER 10

DB2 for z/OS Change Data Capture

This chapter includes the following topics:

DB2 for z/OS CDC Overview

PowerExchange change data capture (CDC) for DB2 for z/OS captures changes that are written to DB2 for z/OS tables.

The DB2 for z/OS ECCR captures the change data and sends it to the PowerExchange Logger for z/OS for logging. On a single DB2 subsystem or z/OS image, you can run multiple DB2 ECCRs, each connecting to a different DB2 subsystem. A single DB2 ECCR can connect to only one DB2 subsystem and communicate with only a single PowerExchange Logger instance.

In a DB2 data sharing environment, a single DB2 ECCR captures changes for all members of the data sharing group.

To capture change data, you must define a capture registration for each source table. In the capture registration, you can select a subset of columns for which to capture data. PowerExchange generates a corresponding extraction map.

If a source table contains columns in which you store data that is inconsistent with the column datatype, you can create a data map to manipulate that data with expressions. For example, if you store packed data in a CHAR column, you can create a data map to manipulate that data to prepare it for loading to a target. Then, merge the data map with an extraction map.

DB2 CDC Considerations

Review these considerations before implementing DB2 for z/OS CDC.

DB2 CDC Operational Considerations

Review the following operational considerations for DB2 for z/OS CDC:

- The DB2 ECCR captures only the changes that are recorded in the DB2 log as SQL inserts, deletes, or updates.
- The DB2 ECCR does not support change data capture for DB2 views and aliases.
- The DB2 ECCR does not support change data capture for the TRUNCATE SQL statement with the IMMEDIATE option.
- The DB2 ECCR does not capture changes that result from a DROP TABLE DDL statement or from a DB2 REORG utility operation that uses the DISCARD option.
- The DB2 ECCR captures changes from the DB2 LOAD utility only if you specify the RESUME YES and SHRLEVEL CHANGE options for the utility. The DB2 ECCR does not capture changes from other DB2 utilities, even if you specify the LOG=YES option.
- The DB2 ECCR does not capture changes from a single UOW that contains both DML and DDL changes for the same table, such as CREATE or ALTER TABLE statements and SQL inserts, deletes, and updates.
- If a DDL operation changes the fixed length of a column, for example, CHAR(6) to CHAR(10), the DB2 ECCR cannot process DELETEs or old images of UPDATEs. To avoid potential problems, perform one of the following actions:
  - If you use a DB2 version earlier than version 12, perform a table REORG immediately after the DDL ALTER operation and before any DML changes occur on the table. The REORG reformats all rows. Otherwise, you will need to specify the SKIPURDML statement in the REPL2OPT DD data set to skip the unit of recovery (UR) that contains these changes, each time the ECCR fails to process a DML change.
  - If you use DB2 12 or later, set the DB2ROWPROMOTION statement in the REPL2OPT DD data set to ENABLE.

How the DB2 ECCR Interacts with Other PowerExchange Components

The DB2 ECCR works with other PowerExchange components, such as the PowerExchange Logger for z/OS and the PowerExchange Agent.

Consider the following interactions:

- A DB2 ECCR must log all changes to a single PowerExchange Logger that runs on the same z/OS system.
- The PowerExchange Logger and PowerExchange Agent must run on the same z/OS system as the DB2 ECCR.
- A single DB2 ECCR that attaches to a single member of a DB2 data sharing group can process changes for all members of the data sharing group. You do not need to use the Post-Log Merge configuration of the PowerExchange Logger to capture DB2 change data when you use DB2 data sharing.
- If you use the Post-Log Merge configuration of the PowerExchange Logger for another reason, a single DB2 ECCR can attach to a single member Logger of the Post-Log Merge group.

Related Topics:

- "Monitoring the PowerExchange Logger for z/OS" on page 71

DB2 for z/OS Datatypes Supported for CDC

PowerExchange supports most DB2 for z/OS datatypes for CDC.

The following table identifies the datatypes PowerExchange supports and does not support for CDC:

DB2 Datatype	Supported for CDC?
BIGINT	Yes
BINARY	Yes
BLOB	Yes[1], up to 32 KB of BLOB data that is stored fully inline in a base table space.
CHAR	Yes
CLOB	Yes[1]
DATE	Yes
DBCLOB	Yes[1]
DECFLOAT	No [2]
DECIMAL	Yes
DISTINCT (user-defined)	No[2]
DOUBLE	Yes
FLOAT	Yes
GRAPHIC	Yes
LONG VARCHAR	Yes
LONG VARGHAPHIC	Yes
INTEGER	Yes
REAL	Yes
ROWID	Yes
SMALLINT	Yes
TIME	Yes
TIMESTAMP	Yes, including extended-precision TIMESTAMP columns, which support fractional seconds up to 12 digits.
TIMESTAMP WITH TIME ZONE	No[2]

DB2 Datatype	Supported for CDC?
VARBINARY	Yes
VARCHAR	Yes
VARGRAPHIC	Yes
XML	No [2]

1. The maximum row size that PowerExchange can process is 8 MB. For BLOB, CLOB, and DBCLOB data that is stored fully inline in the base table space, PowerExchange delivers up to 32 KB of the data to PowerCenter workflows that use a PWX DB2zOS CDC connection. For CLOB and DBCLOB data that is stored fully or partially in the auxiliary table space, PowerExchange provides the generated DTL__ST control column that you can use with a PowerCenter Expression transformation and unconnected Lookup transformation to retrieve all of the LOB data and send it to a target. However, you cannot use PowerCenter to look up BLOB data that is stored in an auxiliary table space because of limitations related to binary ports.

2. You cannot select columns that have unsupported datatypes when you create a capture registration in the PowerExchange Navigator. As a result, PowerExchange does not capture change data for these columns.

Handling DB2 LOB Data

For DB2 for z/OS source tables, PowerExchange can process change data from BLOB, CLOB, and DBCLOB columns, provided that the row size does not exceed 8 MB. PowerExchange reads the LOB data from the PowerExchange Logger log files instead of directly from the DB2 transaction logs.

PowerExchange CDC processing of LOB data depends on how the LOB data is stored. DB2 stores LOB data in the following ways:

- If you defined the INLINE LENGTH(*bytes*) clause for LOB columns when creating or altering a source table or you specified a non-zero value for the LOB_INLINE_LENGTH subsystem parameter, DB2 stores LOB data in a base table space up to the specified length. Any LOB data that exceeds the specified inline length is stored in an auxiliary table space.
- If you did not specify an inline length, DB2 stores all of the LOB data in an auxiliary table space.

When BLOB, CLOB, or DBCLOB data is stored fully inline, the row size in the base table space is limited by the maximum DB2 page size of 32 KB. The DB2 ECCR can capture LOB data up to the inline length, provided that this length is no greater than the 32-KB page size limit minus the size of the DB2 control fields and the size of the columns. PowerExchange delivers the inline LOB data to PowerCenter workflows that use a DB2zOS CDC application connection, as usual. A CDC workflow can write the LOB data to one or more targets.

When CLOB (including DBCLOB) data is stored fully or partially in an auxiliary table space, you can use the generated DTL__ST column in the extraction map to determine if the CLOB data in the PowerExchange Logger log files is complete or incomplete. If the CLOB data is incomplete, in the PowerCenter workflow, you can use an Expression transformation to call an unconnected Lookup transformation. The unconnected Lookup transformation can retrieve all of the current CLOB data from the DB2 source table and pass it back to the Expression. The workflow can then deliver all of the current CLOB data to the target. Informatica recommends that you use a single target because the use of multiple targets can cause updates to be applied in the wrong sequence. When a Lookup transformation is used to retrieve CLOB data, the before images of rows that contain the CLOB data are not available for an UPDATE or DELETE operation. However, the after images of rows that contain the CLOB data are available for an UPDATE or INSERT operation. For more information about using an Expression transformation and Lookup transformation, see "Using Expression and Lookup Transformations to Retrieve CLOB Data That is Not Fully Stored Inline" on page 205 and the *PowerCenter Transformation Guide*.

When BLOB data is stored fully or partially in an auxiliary table space, PowerCenter cannot retrieve all of the BLOB data because of limitations related to using binary ports in Lookup transformations. In this case, contact Global Customer Support to determine if a custom solution is available.

Using Expression and Lookup Transformations to Retrieve CLOB Data That is Not Fully Stored Inline

If you need to extract CLOB or DBCLOB data that is stored fully or partially in an auxiliary table space, use an Expression transformation and an unconnected Lookup transformation in the PowerCenter CDC workflow. Also, use the PowerExchange-generated DTL__ST_*columnname* column in the extraction map.

Note: Hereafter, the term *CLOB* refers to both DB2 CLOB and DBCLOB columns.

Verifying That the DTL__ST Column Is in the Extraction Map

The DTL__ST_*columnname* column indicates whether or not PowerExchange was able to extract all of the data from the CLOB column so that the entire CLOB is available in the change stream. If the DTL__ST column has the value C (complete), PowerExchange was able to extract all of the CLOB data because the data is stored fully inline in the base table space or is null. PowerExchange can then supply the entire CLOB value or null to a PowerCenter workflow that applies the data directly to the target. If the DTL__ST column has the value I (incomplete), PowerExchange was *not* able to extract all of the CLOB data because the CLOB data is stored fully or partially in the auxiliary table space. In this case, you must use a Lookup transformation in the PowerCenter workflow to retrieve all of the current CLOB data from the DB2 source table. CLOB data is stored in an auxiliary table space for either of the following reasons:

- The CLOB column was *not* defined with the INLINE LENGTH(*bytes*) clause. All of the CLOB data is stored in the auxiliary table space.
- The CLOB column was defined with the INLINE LENGTH(*bytes*) clause and the amount of CLOB data exceeds the inline length. In this case, the excess data is stored in the auxiliary table space.

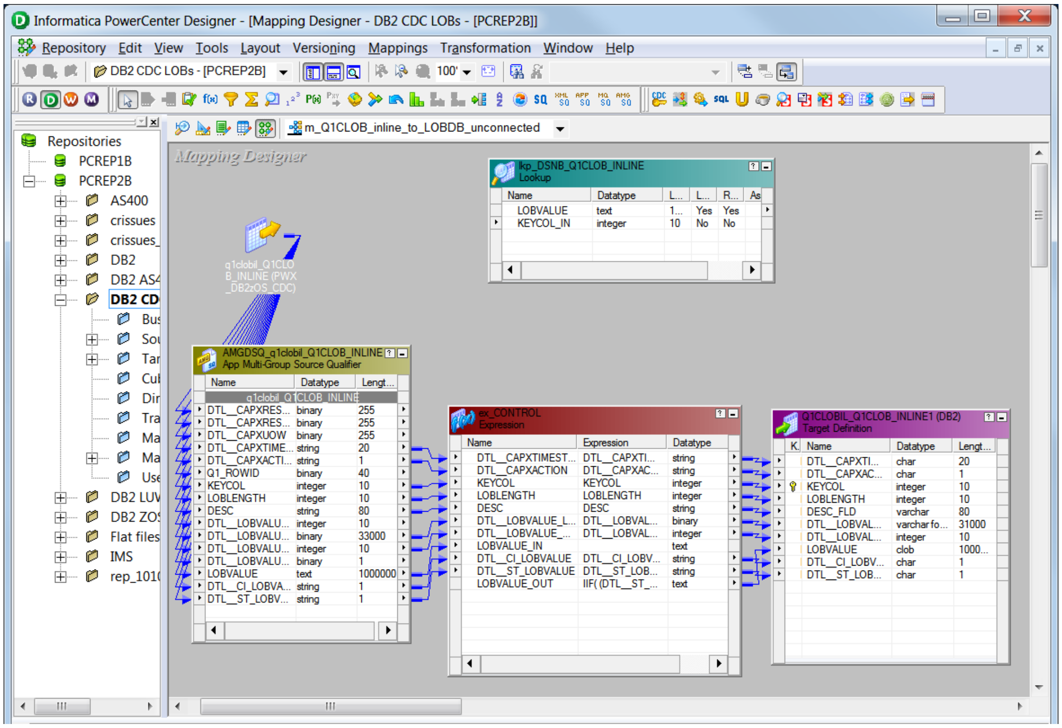
By default, the DTL__ST column is selected for inclusion in extraction maps. To verify that the DTL__ST column is selected in the extraction map that you plan to import into PowerCenter to create the DB2 Source Qualifier, open the extraction map in the PowerExchange Navigator. Then right-click in the **Extraction Definition** window and select **Show Auto Generated Columns**.

Creating a PowerCenter CDC Workflow That Includes Expression and Lookup Transformations

When you create a PowerCenter workflow that processes incomplete CLOB data from a PowerExchange DB2 for z/OS source, perform the following high-level steps:

1. In Source Analyzer, import the PowerExchange extraction map for the DB2 source to create the CDC source definition. You must select **CDC Datamaps** to list the extraction maps. This source definition will be used as the Source Qualifier in the mapping.
2. In Source Analyzer, import another DB2 source definition from PowerExchange but do not select **CDC Datamaps**. PowerExchange gets the source definition from the DB2 catalog for the DB2 subsystem ID that you specify. This source definition will be used as the lookup source.
3. In Target Designer, create the target definition.
4. In PowerCenter Designer, add the CDC source definition and target definition to a mapping.
5. From the **Transformation** menu, create the Expression transformation and unconnected Lookup transformation. Then add the transformations to the mapping. Connect the Source Qualifier output ports to the Expression input ports, and connect the Expression output ports to the Target Definition input ports.

The following image shows an example mapping with a unconnected Lookup transformation and Expression transformation:



When you create the Expression transformation, use the following guidelines:

- Drag the required Source Qualifier columns to the Expression so that the ports are created with the correct attributes.
- On the **Expression Ports** tab, perform the following actions:
  - Rename the CLOB column port ("LOBVALUE" in the example) to *column_name*_IN (LOBVALUE_IN). Then clear the **O** check box for this port. Retain the **I** check box selection.
  - Add a *column_name*_OUT port ("LOBVALUE_OUT" in the example). Then clear the **I** check box for this port. Retain the **O** check box selection.
  - In the **Expression** field for *column_name*_OUT port ("LOBVALUE_OUT"), enter an expression that calls the lookup LKP() function when the DTL__ST_*columnname* value is I (incomplete) and the SQL change is not a DELETE. For example:

```
IIF( (DTL__ST_LOBVALUE='I') AND (DTL__CAPXACTION != 'D'),
:LKP.LKP_DSNB_Q1CLOB_INLINE(KEYCOL), LOBVALUE_IN))
```

When you create the Lookup transformation, use the following guidelines:

- If the source table contains multiple LOB columns, create a separate Lookup transformation for each one.
- When you create the Lookup transformation, select **Source** in the **Location of the Look-up Table** field. Then make sure that you select the DB2 for z/OS lookup source, not the CDC source definition.
- In the Lookup object, delete all columns except those that are used for input or returned values. The lookup function accepts only a singe return column for the CLOB.

  Tip: Informatica recommends that you perform lookups with primary key columns instead of a ROWID column, unless you are sure that the ROWID column will not change after a DB2 REORG.

- In the **Edit Transformations** dialog box for the Lookup transformation, perform the following actions on the **Transformation Ports** tab:
  - Create an input key column port ("KEYCOL_IN" in the example) that has the same attributes as the table key column. Select the **I** check box.
  - For the key column port ("KEYCOL"), select the **L** check box so that it is used in the SQL statements passed to the DB2 lookup. Clear the **O** check box.
  - For the CLOB column port ("LOBVALUE"), select the **O**, **L**, and **R** check boxes. The **L** setting causes the column to be used in the SQL passed to the DB2 lookup. The **O** setting causes column data to be returned from DB2. The **R** setting causes the column data that is returned from the lookup to be passed to the Expression transformation.
- On the **Condition** tab, define a lookup condition that specifies the key column in the lookup table ("KEYCOL") equals the input key column port (KEYCOL_IN).

For more information about Expression and Lookup transformations, see the *PowerCenter Transformation Guide*.

Handling Compressed DB2 Table Spaces

If you capture change data for tables in table spaces that are defined with the COMPRESS YES option, ensure that the DB2 subsystem to which the DB2 ECCR connects can access to the DB2 compression dictionary and the compressed table spaces and buffer pools for the source tables that are registered for CDC. To decompress data for PowerExchange requests, DB2 requires access to the compression dictionary that matches the DB2 log data.

DB2 might not be able to decompress data in the following circumstances:

- The compression dictionary that is required to decompress data is not available.
- You are running a DB2 utility against a compressed table space, and the utility activity prevents DB2 from accessing the required compression dictionary.

Table-space locking by some DB2 utilities can prevent DB2 from accessing the compression dictionary. In this case, the ECCR ends abnormally. When the table-space lock is cleared, you can restart the ECCR to resume processing.

If you use DB2 for z/OS Version 11 new-function mode (NFM) or later, DB2 records old compression dictionaries in the DB2 log so that they remain available to decompress data when needed. You do not need to use the KEEPDICTIONARY option to retain them.

If you want the ECCR to skip any DB2 log records that contain data that DB2 cannot decompress and to continue capture processing, set the ROWNOTDECOMPRESSED parameter to NOFAIL in the DB2 ECCR REPL2OPT DD data set. For more information about the ROWNOTDECOMPRESSED parameter, see "DB2 ECCR Configuration Statements in the REPL2OPT DD Data Set" on page 216.

FIELDPROC and EDITPROC Exit Routines

The following considerations apply to exit routines for DB2 source tables:

- Libraries that contain FIELDPROC or EDITPROC exit routines that processes updated rows must be concatenated in the STEPLIB statement of the DB2 ECCR startup procedure.
- If you update a FIELDPROC or EDITPROC exit routine, complete the following tasks:
  - Refresh or restart the DB2 ECCR to initiate the new routine.
  - Ensure that the DB2 ECCR uses a version of the exit routine that matches the DB2 log records that you want to capture.

DB2 ECCR Capture Directory Tables

The DB2 ECCR uses a set of DB2 tables, called the capture directory tables, to track information about DB2 tables registered for CDC.

The capture directory tables are created during PowerExchange installation. They must reside in their own database and table space on the DB2 subsystem to which the DB2 ECCR connects for change capture.

The following table describes the purpose of each DB2 ECCR capture directory table:

Table Name	Description
TCAPCOLUMNS	Stores catalog and status information for all of the columns in the tables that are registered for change data capture.
TCAPFIELDS	Stores information about the columns that use a field procedure exit routine (FIELDPROC) and that are in tables registered for change data capture.
TCAPSTATUS	Stores status information about all of the tables that are registered for change data capture.
TCAPTABLES	Stores catalog and status information for the tables that are registered for change data capture.
TCAPTABLESPACE	Stores catalog and status information for all table spaces in the DB2 catalog, including table spaces that do not contain registered tables.
TCAPUPDATE	Stores information that the DB2 ECCR uses to coordinate the handling of the DB2 log read process.
TCAPWORK	Stores changes to the DB2 system catalog tables until the UOW that contains these changes is committed. **Note:** If you need to create a full image copy of the table space that contains the TCAPWORK table, run the DB2 COPY utility with the SHRLEVEL CHANGE option. If you use the SHRLEVEL REFERENCE option instead, the DB2 ECCR ends abnormally.

In the z/OS Installation Assistant, you specify a DB2 creator name for the DB2 capture directory tables and a DB2 owner for the DB2 ECCR plans and packages. You also specify the following information for customizing the jobs that create these tables and related DB2 objects:

- DB2 subsystem identifier (SSID)
- Database name
- STOGROUP
- TCAPWORK buffer pool name

The XIDDB220 member of the RUNLIB library creates the DB2 table spaces, tables, and indexes for the DB2 ECCR capture directory tables. The SETUPDB2 job submits the XIDDB220 job. The DDL for the capture directory tables are in the following RUNLIB members:

DB2TGEN

Creates the database and the table space for each table.

DB2SGENB

Creates the capture directory tables for a DB2 database. The XIDDB22O job uses this member.

DB2IGEN

Creates the unique index for each of the tables.

Buffer Pool Requirements for Capture Directory Tables

The DB2 ECCR requires a minimum buffer pool size of 4 KB for all capture directory tables except TCAPWORK. For the TCAPWORK table, the ECCR requires a minimum buffer pool size of 16 KB.

You can assign buffer pool sizes larger than these minimums if needed.

Capture Directory Table Sizing

The DB2 ECCR capture directory tables are each created in their own unique DB2 table space. The tables have certain sizing requirements that must be met for the ECCR to function properly.

The default space allocations from PowerExchange installation are usually sufficient for most DB2 subsystems, although some of the table spaces might create secondary extents. If you have more than 5,000 tables in the DB2 subsystem, or if you have a large number of tables registered for change capture or a large number of columns in these tables, you might need to adjust the PRIQTY primary space and SECQTY secondary space values from installation. Monitor the table spaces to determine if they need to be extended. If the DB2 ECCR cannot extend the table space when needed to support the table sizing requirements, the ECCR abends.

The following table shows the default space allocations from PowerExchange installation and the table-sizing requirements for the capture directory tables:

Default Table Space / Table Name	Install PRIQTY	Install SECQTY	Table Sizing Requirements
PWXPCOLS / TCAPCOLUMNS	180 KB	20 KB	Up to three rows for each column, across all tables from which changes are captured
PWXPFLDS / TCAPFIELDS	3 KB	1	One row for each column that has a FIELDPROC, across all tables from which changes are captured
PWXPSTAT / TCAPSTATUS	3 KB	1 KB	One row for each table from which changes are captured
PWXPTABL / TCAPTABLES	180 KB	20 KB	Up to three rows for each table from changes are captured
PWXPTBSP / TCAPTABLESPACE	180 KB	20 KB	Up to three rows for each table space in the DB2 catalog, including table spaces that contain tables that are *not* registered for change capture
PWXPUPDT / TCAPUPDATE	3 KB	1 KB	One row for each DB2 ECCR
PWXPWORK / TCAPWORK	720 KB	48 KB	One row for each in-flight catalog change

Running Multiple DB2 ECCRs

You might need to run multiple DB2 ECCRs on the same z/OS image in certain scenarios.

Typically, you run multiple ECCRs in the following scenarios:

- You need to capture changes from multiple DB2 subsystems on the same z/OS image. The subsystems are not data sharing subsystems or are not part of the same data sharing group. For example, the subsystems might be test and production subsystems on the same z/OS image.

- You need to capture changes from a single DB2 subsystem and use separate capture environments for separate sets of tables. For example, the DB2 subsystem might contain both test and production tables, and you want to use separate capture environments for the test and production tables.

For each of these scenarios, certain considerations apply.

Change Capture from Multiple DB2 Subsystems on Single z/OS Image

If you need to capture changes from multiple non-data-sharing DB2 subsystems that run on the same z/OS image, review the following considerations:

- A unique DB2 ECCR instance is required for each subsystem. The DB2 ECCR connects only to a single subsystem and captures changes only from that subsystem, assuming you do not use data sharing.
- The capture name that you specify in the CA statement in the DB2 ECCR REPL2CTL control file must be unique for each ECCR and across the z/OS image and sysplex.
- Each DB2 ECCR can have its own unique set of PowerExchange Listener, Agent, and Logger tasks, although configuring a separate environment for each ECCR is not required. For example, you might want to configure separate environments for test and production subsystems, but use the same environment for two test systems.

Change Capture from a Single DB2 Subsystem with Multiple Capture Environments

If you need to capture changes from separate capture environments on the same DB2 subsystem, each environment with its unique DB2 ECCR, review the following considerations:

- Each DB2 ECCR execution must have its own unique parameter files. These files are specified in the REPL2CTL and REPL2OPT DD statements in the ECCR JCL.
- Each DB2 ECCR must have its own set of DB2 capture directory tables.
- Each DB2 ECCR must have its own unique qualifier and plan name in the BIND for the packages and plans.
- The ECCR name that you specify in the CA NAME statement in the REPL2CTL DD data set must be unique for each DB2 ECCR and across the z/OS image and a sysplex.
- DB2 registrations contain either the DB2 subsystem ID (SSID) or group attachment name. To allow registrations to be divided among multiple capture environments, each DB2 ECCR must have its own PowerExchange Listener, Agent, and Logger tasks.

DB2 Data-Sharing Considerations

A DB2 data sharing environment is composed of a collection of DB2 subsystems, called a *data sharing group*, that operate from the same DB2 catalog.

Subsystem members of a data sharing group can directly access any table in the DB2 catalog and change the same data while maintaining data integrity. DB2 controls access through grants, plans, and other usual methods.

Before implementing the DB2 ECCR in a data sharing environment, review the following configuration considerations:

- In the DB2 bind JCL for the DB2 ECCR in the RUNLIB(XIDDB225) member, you can use either the DB2 group attachment name or the SSID when specifying the SYSTEM operand of the DSN command.
- The DB2 ECCR captures changes for tables that are registered under the name that is specified in the RN parameter in the PLAN statement of the REPL2OPT DD data set. The RN parameter can specify the SSID

of a data sharing group member or the group attachment name. All tables must be registered under a single DB2 SSID or group attachment name. Informatica recommends that you use a group attachment name for greater flexibility.

- The DB2 ECCR uses the CN parameter in the PLAN statement in the REPL2OPT DD data set to attach to DB2. You can specify either a SSID or group attachment name for the CN parameter. The CN parameter is optional unless you need to attach to a specific DB2 subsystem. If the CN parameter is not specified, the ECCR uses the RN parameter value to attach to the subsystem.

  To have the flexibility to move the ECCR to another z/OS system that has active members in the same DB2 data sharing group without changing parameters, use the DB2 group attachment name in the CN parameter or default to the RN parameter value. The ECCR must still have access to the PowerExchange Agent and Logger.
- If you configure DB2 to write archive logs to tape, check the MAXRTU subsystem parameter on each data sharing instance where you plan to run the DB2 ECCR. The MAXRTU value must be greater than or equal to the maximum number of concurrently active members in the data sharing group. The MAXRTU parameter is specified on the DSNZPARM DSNLOGP macro. If the MAXRTU value is less than the maximum number of concurrently active members, the DB2 ECCR might hang.

If You Migrate to DB2 12 for z/OS

If you plan to migrate to DB2 12 for z/OS from an earlier DB2 version, you do not need to upgrade the DB2 ECCR capture directory tables. No changes have been made to the structure of these tables since DB2 11.

Note: At initialization, the DB2 ECCR issues message PWXEDM177552I, which reports the highest DB2 version that the current ECCR capture directory tables support. If the capture directory tables have already been successfully upgraded to the level required for DB2 12, the message should report that the tables support DB2 12.

Before you migrate, check the DB2 DSN6SPRM RESTRICT_ALT_COL_FOR_DCC parameter setting. PowerExchange reports this setting in message PWXEDM177155I in the ECCR output. How this parameter is set determines whether you will need to cold start the ECCR during the DB2 migration, as follows:

- If the RESTRICT_ALT_COL_FOR_DCC parameter is set to NO, the ECCR will be able to process all DB2 log data that was generated during the DB2 catalog upgrade process and update the contents of the ECCR capture directory tables. A cold start is not required.

  Note: If you use this setting, shut down the DB2 ECCR before you run the DB2 catalog upgrade utility, CATMAINT.
- If the RESTRICT_ALT_COL_FOR_DCC parameter is set to YES, the first time you start the ECCR after migrating to DB2 12.1.100, you must perform a cold start. In a data sharing environment, you might need to cold start the ECCR an additional time, depending on where it runs:
  - When the first member of the data sharing group is migrated to DB2 12.1.100, cold start the ECCR, regardless of whether the ECCR runs on this first-migrated member.
  - If the ECCR runs on another member of the data sharing group, when that member is migrated to DB2 12.1.100, cold start of the ECCR again.

    Note: If you do not cold start the ECCR in these circumstances, the ECCR will not capture any DDL changes for the tables of CDC interest. In this case, the PowerExchange capture directory tables can become invalid, causing capture processing to fail for the tables with the DDL changes.

  A cold start of the ECCR is *not* required after you migrate any other member in the data sharing group.

  Before you migrate a subsystem on which the ECCR will be cold started, make sure that the DB2 ECCR has captured all of the available changes from the DB2 subsystem.

  Note: When you upgrade from DB2 12.1.100 to 12.1.500, no ECCR cold start or other special action is required.

If You Migrate to DB2 11 for z/OS

DB2 11 introduces changes to the DB2 catalog tables that the DB2 ECCR uses and introduces support for the extended 10-byte format of RBA and LRSN values in DB2 log records.

Before you migrate to DB2 11 conversion mode (CM), check whether the DB2 ECCR capture directory tables support DB2 11. At initialization, the ECCR issues message PWXEDM177552I, which reports the highest DB2 version that the current ECCR capture directory tables support. If the capture directory tables have already been successfully upgraded to the level required for DB2 11, the message should report that the tables support DB2 11.

If you need to upgrade the ECCR capture directory tables, perform the upgrade before migrating any subsystem to DB2 11 CM. For more information, see "Upgrading the DB2 ECCR Capture Directory Tables" on page 231.

Also, check the DB2 DSN6SPRM RESTRICT_ALT_COL_FOR_DCC parameter setting. PowerExchange reports this setting in message PWXEDM177155I in the ECCR output. How this parameter is set determines whether you will need to cold start the ECCR during the migration to DB2 11 CM or enabling-new-function mode (enabling-NFM):

- If the RESTRICT_ALT_COL_FOR_DCC parameter is set to NO, the ECCR will be able to process all DB2 log data that was generated during the DB2 catalog upgrade process and update the contents of the ECCR capture directory tables. If you migrate from DB2 11 CM to enabling-NFM, you must cold start the ECCR. However, if you migrate from enabling-NFM to new-function mode (NFM), you do *not* need to cold start the ECCR.

  Note: If you use this setting, shut down the DB2 ECCR before you run the DB2 catalog upgrade utility, CATMAINT.

- If the RESTRICT_ALT_COL_FOR_DCC parameter is set to YES, you must cold start the ECCR after migrating to DB2 11 CM and after migrating to DB2 11 NFM.
  In a data sharing environment, you might need to cold start the ECCR an additional time, depending on where the ECCR runs:

  - When the first member of the data sharing group is migrated to DB2 11, cold start the ECCR, regardless of whether the ECCR runs on this first-migrated member.
  - If the ECCR runs on another member of the data sharing group, when that member is migrated to DB2 11, cold start of the ECCR again.

    Note: If you do not cold start the ECCR in these circumstances, the ECCR will not capture any DDL changes for the tables of CDC interest. In this case, the PowerExchange capture directory tables can become invalid, causing capture processing to fail for the tables with the DDL changes.

    A cold start of the ECCR is *not* required after you migrate any other member in the data sharing group.

  Before you migrate a subsystem on which the ECCR will be cold started, make sure that the DB2 ECCR has captured all of the available changes from the DB2 subsystem.

Configuring DB2 for CDC

Before you can capture changes for DB2 for z/OS tables, you must complete some DB2 configuration tasks.

These tasks are:

- Verify that PowerExchange supports your DB2 for z/OS version and that you applied the recommended IBM maintenance to the z/OS system.
- Start the DB2 subsystem, if it is not running, on the system where you plan to run the DB2 ECCR.

- Activate change data capture for DB2 catalog tables.
- Enable dual logging in DB2.

Requirements for DB2 Catalog Tables

PowerExchange CDC uses certain DB2 catalog tables. For these catalog tables, ensure that the following requirements are met before you begin CDC:

- The DB2 DATA CAPTURE CHANGES option is set on the table.
- The DB2 ECCR has read access to the table.

The following table shows the PowerExchange requirements for each DB2 catalog table that it uses:

Table	DATA CAPTURE CHANGES Option	SQL Read Access
SYSIBM.SYSTABLESPACE	X	X
SYSIBM.SYSTABLEPART	-	X
SYSIBM.SYSTABLES	X	X
SYSIBM.SYSCOLUMNS	X	X
SYSIBM.SYSFIELDS	X	X
SYSIBM.SYSCOPY	X	-

Managing DB2 Logs

The DB2 ECCR relies on the DB2 logs for change information. If the logs are lost, changes that should be captured are also lost.To avoid losing the log data sets, use dual logging including dual archive logs. Archive logs are required if it ever becomes necessary to retrieve data that has become inactive due to DB2 log switch processing.

Note: If you lose DB2 log data that the DB2 ECCR has not already processed, you must rematerialize the target tables before restarting the DB2 ECCR. Because your source and target tables are synchronized, you should begin capturing from the current DB2 log location. To do so, be sure that you use the START COLD statement in your REPDB2OP parameter file when you restart the DB2 ECCR.

Logging DB2 Data in a Data Sharing Environment

The Post-Log Merge option of the PowerExchange Logger allows you to capture changes using multiple PowerExchange Loggers on multiple z/OS systems and then extract the merged changes from a single Logger. With DB2 data sharing, the Post-Log Merge option of the PowerExchange Logger for z/OS is not required.

The DB2 ECCR uses DB2 IFI 306 calls that return change information from all members in the data sharing group.

Note: Post-Log Merge is not required for DB2 data sharing. However, if Post-Log Merge is used for another reason, the DB2 ECCR can also attach to a member Logger of the Post-Log Merge group, even when running in data sharing mode. A single DB2 ECCR is all that is required, even when connecting to a PowerExchange Logger in a Post-Log Merge configuration.

Configuring the DB2 ECCR

To successfully capture DB2 change data using the DB2 ECCR, there are various operational considerations that must be understood and requirements that must be met.

DB2 ECCR Usage Guidelines

The DB2 ECCR has the following usage guidelines:

- You must define DB2 source tables with the DATA CAPTURE CHANGES option. For more information about this option, see the IBM DB2 documentation.
- The first time you start the DB2 ECCR, use the START COLD parameter. Thereafter, use the START WARM parameter except when a cold start or special start is required for recovery purposes.
- You need at least one active capture registration to start the ECCR successfully. If no active registrations exist, the ECCR abends with a U3680 code, and PowerExchange issues message PWXEDM177509E to indicate that no active registrations exist.
- The DB2 ECCR issues IFCID 306 READS requests to read DB2 log data. To issue the READS request, the ECCR requires that MONITOR TRACE 1 be started. Therefore, the user ID under which the DB2 ECCR runs must have the following authorities:
  - TRACE authority to issue the START TRACE command.
  - DISPLAY authority to issue a DISPLAY TRACE to determine if the MONITOR TRACE is already active.
  - MONITOR2 authority to issue the READS request to get the log data that includes the changes to capture.

  If the user ID for the DB2 ECCR has SYSOPR, SYSCTL, or SYSADM authority, you do not need to grant additional authority.

  If the DB2 ECCR starts the trace during initialization, it issues the following message:

  ```
  PWXEDM177137I -START TRACE(MONITOR) PLAN(plan) LOCATION(caname) CLASS(1)
  ```

  If MONITOR TRACE 1 is started, the DB2 ECCR does not issue the START TRACE command. If MONITOR TRACE 1 was not started or has been stopped, the DB2 ECCR starts it.
- The DB2 ECCR reads the SYSTABLESPACE and SYSTABLEPART tables to determine if the DB2 table spaces that contain the source tables use an outdated row format version. If the table spaces use an outdated row format version, the ECCR reads the physical data sets that underlie table spaces to get the latest reordered row format (RRF) fixed-length-row information. For the ECCR to read the physical data sets, the ECCR must run under the control of a user ID that has read access to these data sets.
- The DB2 ECCR also performs schema verification the first time that the ECCR receives a change record for a table after a schema change on that table. To prevent the ECCR from terminating when the table schemas do not match, you must update the corresponding capture registration any time that the source schema changes.
- At DB2 ECCR startup, the ECCR issues SQL PREPARE and DESCRIBE statements to verify that the TCAP tables are of the correct format for the DB2 version from which the ECCR is capturing change data. Ensure that the user ID under which the ECCR runs has the EXPLAIN system privilege. This privilege is required for the ECCR to issue the PREPARE and DESCRIBE statements.

DB2 ECCR Control Statements in the REPL2CTL DD Data Set

To specify the DB2 for z/OS ECCR name, enter the CA NAME statement in the data set or RUNLIB member that is allocated by the REPL2CTL DD statement in the ECCR JCL. You can include the optional STOPAFT statement to indicate when to stop the ECCR.

At the completion of z/OS installation, PowerExchange creates the RUNLIB(REPDB2CT) member that contains the ECCR control statements. The REPL2CTL DD in the ECCR JCL points to this REPDB2CT member. You can edit the control statements in the REPDB2CT member, or you can copy the member under another name and then update the JCL to point to the new member name.

Syntax:

```
CA NAME=eccr_name
[STOPAFT {LOGLOC=rba|LOGTS=timestamp}]
[UOWPREFIX=xx]
```

For example, the following control statement specifies PWXDB201 as the DB2 ECCR name:

```
CA NAME=PWXDB201
```

Statement descriptions:

CA NAME=*eccr_name*

Required. A name for the DB2 ECCR. This name must be unique within a sysplex.

Warning: If you change the CA NAME value, the ECCR cannot warm start from the position where it last stopped.

The DB2 ECCR uses this name for the following purposes:

- The ECCR name that connects to the PowerExchange Logger for z/OS to write change data
- The member name that joins the XCF group of the PowerExchange Logger
- The minor name of the DB2CAPT ENQ

  During initialization, the DB2 ECCR issues the DB2CAPT ENQ as an exclusive ENQ with SCOPE=SYSTEMS.
- As part of the ECCR-UOW field in the control information for each change record written to PowerExchange Logger log files

This name must be 1 to 8 alphanumeric characters in length. Default is PWXDB201. You can enter another name in the z/OS Installation Assistant during PowerExchange installation.

Tip: Informatica recommends that you use the same value for the CA NAME parameter and the DB2 ECCR started task or job name. This practice allows you to easily identify the DB2 ECCR when reviewing messages and data from the PowerExchange Logger for z/OS.

STOPAFT {LOGLOC=*rba*|LOGTS=*timestamp*}

Optional. An RBA or timestamp that determines when the DB2 ECCR will stop. The ECCR uses this parameter regardless of how you started it.

You can specify only one STOPAFT statement. In the statement, you must specify one of the following parameters:

LOGLOC=*rba*

A 20-digit hexadecimal RBA value that indicates where the DB2 ECCR will stop in the DB2 log. If the ECCR is connected to a DB2 data-sharing group member, this value is a log record sequence number (LRSN).

This RBA or LRSN value must be larger than the RBA or LRSN value at which the ECCR started. Otherwise, the ECCR stops as soon as it gets the first record from the DB2 log.

LOGTS=*timestamp*

A date and time that determines where the DB2 ECCR will stop in the DB2 log. When the ECCR encounters a log record that has a timestamp equal to or later than the LOGTS timestamp, the ECCR stops.

The *timestamp* value has format YYYY-MM-DD-hh.mm.ss.nnnnnn. The date must be a valid date. For example, 2012-02-31-17.15.59.000000 is not valid because February 31st is not a valid date.

Depending on how you start the ECCR, use the following criteria to set this parameter:

- For a warm start, enter a timestamp value that is equal to or later than the timestamp of the last log record processed.
- For a special start, enter a log record timestamp that is equal to or later than the timestamp of the log record that is specified in the STARTLOC keyword of the START statement.
- For a cold start, enter a timestamp value that is equal to or later than the current time.

If STOPAFT statement is not specified, the ECCR runs until you explicitly stop it.

UOWPREFIX=*xx*

A two-character prefix that is used as the first 2 bytes of the UOW ID that the DB2 ECCR creates and sends to the PowerExchange Logger for z/OS when a DB2 unit-of-recovery contains data to be captured. By default, the last two characters of the CA NAME value are used. If you use multiple DB2 ECCRs with CA NAME values that end with the same last two characters, you can use this parameter to define a unique prefix for each ECCR to include in its UOW IDs.

DB2 ECCR Configuration Statements in the REPL2OPT DD Data Set

To configure DB2 for z/OS ECCR processing, you can specify statements in the data set or RUNLIB member that is allocated by the REPL2OPT DD statement in the ECCR JCL.

At installation completion, PowerExchange creates the RUNLIB(REPDB2OP) member that contains these ECCR statements, as customized based on your installation input. The REPL2OPT DD in the ECCR JCL points to this REPDB2OP member. You can edit the REPDB2OP member, or you can copy it under another name and then update the JCL.

If you edit the statements after starting the ECCR, you must refresh or restart the ECCR, depending on which statements you change.

Syntax

Use the following syntax:

```
DB2 PLAN=plan_name {RN=reg_ssid|CN=conn_ssid|RN=reg_ssid CN=conn_ssid}
START {COLD|WARM|STARTLOC=rba [USEDIR],[USESTAT]}
[CHKSCHEM {NO|YES|WARN}]
[COMMITINT [MS=milliseconds]]
[DB2ROWPROMOTION {ENABLE|DISABLE}]
[EC PERMIL={number_of_errors|0}]
[IFI306 [OPT={N|Y|F}] [4KPAGES={nnn|50} [NDWAIT={nnnn|300}]
[ROWNOTDECOMPRESSED {FAIL|NOFAIL}]
[SHOWGENERATED]
[SKIPURDML eccr_description_of_urid]
[STAT LEV={ST|SQ} [SEC=seconds]]
[TRACE trace_id[,trace_level]]
```

The statements must comply with the following rules:

- All of the statements must begin in column 1.
- Keyword parameters in the statements are positional.

Example statements:

```
*********************************************************************
* Use only one START statement for an execution of the DB2 ECCR.      *
* Use only one DB2   statement for an execution of the DB2 ECCR.      *
* Other statements contain default values.                            *
*                                                                     *
* All the parameters below are column specific, beginning in column 1 *
*********************************************************************
START WARM
* START COLD
* START STARTLOC=00000000000000000000 USEDIR,USESTAT
* DB2 PLAN=DTLCPV80 RN=DSN1
DB2 PLAN=<plan_name> RN=<ssid>
* DB2 PLAN=DTLCPV52         CN=DSN1
EC PERMIL=000
STAT LEV=ST SEC=3600
CHKSCHEM NO
```

Statement Descriptions

DB2 PLAN=*plan_name* {RN=*rn_ssid*|CN=*cn_ssid*|RN=*rn_ssid* CN=*cn_ssid*}

Specifies the DB2 plan and subsystem name or group name for the DB2 for z/OS system to which the DB2 ECCR attaches.

You can specify RN, CN, or both RN and CN. At least one of these keywords is required. If you specify RN or CN only, the specified keyword is used for the non-specified keyword.

Tip: When implementing the DB2 ECCR in a data-sharing environment, Informatica recommends entering the group attachment name for the RN keyword and for the registration group in the PowerExchange Navigator. The PowerExchange Logger uses the registration tag name to capture changes. The registration tag name contains the value specified in the **Database Instance** field in the registration group. By using the group attachment name, you make the registration tag names and captured change data independent of a specific data-sharing group member SSID.

PLAN=*plan_name*

Identifies the DB2 plan name that the DB2 ECCR uses.

Ensure that your entry complies with the following rules:

- The PLAN keyword must be in uppercase and begin in column 5.
- Plan names must be in uppercase.
- Plan names can be between 1 and 8 characters long.
- Plan names less than eight characters must be padded with spaces to make eight characters.

  For example, if your plan name is MYPLAN, you must add three spaces between the plan name and the RN keyword.

RN=*reg_ssid*

Specifies the DB2 subsystem identifier that appears in the capture registrations.

This value must match the value that is specified in the **Database Instance** field in the registration group in the PowerExchange Navigator. If not specified, the CN value is used by default.

The following values are valid:

- A DB2 subsystem ID (SSID) or DB2 group attachment name

- An uppercase value of one to four characters in length that begins in column 19

CN=*connect_ssid*

Specifies the DB2 subsystem identifier to which the DB2 ECCR connects. If not specified, the RN value is used by default.

The following values are valid:

- A DB2 subsystem ID (SSID) or DB2 group attachment name
- An uppercase value of one to four characters in length that begins in column 27

The following examples show combinations of RN and CN keywords:

- If you have DB2 subsystem SS01 in non-data-sharing environment, use the following DB2 statement:
  ```
  DB2 PLAN=plan_name RN=SS01
  ```
- If you migrate subsystem SS01 to a data-sharing environment called GRP1, use the following DB2 statement:
  ```
  DB2 PLAN=plan_name RN=SS01 CN=GRP1
  ```
- If you add a DB2 subsystem, SS02, to the data-sharing group GRP, continue to use the previous statement to run one instance of the ECCR on either SS01 or SS02. You must continue to register new tables under the name SS01.
- If you have a data sharing environment with the previous configuration and do not have existing capture registrations, use the following DB2 statement:
  ```
  DB2 PLAN=plan_name RN=GRP1
  ```
  Also, create all capture registrations under the GRP1 name.

Restart the DB2 ECCR to activate a change for this statement.

START {COLD|WARM|STARTLOC=*rba* [USEDIR],[USESTAT]}

Required. Controls the method by which the DB2 ECCR is started.

Options are:

COLD

Starts the ECCR for the first time or restarts the ECCR after a major system failure.

WARM

Restarts change-capture processing from the point where it last stopped, without loss of data.

Use this option to restart the ECCR after a successful shutdown with the STOP command or MODIFY QUIESCE command. Typically, you should use the WARM keyword when starting the ECCR.

STARTLOC=*rba* [USEDIR],[USESTAT]

Restarts change-capture processing from a specific point in the DB2 log.

The *rba* value specifies the 20-digit hexadecimal RBA value or the log record sequence number (LRSN) at which the DB2 ECCR should start in the DB2 log.

The following keywords are optional:

- **USEDIR**. The ECCR uses the source table information from the data-resource information that was registered in the PowerExchange when the STARTLOC option was specified.
- **USESTAT**. The ECCR uses a status of active (C) or inactive (N) for the table registration that existed when the STARTLOC option was specified.

If you change this statement, you must restart the ECCR to activate the new setting. The new setting is ignored if you REFRESH the ECCR.

CHKSCHEM {NO|YES|WARN}

Optional. Specifies whether the DB2 ECCR verifies schema registrations at ECCR startup. Also determines how errors, if found, are handled. This schema verification processing is in addition to the verification processing that is performed when the ECCR receives the first change record for a registered schema.

Options are:

- **NO**. Does not verify registered schema at ECCR startup. When the ECCR receives the first change record for a schema, the ECCR verifies each registered schema against the information in the DB2 catalog.
- **YES**. Verifies all registered schema information against the information in the DB2 catalog at ECCR startup and when you refresh the ECCR. If the verification process encounters errors, the ECCR ends.
- **WARN**. Verifies all registered schema information against the information in the DB2 catalog at ECCR startup and when you refresh the ECCR. If the verification process encounters errors, the ECCR issues a warning message and continues processing.

Default is NO.

Refresh or restart the DB2 ECCR to activate a change for this statement.

COMMITINT [MS={*milliseconds*|60000}]

Optional. Specifies the time interval, in milliseconds, after which the DB2 ECCR issues an SQL COMMIT to free resources that are held on its behalf because of IFI306 activity.

Valid values are 0 through 999999. Default is 60000 milliseconds, or 60 seconds.

A value of 0 disables time-based SQL COMMITs. The ECCR issues SQL COMMITs only after the following types of events:

- ECCR startup
- Processing of the DB2 ECCR REFRESH command
- Processing of a UR that contains DDL

DB2ROWPROMOTION {ENABLE|DISABLE}

If you use DB2 12 or later, use this statement to enable the DB2 ECCR to update old images in DML rows to the current version to avoid problems in processing DELETEs and old images of UPDATEs when a DDL operation changes the fixed length of a column. Options are:

- **ENABLE**. The ECCR uses the DB2 READS API to convert CDC row data to the version that is current at the time of the DML operation.
- **DISABLE**. The ECCR processes old images in rows for DML changes as usual.

Default is DISABLE.

EC PERMIL={*number_errors*|0}

Optional. Specifies the maximum number of acceptable errors per thousand updates.

Default value is 0.

Refresh or restart the DB2 ECCR to activate a new value for this statement.

IFI306 [OPT={N|Y|F}] [4KPAGES={*nnn*|50}] [NDWAIT={*nnnn*|300}]

Optional. Controls the DB2 ECCR interaction with the DB2 instrumentation facility interface (IFI). This statement requires at least one of the following keyword parameters: OPT, 4KPAGES, or NDWAIT.

OPT

Specifies how the DB2 ECCR reads the DB2 log. Enter this keyword in all uppercase beginning in column 8.

Valid values are:

- **Y**. Recommended. Returns CDC records from the DB2 log.
- **N**. Returns all records from the DB2 log.
- **F**. Returns CDC records from the DB2 log and filters them by registered tables.

Note: When you set this parameter to Y or F, the ECCR cannot capture inserts for DB2 QUIESCE operations from the DB2 catalog table SYSCOPY.

Default is Y.

4KPAGES

Specifies the number of 4-KB pages of KEY-7 CSA storage to use for the DB2 IFI 306 buffer that stores the data to pass to the ECCR.

Enter the keyword in all uppercase beginning in column 14. For the keyword value, you can enter up to three digits. If you enter a value less than three digits, pad the value with spaces ending in column 24.

Default is 50.

Important: Do not change the default value unless Informatica Global Customer Support directs you to do so.

NDWAIT

Specifies the interval, in hundredths of a second, that the ECCR waits for DB2 to return change data before sending another request to IFI to retrieve change data from the DB2 logs.

Enter this parameter in all uppercase beginning in column 26.

Valid values are 1-9999. Default is 300.

If you add, remove, or change the IFI306 statement, you must restart the DB2 ECCR for the change to take effect.

ROWNOTDECOMPRESSED {FAIL|NOFAIL}

Optional. Indicates whether the DB2 ECCR continues or fails when it encounters row data that has not been decompressed for a table with an active capture registration. This situation can occur, for example, if a REORG operation causes the DB2 compression dictionary to become invalid.

Options are:

- **FAIL**. If the ECCR encounters rows with compressed data, it ends abnormally. PowerExchange issues error message PWXEDM177462E to the EDMMSG data set and as a WTO message.
- **NOFAIL**. If the ECCR encounters rows with compressed data, it skips them and continues reading the DB2 log. PowerExchange issues informational messages PWXEDM177462I and PWXEDM177596I to the EDMMSG data set and as WTO messages.

Default is FAIL.

Tip: You can use the WTO messages to automate alert notifications to the appropriate system users.

SHOWGENERATED

Include this optional statement if you want the ECCR to list internally generated control statements in its output. If you have many capture registrations, the SHOWGENERATED statement can substantially increase the amount of ECCR output that is written to the EDMMSG data set. By default, the internally generated control statements are suppressed because they are not needed for normal operation. However, if you need them for debugging purposes, include this SHOWGENERATED statement.

SKIPURDML *eccr_description_of_urid*

Optional. Causes the DB2 ECCR to skip operations in a specific DB2 unit of recovery (UR) when capturing changes. Use this statement to have the ECCR skip change records from a problematic area of the log. The *urid* value is the ECCR description of the DB2 URID, which consists of 20 hexadecimal characters, a period, and four ending hexadecimal characters. For example:

```
SKIPURDML 000000000004AB60DEC0.0000
```

Important: Use this statement only at the direction of Informatica Global Customer Support.

You can specify up to 255 SKIPURDML statements in the REPL2OPT DD data set.

If you specify this parameter, the ECCR issues messages PWXEDM177230I and PWXEDM177231W to describe the UR and each log record that is skipped.

STAT LEV={ST|SQ} [SEC={*seconds*|3600}]

Optional. Controls the detail level of the PWXEDM177085I statistics message that the DB2 ECCR writes for tables of CDC interest to the EDMMSG data set. Also, optionally specifies the interval at which the ECCR issues the PWXEDM177084I and PWXEDM177085I statistics messages. The ECCR writes the statistics messages to the EDMMSG data set at the following points in time:

- At ECCR termination
- When you issue the ECCR DISPLAY command
- When you issue the ECCR REFRESH command
- When the reporting interval that is specified by the SEC parameter in this statement elapses

Note: The ECCR writes PWXEDM177085I capture statistics only for tables for which change records have been captured. You can use the DISPLAY command with the ALL parameter to print the statistics for all source tables, including those with no change capture activity. For more information, see the *PowerExchange Command Reference*.

LEV={ST|SQ}

Identifies the detail level of the PWXEDM177085I table statistics that PowerExchange writes to the EDMMSG data set. Options are:

- **ST**. Writes summary statistics. Summary statistics are the total number of changes that the DB2 ECCR captured since the ECCR started, including backout records.
- **SQ**. Writes detail-level statistics. Detail-level statistics are counts of the inserts, updates, and deletes that were captured for each table that had some DML change activity.

Default is ST.

SEC={*seconds*|3600}

Optional. Specifies the number of seconds in the statistics reporting period. Default is 3600 seconds, or 1 hour.

If you update this statement, you must refresh or restart the DB2 ECCR to activate the change.

TRACE *trace_ID*[,*trace_level*]

Enables a trace that provides diagnostic information for troubleshooting DB2 ECCR problems.

Important: Use this statement only at the direction of Informatica Global Customer Support.

In this statement, the *trace_id* is a trace type identifier. The trace level is a number from 1 to 9. Customer Support will provide the trace ID and the optional trace level if needed.

To activate more than one trace, you must enter the TRACE statement multiple times.

If you change the TRACE statement, you must restart the DB2 ECCR.

Configuring the DB2 ECCR JCL

The following sample JCL for the DB2 ECCR PROC is provided in the ECCRDB2 member of the RUNLIB library:

```
//<db2pref>DB2EC PROC HLQEDM=<libname_edmparm>,
//    HLQRO=<libnameloadlib>,
//    LOGGER=<zlogger>,
//    SUFFIX=<plm_symbolic_suffix>,
//    RUNLIB=<runlib>,
//    DB2EXIT=<db2exit>,
//    DB2LOAD=<db2load>
//*
//*   PROC OR JOB
//*-------------------------------------------------------------------*
//* DB2 CHANGE CAPTURE (ECCR) JCL
//*-------------------------------------------------------------------*
//* NOTE: THIS PROCEDURE CAN BE RUN AS A Z/OS STARTED TASK OR AS A JOB
//*-------------------------------------------------------------------*
//* REPLACE THE FOLLOWING ITEMS WITH PROPER INSTALLATION VALUES
//* 1. JCL DATA SET NAMES
//* 2. REPDB2CT MEMBER OF YOUR RUNLIB
//* 3. REPDB2OP MEMBER OF YOUR RUNLIB
//*-------------------------------------------------------------------*
//ECCR   EXEC PGM=PX029200,TIME=NOLIMIT
//STEPLIB  DD DISP=SHR,DSN=&HLQRO..LOADLIB
//         DD DISP=SHR,DSN=&HLQRO..LOAD
//         DD DISP=SHR,DSN=&DB2EXIT
//         DD DISP=SHR,DSN=&DB2LOAD
//EDMPARMS DD DISP=SHR,DSN=&HLQEDM..&LOGGER&SUFFIX..USERLIB
//REPL2CTL DD DISP=SHR,DSN=&RUNLIB(REPDB2CT)
//REPL2OPT DD DISP=SHR,DSN=&RUNLIB(REPDB2OP)
//EDMMSG   DD SYSOUT=*
//REPL2TRA DD SYSOUT=*
//SYSUDUMP DD SYSOUT=*
//ABNLIGNR DD DUMMY                       << Ignore Abend-Aid
//IDIOFF   DD DUMMY                       <<Ignore FAULT ANALYIZER
//*
//*-------------------------------------------------------------------*
//*
//* EDMTRACE DD  SYSOUT=*     EDM Tracing
//*
```

Note: In this sample, the values in pointed brackets <> are variables. During installation, these variables are replaced by specific values that you enter in the z/OS Installation Assistant.

The following table describes the JCL statements for the DB2 ECCR procedure:

JCL Statement	Description
EXEC	Specify the PX029200 program.
STEPLIB DDs	Include the PowerExchange load libraries (LOADLIB and LOAD), the DB2 load library (&DB2LOAD), and the DB2 exit load library (&DB2EXIT). If your DB2 subsystem uses EDITPROC or FIELDPROC exit routines, also include the library that contains them. All libraries in this STEPLIB concatenation must be APF-authorized. If any of the libraries are included in your system's LNKLST concatenation, you do not need to include them in the STEPLIB.
EDMPARMS DD	Specify the name of the PowerExchange USERLIB library that contains the EDMSDIR modules options module that is associated with the PowerExchange Logger for z/OS instance. If you do not include an EDMPARMS DD statement, or if the library you specify does not contain the EDMSDIR options module, the DB2 ECCR searches the STEPLIB concatenation for those options.
REPL2CTL DD	Specify the REPL2CTL file (REPDB2CT in RUNLIB) that is associated with the ECCR.
REPL2OPT DD	Specify the REPL2OPT file (REPDB2OP in RUNLIB) that is associated with the ECCR.
EDMMSG DD	Specify the output data set for PWXEDM messages from the PowerExchange ECCRs, PowerExchange Logger for z/OS, Log Read API (LRAPI), and the Log Write API (LWAPI). This data set must be a SYSOUT data set. If you do not include this DD statement, the EDMMSG data set is dynamically allocated.
REPL2TRA DD	Specify the output data set for the DB2 ECCR TRACE output. The default and recommended specification is SYSOUT=*. The DB2 ECCR writes data to this DD in error situations and if the TRACE statement is included in the REPL2OPT file.
SYSUDUMP DD	Specify the data set for storage dump data that is generated for an abend of a job step. Enter SYSOUT=* to direct output to a standard SYSOUT data set.
ABNLIGNR DD	Do not delete or comment out this DD statement. If you have the Compuware Abend-AID tool, this statement causes PowerExchange to bypass Abend-AID and use an IBM SYSUDUMP instead to collect diagnostic information after a DB2 ECCR abend. PowerExchange requires an IBM SYSUDUMP to find the last processed LSRN value to use for a subsequent ECCR special start.
IDIOFF DD	Do not delete or comment out this DD statement. If you have IBM Fault Analyzer, this statement causes PowerExchange to bypass the Fault Analyzer tool and use an IBM SYSUDUMP instead to collect diagnostic information after a DB2 for z/OS ECCR abend. PowerExchange requires an IBM SYSUDUMP to find the last processed LSRN value to use for a subsequent ECCR special start.
EDMTRACE DD	Specify the output data set for the PowerExchange common services trace. Include this DD statement only at the direction of Informatica Global Customer Support.

Related Topics:

- "DB2 ECCR Control Statements in the REPL2CTL DD Data Set" on page 215
- "DB2 ECCR Configuration Statements in the REPL2OPT DD Data Set" on page 216

Starting the DB2 ECCR

The DB2 ECCR runs as an MVS started task or as an MVS batch job. For the DB2 ECCR to start successfully, DB2 must be running.

Use this procedure to start the DB2 ECCR for the first time or to restart it after a system shutdown.

1. Configure the DB2 ECCR options:
   - Edit the REPDB2CT member in the PowerExchange RUNLIB data set as required.
   - Edit the REPDB2OP member in the PowerExchange RUNLIB data set as required.

   Important: The default member that PowerExchange supplies specifies WARM for the start type. The first time you start the DB2 ECCR, temporarily change the start type to COLD to allow the DB2 ECCR to start. After the initial start, warm start the DB2 ECCR.
2. Edit the ECCRDB2 sample JCL in the PowerExchange RUNLIB data set as required.
3. Execute the procedure in a batch job. Alternatively, start it as a started task by using the MVS START command. Generally, the DB2 ECCR is run as a started task because it is a long-running job.

The process described previously details the requirements for starting a single DB2 ECCR in a simple environment.

Related Topics:

- "Running Multiple DB2 ECCRs" on page 209
- "DB2 Data-Sharing Considerations" on page 210

Managing DB2 CDC

This section describes how to start and stop the DB2 ECCR. It also describes how to control DB2 ECCR statistics and output.

Stopping the DB2 ECCR

You can stop the DB2 ECCR by issuing the ECCR QUIESCE command or the MVS STOP command.

If you use the QUIESCE command, the DB2 ECCR waits until it reaches a point in the DB2 log where no in-flight UOWs exist before shutting down. Use the QUIESCE command before performing a required cold start, for example, when migrating to a new DB2 version or upgrading PowerExchange. On a busy DB2 subsystem, quiesce processing might take a long time. To issue the QUIESCE command, use the following syntax:

```
F eccr_task_name,QUIESCE
```

Use the MVS STOP command to stop the DB2 ECCR immediately, even though in-flight UOWs might exist. To issue the STOP command, use the following syntax:

```
{STOP|P} eccr_task_name
```

After you stop the ECCR, PowerExchange issues messages that report the ECCR starting RBA, the number of records sent to the PowerExchange Logger for z/OS, the RBA or LRSN of the last DB2 log record that the DB2 ECCR read, and the URID of the oldest open UOW at that location in the DB2 log.

Example QUIESCE Command Output

The following messages are issued when you use the QUIESCE command to stop the DB2 ECCR:

```
PWXEDM177048I CAPTURE PROGRAM ACKNOWLEDGES A QUIESCE COMMAND
PWXEDM177276I DB2 CAPTURE ENDING DUE TO CAPTURE QUIESCE COMMAND
PWXEDM177282I BEGIN DB2 CAPTURE TERMINATION
PWXEDM177137I -STOP TRACE(MONITOR) PLAN(ABCCPDEV) LOCATION(ABCDSNB ) CLASS(1)
DSNW131I  -DSNB STOP TRACE SUCCESSFUL FOR TRACE NUMBER(S) 07
DSN9022I  -DSNB DSNWVCM1 '-STOP TRACE' NORMAL COMPLETION
PWXEDM177268I LAST READ DB2 LOG LOCATION 000000000007AE9460EA.0000.0000
PWXEDM177084I ABCDSNB  capture statistics at 2016-09-06 21.31.44
DB2 Log Location  000000000007AE9460EA.0000.0000
DB2 Log Timestamp 2016-09-06 21.30.17
Current Delay=           sec   Average Delay=           sec
DB2 Log records       REC_TOT      REC_INTV REC_PSEC
                           13             0        0
EDM Messages          MSG_TOT      MSG_INTV MSG_PSEC
                            2             0        0
PWXEDM177085I Detail level statistics follow
      MSG_TOT      MSG_INTV MSG_PSEC  TABLE_NAME
            1             0        0  RSHOOK1.TSTP1
            1             0        0  RSHOOK1.SVT@ALL
PWXEDM177436I No UOWs found
PWXEDM177012I ECCR STATUS: LAST DB2 READ LOC 000000000007AE9460EA.0000.0000 OLDEST OPEN UOW
*NONE*
PWXEDM177013I LOGGER:      LAST DB2 READ LOC 000000000007AE945E00           OLDEST OPEN UOW
*NONE*
PWXEDM172809I Change Capture counts for DSNB/RSHOOK1.TSTP1: Insert=1, Update=0, Delete=0
PWXEDM172809I Change Capture counts for DSNB/RSHOOK1.SVT@ALL: Insert=1, Update=0, Delete=0
PWXEDM172841I EDM ECCR ABCDSNB disconnected from EDM Logger ABCD, Log RBA=X'0000380FA7D00000'
PWXEDM172818I Left XCF group 'ABCD' as member 'ABCDSNB'
PWXEDM172829I EDM ECCR sent 2 records to Logger ABCD (2 change records)
PWXEDM177265I PROCESSING IS COMPLETE
```

Example MVS STOP Command Output

The following messages are issued when you use the MVS STOP command to stop the DB2 ECCR:

```
PWXEDM177046I CAPTURE PROGRAM ACKNOWLEDGES A MVS STOP COMMAND
PWXEDM177276I DB2 CAPTURE ENDING DUE TO MVS STOP COMMAND
PWXEDM177282I BEGIN DB2 CAPTURE TERMINATION
PWXEDM177137I -STOP TRACE(MONITOR) PLAN(plan) LOCATION(caname) CLASS(1)
PWXEDM177268I LAST READ DB2 LOG LOCATION=rba_or_lrsn.data_sharing_member_id.sequence_number
PWXEDM177265I PROCESSING IS COMPLETE
PWXEDM172809I Change Capture counts for DEBB/RDADGK.DGKSRC01: Insert=1, Update=0, Delete=0
PWXEDM172841I EDM ECCR DEBB0001 disconnected from EDM Logger DGKL, Log
RBA=X'0000014A8FB40000'
PWXEDM172818I Left XCF group 'DGKL' as member 'DEBB0001'
PWXEDM172829I EDM ECCR sent 1 records to Logger DGKL (1 change records)
PWXEDM177012I ECCR STATUS: LAST DB2 READ LOC
rba_or_lrsn.data_sharing_member_id.sequence_number
OLDEST OPEN UOW urid.data_sharing_member_id
```

Commands for Controlling DB2 ECCR Processing

You can control the DB2 ECCR either by issuing MVS MODIFY commands to the ECCR. You can also change configuration statements in the REPL2OPT DD file and then issue the REFRESH command or restart the ECCR.

The following table summarizes the MVS MODIFY commands that you can use to control the DB2 ECCR:

Command	Description
DISPLAY	Prints statistics reports on ECCR activity.
QUIESCE	Stops the DB2 ECCR after all in-flight UOWs for the ECCR complete and the ECCR sends the change records to the PowerExchange Logger.
REFRESH	Refreshes the ECCR after you update configuration statements in the REPDB2OP member in the RUNLIB library or after you add, edit, or delete capture registrations for DB2 source tables. The refresh operation activates the new DB2 ECCR options and registration changes for change data capture. You can refresh the DB2 ECCR only while it is active. **Note:** The REFRESH command ignores any changes that you make to the CA NAME statement in the REPL2CTL data set and to the IFI306 and START statements in the REPL2OPT data set. The REFRESH command is equivalent to stopping the DB2 ECCR and then restarting it with the START WARM statement.
URID	Lists the DB2 URIDs for the DB2 subsystem or data-sharing group to which the DB2 for z/OS ECCR is connected.

Note: Other DB2 ECCR MODIFY command are primarily for use by Informatica Global Customer Support. For more information, see the *PowerExchange Command Reference*.

You can also use the MVS START and STOP commands to start and stop the ECCR started task or job. The STOP command stops the DB2 ECCR immediately without waiting for in-flight UOWs to complete or for change records to be sent to the PowerExchange Logger. Informatica recommends that you use the QUIESCE command instead.

DB2 ECCR Reports

The DB2 ECCR prints reports at startup, at completion of capture processing, at a specified statistics reporting interval, and when a DISPLAY command is issued.

At startup, the ECCR generates a report that shows the default ECCR options that are in effect and initialization processing. At shutdown, the ECCR reports the number of captured changes. If you applied any zaps or load module replacements to PowerExchange, the ECCR also reports which ones you applied. The ECCR prints these reports to the output queue or to the location that is specified in the ECCR procedure JCL in the RUNLIB(ECCRDB2) member.

The ECCR also prints statistics in messages PWXEDM177084I and PWXEDM177085I based on the reporting interval that is specified in the STAT statement of the REPL2OPT DD configuration data set or in response to an ECCR DISPLAY command.

- If you set STAT LEV=ST parameter or issue the DISPLAY,ST command, the ECCR prints counts of records that the ECCR read from the DB2 log by source table.
- If you set STAT LEV=SQ or issue the DISPLAY,SQ command, the ECCR prints counts of records that the ECCR sent to the PowerExchange Logger for z/OS by source table and record type.

The ECCR writes the statistics in the PWXEDM177084I and PWXEDM085I messages to the EDMMSG data set. The ECCR also writes the PWXEDM177084I summary statistics to the JES job log and MVS hardcopy log and as a WTO message.

Example DB2 ECCR Startup Report

For a DB2 for z/OS ECCR warm start, the following report shows the ECCR options that are in effect and initialization processing:

```
PWXEDM177401I START OF REPL2OPT CONTROL STATEMENTS
              DB2 PLAN=PWXC1020 RN=DSNC
              EC PERMIL=000
              STAT LEV=ST SEC=3600
              IFI306 OPT=Y
PWXEDM177402I END OF REPL2OPT CONTROL STATEMENTS
PWXEDM177150I Connected to DB2 subsystem DSNC
PWXEDM177155I DB2 DSN6SPRM configuration parameter APPLCOMPAT is 'V12R1M500'
PWXEDM177155I DB2 DSN6SPRM configuration parameter RESTRICT_ALT_COL_FOR_DCC is 'NO'
PWXEDM177155I DB2 DSN6SPRM configuration parameter CATALOG is 'DSNC'
PWXEDM177137I -DISPLAY GROUP
DSN7100I  -DSNC DSN7GCMD
*** BEGIN DISPLAY OF GROUP(........) CATALOG LEVEL(V12R1M500)
                  CURRENT FUNCTION LEVEL(V12R1M500)
                  HIGHEST ACTIVATED FUNCTION LEVEL(V12R1M500)
                  HIGHEST POSSIBLE FUNCTION LEVEL(V12R1M500)
                  PROTOCOL LEVEL(2)
                  GROUP ATTACH NAME(....)
--------------------------------------------------------------------
DB2          SUB                     DB2    SYSTEM    IRLM
MEMBER   ID  SYS  CMDPREF   STATUS   LVL    NAME      SUBSYS IRLMPROC
-------- --- ---- --------  -------- ------ --------  ----   --------
........   0 DSNC -DSNC     ACTIVE   121500 ZO61      DRLC   DSNCIRLM
--------------------------------------------------------------------
SPT01 INLINE LENGTH:        32138
*** END DISPLAY OF GROUP(........)
DSN9022I  -DSNC DSN7GCMD 'DISPLAY GROUP ' NORMAL COMPLETION
PWXEDM177601I DB2 Product ID:    DSN1201500
PWXEDM177601I DB2 Catalog level: V12R1M500
PWXEDM177404I START OF REPL2CTL CONTROL STATEMENTS
              *---+----1----+----2----+----3----+----4----+----5
              CA NAME=A1020DSC
              *---+----1----+----2----+----3----+----4----+----5
PWXEDM177405I END OF REPL2CTL CONTROL STATEMENTS
PWXEDM172852I Options in effect:
   Load Library containing EDMSDIR. . . . . : ABCQA.V1020.A02L.USERLIB
   EDMSDIR assembly date/time . . . . . . . : 20170315 22.26
   EDP Rollup . . . . . . . . . . . . . . . : V1020_HF2B04_20190211
   Product distribution date. . . . . . . . : 20181029
   Product distribution level . . . . . . . : 2.4.05
   Agent Id . . . . . . . . . . . . . . . . : A02A
   Logger Id. . . . . . . . . . . . . . . . : A02L
   SYSOUT class . . . . . . . . . . . . . . : *
   Action if ECCR error encountered . . . . : Continue
PWXEDM172886I The following Load Module replacements have been installed:
    0----+----1----+----2----+----3----+----4----+----5----+----6----+----7----+----8----+----9----+
    4$+4444+4444$$$44$$$$$$$$$$$$$+$+$$$$+$$$$$$$$$$+$$$$$$$$$$$$$$$$$+$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
  100----+----1----+----2----+----3----+----4----+----5----+----6----+----7----+----8----+----9----+
    $$$$$$$$$$$$$$+$$$$$$$$$$$$+$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
  200----+----1----+----2----+----3----+----4----+----5-
    $ $+$+$$$$$$+$$$$$$$$$$$$$+$$$$$$$$$$$$$$$$$$$$$$ $$
PWXEDM172818I Joined XCF group 'A02L' as member 'A1020DSC'
PWXEDM172841I EDM ECCR A1020DSC connected to EDM Logger A02L, Log RBA=X'00000052AE880000'
PWXEDM172808I Change Capture active for Tag DB2DSNCalldec21 DB2 table DSNC/CWHITL1.ALL_DEC_002
PWXEDM172808I Change Capture active for Tag DB2DSNCalldte1 DB2 table DSNC/CWHITL1.ALL_DATES_001
PWXEDM172808I Change Capture active for Tag DB2DSNCalldte21 DB2 table DSNC/CWHITL1.ALL_DATES_002
PWXEDM172808I Change Capture active for Tag DB2DSNCphoto3in1 DB2 table DSNC/CWHITL2.PHOTO3
PWXEDM177413I Start processing spooled REPL2CTL statements
              *---+----1----+----2----+----3----+----4----+----5
              CA NAME=A1020DSC
              *---+----1----+----2----+----3----+----4----+----5
PWXEDM177414I End processing spooled REPL2CTL statements
PWXEDM177548I Verifying Capture Directory supports up to DB2 V12.1.500 catalog level.
PWXEDM177552I Capture Directory supports up to DB2 V12.1.500 catalog level.
PWXEDM177137I -START TRACE(MONITOR) PLAN(PWXC1020) LOCATION(A1020DSC) CLASS(1)
DSNW130I  -DSNC MONITOR TRACE STARTED, ASSIGNED TRACE NUMBER 04
DSN9022I  -DSNC DSNWVCM1 '-START TRACE' NORMAL COMPLETION
PWXEDM177283I Begin DB2 ECCR WARM start processing.
PWXEDM177398E Table CWHITL1.QACLOB1 probably not defined with DATA CAPTURE CHANGES
PWXEDM177340I MAINTENANCE OF CAPTURE DIRECTORY IS COMPLETE
PWXEDM177310I WARM start processing is complete.
PWXEDM172820I Change Capture initialized for DB2 on DSNC
PWXEDM177013I LOGGER:      LAST DB2 READ LOC 000000000009C075232E           OLDEST OPEN UOW *NONE*
PWXEDM177267I STARTING AT DB2 LOG LOCATION 000000000009C075232E
```

Example DB2 ECCR Statistics Reports

Review the example DB2 ECCR statistics reports and the descriptions of the report fields to learn about the information that these reports provide.

The reports are printed to the EDMMSG data set at the reporting interval that is set in the STAT statement of the REPL2OPT DD data set and in response to an ECCR DISPLAY command. The type of statistics depends on the LEV parameter in the STAT statement or on the parameters that you specify in the DISPLAY command. The default for the LEV parameter is ST. For more information about the DISPLAY command, see the *PowerExchange Command Reference*.

ST Display Example:

The following example statistics report is generated when STAT LEV=ST is set in the REPL2OPT data set or in response to the DISPLAY,ST command:

```
PWXEDM177084I ABCDSNB  capture statistics at 2017-06-16 19.24.22
DB2 Log Location  00000000000A9B69565A.0000.0000
DB2 Log Timestamp 2017-06-16 19.22.47
Current Delay=       1.59 sec   Average Delay=       1.60 sec
                      REC_TOT     RECS/INTV RECS/SEC
DB2 log records           209           209        -
EDM records                 8             8        -
PWXEDM177085I ST Display
      MSG_TOT      MSG/INTV MSG/PSEC  TABLE_NAME
            5             5        -  ABCNKL1.TSTP1
            1             1        -  ABCNKL1.P707951D
            2             2        -  ABCNKL1.P707951A
```

The entire report is written to the EDMMSG data set. The summary statistics in message PWXEDM177084I are also written to the JES job log and MVS hardcopy log and as a WTO message.

The ST Display report in message PWXEDM177085I shows counts of change records that the ECCR read from the DB2 log for each source table that has a non-zero value in the MSG_TOT field. To show these statistics for every source table, including those with a MSG_TOT value of zero or null, use the DISPLAY,ST,ALL command.

Note: Any numeric value with an integer overflow condition is displayed as asterisks, for example, `*,***,***,***`. A zero or null value is indicated by a hyphen (-).

The following table describes the fields in the PWXEDM177084I summary statistics and PWXEDM177085I ST Display statistics:

Report Field	Description
DB2 Log Location	In the PWXEDM177084I statistics, displays the RBA that indicates the current location of ECCR processing in the DB2 log.
DB2 Log Timestamp	In the PWXEDM177084I statistics, displays the timestamp of the last DB2 log record that the ECCR read. This timestamp reflects the date and time that the record was written to the DB2 log.
Current Delay	In the PWXEDM177084I statistics, displays the delay, in seconds, for the last change record. The delay is the difference between the time when a change record was written to the DB2 log and the time when the ECCR read the record.
Average Delay	In the PWXEDM177084I statistics, displays the average delay, in seconds, for processing a change record during the statistical reporting period. The delay is the difference between the time when a change record was written to the DB2 log and the time when the ECCR read the record.
REC_TOT	In the PWXEDM177084I statistics, displays the total number of DB2 log records and the total number of EDM records that the ECCR read since the ECCR started.

Report Field	Description
REC/INTV	In the PWXEDM177084I statistics, displays the number of DB2 log records and the number of EDM records that the ECCR read since the last statistics reporting interval. The reporting interval is specified in the SEC parameter in the STAT statement in the REPL2OPT data set.
REC/PSEC	In the PWXEDM177084I statistics, displays the average number of DB2 log records and the average number of EDM records that the ECCR read per second during the current statistics reporting interval.
MSG_TOT	In the PWXEDM177085I ST Display report, displays the total number of changes that the DB2 ECCR captured for each table since the ECCR started. This count includes backout records.
MSG/INTV	In the PWXEDM177085I ST Display report, displays the total number of changes that the DB2 ECCR captured for each table since the last statistics reporting interval. This count includes backout records.
MSG/PSEC	In the PWXEDM177085I ST Display report, displays the average number of changes that the ECCR captured per second for each table during the current statistics reporting interval. This average includes backout records.
TABLE_NAME	In the PWXEDM177085I ST Display report, displays the name of a source table for which the MSG_TOT, MSG/INTV, and MSG/PSEC statistics are reported.

If no ST type of activity has occurred, the following message is issued in response to the DISPLAY,ST command instead of the PWXEDM177085I message:

```
PWXEDM177086I No ST activity
```

SQ Display Example:

The following example statistics report is generated when STAT LEV=SQ is set in the REPL2OPT data set or in response to the DISPLAY,SQ command:

```
PWXEDM177084I ABCDSNB  capture statistics at 2017-06-16 19.24.22
DB2 Log Location  00000000000A9B69565A.0000.0000
DB2 Log Timestamp 2017-06-16 19.22.47
Current Delay=       1.59 sec   Average Delay=       1.60 sec
                      REC_TOT     RECS/INTV RECS/SEC
DB2 log records           209           209        -
EDM records                 8             8        -
PWXEDM177085I SQ Display
      INSERTs        UPDATEs        DELETEs  TABLE_NAME
            3              -              2  ABCNKL1.TSTP1
            1              -              -  ABCNKL1.P707951D
            1              1              -  ABCNKL1.P707951A
```

The entire report is written to the EDMMSG data set. The summary statistics in PWXEDM177084I are also written to the JES job log and MVS hardcopy log and as a WTO message.

The SQ Display report in PWXEDM177085I shows counts of records that the ECCR sent to the PowerExchange Logger for z/OS since the ECCR started, by table and record type. These counts are for low-level types of database operations that indicate logging activity, not for SQL INSERT, UPDATE, and DELETE operations.

Only tables that have a non-zero value for at least one count are displayed. To display these counts for every table from which the ECCR captures changes, including tables that have a zero value for all of these counts, use the DISPLAY,SQ,ALL command.

Note: Any numeric value with an integer overflow condition is displayed as asterisks, for example, `*,***,***,***`. A zero or null value is indicated by a hyphen (-).

If no SQ type of activity has occurred, the following message is issued in response to the DISPLAY,SQ command instead of the PWXEDM177085I message:

```
PWXEDM177086I No SQ activity
```

The following table describes the fields in the SQ Display report in PWXEDM177085I:

Report Field	Description
INSERTs	Displays the number of records of type "insert" that the ECCR sent to the PowerExchange Logger for z/OS for a source table since the ECCR started. The count is for low-level database operations of type of "insert," not for SQL insert operations.
UPDATEs	Displays the number of records of type "update" that the ECCR sent to the PowerExchange Logger for z/OS for a source table since the ECCR started. The count is for low-level database operations of type of "update," not for SQL update operations.
DELETEs	Displays the number of records of type "delete" that the ECCR sent to the PowerExchange Logger for z/OS for a source table since the ECCR started. The count is for low-level database operations of type "delete," not for SQL delete operations.
TABLE_NAME	Displays the name of a source table for which INSERTs, UPDATEs, and DELETEs are reported.

Recovering the DB2 ECCR

You can recover the DB2 ECCR if it fails or if the PowerExchange Logger for z/OS stops or fails while attached to the ECCR.

When the PowerExchange Logger stops or abends while attached to the ECCR, the ECCR also abends when it receives the first change record after the PowerExchange Logger failure.

1. Determine the cause of the DB2 ECCR failure.

   The EC PERMIL statement in the REPL2OPT DD data set indicates the maximum number of errors that the ECCR tolerates before ending.
2. Correct the error.

   If the DB2 ECCR failed because the PowerExchange Logger ended, restart the PowerExchange Logger.
3. Restart the DB2 ECCR from the point at which it abended.

   Specify the STARTUP WARM statement in the REPDB2OPT DD data set. Use the same REPL2CTL file that you used prior to the abend.

When you restart the DB2 ECCR or the PowerExchange Logger, the PowerExchange Logger determines the point at which to resume capturing changes for the corresponding CA name.

Related Topics:

- "DB2 ECCR Configuration Statements in the REPL2OPT DD Data Set" on page 216

DB2 ECCR Capture Directory Table Upgrades

For Db2 versions earlier than Version 11, you might need to upgrade the DB2 ECCR capture directory tables before migrating to a new DB2 version.

During ECCR initialization, message PWXEDM177552I identifies the latest DB2 catalog version that the PowerExchange capture directory tables support. If the reported DB2 catalog version is earlier than the DB2 catalog version with which the ECCR runs, you must upgrade the capture directory table definitions. Otherwise, the ECCR will fail on the new DB2 version.

SAMPLIB Members for Upgrading the Capture Directory Tables

PowerExchange provides the following the SAMPLIB members, each with detailed comments, for upgrading the capture directory tables:

BNDECCRB

Serves as a template of all of the DB2 BIND statements that are required to bind the DB2 ECCR plan. The BIND statements are equivalent to those in DB2BINDB. If you use the BNDECCRB member to create another bind member, change the PACKAGE, OWNER, and QUALIFIER keywords to match those that your DB2 ECCR uses. You must rebind the DB2 ECCR plan after the upgrading the capture directory tables. During bind processing, DB2 is expected to issue some DB2 DSNX105I warning messages. For more information, see the comments in the BNDECCRB member.

EXPNDC51

Creates copies of the capture directory tables to be upgraded for DB2 11 support.

EXPNC5L2

Upgrades the capture directory tables to support DB2 11 and later in a DB2 data sharing environment. If you ran the SQL in EXPNDCP4 previously, you can still run the SQL in EXPNC5L2 without generating errors.

EXPNC5R2

Upgrades the capture directory tables to support DB2 11 and later in a DB2 environment that does not use data sharing. If you ran the SQL in EXPNDCP4 previously, you can still run the SQL in EXPNC5L2 without generating errors.

EXPNDCP4

Increases the length of the SCHEMA_VERSIONS column in the TCAPTABLES table to prevent the DB2 ECCR from ending abnormally when gathering schema version information. Use of this member is optional. This function is also included in EXPNC5L2 and EXPNC5R2.

Upgrading the DB2 ECCR Capture Directory Tables

You might need to upgrade the DB2 ECCR capture directory tables before migrating to DB2 11.

To determine whether you need to upgrade the capture directory tables, look for message PWXEDM177552I in the message output from DB2 ECCR initialization. This message identifies the latest DB2 version that your capture directory tables support.

Important: Do not change the schemas of any DB2 tables that are registered for change data capture until *after* you upgrade the capture directory tables and restart the DB2 ECCR.

To properly upgrade the capture directory tables, complete the following steps:

1. If the DB2 ECCR is running, use the QUIESCE command to stop it.
2. Customize the SQL statements in the sample EXPNDC51 member in the SAMPLIB library.

   This SQL creates copies of the current capture directory tables prior to upgrading them.
3. Use SPUFI or a batch SQL utility to execute the SQL statements in the modified EXPNDC51 member.
4. Customize the SQL statements in the sample EXPNC5L2 or EXPNC5R2 member in the SAMPLIB library.

   Use the EXPNC5L2 member in a data sharing environment, or use the EXPNC5R2 member in a non-data-sharing environment. These members drop the old capture directory tables and create new capture directory tables that support DB2 11. For more information, see the comments in these members.
5. Use SPUFI or a batch SQL utility to execute the SQL statements in the modified EXPNC5L2 or EXPNC5R2 member.

6. Warm start the DB2 ECCR.

   The ECCR resumes change data capture with the upgraded catalog capture directory tables.

You can now migrate your subsystem to DB2 11.

Replacing a Table with Another Table That Has the Same Name

If you need to replace a table from which changes are captured with another table that has the same name, use this procedure.

1. Stop SQL changes from being written to the table.

   You can set read-only access on the table.
2. Verify that the DB2 ECCR captured all changes up to the point at which change activity was stopped.
3. Rename the table from which changes were captured to a different name.
4. Delete or deactivate the capture registration for the table.
5. Issue the DB2 ECCR REFRESH command to drop the table from the DB2 ECCR.
6. Rename the new table to the name of the dropped table that was previously registered for change capture.
7. Create and activate a capture registration for the newly renamed table.
8. Issue the DB2 ECCR REFRESH command again to add the newly renamed table to the DB2 ECCR.
9. Allow change activity to resume on both tables.

Migrating from a DB2 Data Sharing Environment

If you need to migrate a DB2 environment from data sharing to non-data-sharing mode during DB2 CDC, complete this procedure.

Note: Before migrating to non-data-sharing mode, wait until the DB2 ECCR processes all of the change records that were produced in data sharing mode. Otherwise, change data might be lost, which can cause data inconsistencies and require target table rematerialization.

1. Verify that the DB2 ECCR successfully captured all of the log records for source table changes that were written in data sharing mode.
2. Configure read-only (RO) access for the database and each table space. Use the following commands:

   For a database:

   ```
   START DATABASE(database_name) ACCESS(RO)
   ```

   For a table space:

   ```
   START DATABASE (database_name) SPACENAM(table_space_name) ACCESS(RO)
   ```
3. To verify that the DB2 ECCR processed all of the log records that were written prior to setting RO access on the table spaces, issue the following command:

   ```
   MODIFY job_name,DISPLAY
   ```

   This command returns the DB2 log timestamp for when the last-read log record was created. This timestamp must be later than the recorded time at which the last table space with source tables was set to RO access.
4. Stop the DB2 ECCR by issuing the following command:

   ```
   STOP job_name
   ```

5. After you complete the migration from the DB2 data sharing environment, start the DB2 subsystem in non-data-sharing mode. Then start the DB2 ECCR on one of the following ways:
   - Cold start the ECCR. Then set read-write (RW) access on the table spaces that contain the source tables and allow updates on the source tables again. PowerExchange begins capturing changes that are written in non-data-sharing mode to the source tables.
   - Special start the DB2 ECCR before doing any DDL operations on the source tables. You can perform the special start before or after allowing updates on the source tables again.
6. For the special start, determine the STARTLOC keyword value in the START statement in the REPL2OPT DD data set:
   - Run the DB2 DSNJU004 utility.
   - From the DSNJU004 print output, get the MIN RBA FOR TORBA value.
   - Use the MIN RBA FOR TORBA value as the STARTLOC value.
   - If you specified the group attachment name in the CN statement of the REPL2OPT DD data set, or use the RN statement value by default, specify a DB2 subsystem ID.

After you migrate to a DB2 non-data-sharing environment, DB2 does not support read operations on the log records that were written in data sharing mode.

If you run multiple ECCRs and registered all resources under the group attachment name, you can continue to use the same repository and the same RN value as before. For each registered table that is not in the DB2 catalog, the following message is issued:

```
PWXEDM177371W Table 'creator.table_name' does not exist in DB2 catalog
```

This warning message does not affect change capture for tables that are defined in the DB2 catalog for the DB2 subsystem under which the ECCR is running.

Stopping DB2 Change Data Capture

You can stop capture processing at various levels depending on your situation.

The following table identifies the methods of stopping change capture by level:

Level at Which to Stop Change Capture	Method
DB2 tables	Alter the DB2 table to specify DATA CAPTURE NONE. Use the following DDL statement: `ALTER owner.table_name DATA CAPTURE NONE` **Warning:** When you change the structure of a DB2 table to DATA CAPTURE NONE, changes are no longer written to the DB2 log in the expanded format that is required for change data capture. Consequently, the changes cannot be retrieved later.
DB2 environment	Stop the ECCR. Use the QUIESCE command or the MVS STOP command.
Registered DB2 tables	In the PowerExchange Navigator, deactivate or delete the capture registration. Then refresh the DB2 ECCR, or stop and restart the ECCR. **Warning:** Keep at least one active DB2 data-resource registration in the PowerExchange repository (CCT file). If you deactivate or delete all of the DB2 registrations, the DB2 ECCR ends abnormally when you refresh or restart it. For proper restart and recovery, do not delete registrations.

Related Topics:

- "Stopping the DB2 ECCR" on page 224

Managing DB2 Schema Changes

To capture changes without interruption to DB2 tables registered for capture, you must manage changes to DB2 tables and tablespaces.

Schema Verification

When the DB2 ECCR captures the first change record for a DB2 table, the ECCR verifies that the table schema in the DB2 catalog matches the schema in the corresponding PowerExchange capture registration.

The schema verification routine does not access the DB2 catalog. Instead, the routine uses the internal PowerExchange tables that were created from the DB2 catalog when you started the DB2 ECCR.

- If the DB2 table schema in the catalog matches the schema in the activated registration, capture processing continues.
- If the DB2 table schema in the catalog does not match the activated schema registration, the verification routine prints a report and the DB2 ECCR ABENDs.

You can request that the DB2 ECCR also run this schema verification routine at startup by specifying the CHKSCHEM statement in the RUNLIB member to which the REPL2OPT DD statement in the ECCR JCL points.

Sample Schema Verification Report and Abend Messages

The sample schema verification report shows the messages and information that are displayed when schema verification fails.

In this example, schema verification fails because the schema in the capture registration contains a column that is not defined in the DB2 catalog. This situation can occur if a column was removed from the table after the table was registered.

The following example report shows the output and abend messages that are printed:

```
PWXEDM177502I Table 'ABCOOK1.PLOB2A' the DB2 schema does not match the active profile schema. DB2 log time =
2017-05-04-20.47.33.379616.
   ----------------------- DB2 Catalog ------------------------ | ------------------- PWX Registration -----------------------
   Create timestamp =  2017-05-04-20.39.29.360081              |
   Alter  timestamp =  2017-05-04-20.45.14.567313              |
   #   NL Column Name                     Datatype Len   Pr Sc N | #   NL Column Name                     Datatype Len   Pr Sc N
   --- -- ------------------------------ -------- ----- -- -- - | --- -- ------------------------------ -------- ----- -- -- -
   1   3  KEY                             Integer  4     0  0  N | 1   3  KEY                             Integer  4     0  0  N
   2   3  C01                             CLOB     0     0  0  Y | 2   3  C01                             CLOB     0     0  0  Y
   3   28 DB2_GENERATED_ROWID_FOR_LOBS    ROWID    17    0  0  N | 3   28 DB2_GENERATED_ROWID_FOR_LOBS    ROWID    17    0  0  N
   4   7  NEWCOL1                         CLOB     0     0  0  Y |
PWXEDM177511E Table 'ABCOOK1.PLOB2A' Schema verification failed.
PWXEDM172807E ABEND issued by schema verification, Abend code=3680, Reason=10040001.
```

Field Descriptions

The following table describes the fields in the example schema verification report:

Field	Description
Create timestamp	Date and time when the DB2 table schema was created and registered.
Alter timestamp	Date and time when the DB2 table schema and schema registration were last altered.
#	Sequential number of the column in the DB2 table and associated schema registration.
NL	Length of the column name in the DB2 table and associated schema registration.
Column Name	Name of the column in the DB2 table and associated schema registration.
Datatype	Datatype of the column in the DB2 table and associated schema registration.
Len	Length of the column in the DB2 table and associated schema registration.
Pr	Precision of the column in the DB2 table and associated schema registration.
Sc	Scale of the column in the DB2 table and associated schema registration.
N	Whether the column in the DB2 table and associated schema registration can have null values.

Changing the Schema of DB2 Source Tables

If you need to change the schema of a DB2 source table that is registered for change data capture, follow this procedure to ensure that you can restart extraction processing without change data loss or corruption.

Schema changes include the following types of column changes:

```
ALTER TABLE table_name ADD COLUMN column_name  << Operations on source tables that you registered with
the Select all and notify changes option
ALTER TABLE table_name ALTER COLUMN column_name SET DATA TYPE
ALTER TABLE table_name ALTER COLUMN column_name SET column_alteration
ALTER TABLE table_name RENAME COLUMN column_name
ALTER TABLE table_name DROP COLUMN column_name
```

1. Stop SQL changes from being written to the table.

   You can set read-only access on the table.
2. Verify that the DB2 ECCR captured all changes up to the point at which change activity was stopped.
3. If you use PowerExchange Condense, ensure that PowerExchange Condense has processed all of the captured changes. Then, shut down PowerExchange Condense.
4. Extract all of the captured changes to the target.
5. If you set the DB2 subsystem parameter RESTRICT_ALT_COL_FOR_DCC to YES and plan to alter columns from which the ECCR captures change data, disable DATA CAPTURE CHANGES on the table. Also prevent change activity on the table while DATA CAPTURE CHANGES is disabled.

   Important: If you do not disable DATA CAPTURE CHANGES, DB2 will issue SQLCODE -148 error code. If you allow SQL changes on the table while DATA CAPTURE CHANGES is disabled, the ECCR will not capture the changes, which will require you to rematerialize the table.

   If you set the DB2 parameter RESTRICT_ALT_COL_FOR_DCC to NO, DB2 allows altering columns in tables that are defined with the DATA CAPTURE CHANGES option.

6. Alter the DB2 table schema. Reorganize the table space, if necessary.
7. Delete the existing capture registration for the table and the associated extraction map.
8. Create a new capture registration for the table using the new schema.
9. Issue the DB2 ECCR REFRESH command so that the ECCR can use the new registration.
10. Allow change activity to resume on the table.
11. Restart any extraction processes and, if applicable, PowerExchange Condense.

Recovering from Unplanned Schema Changes to DB2 Source Tables

If schema changes were improperly made to DB2 source tables in a CDC environment, the DB2 ECCR might abend when it reads the first change record for the table after the schema change is made.

When the DB2 ECCR abends, it writes the following messages to the EDMMSG data set:

```
PWXEDM177511E Table 'creator.table_name' Schema verification failed.
PWXEDM172807E ABEND issued by schema verification, Abend code=3680, Reason
code=10040001. [additional_text]
```

Tip: To prevent this problem, make schema changes by following the procedure in "Changing the Schema of DB2 Source Tables" on page 235.

1. If you use PowerExchange Condense, ensure that PowerExchange Condense has processed all of the captured changes. Then, shut down PowerExchange Condense.
2. Extract all of the changes to the target.
3. Delete the capture registration and extraction map.
4. Create a new capture registration that uses the new schema.
5. Issue the DB2 ECCR REFRESH command so that the ECCR can use the new registration based on the changed schema.
6. Warm start the DB2 ECCR.
7. Restart any extraction processes and, if applicable, PowerExchange Condense.

Related Topics:

- "Changing the Schema of DB2 Source Tables" on page 235

CHAPTER 11

IDMS Log-Based Change Data Capture

This chapter includes the following topics:

IDMS Log-Based CDC Overview

PowerExchange IDMS log-based change data capture (CDC) captures changes to registered IDMS source records from the IDMS log files. PowerExchange logs those changes to PowerExchange Logger for z/OS log data sets.

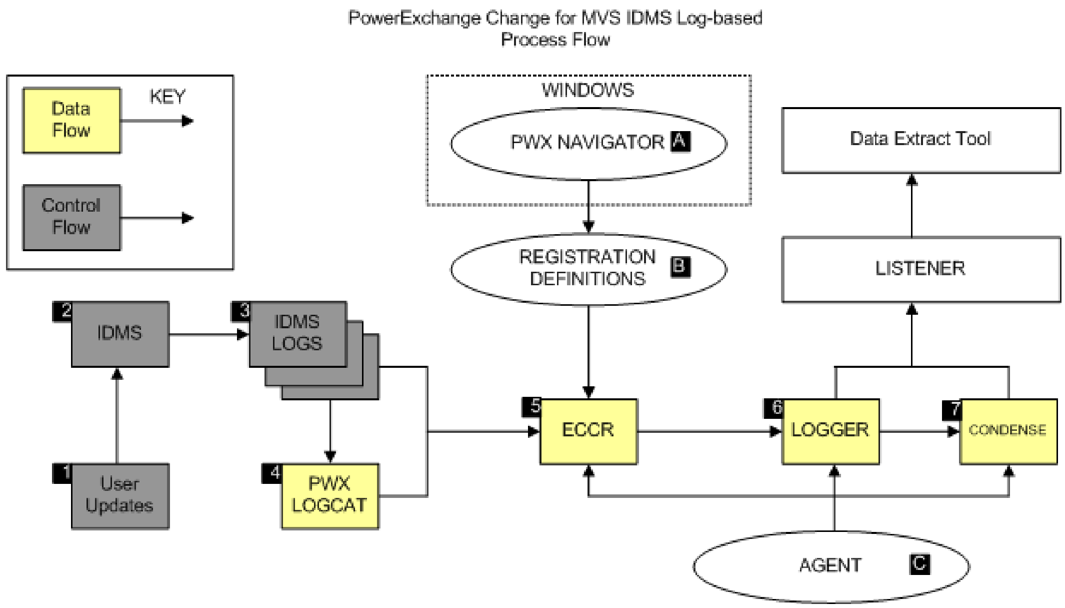
To implement a CDC environment, you must complete the following tasks:

- Create capture registrations for the sources in the PowerExchange Navigator.
- Create a PowerExchange Logger Catalog (PWXLOGCAT).
- Populate the PWXLOGCAT with information about the IDMS logs.
- Configure and start the IDMS ECCR.
- Configure restart tokens.
- Enable data access.

PowerExchange IDMS Log-Based CDC Components

The PowerExchange IDMS log-based CDC uses various components on the z/OS and Windows systems.

The following figure shows the PowerExchange IDMS log-based CDC architecture:



In this figure, the components through which the data flows appear as shaded, rectangular shapes with numeric labels. The components that control the data flow appear as elliptical shapes with alphabetic labels.

A user application updates the IDMS source database. IDMS writes the changes to its log files. The PowerExchange IDMS ECCR captures changes from the IDMS logs and sends it to the PowerExchange Logger. The PowerExchange Logger stores the changes in its log files. If you use PowerExchange Condense, PowerExchange Condense performs full or partial condense processing on the change data and stores the data in condense files. When a CDC session runs, the change data is pulled from the PowerExchange Logger log files or PowerExchange Condense condense files.

The following list summarizes the PowerExchange IDMS log-based CDC components:

PowerExchange Agent

The PowerExchange Agent controls mainframe service routines and programs for data propagation in PowerExchange. The PowerExchange Agent obtains data from repositories, manages authorization, and facilitates communication between components.

PowerExchange Condense

Optional. Extracts changes from the PowerExchange Logger log data set, performs full or partial condense processing on the data, and then stores the data in condense files.

PowerExchange IDMS ECCR

Captures change data from the IDMS logs that are recorded in the PowerExchange Log Catalog and makes that data available to the PowerExchange Logger. The ECCR can run as a batch job or started task.

PowerExchange Logger for z/OS

Records the change data that the ECCR captured in log data set. When CDC sessions run, PWXPC in conjunction with PowerExchange extracts change data from the PowerExchange Logger log files through the PowerExchange Listener.

PWXLOGCAT or PowerExchange Log Catalog

Contains information about all of the IDMS logs from which to capture change data. You use the PowerExchange Log Catalog utilities, DTLULCAT and DTLULOGC, to build and maintain this catalog.

Warning: Multiple schemas can be registered in a single LOGSID. However, schemas, which include objects of the same name, cannot be differentiated. If you copy schemas under the same names, such as in test environments, configure the copies for their own environments. A separate PowerExchange Listener, PowerExchange Logger, and ECCR is required for each like-named schema.

Related Topics:

- "Configuring IDMS Log Catalog Procedures" on page 240
- "Running DTLULCAT" on page 241
- "Running DTLULOGC" on page 242

IDMS Log-Based ECCR Operational Considerations

The IDMS log-based ECCR works with other PowerExchange components such as the PowerExchange Logger and the PowerExchange Agent to capture change data.

Before implementing the ECCR, review the following information about ECCR relationships and operational issues:

- The ECCR must log all changes to a single PowerExchange Logger.
- The ECCR must run on the same z/OS system as the PowerExchange Logger and PowerExchange Agent.
- Operational issues in the PowerExchange Logger can cause the ECCR to enter a wait state. While in a wait state, the ECCR cannot capture and record additional changes. After you resolve the PowerExchange Logger issues, the ECCR can resume the capture and recording of change data without any data loss.

  Tip: Carefully monitor the PowerExchange Logger to ensure that change data capture proceeds without interruption.
- PowerExchange can capture IDMS change data that has been compressed with the CA-IDMS Presspack package or IDMSCOMP database procedure.
  If you use IDMSCOMP compression and IDMSDCOM decompression, you do not need to take any special configuration action for CDC.

  If you use Presspack compression, you must modify the IDMS ECCR JCL so that the ECCR can use Presspack decompression during change capture. Complete the following configuration steps:
  - If the ECCR does not run APF-authorized, specify the standard IDMS runtime libraries, including the data characteristic tables (DCTs) and a valid DMCL, in the STEPLIB concatenation of the ECCR JCL.
  - If the ECCR runs APF-authorized, create copies of the IDMS runtime libraries and APF-authorize the copies. Then specify these copies in the STEPLIB concatenation. If you add or modify DCTs for records that are registered for change capture later, you must manually copy the tables to these duplicate libraries.

    Warning: Do not APF-authorize the original IDMS libraries. If you do, some IDMS utilities might fail with a S0C4.
  - Unless you use the default DMCL named "IDMSDMCL," add a SYSIDMS DD input card and specify the name of the DMCL that you use in the input stream.

Related Topics:

- "Monitoring the PowerExchange Logger for z/OS" on page 71

PowerExchange Log Catalog for IDMS Log-Based CDC

The PowerExchange Log Catalog for IDMS log-based CDC contains information about the IDMS logs from which change data is captured.

At PowerExchange installation, the Log Catalog is created as a VSAM file. This file has the default name &HLQ..LOGSCAT and contains a dummy record.

To add information to the Log Catalog, use the DTLULCAT and DTLULOGC utilities. DTLULCAT formats input to DTLULOGC, and DTLULOGC populates the Log Catalog.

You can run the DTLULCAT and DTLULOGC utilities consecutively by using the JCL in the RUNLIB(DTLULCAU) member. Schedule a job that contains this JCL to run as soon as the latest IDMS log is spooled off. For timely CDC processing, it is important that you correctly schedule the addition of logs to the Log Catalog.

Occasionally, you might need to run DTLULOGC separately. In this case, you must manually code the input file.

Ensure that Log Catalog information is updated in a timely manner and is secure and available. IDMS logs that are not recorded in the Log Catalog are unknown to PowerExchange for CDC processing.

Configuring IDMS Log Catalog Procedures

Develop procedures for running the DTLULCAT and DTLULOGC utilities in a manner that adds IDMS logs to the Log Catalog in the correct sequence.

The preferred method of operation is to include DTLULCAT and DTLULOGC JCL in an archive log job. Use the DTLULCAU JCL to run DTLULCAT followed by DTLULOGC. You can submit the job by using a WTOEXIT that intercepts a WTO message.

Include the following steps in the job:

1. Offload the active journal to an archive log.
2. Write the archive log to a data set by using a utility such as IEBGENER.

   You can use a unique data set name and a GDG data set structure.

   Retain this copy of the log until PowerExchange has captured all changes.
3. Add the data set to the PowerExchange Log Catalog by running the following jobs:
   - Run DTLULCAT to generate input statements for DTLULOGC.
   - Run DTLULOGC to update the PowerExchange Log Catalog.

To add logs to the Log Catalog, use the following rules:

- A local mode journal must not be added to the Log Catalog if the last available timestamp in the journal is later than the timestamp of the previously added CV mode journal.

- If Central Versions (CVs) are varied offline to run in Local Mode, ensure that Local Mode logs are added to the Log Catalog before any CV logs. If a database is varied offline and then back online again and the Local Mode log is not added immediately, a subsequent attempt to add the Local Mode log might fail.
- Add logs in the correct sequence.

  If you add logs in the incorrect sequence, PowerExchange issues messages such as the following message:

  ```
  51007 162240 MVS 1 PWX-19862 IDMS CATLG FILE: Add Entry Failure - Timestamp not
  greater than previous for key
  XYLOGSID00000000000000000001AIDL15CDBAIDMSE150DTLUSR.IDMS.D15SP0.OFF.J4
  ```

Running DTLULCAT

Use the DTLULCAT utility to take a supplied journal name and use it to prepare the input for the DTLULOGC utility.

PowerExchange provides the DTLULCAT utility as an executable on Windows and as the RUNLIB(DTLULCAT) member on z/OS.

The DTLULCAT utility writes information to DDCARD SYSPUNCH. This file is the input to the DTLULOGC utility.

The following example shows sample utility statements:

```
IDMS_VERSION=15
FILE_TYPE=C
MEDIA_TYPE=D
MEDIA_CONTENT=BI
SERVICE=IDMSE150
INSTANCE_IDENTIFIER=XYLOGSID.
```

The following table describes the utility statements:

Statement	Description
IDMS_VERSION	A supported IDMS version.
FILE_TYPE	One of the following file types: - C. Central version. - L. Local mode.
MEDIA_TYPE	One of the following media types: - T. Tape media. - D. Disk.
MEDIA_CONTENT	One of the following options for the types of images of change records delivered: - BI. Before images. - AI. After images. - BA. Both before and after images.
SERVICE	IDMS CV name or Local Job name.
INSTANCE_IDENTIFIER	The LOGSID identifier.

Running DTLULOGC

Use the DTLULOGC utility to populate the PowerExchange Log Catalog with information about the IDMS logs to process.

The following example DTLULCAU JCL runs DTLULCAT followed by DTLULOGC:

```
//*******************************************************************/
//*                                                                 */
//* SAMPLE JCL TO:-                                                 */
//*                                                                 */
//* CAPTURE IDMS JOURNAL FILE INFORMATION AND INPUT STREAM          */
//* INTO FOR DTLULOGC LOG FILE CATALOG ROUTINE.                     */
//*                                                                 */
//* NORMALLY THE SYSIN INPUT STREAM WOULD BE A PDS MEMBER.          */
//*                                                                 */
//* THIS NEEDS TO BE INTEGRATED INTO THE END USERS JOURNAL          */
//* ARCHIVING PROCEDURE, WHICH MAY BE DIFFERENT FROM SITE TO SITE.  */
//*                                                                 */
//* A MECHANISM WILL NEED TO BE ESTABLISHED TO REPLACE THE DATASET  */
//* SPECIFIED VIA THE LOGFILE DD STATEMENT WITH THE LOGFILE         */
//* WHICH IS CURRENTLY THE OBJECT OF THE USERS ARCHIVING PROCEDURE  */
//* AND OUR CATALOG OPERATION                                       */
//*                                                                 */
/*******************************************************************/
//INCS1 INCLUDE MEMBER=GENBULK
//DTLULCAT EXEC PGM=DTLULCAT
//STEPLIB  DD DISP=SHR,DSN=DTLUSR.V800B14.LOADLIB
//DTLCFG   DD DISP=SHR,DSN=DTLUSR.V800B14.RUNLIB(DBMOVER)
//DTLKEY   DD DISP=SHR,DSN=DTLUSR.V800B14.RUNLIB(LICENSE)
//DTLMSG   DD DISP=SHR,DSN=&HLQ..DTLMSG,FREE=CLOSE
//DTLLOG   DD SYSOUT=*
//LOGFILE  DD DISP=SHR,DSN=DTLUSR.IDMS.E15SP0.OFF.LOADED.JOURNAL1
//SYSPRINT DD SYSOUT=*
//SYSPUNCH DD DSN=&&LOGDATA,
//        DISP=(,PASS),
//        SPACE=(CYL,(2,1),RLSE),
//        DCB=(RECFM=FB,LRECL=80,BLKSIZE=3120)
//SYSIN    DD *
IDMS_VERSION=15
FILE_TYPE=C
MEDIA_TYPE=D
MEDIA_CONTENT=BI
SERVICE=IDMSE150
INSTANCE_IDENTIFIER=XYLOGSID
/*
//DTLULOGC EXEC PGM=DTLULOGC
//STEPLIB   DD  DISP=SHR,DSN=DTLUSR.V800B14.LOADLIB
//DTLCFG    DD  DISP=SHR,DSN=DTLUSR.V800B14.RUNLIB(DBMOVER)
//DTLKEY    DD  DISP=SHR,DSN=DTLUSR.V800B14.RUNLIB(LICENSE)
//DTLSGN    DD  DISP=SHR,DSN=DTLUSR.V800B14.RUNLIB(SIGNON)
//DTLMSG    DD  DISP=SHR,DSN=&HLQ..DTLMSG
//LOGSCAT   DD  DISP=SHR,DSN=DTLUSR.V800B14.V1.LOGSCAT
//DTLLOG    DD  SYSOUT=*
//SYSUDUMP  DD  SYSOUT=*
//SYSPRINT  DD  SYSOUT=*
//REPORT    DD  SYSOUT=*
//EXPORT    DD  SYSOUT=*
//SYSIN     DD  DISP=SHR,DSN=&&LOGDATA
```

This JCL adds the log DTLUSR.IDMS.E15SP0.OFF.LOADED.JOURNAL1 for an IDMS Version 15 environment with the CV Name IDMSE150. The log resides on disk storage and is accessed with a LOGSID value of XYLOGSID. The SYSIN data is specified as instream data for clarity. However, when running against a CV (DTLIDLL for Local Job mode), the JCL points to the DTLIDLC member.

Configuring and Starting the IDMS Log-Based ECCR

To use IDMS log-based CDC, you must complete a few configuration tasks.

The configuration tasks are:

- Configure the IDMS log-based ECCR options in the RUNLIB(ECCRIDLP) member.
- Populate the PowerExchange Log Catalog.
- Run the DTLUCSR2 utility to enable the ECCR to find SR2 and SR3 records.
- Customize the JCL in the RUNLIB(ECCRIDL) member.

After completing these tasks, you can start the ECCR to begin change data capture.

Configuring IDMS Log-Based ECCR Parameters

Configure IDMS log-based ECCR parameters in the RUNLIB(ECCRIDLP) member to which the DTLCACFG DD statement in the ECCR JCL points.

Based on your input during installation, the z/OS Installation Assistant adds values for some parameters to the ECCRIDLP member. You can accept or change these values.

The ECCRIDLP member can contain the following parameters:

```
LOGSID=logsid
[NO_DATA_WAIT=minutes]
[NO_DATA_WAIT2=seconds]
ECCRNAME=PWXIDLEC
DB_TYPE=IDL
[ABRT_TERMINATION_BLOCK_COUNT={number|10000}]
[CAPT_STATS={Y|N}]
[CAPT_STATS_INTVL=minutes]
[CAPT_STATS_TERSE={Y|N}]
[COLDSTART={Y|N}]
[ON_SUSPENSION_ERROR_CONTINUE={N|Y}]
[REFRESH_ALLOWED={Y|N}]
[RESTART_ADVANCE_ACTIVE=number_of_records]
```

The following table summarizes the ECCR parameters:

Parameter	Required or Optional	Description
LOGSID	Required	The LOGSID value that is specified in the DBMOVER configuration file. This parameter is customized by the z/OS Installation Assistant.
NO_DATA_WAIT	Optional	The number of minutes that the ECCR waits after an end-of-log condition before starting the next log read. If the next log read returns no changes, the NO_DATA_WAIT2 interval takes effect. This parameter can be customized by the z/OS Installation Assistant.

Parameter	Required or Optional	Description
NO_DATA_WAIT2	Optional	After the NO_DATA_WAIT interval is no longer in effect, the number of seconds that the ECCR waits after an end-of-log condition before trying another log read. The NO_DATA_WAIT2 wait and retry cycle remains in effect as long as no changes are received. This parameter can be customized by the z/OS Installation Assistant.
ECCRNAME	Required	The ECCR name.
DB_TYPE	Required	The database type, which must be IDL for IDMS.
ABRT_TERMINATION_BLOCK_COUNT	Optional	After the IDMS log-based ECCR encounters ABRT records in the IDMS journal that result from an IDMS ROLLBACK or ROLLBACK CONTINUE command, the number of subsequent IDMS journal blocks that the ECCR processes before it passes the job-level ABRT record to the PowerExchange Logger for z/OS. By processing these additional blocks, the ECCR can catch any additional updates from the job before the job-level ABRT record is logged. If the ECCR encounters additional updates, the job-level ABRT operation is canceled. If this block count is too high, the ECCR might not resolve outstanding UOWs that contain ABRT records in timely manner, which prevents the journals from being freed. If you use small journals, you can decrease this parameter value to resolve these outstanding UOWs more quickly. Valid values are 100 through 10000. Default is 10000.
CAPT_STATS	Optional	Controls whether PowerExchange writes ECCR statistics messages to the DTLLOG and DTLOUT data sets and WTO messages to the system operator console when the IDMS log-based ECCR finishes processing an IDMS log.
CAPT_STATS_INTVL	Optional	The interval, in minutes, for which the IDMS log-based ECCR collects and reports the number of inserts, deletes, updates, and commits that were captured from the change stream. The ECCR also reports the current point in the change stream.
CAPT_STATS_TERSE	Optional	Controls whether the IDMS log-based ECCR prints PWX-06153 statistics messages only for registered sources for which the ECCR captured changes.
COLDSTART	Optional	Controls whether the IDMS log-based ECCR cold starts or warm starts.
ON_SUSPENSION_ERROR_CONTINUE	Optional	If you use the PWXUCREG utility to suspend and reactivate capture registrations, controls whether the ECCR ends or continues when a UOW that contains change records to be discarded or captured started at an invalid point in the change stream relative to the suspension window.

Parameter	Required or Optional	Description
REFRESH_ALLOWED	Optional	Controls whether you can use the REFRESH command after adding or deleting capture registrations or after suspending or reactivating capture registrations with the PWXUCREG utilty. The REFRESH command refreshes the list of registered IDMS records that the ECCR uses for change capture processing.
RESTART_ADVANCE_ACTIVE	Optional	The number of change records that an active IDMS ECCR processes after a special restart UOW before writing another updated special UOW to the PowerExchange Logger.

Note: If a parameter has a default value or is not required, it is marked as optional. A default value is the value that PowerExchange uses if the parameter is not defined. For some parameters, the z/OS Installation Assistant provides recommended values, which you can accept or change.

More detailed parameter descriptions follow.

CAPT_STATS Parameter

Controls whether PowerExchange writes ECCR statistics messages to the DTLLOG and DTLOUT data sets and WTO messages to the system operator console when the IDMS log-based ECCR finishes processing an IDMS log.

The ECCR issues PWX-06153 messages that report the number of inserts, deletes, and updates that were captured for each registration, grouped by IDMS log. The WTO messages also notify the system operator that a log was closed and provide capture counts.

Regardless of the CAPT_STATS setting, the ECCR always reports the total number of inserts, deletes, updates, and commits across all of the IDMS logs at the end of the ECCR run.

Related Parameters: CAPT_STATS_INTVL, CAPT_STATS_TERSE

Syntax:

```
CAPT_STATS={N|Y}
```

Valid Values:

- **N**. Do not write the ECCR capture statistics messages to the DTLLOG and DTLOUT data sets and WTO capture count messages when the ECCR finishes processing each log.
- **Y**. Write the ECCR capture statistics messages to the DTLLOG and DTLOUT data sets and WTO capture count messages when the ECCR finishes processing each log.

Default is N.

Usage Notes:

- If you do not set the global CAPT_STATS parameter to Y, you can issue to STATISTICS ON command after the ECCR is started to enable statistics reporting for each IDMS log.
- If you also specify the CAPT_STATS_INTVL parameter or run the STATISTICS *minutes*, the ECCR also reports the total number of inserts, deletes, updates, and commits for the each interval.

For more information about the STATISTICS command and its parameters, see the *PowerExchange Command Reference*.

CAPT_STATS_INTVL Parameter

The interval, in minutes, for which the IDMS log-based ECCR collects and reports change capture statistics.

If you specify an interval, the ECCR prints a PWX-06181 message each time the interval elapses. The message reports the total number of inserts, deletes, updates, and commits that the ECCR processed during the interval and the last log position.

You can use this ECCR parameter to print statistics messages at a specific frequency, for example, every 60 minutes.

For the ECCR to print capture statistics, you must set the CAPT_STATS parameter to Y in the RUNLIB(ECCRIDLP) member or run the ECCR STATISTICS ON command.

Related Parameters: CAPT_STATS, CAPT_STATS_TERSE

Syntax:

```
CAPT_STATS_INTVL=minutes
```

Value: For the *minutes* variable, enter a number from 1 through 1440. No default is provided.

Usage Notes:

- If you set the CAPT_STATS_INTVL parameter to 0, PowerExchange issues the error message PWX-00967.
- After you start the ECCR, message PWX-07805 identifies the collection interval that is defined.
- If you issue the `STATISTICS` *`minutes`* command, the number of minutes that is specified in the command overrides the CAPT_STATS_INTVL value for the duration of the ECCR run.

CAPT_STATS_TERSE Parameter

Controls whether the IDMS log-based ECCR prints PWX-06153 messages only for registered sources for which the ECCR captured changes. If no inserts, updates, or deletes occurred on a registered source, the ECCR does not report capture counts for it.

A PWX-06153 message reports the number of inserts, deletes, and updates that were captured for a registered source. The message is printed when the ECCR finishes processing an IDMS log and at the end of the ECCR run.

For the ECCR to print statistics, you must set the CAPT_STATS=Y parameter in the RUNLIB(ECCRIDLP) member or run the ECCR STATISTICS ON command.

Related Parameters: CAPT_STATS, CAPT_STATS_INTVL

Syntax:

```
CAPT_STATS_TERSE={Y|N}
```

Valid Values:

- **Y**. Print statistics only for registered sources with change activity.
- **Y**. Print statistics only for the registered sources for which the ECCR captured changes.

Default is N.

Usage Notes:

- If you set the CAPT_STATS_TERSE parameter to N and then issue the STATISTICS SINCE TERSE command, the TERSE option in the command overrides the CAPT_STATS_TERSE setting for the SINCE period. PWX-06153 messages are then printed only for registered sources for which changes were captured.

COLDSTART Parameter

Controls whether the IDMS log-based ECCR cold starts or warm starts.

When the ECCR cold starts, it begins reading change records from the IDMS logs that are recorded at the beginning of the PowerExchange Log Catalog (LOGSCAT). When the ECCR warm starts, it resumes reading change records from where it last left off.

Syntax:

```
COLDSTART={N|Y}
```

Valid Values:

- **N**. Warm starts the ECCR.
- **Y**. Cold starts the ECCR.

Default is N.

Usage Notes: If you use a PowerExchange Logger to which the ECCR has not previously connected, or if you change the ECCRNAME value in the RUNLIB(ECCRIDLP) options member, the ECCR automatically cold starts, regardless of the COLDSTART setting. In these situations, you cannot warm start.

If you clear the LOGSCAT, you must set COLDSTART to Y to clear the restart information and cold start.

DB_TYPE Parameter

The database type.

Syntax:

```
DB_TYPE=IDL
```

Value: This value must be "IDL" for the IDMS log-based ECCR.

ECCRNAME Parameter

A name for the IDMS log-based ECCR.

Syntax:

```
ECCRNAME=eccrname
```

Value: For the *eccrname* variable, enter an alphanumeric string from 1 to 8 characters long.

No default. However, the z/OS Installation Assistant generates an ECCR name that begins with the **PowerExchange Agent / Logger Prefix** value followed by IDLEC, for example, PWXIDLEC.

Usage Notes:

- The IDMS log-based ECCR uses the ECCRNAME value for the following purposes:
  - The ECCR name for connecting to the PowerExchange Logger to write change data
  - The member name that joins the XCF group of the PowerExchange Logger
  - As part of the ECCR-UOW field in the control information for each change record written to PowerExchange Logger log files
- This name must be unique within a PowerExchange Logger group.
- If you change the ECCRNAME value, the ECCR cannot warm start from its last position in the change stream. You must cold start the ECCR. Also, in-flight UOWs might occur in the PowerExchange Logger log files. To clean up in-flight UOWs, use the PowerExchange Logger RESOLVE_INDOUBT command.

- Informatica recommends that you use the same value for both the ECCRNAME parameter and the IDMS log-based ECCR started task name or job name. This practice allows you to easily identify the IDMS log-based ECCR when reviewing messages and data from the PowerExchange Logger.

LOGSID Parameter

The LOGSID value that is specified in the DBMOVER configuration file.

Syntax:

```
LOGSID=logsid
```

Value: For the *logsid* variable, enter the LOGSID value that is specified in the DBMOVER configuration file.

This value indicates the location of the IDMS logs and the PowerExchange Log Catalog.

NO_DATA_WAIT Parameter

The number of minutes that the IDMS log-based ECCR waits after an end-of-log condition before it starts the next log read operation.

During the next log read, if the ECCR reaches another end-of-log condition without finding new changes, the NO_DATA_WAIT2 interval takes effect.

Syntax:

```
NO_DATA_WAIT={number|60}
```

Valid Values:

- **0**. The ECCR shuts down when no more logs are available to process.
- A *number* greater than 0. The ECCR waits the specified number of minutes for more logs or changes before shutting down.

Default is 60.

NO_DATA_WAIT2 Parameter

After the NO_DATA_WAIT interval is no longer in effect, the number of seconds that the IDMS log-based ECCR waits after an end-of-log condition before staring another log read.

During a read operation, if the ECCR captures changes, the NO_DATA_WAIT interval takes effect again. If the ECCR does not capture changes, it waits for the NO_DATA_WAIT2 interval and then tries the read again. The ECCR continues to wait for the NO_DATA_WAIT2 interval and retry the read on an ongoing basis, as long as no changes are available.

To determine if new log data sets have been registered, the ECCR reads the Log Catalog.

Syntax:

```
NO_DATA_WAIT2={number|600}
```

Value: For the *number* variable, enter a number greater than 0.

The z/OS Installation Assistant enters 999 for this parameter in the ECCR configuration member unless you specify another value. If this parameter is not defined, the default of 600 is used.

ON_SUSPENSION_ERROR_CONTINUE Parameter

Optional. If you use the PWXUCREG utility to suspend and reactivate capture registrations, controls whether the IDMS log-based ECCR ends or continues when a UOW that contains change records to be discarded or captured started at an invalid point in the change stream relative to the suspension window.

Syntax:

```
ON_SUSPENSION_ERROR_CONTINUE={N|Y}
```

Valid Values:

- **N**. The ECCR issues an error message and ends.
- **Y**. The ECCR issues a warning and continues processing.

Default is N.

Usage Notes: If you use the PWXUCREG utility, this parameter controls whether the ECCR ends or continues in the following situations:

- When discarding change records for a suspended registrations, the ECCR determines that the associated UOW started before the beginning of the suspension window.
- When capturing change records for an activated registration, the ECCR determines that the associated UOW started before the end of the suspension window.

The suspension window is the time period between the suspension timestamp and reactivation timestamp. For more information about the PWXUCREG utility, see the *PowerExchange Utilities Guide*.

REFRESH_ALLOWED Parameter

Controls whether PowerExchange users can issue the ECCR REFRESH command. This command refreshes the list of IDMS records with active capture registrations that the IDMS log-based ECCR uses to capture change data.

When this parameter is set to Y, users can issue the REFRESH command after adding or deleting capture registrations or after suspending or reactivating capture registrations with the PWXUCREG utilty. The REFRESH command updates the list of registered sources that the ECCR uses, without shutting down and restarting the ECCR.

Syntax:

```
REFRESH_ALLOWED={N|Y}
```

Valid Values:

- **N**. Do not allow users to issue the REFRESH command. This option is intended for users of PowerExchange versions earlier than 9.5.0, when the REFRESH command was not available. This option maintains the previous behavior, which requires a restart of the ECCR after registration changes.
- **Y**. Allow users to issue the REFRESH command.

Default is N.

RESTART_ADVANCE_ACTIVE Parameter

The number of change records that an active IDMS log-based ECCR processes after a special restart UOW, before it writes another updated special UOW to the PowerExchange Logger.

This value can affect how far back the PowerExchange Logger searches for the restart point when the ECCR is restarted.

Syntax:

```
RESTART_ADVANCE_ACTIVE=number
```

Valid Values: Enter a number from 1 to 10000. Default is 10000.

Usage Notes: When the ECCR is inactive and waiting for work, PowerExchange updates the special UOW before each NO_DATA_WAIT2 cycle.

Configuring the IDMS Log-Based ECCR JCL

Configure the JCL for the IDMS log-based ECCR.

Use the following sample JCL in the RUNLIB(ECCRIDL) member:

```
//*******************************************************************
//*                                                                 *
//* RUN DETAIL IDMS LOG BASED ECCR                                  *
//*                                                                 *
//*******************************************************************
//ECCRAD1  EXEC PGM=DTLCCIDL,REGION=50M
//STEPLIB   DD  DISP=SHR,DSN=&HLQ..LOADLIB
//          DD  DISP=SHR,DSN=&HLQ..LOAD
//EDMPARMS  DD  DISP=SHR,DSN=&HLQ..&LOGGER..USERLIB
//DTLCFG    DD  DISP=SHR,DSN=&RUNLIB(DBMOVER)
//DTLKEY    DD  DISP=SHR,DSN=&RUNLIB(LICENSE)
//DTLCACFG  DD  DISP=SHR,DSN=&RUNLIB(ECCRIDLP)
//SYSIDMS   DD  DISP=SHR,DSN=&RUNLIB(MYDMCL)
//DTLAMCPR  DD  DISP=SHR,DSN=&HLQ..CCT
//DTLMSG    DD  DISP=SHR,DSN=&HLQ..DTLMSG
//* IF USING MESSAGE OVERRIDE THEN CUSTOMIZE BELOW
//*DTLMSGO DD DISP=SHR,DSN=&RUNLIB(DTLMSGO)
//*
//*******************************************************************
//* FOLLOWING FILE CONCATENATION POINTS TO THE RESULTS FILES CREATED *
//* BY THE DTLUCSR2 UTILITY AND ALLOWS BUILDING OF SR2 RUNTIME TABLE.*
//*******************************************************************
//*
//SR2INPUT  DD  DISP=SHR,DSN=&HLQ..SR2TOTAL
//          DD  DISP=SHR,DSN=&HLQ..SR2OUT
//DTLLOG    DD  SYSOUT=*
//DTLLOG01  DD  SYSOUT=*
//DDPRINT   DD  SYSOUT=*
//DDDRUCK   DD  SYSOUT=*
//SYSUDUMP  DD  SYSOUT=*
//SYSOUT    DD  SYSOUT=*
//SYSPRINT  DD  SYSOUT=*
//EDMMSG    DD  SYSOUT=*
//CEEDUMP   DD  SYSOUT=*
```

Note: PowerExchange inserts values for the &HLQ and &LOGGER variables based on information that you provide in the z/OS Installation Assistant.

The following table describes the PowerExchange-related JCL statements for the ECCR startup PROC:

Statement	Description
EXEC	Specifies the ECCR program, DTLCCIDL.
STEPLIB DD	Specifies the PowerExchange LOADLIB and LOAD libraries. If you capture change data from IDMS records that use Presspack compression, you must also specify the IDMS runtime libraries so the ECCR can use Presspack decompression during change capture. Specify the IDMS libraries as follows: - If the ECCR runs APF-authorized, copy the standard IDMS runtime libraries, including the libraries that contain the DCTs and a valid DMCL, and APF-authorize the copies. Then specify these copies in the STEPLIB concatenation. - If the ECCR does not run APF-authorized, specify the standard IDMS runtime libraries in the STEPLIB concatenation. You do not need to copy the libraries.
EDMPARMS DD	Specifies the name of the user library that contains the EDMSDIR default options module that is associated with the PowerExchange Logger. If you do not include an EDMPARMS DD statement, or if you specify a library that does not contain the options module, PowerExchange uses the STEPLIB concatenation to get the configuration options.
DTLCFG DD	Specifies the DBMOVER configuration file for PowerExchange, which contains some parameters applicable to the IDMS log-based ECCR.
DTLKEY DD	Specifies the PowerExchange license key file.
DTLCACFG DD	Points to the RUNLIB(ECCRIDLP) member that contains IDMS log-based ECCR options.

SYSIDMS DD	Include this statement only if you capture change data from IDMS records that use Presspack compression and you do not use the default DMCL named “IDMSDMCL.” This statement either points to a data set that contains your DMCL statement or specifies the DMCL inline. Use the following syntax to specify the DMCL inline:
	`//SYSIDMS DD *`
	`DMCL=`*`name`*
	`/*`
	Where *name* is a DMCL name up to eight characters in length.

DTLAMCPR DD	Specifies the data set that contains the capture registrations.
DTLMSG DD	Specifies the output data set for PowerExchange messages.
SR2INPUT DD	Specifies the DTLUCSR2 utility result files. These files contain information that is used to generate the SR2-SR3 internal table.
DTLLOG DD and DTLLOG01 DD	Specifies the output data sets for ECCR capture statistics.
EDMMSG DD	Specifies the output data set for IDMS log-based ECCR messages.

Detecting Matching SR2 and SR3 Records for ECCR Capture of Relocated Records

For the IDMS log-based ECCR to capture changes made to a relocated SR3 record, it must find the matching SR2 that contains the original record ID. The ECCR uses this record ID to determine if the changes are of CDC interest. To enable the ECCR to find the SR2 record, run the DTLUCSR2 utility. The utility records the pairs of matching SR2 and SR3 records in an internal table. The ECCR can then perform a lookup on the table with an SR3 database key to find the matching SR2 record that contains the original record ID.

Run the DTLUCSR2 utility before you start the ECCR for the first time and after events that tend to relocate records. For example, run the utility after the following events:

- An IDMS REORG operation
- An IDMS dictionary migration utility (RHDCMIG1 and RHDCMIG2) run
- An alter table operation that adds one or more columns, or any other schema change that can increase the record size
- The following PowerExchange program logic errors, which are issued for an after image (AFTR) or before image (BFOR):

```
PWX-00999 Program logic error. Prog="program". Line=line_number. P1="UOW - SR3 AFTR
hex_SR3_database_key, not found in hash table". P2=1
```

```
PWX-00999 Program logic error. Prog="program". Line=line_number. P1="UOW - SR3 BFOR
hex_SR3_database_key, not found in hash table". P2=1
```

After you run the utility, restart the ECCR so that it can detect the SR2 and SR3 pairs that the utility recorded.

Running the DTLUCSR2 Utility

Run the DTLUCSR2 utility before you run the IDMS log-based ECCR the first time and after any event that tends to create SR2 and SR3 records.

Before you start the utility, ensure that you added the SR2INPUT DD statement to the IDMS log-based ECCR JCL. This DD statement points to the utility result files that contain information for building the SR2-SR3 internal table. For more information, see the *PowerExchange CDC Guide for z/OS*.

1. Edit the DTLICSRI member in the RUNLIB library.

   For each database with source tables to be registered for change capture, customize the following sample statements:

   ```
   Read,
   DD_NAME=ddname
   PAGE_GROUP=n
   RADIX=x
   ```

   The following table describes these statements:

Statement	Description
DD_NAME	The DDNAME to be added to the DTLUCSR2 JCL. This name does not have to match a DD name from an IDMS region, but it must exactly match the DD name in the DTLUCSR2 JCL. Format: DD_NAME=STUDENT
PAGE_GROUP	If the database file is normally accessed with a page group other than zero, you must specify the PAGE_GROUP number.
RADIX	If you want to use a RADIX value other than the default of 8, enter a value from 2 to 12.

   Note: DTLUCSR2 writes control information to the SR2TOTAL file and SR2/SR3 link information to the SR2OUT file. These files are created with default information at installation time. You might need to change the file sizes, depending on the number of SR3 records.

2. Add DD cards to the DTLUCSR2 JCL that match the DD names in the DTLICSRI parameter file.

   The DD cards point to the relevant IDMS data set names.

3. Run the JCL in RUNLIB member DTLUCSR2.

Starting the IDMS Log-Based ECCR

You can run the IDMS log-based ECCR as a started task or batch job. Usually, the ECCR runs as a started task. Whenever you create or change IDMS capture registrations, you must restart the ECCR to activate those registrations.

Before you start the ECCR, verify that you completed the following tasks:

- Configure the IDMS log-based ECCR options.
- Configure the IDMS log-based ECCR JCL.
- Activate the PowerExchange Agent, Listener, and Logger.
- Create capture registrations for the IDMS sources and activate the registrations.
- Create and populate the PowerExchange Log Catalog for IDMS logs.

1. To start the ECCR as a started task, use the MVS START command:

   ```
   S eccr_task_name
   ```

   If you set the COLDSTART option to Y in the ECCRIDLP options member, the ECCR cold starts.
   If you set the COLDSTART option to N and previously ran the ECCR, the ECCR warm starts from where it left off.
2. Verify that all of the IDMS logs of interest for CDC processing have been added to the PowerExchange Log Catalog.

When the IDMS log-based ECCR is running, it regularly checks whether logs have been added to the PowerExchange Log Catalog for capture processing. If logs have been added, the ECCR captures the change data from the logs and sends the data to the PowerExchange Logger.

Managing IDMS Log-Based CDC

Occasionally, you might need to alter the Log Catalog or recover change capture processing after IDMS ECCR failures or IDMS restore operations.

Adding an IDMS Capture Registration

You might need to add a capture registration for a new or existing IDMS record from which you want to start capturing change data. In this case, you can use the REFRESH command to refresh the list of registered IDMS records for the IDMS log-based ECCR, without restarting the ECCR.

Before you begin, ensure that REFRESH_ALLOWED=Y is specified in the RUNLIB(ECCRIDLP) member to which the DTLCACFG DD statement in the ECCR JCL points.

Enter the context of your task here (optional).

1. If you need to begin capturing changes for the new registration from a specific point, stop any change activity on the source record.
2. In the PowerExchange Navigator, open the capture registration and set the **Status** field to **Active**.
3. If you use PowerExchange Condense, ensure that PowerExchange Condense has processed all of the captured changes. Then shut down PowerExchange Condense.
4. Enter the ECCR REFRESH command using the MVS MODIFY (F) command:

   ```
   F eccr_task_name,REFRESH
   ```

   The newly registered source is added to the list of registered sources for the ECCR.

5. Enable change activity on the source to resume.
6. If you use PowerExchange Condense, restart it.

Deleting an IDMS Capture Registration

You might need to delete a capture registration that has been used for change capture processing. In this case, you can use the REFRESH command to refresh the list of registered IDMS records for the IDMS log-based ECCR, without restarting the ECCR.

Before you begin, ensure that REFRESH_ALLOWED=Y is specified in the RUNLIB(ECCRIDLP) member to which the DTLCACFG DD statement in the ECCR JCL points.

1. Stop applications and other activities that update the source record that is associated with the registration that you are deleting.
2. Ensure that the ECCR has processed all of the IDMS logs that contain changes for the source that is associated with the registration that you are deleting. Also ensure that the source data has been extracted and applied to the target. Then stop all workflows that extract change data for the source.
3. If you use PowerExchange Condense, ensure that PowerExchange Condense has processed all of the captured changes. Then shut down PowerExchange Condense.
4. In the PowerExchange Navigator, open the capture registration and set the **Status** field to **History**. Then delete the registration.
5. Enter the ECCR REFRESH command using the MVS MODIFY (F) command:
   ```
   F eccr_task_name,REFRESH
   ```
6. Enable change activity on the source to resume.
7. If you use PowerExchange Condense, restart it.
8. Restart extraction processing.

Suspending Change Capture for Registered IDMS Sources Temporarily

Use this task flow to suspend change capture processing for registered IDMS log-based CDC sources temporarily.

You perform some tasks with the PWXUCREG utility and other tasks outside of the utility on the z/OS system.

Before you begin, ensure that the REFRESH_ALLOWED=Y parameter is specified in the RUNLIB(ECCRIDLP) member to which the DTLCACFG DD statement in the ECCR JCL points. You must have the authority to issue a REFRESH command after each registration status change.

1. Stop database activity for the registered source or sources for which you want to suspend capture registrations.
2. To suspend the capture registrations, use the PWXUCREG utility to issue the SUSPEND_REGISTRATION command.

   The suspension window opens. The utility sets the suspension timestamp to the current system time without any adjustment for the local time. Also, the utility issues message PWX-03716 to the DTLLOG log to report the registration status change.

   For each suspended registration, the PowerExchange Navigator Resource Inspector displays **Suspended** in the the **Status** field and the suspension timestamp in the **Suspend Time** field. The **Suspend Time** value is not adjusted for the local time.

3. Enter the ECCR REFRESH command with the MVS MODIFY (F) command:

   ```
   F eccr_task_name,REFRESH
   ```

   The ECCR becomes aware of the registration status change and suspension timestamp. When the ECCR encounters the first change record to discard, it issues message PWX-07752. The ECCR discards change records that have a timestamp later than the suspension timestamp.
4. Run the jobs or processes that generate the changes that you do not want to capture for the source or sources that are associated with the suspended registrations.
5. After the jobs or processes complete, use the PWXUCREG utility to issue the ACTIVATE_REGISTRATION command to reactivate the capture registrations.

   The suspension window closes. The utility sets the activation timestamp to the current system time without any adjustment for the local time. Also, the utility issues message PWX-03716 to the DTLLOG log to report the registration status change.

   For each reactivated registration, the PowerExchange Navigator Resource Inspector displays **Active** in the **Status** field and the activation timestamp in the **Active Time** field. The **Active Time** value is not adjusted for the local time.
6. Enter the ECCR REFRESH command with the MVS MODIFY (F) command again.

   The ECCR becomes aware of the registration status change and activation timestamp.
7. Enable database activity to resume on the registered source or sources.

   The ECCR starts capturing change records that have timestamps later than the activation timestamp. The ECCR issues message PWX-07753 when it encounters the first change record in the change stream after the end of the suspension window.

Note: You can automate this processing if appropriate for your environment.

Changing an IDMS Source Schema

If you make schema changes to an IDMS source, use this procedure to retain access to historically captured data while capturing data in the new format.

1. Stop all update activity against the IDMS database.
2. Ensure that PowerExchange processed all changes that occurred under the old schema.
3. Change the IDMS schema.
4. Create a new PowerExchange capture registration that reflects the schema changes.
5. Ensure that the updated schemas are in place in the PowerExchange copies of the IDMS libraries.
6. Allow update activity to the IDMS database to resume.
7. Restart PowerExchange processing.

Manipulating the Log Catalog

During normal IDMS log processing, PowerExchange updates the Log Catalog, LOGSCAT, to add the next available log by using the PowerExchange DTLULCAT and DTLULOGC log catalog utilities.

If you need to add, change, or remove log entries in the Log Catalog, run the DTLULOGC utility standalone with hand-coded input. Use the sample DTLULOGC JCL in the RUNLIB library.

Customize the DTLULOGC JCL to perform any of the following tasks:

- Add a LOGSID instance.
- Add a log entry to the Log Catalog.

- Update a log entry.
- Delete a log entry.
- Export a log entry to another data set for offloading.

Then specify the DTLULOGC file as input in the SYSIN DD card.

The following table describes the keywords and parameters that you can code in the 80-byte DTLULOGC JCL file:

Keyword	Description	Parameters
ADD_INSTANCE	Add a LOGSID instance to the catalog. Each LOGSID requires an instance to be added to the log catalog.	- INSTANCE_IDENTIFIER. A LOGSID value. - VERSION. A version number of the entry.

ADD_ENTRY	Adds a specific log to the log catalog.	- BLOCK_SIZE. The block size of the log. Required if the logs are to be shipped to another platform.
		- ENTRY_NUMBER. A sequential number, which should be incremented by 1 for each new log added to the log catalog.
		- FILE_TYPE. One of the following values:
		  - **C**. Central or Shared Service Log or Journal.
		  - **L**. Local Mode or Unshared Service Log or Journal.
		- FIRST_RECORD_SEQUENCE_NUMBER. The sequence number of the first record in the block.
		- FIRST_RECORD_TIME_STAMP. The time stamp of the first record in the block.
		- IDMS_VERSION. The version number of IDMS. Specified as an integer.
		- INSTANCE_IDENTIFIER. A LOGSID value.
		- LAST_RECORD_IDENTIFIER. The record ID of the last record in the block or zeros if a non-data record.
		- LAST_RECORD_OFFSET. The offset of last valid offset in the block.
		- LOG_DATA_TYPE. "IDL" for MVS IDMS log data.
		- LOG_FILE_NAME. The name of IDMS log file.
		- MEDIA_CONTENT. One of the following values:
		  - **AI**. Only contains After images.
		  - **BI**. Only contains Before images.
		  - **BA**. Contains both Before and After images.
		- MEDIA_TYPE. One of the following values:
		  - **D**. Disk.
		  - **T**. Tape.
		- NUMBER_OF_BLOCKS. The number of blocks in the log.
		- SERVICE. The CV name or Local Mode job name.
		- STATUS. One of the following values:
		  - **A**. Active.
		  - **S**. Skip.
		  - **T**. Terminate.
		- ENTRY_TYPE. One of the following values:
		  - **1**. File entry.
		  - **2**. Reserved for future use.
		- VERSION. The version number of the entry.

UPDATE_ENTRY	Updates a log entry.	Valid parameters are those listed for ADD_ENTRY. Use the following parameters to identify the entry: - INSTANCE_IDENTIFIER - ENTRY_NUMBER

Keyword	Description	Parameters
DELETE_ENTRY	Deletes the last log for the specified INSTANCE_IDENTIFIER.	INSTANCE_IDENTIFIER
REPORT_INSTANCE	Lists catalog entries for the specified INSTANCE_IDENTIFIER.	INSTANCE_IDENTIFIER
EXPORT_INSTANCE	Exports all information for a specified INSTANCE_IDENTIFIER to a file.	INSTANCE_IDENTIFIER

Note: Keywords are separated by a semicolon (;). Parameters are separated by a comma (,).

The following sample input adds two instances (LOGSIDs), adds log entries, deletes a log entry, reports instance LOGSIDA, exports instance LOGSIDA to a file (dtlulgce.txt), and deletes instance LOGSIDA:

```
ADD_INSTANCE INSTANCE_IDENTIFIER=LOGSIDA, VERSION=224;
ADD_ENTRY INSTANCE_IDENTIFIER=LOGSIDA, ENTRY_NUMBER=777, VERSION=0,
ENTRY_TYPE=1, STATUS=A, LOG_DATA_TYPE=IDL, IDMS_VERSION=15,
FILE_TYPE=C, MEDIA_TYPE=D, MEDIA_CONTENT=BI, SERVICE=IDMSE150,
LOG_FILE_NAME=XXXXXXXXXXXXXXXXXXXXXXXXXXXXX, BLOCK_SIZE=29000,
NUMBER_OF_BLOCKS=445, LAST_RECORD_OFFSET=1119, LAST_RECORD_IDENTIFIER=3,
FIRST_RECORD_SEQUENCE_NUMBER=4, FIRST_RECORD_TIME_STAMP="05/03/03 10:55:01";
ADD_ENTRY INSTANCE_IDENTIFIER=LOGSIDA, ENTRY_NUMBER=778, VERSION=0,
ENTRY_TYPE=1, STATUS=A, LOG_DATA_TYPE=IDL, IDMS_VERSION=15, FILE_TYPE=C,
MEDIA_TYPE=D, MEDIA_CONTENT=BI, SERVICE=IDMSE150,
LOG_FILE_NAME=MMMMMMMMMMMMMMMMMMMMMMMMMMM, BLOCK_SIZE=29000,
NUMBER_OF_BLOCKS=445, LAST_RECORD_OFFSET=1119, LAST_RECORD_IDENTIFIER=3,
FIRST_RECORD_SEQUENCE_NUMBER=4,   FIRST_RECORD_TIME_STAMP="05/03/03 12:55:01";
ADD_ENTRY INSTANCE_IDENTIFIER=LOGSIDA, ENTRY_NUMBER=779, VERSION=0,
ENTRY_TYPE=1, STATUS=A, LOG_DATA_TYPE=IDL, IDMS_VERSION=15, FILE_TYPE=C,
MEDIA_TYPE=D, MEDIA_CONTENT=BI, SERVICE=IDMSE150,
LOG_FILE_NAME=ZZZZZZZZZZZZZZZZZZZZCCCCCCCCCCCC, BLOCK_SIZE=29000,
NUMBER_OF_BLOCKS=333, LAST_RECORD_OFFSET=1119, LAST_RECORD_IDENTIFIER=3,
FIRST_RECORD_SEQUENCE_NUMBER=4, FIRST_RECORD_TIME_STAMP="05/03/03 14:55:01";
ADD_INSTANCE INSTANCE_IDENTIFIER=ABCDE, VERSION=0;
ADD_ENTRY INSTANCE_IDENTIFIER=ABCDE, ENTRY_NUMBER=1, VERSION=0,
ENTRY_TYPE=1, STATUS=A, LOG_DATA_TYPE=IDL, IDMS_VERSION=15,
FILE_TYPE=C, MEDIA_TYPE=D, MEDIA_CONTENT=BI, SERVICE=IDMSE15P,
LOG_FILE_NAME=BBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBB, BLOCK_SIZE=29000,
NUMBER_OF_BLOCKS=444, LAST_RECORD_OFFSET=1112, LAST_RECORD_IDENTIFIER=2,
FIRST_RECORD_SEQUENCE_NUMBER=3, FIRST_RECORD_TIME_STAMP="05/04/03 08:55:01";
ADD_ENTRY INSTANCE_IDENTIFIER=ABCDE, ENTRY_NUMBER=2, VERSION=0,
ENTRY_TYPE=1, STATUS=A, LOG_DATA_TYPE=IDL, IDMS_VERSION=15,
FILE_TYPE=C, MEDIA_TYPE=D, MEDIA_CONTENT=BI, SERVICE=IDMSE15P,
LOG_FILE_NAME=CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC, BLOCK_SIZE=29000,
NUMBER_OF_BLOCKS=445, LAST_RECORD_OFFSET=1119, LAST_RECORD_IDENTIFIER=3,
FIRST_RECORD_SEQUENCE_NUMBER=4, FIRST_RECORD_TIME_STAMP="05/04/03 10:55:01";
UPDATE_ENTRY INSTANCE_IDENTIFIER=LOGSIDA, ENTRY_NUMBER=779, VERSION=0,
ENTRY_TYPE=1, STATUS=A, LOG_DATA_TYPE=IDL, IDMS_VERSION=15, FILE_TYPE=C,
MEDIA_TYPE=D, MEDIA_CONTENT=BI, SERVICE=DTLXXXXX,
LOG_FILE_NAME=AAAAAAAAAAAAAAAAKKKKKKKKKKKKKKK, BLOCK_SIZE=29000,
NUMBER_OF_BLOCKS=111, LAST_RECORD_OFFSET=1119, LAST_RECORD_IDENTIFIER=3,
FIRST_RECORD_SEQUENCE_NUMBER=4, FIRST_RECORD_TIME_STAMP="05/04/03 12:55:01";
DELETE_ENTRY INSTANCE_IDENTIFIER=LOGSIDA;
REPORT_INSTANCE INSTANCE_IDENTIFIER=LOGSIDA;
EXPORT_INSTANCE INSTANCE_IDENTIFIER=LOGSIDA;
DELETE_INSTANCE INSTANCE_IDENTIFIER=LOGSIDA;
```

Starting the ECCR After Clearing the Log Catalog

If you clear or reinitialize the PowerExchange Log Catalog, *hlq*.LOGSCAT, you must cold start the IDMS log-based ECCR for the ECCR to correctly process IDMS logs or journals that are subsequently added to the Log Catalog.

The cold start causes the ECCR to ignore obsolete log position information from the PowerExchange Logger, which includes Log Catalog information that was cleared.

Recovering from Failures

Use the following guidelines to recover from certain events that disrupt change data capture.

These events include:

- IDMS log-based ECCR abnormal ends that occur because of an ECCR failure or a PowerExchange Logger stoppage
- Restores of the IDMS database

Recovering the IDMS Log-Based ECCR

You must recover the IDMS log-based ECCR when the IDMS log-based ECCR fails or the PowerExchange Logger stops or fails while attached to the IDMS log-based ECCR.

If the PowerExchange Logger stops or abends while attached to the IDMS log-based ECCR, the ECCR also abends when it receives the first change record following the PowerExchange Logger failure. When you restart the IDMS log-based ECCR or the Logger after a failure, the Logger determines the point at which to begin capturing changes again.

To recover the IDMS log-based ECCR, complete the following steps:

1. Determine the cause of the ECCR failure and correct it.
2. If the ECCR failed because the PowerExchange Logger stopped, restart the Logger.
3. Restart the IDMS log-based ECCR from the point at which it abended.

The ECCR warm starts if warm start data is available from the Agent or Logger. It restarts at the correct point.

If warm start data is not available, the ECCR issues a prompt for a cold start. Use the same ECCRNAME parameter in your ECCRIDLP parameter file that you used for the ECCR that abended.

Recovering after IDMS Restores or Reruns

Use the PowerExchange Logger to log all PowerExchange activity.

You do not normally restore the PowerExchange Logger.

When you restore the source database because of application failures, you typically reset the application extraction start points to the relevant point.

To identify the correct point to start, use the Event Marker utility, EDMXLUTL, to put markers into the Logger on a regular basis. When you add these markers, they appear in the PowerExchange log.

CHAPTER 12

IMS Log-Based Change Data Capture

This chapter includes the following topics:

IMS CDC Overview

PowerExchange change data capture (CDC) for IMS captures changes made to IMS databases and logs those changes to PowerExchange Logger for z/OS log files.

You can use PowerCenter CDC sessions to extract the captured change data from the PowerExchange Logger log files or from PowerExchange Condense condense files and apply that data to one or more target databases.

PowerExchange provides the following alternative methods for performing IMS CDC:

- **Synchronous IMS CDC**. Captures changes as they occur and logs them to the PowerExchange Logger. The IMS synchronous ECCR runs as separate subtasks in IMS regions such as the control region, DBCTL, DL/1, and DBB batch jobs.
- **Log-based IMS CDC**. Asynchronously captures changes by reading them from the IMS archive logs and logging them to the PowerExchange Logger. The IMS log-based ECCR runs in a separate address space as a started task or a batch job.

The following table compares IMS synchronous CDC and the IMS log-based CDC methods:

Feature	IMS Synchronous CDC	IMS Log-Based CDC
Does real-time capture of change data.	Yes	No
Reads IMS archive logs to capture IMS change data asynchronously.	No	Yes
PowerExchange IMS interface modules install into the IMS RESLIB.	Yes	No

Feature	IMS Synchronous CDC	IMS Log-Based CDC
Uses the IMS external subsystem to communicate with IMS ECCR.	Yes	No
PowerExchange libraries must be added to the IMS region JCL.	Yes	No
An EXIT statement must be added to the DBD for each database from which you capture changes.	No	Yes
All databases from which you capture changes must be registered in DBRC.	No	Yes
ECCR uses the current RECON data set to determine which IMS archive logs to process.	No	Yes
Captures change data within an IMSplex.	Yes	No
Captures multiple segments with a single capture registration.	No	Yes
Captures non-keyed and non-uniquely keyed segments.	Yes	No
Captures changes from segments that have had compression exits applied.	Yes	Yes
Adds additional data to the IMS log data sets.	No	Yes

IMS Log-Based Change Data Capture

The IMS log-based ECCR asynchronously captures change data from closed IMS archive logs (SLDSs) for a registered IMS database.

The ECCR passes the changes to the PowerExchange Logger for z/OS. After the PowerExchange Logger logs the changes to its log files, the changes are available for extraction processing. Based on specific parameters, the ECCR periodically inspects the IMS RECON data sets for new archive logs to process.

The IMS log-based ECCR runs in a separate address space either continuously or in batch mode. Because the ECCR runs within a multitasking environment, data capture, processing, and delivery can proceed in parallel.

During initialization, the ECCR reads capture registration information from the CCT data set to determine the segments in an IMS database that are registered for change capture. For each source database, you must complete the following tasks in the IMS environment:

- Change the DBD to include the EXIT statement.
- Register the database in DBRC, if it is not already registered.

Because the IMS log-based ECCR reads closed IMS archive logs, a delay occurs between the time a change is made and the time the change is captured. The length of this delay depends on the following factors:

- How quickly IMS archives the active logs after a change is made.
- How frequently the IMS log-based ECCR checks for new archive logs.

PowerExchange transforms the captured changes into a PowerExchange internal format, which is essentially the same for all data sources.

If the IMS log-based change capture stops for any reason and updates to the IMS database continue, PowerExchange can resume change data capture from where it left off after you correct the problem and start change capture again. No changes are lost.

Note: The IMS log-based ECCR can capture change data from complex tables. A complex table includes records for multiple segments in the IMS database hierarchy. If you need to capture change data from a complex table, do not use IMS field (FLD) calls to make changes to a low-level segment in the complex table. In this case, IBM IMS cannot provide the data for the parent segments. Conversely, if you need to allow FLD calls against the source database, Informatica recommends that you do not define complex tables as sources. If you must use complex tables with FLD calls, contact Informatica Global Customer Support to determine the best strategy for getting change data from the parent segments.

IMS Log-Based ECCR Processing Phases

On startup, the IMS log-based ECCR goes through the following processing phases:

- Initialization
- Reading and processing blocks of change data
- Waiting for data

Initialization

During initialization, the IMS log-based ECCR performs the following tasks:

- Checks and loads the capture registrations.
- Determines which of the RECON data sets that are specified in the ECCR input parameters is the current data set.
- Uses the current RECON data set to determine which log data sets to process and the order in which to process them.
- Opens a connection to the PowerExchange Logger and retrieves restart information.
- Sets up searchable structures and allocates work buffers.

Processing Blocks of Data

Log records are read, compared to the registrations, deconstructed, and the data assembled to provide the changed data. The changed data is passed to the PowerExchange Logger. Unit of recovery data is kept in memory until it is either complete or abandoned, so that appropriate checkpoint or abort calls can be made to the PowerExchange Logger. This data is also logged for restart purposes.

Waiting for Data

After the ECCR processes the IMS archive logs up to the point that was the current point when the ECCR run began, it receives a “no more log data” return code. The IMS log-based ECCR then waits for more change data to process.

The ECCR waits until one of the following events occur:

- The wait interval that is specified in the NO_DATA_WAIT2 parameter elapses.
- An interrupt from an event.

Relationships with Other PowerExchange Components

PowerExchange for IMS change data capture is shipped with the standard PowerExchange software.

The IMS log-based ECCR uses other PowerExchange components such as the PowerExchange Logger and the PowerExchange Agent. Consider the following operational factors:

- The IMS log-based ECCR must log all changes to a single PowerExchange Logger running on the same MVS system.
- The PowerExchange Logger and PowerExchange Agent must run on the same MVS system as the IMS log-based ECCR.
- Operational issues in the PowerExchange Logger can cause the IMS log-based ECCR to enter a wait state, which would prevent further capture and recording of change data until the issues are resolved. After you resolve the operational issues in the PowerExchange Logger, the IMS log-based ECCR continues the capture and recording of change data without any loss of data.

  You must carefully monitor the PowerExchange Logger to ensure that change data capture proceeds without interruption.

Related Topics:

- "Monitoring the PowerExchange Logger for z/OS" on page 71

IMS Catalog Use

PowerExchange requires access to IMS DBD information in DBGEN format to register IMS CDC sources in the PowerExchange Navigator. PowerExchange can transparently get this information directly from the IMS catalog.

Use of the IMS catalog is optional in PowerExchange and IMS. However, certain IMS functionality, such as database versioning and the management of run-time application control blocks, requires the IMS catalog. For more information, see the IBM IMS documentation.

To get DBD information for source objects from the IMS catalog, PowerExchange uses the IMS catalog API. This API consists of the DFS3CATQ assembly program in the IMSxx.SDFSRESL.RESLIB library and the DFS3CATQ macro in the IMSxxx.SDFSMAC library. The API requires the high-level qualifier of the IMS bootstrap data set. If the IMS control region is *not* running, or if you are using an IMS version earlier than IMS 15, you must specify the high-level qualifier of the bootstrap data set in the IMSBSDS statement in the DBMOVER configuration file. If you use IMS 15 and the control region is running, the high-level qualifier can be retrieved programmatically.

To use the IMS catalog, configure the IMSBSDS statement in the DBMOVER configuration file on the PowerExchange Listener system. This statement specifies the high-level qualifier of the bootstrap data set and the order in which PowerExchange searches locations, such as the IMS catalog and IMS DBDLIB library, for DBD information. Ensure that the *ims_ssid* value that you specify in this statement matches the *ims_ssid* value in an IMSID statement in the DBMOVER file. If DBD information cannot be found in the IMS catalog, PowerExchange uses the associated IMSID statement to find the DBDLIB library. For more information, see the "DBMOVER Configuration File" chapter in the *PowerExchange Reference Manual*.

IMS for Log-Based CDC Prerequisites

Before you can use IMS log-based CDC, verify that the following conditions are true for each IMS database for which you want to capture changes:

- The DBD source for the database specifies the EXIT parameter.
- The database is registered with DBRC.

Specifying the EXIT Parameter in the DBD Statement

For IMS to write log records from which the PowerExchange IMS log-based ECCR can capture data, you must specify the IMS Data Capture EXIT parameter in the DBD statement that the DBDGEN utility uses.

The EXIT parameter causes IMS to create log record type x'99' for data that IMS logs for a segment. The IMS log-based ECCR reads the x'99' records to capture change data.

The following example DBD statement includes the EXIT parameter:

```
DBD NAME=DBFSAMD3,ACCESS=DEDB,RMNAME=DBFHDC40,
    EXIT=(*,KEY,PATH,(CASCADE,KEY,PATH),LOG)
```

Use of the EXIT parameter increases the number of x'99' log records for the IMS online and batch regions. If you need to reduce the number of x'99' records, edit the EXIT parameter to change PATH to NOPATH. PATH causes IMS to log the entire hierarchical path for the segment, whereas NOPATH causes IMS to log only the segment. However, you can use NOPATH only if the PowerExchange capture registrations each represent a single segment.

IMS 12 introduced some additional EXIT options for Fast Path databases, which might interfere with ECCR change data capture. If your source is an IMS 12 or later Fast Path database, Informatica recommends that you do not specify the following options in the EXIT parameter:

- **NOBEFORE**. No before data is included in X'99' log records for REPL calls. As a result, the ECCR cannot capture the IMS REPL operations.
- **NODLET**. No X'99' log records are written for DLET calls. As a result, the ECCR cannot capture the delete operations.
- **NODLET with CASCADE**. If children of a segment are registered for change capture and you delete the parent segment, the ECCR does not capture the delete for the segment but does capture the deletes for the children.

For more information about the EXIT parameter, see the IBM IMS reference information for the system utility DBDGEN.

Configuring the IMS Log-Based ECCR

Before you start the IMS log-based ECCR, complete the following configuration tasks:

- Configure the ECCR parameters.
- APF-authorize the libraries in the STEPLIB concatenation.
- Configure the IMS log-based ECCR JCL.
- Create at least one capture registration for the IMS source. For more information, see the *PowerExchange Navigator User Guide*.

IMS Log-Based ECCR Programs

PowerExchange provides an IMS log-based ECCR program for each supported IMS version. It also provides an ECCR program that works the DBRC API and can be used with IMS 10 or later.

You specify the ECCR program in the ECCRIMS EXEC statement of the ECCR JCL. The z/OS Installation Assistant uncomments the correct ECCRIMS EXEC statement based on your input when it generates the JCL. To change the ECCR program, edit the JCL.

The following table describes the ECCR programs that are available for each supported IMS version:

IMS Version	ECCR Program	Description
10	DTLCCIMA or DTLCCIMX[1]	DTLCCIMA works with IMS Version 10 only. DTLCCIMX uses the DBRC API and works with IMS 10 or later.
11	DTLCCIMB or DTLCCIMX	DTLCCIMB works with IMS Version 11 only. DTLCCIMX uses the DBRC API and works with IMS 10 or later.
12	DTLCCIMC or DTLCCIMX	DTLCCIMC works with IMS Version 12 only. DTLCCIMX uses the DBRC API and works with IMS 10 or later.
13	DTLCCIMD or DTLCCIMX	DTLCCIMD works with IMS Version 13 only. DTLCCIMX uses the DBRC API and works with IMS 10 or later.
14	DTLCCIMX	DTLCCIMX uses the DBRC API and works with IMS 10 or later.
15	DTLCCIMX	DTLCCIMX uses the DBRC API and works with IMS 10 or later.
1. If you use DTCCIMX with IMS Version 10, you must apply IBM APAR PK50752.		

Note: With the DTLCCIMX program, you do not have to switch to another ECCR program when you upgrade IMS. Also, you can print ECCR capture statistics by using the STATISTICS command and CAPT_STATS=Y parameter. For information about implementing DTLCCIMX, contact Informatica Global Customer Support.

Configuring the IMS Log-Based ECCR Parameters

Configure the IMS log-based ECCR parameters in the RUNLIB(CAPTIMS) member to which the DTLCACFG DD in the ECCR JCL points.

Based on your input during installation, the z/OS Installation Assistant adds values for some parameters to the CAPTIMS member. You can change these values if necessary.

The CAPTIMS member can contain the following parameters:

```
DBID=imsregn
DB_TYPE=IMS
ECCRNAME=IMSEC
[RECID=A0]
IMSID=(subsystem,dbd,
       RECON=(imsrecon1,
              imsrecon2,
              imsrecon3))
[NO_DATA_WAIT=seconds]
[NO_DATA_WAIT2=seconds]
[BYPASS_VERSION_CHECKING={Y|N}]
[CAPT_STATS={Y|N}]
[CAPT_STATS_INTVL=minutes]
[CAPT_STATS_TERSE={Y|N}]
```

```
[COLDSTART={Y|N}]
[ERROR_LOG={ABEND|SKIP|WAIT|WTOR|No response}]
[MSGLVL={0|1}]
[ON_SUSPENSION_ERROR_CONTINUE={N|Y}]
[REFRESH_ALLOWED={Y|N}]
[STARTTIME="YY/MM/DD hh:mm:ss[.nnnnnn]"]
[WRITE_RESTART_SECS=seconds]
```

The following table summarizes the IMS log-based ECCR parameters:

Parameter	Required or Optional	Description
DBID	Required	The RECON identifier that is specified in the registration group for the IMS source from which the ECCR captures changes. This parameter is customized by the z/OS Installation Assistant.
DB_TYPE	Required	The database type, which must be IMS.
ECCRNAME	Required	The ECCR name.
RECID	Optional	A hexadecimal value that corresponds to the record type of user-defined records that the DTLCUIML utility writes to the IMS SLDS. You can use these record IDs to define a start marker for the IMS log-based ECCR in the IMS SLDS.
IMSID	Required	The IMS subsystem ID, the DBDLIB data set, and the RECON data sets. This parameter is customized by the z/OS Installation Assistant.
NO_DATA_WAIT	Optional	The number of seconds that the ECCR waits after an end-of-log condition before starting the next log read. During the next read operation, if the ECCR receives another end-of-log condition without having processed new changes, the NO_DATA_WAIT_2 parameter takes effect. This parameter can be customized by the z/OS Installation Assistant.
NO_DATA_WAIT2	Optional	After the NO_DATA_WAIT interval is no longer in effect, the number of seconds that the ECCR waits after an end-of-log condition before trying another log read. The NO_DATA_WAIT2 wait and retry cycle remains in effect as long as no changes are received. This parameter can be customized by the z/OS Installation Assistant.
BYPASS_VERSION_CHECKING	Optional	Controls whether the ECCR checks that the IMS version matches the IMS version of the DBRC RECON data sets.
CAPT_STATS	Optional	Controls whether PowerExchange writes ECCR statistics messages to the DTLLOG and DTLOUT data sets and WTO messages to the system operator console when the IMS log-based ECCR finishes processing a SLDS.

Parameter	Required or Optional	Description
CAPT_STATS_INTVL	Optional	The interval, in minutes, for which the IMS log-based ECCR collects and reports the number of inserts, deletes, updates, and commits that were captured. The ECCR also reports the log position up to which changes were processed.
CAPT_STATS_TERSE	Optional	Controls whether the IMS log-based ECCR prints PWX-06153 statistics messages only for registered sources for which the ECCR captured changes.
COLDSTART	Optional	Controls whether the ECCR cold starts or warm starts.
ERROR_LOG	Optional	Controls how the ECCR behaves when it encounters an IMS log in the RECON data set that is marked as `in error` or is otherwise unavailable.
MSGLVL	Optional	Controls whether PowerExchange issues detailed messages that indicate the status of ECCR processing of IMS logs that are recorded in the RECON data sets and that contain CDC statistics.
ON_SUSPENSION_ERROR_CONTINUE	Optional	If you use the PWXUCREG utility to suspend and reactivate capture registrations, controls whether the ECCR ends or continues when a UOW that contains change records to be discarded or captured started at an invalid point in the change stream relative to the suspension window.
REFRESH_ALLOWED	Optional	Controls whether you can use the REFRESH command after adding or deleting capture registrations or after suspending or reactivating capture registrations with the PWXUCREG utilty. The REFRESH command refreshes the list of registered IMS segments that the ECCR uses for change capture processing.
STARTTIME	Optional	The date and time when the ECCR starts processing change records from IMS logs after a cold start.
WRITE_RESTART_SECS	Optional	Controls how often, in seconds, a special restart UOW is written to the PowerExchange Logger when nothing of interest has occurred since the last special restart UOW was written.

Note: If a parameter has a default value or is not required, it is marked as optional. A default value is the value that PowerExchange uses if the parameter is not defined. For some parameters, the z/OS Installation Assistant provides recommended values, which you can accept or change.

More detailed parameter descriptions follow.

BYPASS_VERSION_CHECKING Parameter

Controls whether the IMS log-based ECCR checks that the IMS version matches the IMS version of the DBRC RECON data sets.

Syntax:

```
BYPASS_VERSION_CHECKING={N|Y}
```

Valid Values:

- **N**. The ECCR checks that the IMS version matches the IMS version of the DBRC RECON data sets.
- **Y**. The ECCR bypasses version checking. Enter this value if you plan to upgrade RECON data sets to a later IMS release in preparation for upgrading IMS.

Default is N.

CAPT_STATS Parameter

Controls whether PowerExchange writes ECCR statistics messages to the DTLLOG and DTLOUT data sets and WTO messages to the system operator console when the IMS log-based ECCR finishes processing a SLDS.

IMS log-based ECCR statistics reporting is supported only for the ECCR DTLCCIMX program that works with the DBRC API. PowerExchange supplies the DTLCCIMX program for IMS 10 and later.

The ECCR issues PWX-06153 messages that report the number of inserts, deletes, and updates that were captured for each registration, grouped by SLDS. The WTO messages also notify the system operator that a SLDS was closed and provide capture counts.

Regardless of the CAPT_STATS setting, the ECCR always reports the total number of inserts, deletes, updates, and commits across all of the SLDSs at the end of the ECCR run.

Related Parameters: CAPT_STATS_INTVL, CAPT_STATS_TERSE

Syntax:

```
CAPT_STATS={N|Y}
```

Valid Values:

- **N**. Do not write the ECCR capture statistics messages to the DTLLOG and DTLOUT data sets and WTO capture count messages when the ECCR finishes processing each SLDS.
- **Y**. Write the ECCR capture statistics messages to the DTLLOG and DTLOUT data sets and WTO capture count messages when the ECCR finishes processing each SLDS.

Default is N.

Usage Notes:

- If you do not set the global CAPT_STATS parameter to Y, you can issue to STATISTICS ON command after the ECCR is started to enable statistics reporting for each SLDS.
- If you also specify the CAPT_STATS_INTVL parameter or run the STATISTICS *minutes*, the ECCR also reports the total number of inserts, deletes, updates, and commits for the each interval.

For more information about the STATISTICS command and its parameters, see the *PowerExchange Command Reference*.

CAPT_STATS_INTVL Parameter

The interval, in minutes, for which the IMS log-based ECCR collects and reports change capture statistics.

If you specify an interval, the ECCR prints a PWX-06181 message each time the interval elapses. The message reports the total number of inserts, deletes, updates, and commits that the ECCR processed during the interval and the last log position.

You can use this ECCR parameter to print statistics messages at a specific frequency, for example, every 60 minutes.

For the ECCR to print capture statistics at a specifc interval, you must also set the CAPT_STATS parameter to Y in the RUNLIB(CAPTIMS) member or run the ECCR STATISTICS ON command.

Related Parameters: CAPT_STATS, CAPT_STATS_TERSE

Syntax:

```
CAPT_STATS_INTVL=minutes
```

Value: For the *minutes* variable, enter a number from 1 through 1440. No default is provided.

Usage Notes:

- If you set the CAPT_STATS_INTVL parameter to 0, PowerExchange issues the error message PWX-00967.
- After you start the ECCR, message PWX-07805 identifies the collection interval that is defined.
- If you issue the `STATISTICS minutes` command, the number of minutes that is specified in the command overrides the CAPT_STATS_INTVL value for the duration of the ECCR run.

CAPT_STATS_TERSE Parameter

Controls whether the IMS log-based ECCR prints PWX-06153 messages only for registered sources for which the ECCR captured changes. If no inserts, updates, or deletes occurred on a registered source, the ECCR does not report capture counts for it.

A PWX-06153 message reports the number of inserts, deletes, and updates that were captured for a registered source. The message is printed when the ECCR finishes processing a SLDS and at the end of the ECCR run.

For the ECCR to print statistics, you must set the CAPT_STATS=Y parameter in the RUNLIB(CAPTIMS) member or run the ECCR STATISTICS ON command.

Related Parameters: CAPT_STATS, CAPT_STATS_INTVL

Syntax:

```
CAPT_STATS_TERSE={N|Y}
```

Valid Values:

- **N**. Print statistics for all registered sources, including sources without change activity.
- **Y**. Print statistics only for the registered sources for which the ECCR captured changes.

Default is N.

Usage Notes:

- If you set the CAPT_STATS_TERSE parameter to N and then issue the STATISTICS SINCE TERSE command, the command overrides the CAPT_STATS_TERSE setting for the SINCE period. PWX-06153 messages are then printed only for registered sources for which changes were captured.

COLDSTART Parameter

Controls whether the IMS log-based ECCR cold starts or warm starts.

A cold start causes the ECCR to start processing changes with the next IMS log file that is created. A warm start causes the ECCR to resume change processing where it last left off.

Syntax:

```
COLDSTART={N|Y}
```

Valid Values:

- **N**. Warm starts the ECCR.
- **Y**. Cold starts the ECCR. If you specify Y, you can also specify the STARTTIME parameter.

Default is N.

Usage Notes: The following actions cause the IMS log-based ECCR to cold start, regardless of the COLDSTART setting:

- When you start the ECCR with a PowerExchange Logger to which the ECCR has not previously connected.
- When you change the ECCRNAME value in the *hlq*.RUNLIB(CAPTIMS) member.

DB_TYPE Parameter

Required. The database type.

Syntax:

```
DB_TYPE=IMS
```

Value: The value must be "IMS" for the IMS log-based ECCR.

DBID Parameter

Required. A value that matches the RECON identifier in the registration group for the IMS source database from which the IMS log-based ECCR captures changes.

Syntax:

```
DBID=recon_id
```

Value: For the *recon_id* variable, enter a value that matches both the **RECON Identifier** value that is specified in the registration group and the first positional parameter in the IMSID statement of the DBMOVER configuration file.

ECCRNAME Parameter

Required. A name for the IMS log-based ECCR.

Syntax:

```
ECCRNAME=eccr_name
```

Value: For the *eccr_name* variable, enter an alphanumeric string from 1 to 8 characters long.

No default. However, the z/OS Installation Assistant generates an ECCR name that begins with the **PowerExchange Agent / Logger Prefix** value followed by IMSEC, for example, PWXIMSEC.

Usage Notes:

- The ECCR uses the ECCRNAME value for the following purposes:
  - To connect to the PowerExchange Logger to write change data
  - As the member name that joins the XCF group of the PowerExchange Logger
  - As part of the ECCR-UOW field in the control information for each change record written to PowerExchange Logger log files
- The ECCRNAME value must be unique within a PowerExchange Logger group.

- Informatica recommends that you use the same value for the ECCRNAME parameter and the IMS log-based ECCR started task or job name. This practice allows you to easily identify the IMS log-based ECCR when reviewing messages and data from the PowerExchange Logger.
- If you change the ECCRNAME value, the ECCR cannot warm start from where it last left off.

ERROR_LOG Parameter

Controls how the IMS log-based ECCR behaves when it encounters an IMS log that is marked as `in error` in the RECON data set or is otherwise unavailable.

Syntax:

```
ERROR_LOG={ABEND|SKIP|WAIT|WTOR|No response}
```

Valid Values:

ABEND

When the IMS ECCR encounters a log that is marked as `in error`, it ends and issues a WTO message to the system operator console. The ECCR also issues messages that report the start and stop times of the log in error. The ECCR ends in a manner that enables you to restart it after resolving the log in error.

SKIP

The IMS ECCR skips any log that is marked as `in error`. The ECCR issues messages that indicate which logs have been skipped, including their names and start and stop times.

Use this option carefully. The ECCR might miss changes, which can invalidate the target data.

WAIT

When the IMS ECCR encounters a IMS log that is marked as `in error`, it issues informational messages that indicate the status of the log. Then, the ECCR sleeps. Periodically, the ECCR becomes active, based on the NO_DATA_WAIT2 value, to check the log status. After you resolve the log in error, the ECCR continues processing. Optionally, you can change the status of the log in IMS or remove the log from the RECON data set. If you do so, ensure that no changes are lost.

WTOR

Stops the IMS ECCR from continuing and issues a WTOR that asks for which option to use.

No response

The IMS ECCR waits on continuing basis. The ECCR issues messages that identify the log that is in error and the reason for the error.

Default is ABEND.

Usage Notes:

- Typically, a IMS log is marked as `in error` when some type of media error occurs, such as an x37 abend, while data is being written to the log.
- After a log has been ignored or skipped, you cannot try to process it again. You must rematerialize the target data.

IMSID Parameter

Required. The IMS subsystem ID, the DBDLIB data set name, and the RECON data set names. Defines the IMS subsystem to the IMS log-based ECCR.

Syntax:

```
IMSID=(ims_ssid,
       dbdlib,
       RECON=(recon1,recon2,recon3))
```

Values: Enter values for all of the positional parameters and options that are represented by the following variables:

ims_ssid

An IMS subsystem ID. This value can be from one to eight characters in length. Enter a value that matches the IMS SSID value in the IMS data map that you used to register the IMS source.

dbdlib

The name of the IMS DBDLIB data set that contains the DBD load modules. This value is an alphanumeric string from one to eight characters in length.

recon1, recon2, recon3

The names of the IMS RECON data sets that the ECCR uses. Enter values for all three parameters. Use a comma to separate the data set names.

The z/OS Installation Assistant can enter these RECON data set names based on your input on the IMS CDC Parameters page of the installation wizard.

MSGLVL Parameter

Controls whether the IMS log-based ECCR issues detailed messages that indicate the status of ECCR processing of IMS logs that are recorded in the RECON data sets and that contain CDC statistics.

Syntax:

```
MSGLVL={0|1}
```

Valid Values:

- **0**. The ECCR does not issue detailed messages.
- **1**. The ECCR issues detailed messages.

Default is 0. Recommended value is 1.

NO_DATA_WAIT Parameter

The number of seconds that the IMS log-based ECCR waits after an end-of-log condition before it starts the next log read operation.

During the next read operation, if the ECCR receives another end-of-log condition without having processed new changes, the NO_DATA_WAIT_2 parameter takes effect.

Related Parameters: NO_DATA_WAIT2

Syntax:

```
NO_DATA_WAIT={60|seconds}
```

Value: For the *seconds* variable, enter a number from 1 to 99999999.

Default is 60.

NO_DATA_WAIT2 Parameter

After the NO_DATA_WAIT interval is no longer in effect, the number of seconds that the IMS log-based ECCR waits after an end-of-log condition before starting another log read operation.

During a read operation, if the ECCR captures changes, the NO_DATA_WAIT interval takes effect again. If the ECCR does not capture changes, it waits for the NO_DATA_WAIT2 interval and then tries the read again. The ECCR continues to wait for the NO_DATA_WAIT2 interval and retry the read on an ongoing basis, as long as no changes are available.

The ECCR checks the RECON data sets to determine whether a new LOG data set was registered.

Related Parameters: NO_DATA_WAIT

Syntax:

```
NO_DATA_WAIT2={600|seconds}
```

Value: For the *seconds* variable, enter a number from 1 to 99999999.

Default is 600.

ON_SUSPENSION_ERROR_CONTINUE Parameter

Optional. If you use the PWXUCREG utility to suspend and reactivate capture registrations, controls whether the IMS log-based ECCR ends or continues when a UOW that contains change records to be discarded or captured started at an invalid point in the change stream relative to the suspension window.

Enter the syntax information of your reference here (optional).

Valid Values:

- **N**. The ECCR issues an error message and ends.
- **Y**. The ECCR issues a warning and continues processing.

Default is N.

Usage Notes: If you use the PWXUCREG utility, this parameter controls whether the ECCR ends or continues in the following situations:

- When discarding change records for a suspended registrations, the ECCR determines that the associated UOW started before the beginning of the suspension window.
- When capturing change records for an activated registration, the ECCR determines that the associated UOW started before the end of the suspension window.

The suspension window is the time period between the suspension timestamp and reactivation timestamp. For more information about the PWXUCREG utility, see the *PowerExchange Utilities Guide*.

RECID Parameter

A hexadecimal value that corresponds to the record type of user-defined records that the DTLCUIML utility writes to the IMS SLDS. You can use these record IDs to define a start marker for the IMS log-based ECCR in the IMS SLDS.

The ECCR looks for the markers when reading IMS SLDS. When the ECCR encounters a marker, it triggers a message in the PowerExchangeLogger that provides restart and sequence tokens for registration tags.

Syntax:

```
RECID={nn|A0}
```

Value: For the *nn* variable, enter a hexadecimal value from A0 to FF that is unique in your PowerExchange environment.

Default is A0.

REFRESH_ALLOWED Parameter

Controls whether PowerExchange users can issue the ECCR REFRESH command. This command refreshes the list of IMS segments with active capture registrations that the IMS log-based ECCR uses to capture change data.

When this parameter is set to Y, users can issue the REFRESH command after adding or deleting capture registrations or after suspending or reactivating capture registrations with the PWXUCREG utilty. The REFRESH command updates the list of registered sources that the ECCR uses, without shutting down and restarting the ECCR.

Syntax:

```
REFRESH_ALLOWED={N|Y}
```

Valid Values:

- **N**. Do not allow users to issue the REFRESH command. This option is intended for users of PowerExchange versions earlier than 9.5.0, when the REFRESH command was not available. This option maintains the previous behavior, which requires a restart of the ECCR after registration changes.
- **Y**. Allow users to issue the REFRESH command.

Default is N.

STARTTIME Parameter

The date and time in the IMS logs where the IMS log-based ECCR starts processing change records after a cold start.

For the ECCR to use this parameter, you must also set the COLDSTART parameter to Y.

Syntax:

```
STARTTIME="YY/MM/DD hh:mm:ss[.nnnnnn]"
```

Value: In the syntax, the following variables are:

- *YY*. A two-digit year value from 00 to 99.
- *MM*. A two-digit month value from 01 to 12.
- *DD*. A two-digit day value from 01 to 31.
- *hh*. A two-digit hour value from 01 to 23.
- *mm*. A two-digit minutes value from 00 to 59.
- *ss*. A two-digit seconds value from 00 to 59.
- *nnnnnn*. Optional. A subsecond value of up to six digits.

Examples:

```
STARTTIME="10/12/31 23:59:59"
STARTTIME="10/12/31 23:59:59.123456"
```

WRITE_RESTART_SECS Parameter

Controls how often, in seconds, a special restart UOW is written to the PowerExchange Logger when nothing of interest has occurred since the last special restart UOW was written. This value affects how far back the PowerExchange Logger searches for the restart point when the ECCR is restarted.

Syntax:

```
WRITE_RESTART_SECS={seconds|600}
```

Value: For the *seconds* variable, enter a number greater than 0.

Default is 600.

APF-Authorize the Libraries in the STEPLIB Concatenation

All libraries that are specified in the STEPLIB concatenation of the IMS log-based ECCR JCL must be APF-authorized.

1. Verify that the PowerExchange LOAD and LOADLIB libraries are APF-authorized. You should have completed this step during installation.
2. If you use the DTLCCIMX ECCR program that works with the DBRC API, APF-authorize the IMS RESLIB library, which must be included in the STEPLIB concatenation.

To determine the library names, see the ECCR JCL member, called *xxx*IMSEC, that PowerExchange generates in the PROCLIB library based on your entries in the z/OS Installation Assistant.

Configuring the IMS Log-Based ECCR JCL

Configure the IMS log-based ECCR JCL that PowerExchange installation generates in the *xxx*IMSEC member of the PROCLIB library, where *xxx* is the **PowerExchange Agent / Logger Prefix** value that you specified in the z/OS Installation Assistant.

The generated JCL is customized based on your input in the z/OS Installation Assistant. The ECCRIMS EXEC statement that is compatible with your IMS version is uncommented. You can customize the JCL as needed. For example, to run the ECCR as a started task, configure a PROC instead of a JOB card.

The following sample JCL contains statements that were generated at installation:

```
//IMSEC  PROC HLQ=PWX.PROD,LOGGER=PWXL,
//          HLQEDM=PWX.PROD,
//          RUNLIB=PWX.PROD.RUNLIB,
//          HLQVS=PWX.PROD.VSM
//          IMSRES=IMS1110.SDFSRESL
//*ECCRIMS EXEC PGM=DTLCCIMA,TIME=NOLIMIT,REGION=0M (V10)
//*ECCRIMS EXEC PGM=DTLCCIMB,TIME=NOLIMIT,REGION=0M (V11)
//ECCRIMS EXEC PGM=DTLCCIMC,TIME=NOLIMIT,REGION=0M  (V12)
//*ECCRIMS EXEC PGM=DTLCCIMD,TIME=NOLIMIT,REGION=0M (V13)
//*ECCRIMS EXEC PGM=DTLCCIMX,TIME=NOLIMIT,REGION=0M (V10 and higher)
//STEPLIB  DD  DISP=SHR,DSN=PWX.PROD.LOADLIB
//         DD  DISP=SHR,DSN=PWX.PROD.LOAD
//         DD  DISP=SHR,DSN=IMS1110.SDFSRESL
//EDMPARMS DD  DISP=SHR,DSN=PWX.PROD.PWXL.USERLIB
//*-----------------------------------------------------------------*
//DTLCFG   DD DSN=PWX.PROD.RUNLIB(DBMOVER),
//            DISP=SHR
//DTLKEY   DD DSN=PWX.PROD.RUNLIB(LICENSE),
//            DISP=SHR
//DTLMSG   DD DSN=PWX.PROD.DTLMSG,
//            DISP=SHR
//* IF USING MESSAGE OVERRIDE THEN CUSTOMIZE BELOW
//*DTLMSGO DD DISP=SHR,DSN=PWX.PROD.RUNLIB(DTLMSGO)
//DTLLOG   DD SYSOUT=*
//DTLLOG01 DD SYSOUT=*
```

```
//*
//DATAMAP  DD DSN=PWX.PROD.VSM.DATAMAPS,
//            DISP=SHR
//SYSUDUMP DD SYSOUT=*
//SYSOUT   DD SYSOUT=*
//SYSPRINT DD SYSOUT=*
//CEEDUMP  DD SYSOUT=*
//DTLCACHG DD DUMMY
//DTLCACDC DD DSN=PWX.PROD.VSM.CDCT,
//            DISP=SHR
//DTLCACFG DD DSN=PWX.PROD.RUNLIB(CAPTIMS),
//            DISP=SHR
//DTLAMCPR  DD DSN=PWX.PROD.VSM.CCT,
//            DISP=SHR
//* For DBRC API
//DTLDBRC  DD  SYSOUT=*
//*
```

Note: To configure the JCL for use of the DTLCCIMX ECCR, contact Informatica Global Customer Support.

IMS Log-Based ECCR DD Statements

You must specify certain DD statements in the IMS log-based JCL. The DDs identify data sets that the ECCR uses.

Some of the data sets are allocated at installation, while others are created dynamically by the IMS log-based ECCR.

The following table describes the DD statements:

DD Name	Description
DATAMAP	Identifies the data set that contains the data maps that the PowerExchange Listener uses for nonrelational access to data.
DTLAMCPR	Identifies the data set that contains capture registration information. This data set is used by both the PowerExchange Listener and IMS log-based ECCR. The PowerExchange Listener opens the data set in read/write mode, whereas the ECCR only reads it.
DTLCACFG	Identifies the data set that contains the IMS log-based ECCR configuration parameters.
DTLCFG	Identifies the main PowerExchange configuration member, which is usually named DBMOVER. Some of these parameters also apply to the IMS log-based ECCR.
DTLDBRC	To use the DTLCCIMX ECCR program, you must specify this DD with SYSOUT=*. If you use another ECCR program, this DD is not required, but you can leave it uncommented in the JCL without causing errors.
DTLKEY	Identifies the PowerExchange License key file that contains the license key for PowerExchange, including the PowerExchange CDC options you have.
DTLLOG and DTLLOG01	Identifies the PowerExchange message log files. These SYSOUT files contain messages that report the IMS log-based ECCR status and events.
DTLMSG	Identifies the data set contains the PowerExchange messages.

Managing IMS Log-Based CDC

You can start, stop, and control the IMS log-based ECCR using commands.

When you register databases for CDC, you must restart the IMS log-based ECCR to activate the new or changed capture registrations.

Starting the IMS Log-Based ECCR

After you configure the IMS log-based ECCR, you can start it.

1. Verify that the PowerExchange Listener, PowerExchange Agent, and PowerExchange Logger for z/OS are running.
2. Use one of the following methods to start the ECCR:
   - To run the ECCR as a started task, use the MVS START command.
   - To run the ECCR as a batch job, submit the job.

Related Topics:

- "Configuring the IMS Log-Based ECCR JCL" on page 275

Stopping IMS Log-based Change Data Capture

You can stop IMS log-based change data capture at various capture levels

The following table summarizes methods of stopping change data capture by level:

Capture Level	Method
All registered IMS databases	Stop the IMS log-based ECCR.
A specific registered IMS database	Deactivate or delete the capture registration. Then restart the IMS log-based ECCR.

Related Topics:

- "Stopping the IMS Log-Based ECCR" on page 277
- "Deactivating or Deleting Registrations" on page 278

Stopping the IMS Log-Based ECCR

To stop the IMS log-based ECCR, use the MVS STOP command.

By stopping the IMS log-based ECCR, you stop the capture of change data until you restart the ECCR.

The IMS log-based ECCR disconnects from the PowerExchange Logger and displays a set of messages. The messages include the number and type of changes that the ECCR captured since the last time the data set was opened. For example, the ECCR might display the following messages:

```
PWXEDM172809I Change Capture counts for IMLIMS1IMSVXCP1100000: Insert=3, Update=0, Delete=0
PWXEDM172818I Left XCF group 'DOCL' as member 'DTLUSRIM'
PWXEDM172829I EDM ECCR sent 3 records to Logger DOCL (3 change records)
```

For more information about the STOP command for the IMS log-based ECCR, see the *PowerExchange Command Reference*.

Deactivating or Deleting Registrations

To delete or deactivate capture registrations, use the PowerExchange Navigator.

To activate capture registration changes, you must restart the IMS log-based ECCR.

Using the DTLCUIML Utility to Create Restart Points

Use the DTLCUIML utility to write user-defined records to the IMS log. When the IMS log-based ECCR encounters one of the user-defined records, it triggers a message in the PowerExchange Logger to create a marker in the change stream for the affected registration tags.

The tokens represented by the marker can be used to define the start point for an extraction in the PWXPC restart token file or in the DTLUAPPL utility for ODBC extractions.

There is no limit or restriction on the number of markers being set in the change stream. The IMS log record ID chosen has to be unique for the individual installation. Specify the IMS log record ID chosen in the RECID parameter for the IMS log-based ECCR.

The utility runs as a standard IMS application program. There is no need to provide a specific PSB. The utility can use any PSB as long as the first PCB in the PSB is an IOPCB. The utility uses the IMS LOG Call to write IMS log records.

This utility must run as an IMS BMP job. This ensures that the IMS log record is written into the IMS logs and that the associated log is read by the IMS log-based ECCR. Sample JCL is supplied in member IMSLOGW in the RUNLIB library.

For more information about the DTLUCIML utility, see the *PowerExchange Utilities Guide*.

Adding an IMS Capture Registration

You might need to add a capture registration for a new or existing IMS segment from which you want to start capturing change data. In this case, you can use the REFRESH command to refresh the list of registered IMS segments for the IMS log-based ECCR, without restarting the ECCR.

Before you begin, ensure that REFRESH_ALLOWED=Y is specified in the RUNLIB(CAPTIMS) member to which the DTLCACFG DD statement in the ECCR JCL points.

1. If you need to begin capturing changes for the new registration from a specific point, stop any change activity on the source database.
2. In the PowerExchange Navigator, open the capture registration and set the **Status** field to **Active**.
3. If you use PowerExchange Condense, ensure that PowerExchange Condense has processed all of the captured changes. Then shut down PowerExchange Condense.
4. Enter the ECCR REFRESH command using the MVS MODIFY (F) command:

   ```
   F eccr_task_name,REFRESH
   ```

   The newly registered source is added to the list of registered sources for the ECCR.
5. Enable change activity on the source to resume.
6. If you use PowerExchange Condense, restart it.

Deleting an IMS Capture Registration

You might need to delete a capture registration that has been used for change capture processing. In this case, you can use the REFRESH command to refresh the list of registered IMS segments for the IMS log-based ECCR, without restarting the ECCR.

Before you begin, ensure that REFRESH_ALLOWED=Y is specified in the RUNLIB(CAPTIMS) member to which the DTLCACFG DD statement in the ECCR JCL points.

1. Stop applications and other activities that update the source database that is associated with the registration that you are deleting.
2. Ensure that the ECCR has processed all of the IMS SLDSs that contain changes for the source that is associated with the registration that you are deleting. Also ensure that the source data has been extracted and applied to the target. Then stop all workflows that extract change data for the source.
3. If you use PowerExchange Condense, ensure that PowerExchange Condense has processed all of the captured changes. Then shut down PowerExchange Condense.
4. In the PowerExchange Navigator, open the capture registration and set the **Status** field to **History**. Then delete the registration.
5. Enter the ECCR REFRESH command using the MVS MODIFY (F) command:

   ```
   F eccr_task_name,REFRESH
   ```
6. Enable change activity on the source to resume.
7. If you use PowerExchange Condense, restart it.
8. Restart extraction processing.

Suspending Change Capture for Registered IMS Sources Temporarily

Use this task flow to suspend change capture processing for registered IMS log-based CDC sources temporarily.

You perform some tasks with the PWXUCREG utility and other tasks outside of the utility on the z/OS system.

Before you begin, ensure that the REFRESH_ALLOWED=Y parameter is specified in the RUNLIB(CAPTIMS) member to which the DTLCACFG DD statement in the ECCR JCL points. You must be able to issue a REFRESH command after each registration status change.

1. Stop database activity for the registered source or sources for which you want to suspend capture registrations.
2. To suspend the capture registrations, use the PWXUCREG utility to issue the SUSPEND_REGISTRATION command.

   The suspension window opens. The utility sets the suspension timestamp to the current system time without any adjustment for the local time. Also, the utility issues message PWX-03716 to the DTLLOG log to report the registration status change.

   For each suspended registration, the PowerExchange Navigator Resource Inspector displays **Suspended** in the **Status** field and the suspension timestamp in the **Suspend Time** field. The **Suspend Time** value is not adjusted for the local time.
3. Enter the ECCR REFRESH command with the MVS MODIFY (F) command:

   ```
   F eccr_task_name,REFRESH
   ```

   The ECCR becomes aware of the registration status change and suspension timestamp. When the ECCR encounters the first change record to discard, it issues message PWX-07752. The ECCR discards change records that have a timestamp later than the suspension timestamp.

4. Run the jobs or processes that generate the changes that you do not want to capture for the source or sources that are associated with the suspended registrations.
5. After the jobs or processes complete, use the PWXUCREG utility to issue the ACTIVATE_REGISTRATION command to reactivate the capture registrations.

   The suspension window closes, and the utility sets the activation timestamp to the current system time without any adjustment for the local time. Also, the utility issues message PWX-03716 to the DTLLOG log to report the registration status change.

   For each reactivated registration, the PowerExchange Navigator Resource Inspector displays **Active** in the **Status** field and the activation timestamp in the **Active Time** field. The **Active Time** value is not adjusted for the local time.
6. Enter the ECCR REFRESH command with the MVS MODIFY (F) command again.

   The ECCR becomes aware of the registration status change and activation timestamp.
7. Enable database activity to resume on the registered source or sources.

   The ECCR starts capturing change records that have timestamps later than the activation timestamp. The ECCR issues message PWX-07753 when it encounters the first change record in the change stream after the end of the suspension window.

Note: You can automate this processing if appropriate for your environment.

Changing IMS Source Schema

If you need to change the structure an IMS database that is registered for change capture, use this procedure to retain access to historically captured data while capturing data of the new format.

1. Stop all update activity against the IMS database.
2. Verify that the IMS log-based ECCR has captured all changes under the current schema.
3. Stop the IMS log-based ECCR.
4. Complete extraction processing of all captured changes for the IMS database.
5. Make the schema changes.
6. Create a new capture registration that reflects the schema changes.
7. Restart the IMS log-based ECCR.
8. Allow update activity to the IMS database to resume.

CHAPTER 13

IMS Synchronous Change Data Capture

This chapter includes the following topics:

IMS CDC Overview

PowerExchange change data capture (CDC) for IMS captures changes made to IMS databases and logs those changes to PowerExchange Logger for z/OS log files.

You can use PowerCenter CDC sessions to extract the captured change data from the PowerExchange Logger log files or from PowerExchange Condense condense files and apply that data to one or more target databases.

PowerExchange provides the following alternative methods for performing IMS CDC:

- **Synchronous IMS CDC**. Captures changes as they occur and logs them to the PowerExchange Logger. The IMS synchronous ECCR runs as separate subtasks in IMS regions such as the control region, DBCTL, DL/1, and DBB batch jobs.
- **Log-based IMS CDC**. Asynchronously captures changes by reading them from the IMS archive logs and logging them to the PowerExchange Logger. The IMS log-based ECCR runs in a separate address space as a started task or a batch job.

The following table compares IMS synchronous CDC and the IMS log-based CDC methods:

Feature	IMS Synchronous CDC	IMS Log-Based CDC
Does real-time capture of change data.	Yes	No
Reads IMS archive logs to capture IMS change data asynchronously.	No	Yes
PowerExchange IMS interface modules install into the IMS RESLIB.	Yes	No

Feature	IMS Synchronous CDC	IMS Log-Based CDC
Uses the IMS external subsystem to communicate with IMS ECCR.	Yes	No
PowerExchange libraries must be added to the IMS region JCL.	Yes	No
An EXIT statement must be added to the DBD for each database from which you capture changes.	No	Yes
All databases from which you capture changes must be registered in DBRC.	No	Yes
ECCR uses the current RECON data set to determine which IMS archive logs to process.	No	Yes
Captures change data within an IMSplex.	Yes	No
Captures multiple segments with a single capture registration.	No	Yes
Captures non-keyed and non-uniquely keyed segments.	Yes	No
Captures changes from segments that have had compression exits applied.	Yes	Yes
Adds additional data to the IMS log data sets.	No	Yes

IMS Synchronous Change Data Capture

The IMS synchronous ECCR captures changes made by IMS transactions as they occur and passes the captured changes to the PowerExchange Logger. After the changes are logged, control is returned to the transaction and the changed data is available for extraction. IMS synchronous capture provides real-time changed data capture and near real-time extraction capability for changed data.

During the installation of IMS synchronous capture, you link PowerExchange code into the IMS RESLIB. The IMS synchronous ECCR uses this code to gain control during database OPEN processing to perform registration checks. Registration check processing communicates with the PowerExchange Agent to determine if the database being opened is registered for capture.

The IMS synchronous ECCR runs as separate subtasks in the IMS control region, IMS DBCTL region, or in DL/I and DBB batch regions. In addition to the modifications to the IMS RESLIB, you must also update the IMS region JCL. The PowerExchange CRG load library must be included in the STEPLIB for all IMS online and batch regions where capture is required. During the initialization of the IMS region, PowerExchange dynamically installs the IMS interface and initializes the IMS synchronous ECCR to capture changes.

The IMS synchronous ECCR captures changes made to IMS databases and logs those changes to the PowerExchange Logger. You must perform the following tasks before capturing changes for IMS databases:

- Start the PowerExchange Listener, PowerExchange Agent, and PowerExchange Logger.
- Install a modification to the IMS DBRC.

- Configure the IMS region and DBRC JCL.
- Configure an IMS external subsystem.
- Verify that the IMS external subsystem has been started. Normally, IMS starts the external subsystem when the DB/DC ro DBCTL region is started.
- Create capture registrations for IMS database segments using the PowerExchange Navigator.
- Open databases to begin capturing changed data.

After the IMS synchronous ECCR is active, you can activate new registrations by closing the database with the IMS DBR command and re-opening the database with the IMS START command. You can communicate with the ECCR by using the PowerExchange IMS external subsystem commands.

IMS Environments

The IMS synchronous ECCR operates in the following IMS environments:

- DBCTL
- DB/DC
- Batch IMS

IMS Catalog Use

PowerExchange requires access to IMS DBD information in DBGEN format to register IMS CDC sources in the PowerExchange Navigator. PowerExchange can transparently get this information directly from the IMS catalog.

Use of the IMS catalog is optional in PowerExchange and IMS. However, certain IMS functionality, such as database versioning and the management of run-time application control blocks, requires the IMS catalog. For more information, see the IBM IMS documentation.

To get DBD information for source objects from the IMS catalog, PowerExchange uses the IMS catalog API. This API consists of the DFS3CATQ assembly program in the IMSxx.SDFSRESL.RESLIB library and the DFS3CATQ macro in the IMSxxx.SDFSMAC library. The API requires the high-level qualifier of the IMS bootstrap data set. If the IMS control region is *not* running, or if you are using an IMS version earlier than IMS 15, you must specify the high-level qualifier of the bootstrap data set in the IMSBSDS statement in the DBMOVER configuration file. If you use IMS 15 and the control region is running, the high-level qualifier can be retrieved programmatically.

To use the IMS catalog, configure the IMSBSDS statement in the DBMOVER configuration file on the PowerExchange Listener system. This statement specifies the high-level qualifier of the bootstrap data set and the order in which PowerExchange searches locations, such as the IMS catalog and IMS DBDLIB library, for DBD information. Ensure that the *ims_ssid* value that you specify in this statement matches the *ims_ssid* value in an IMSID statement in the DBMOVER file. If DBD information cannot be found in the IMS catalog, PowerExchange uses the associated IMSID statement to find the DBDLIB library. For more information, see the "DBMOVER Configuration File" chapter in the *PowerExchange Reference Manual*.

IMS CDC Operational Considerations

Review the following operational considerations and restrictions when planning your IMS CDC environment.

ECCR Relationships with Other PowerExchange Components

The IMS synchronous ECCR coordinates with other PowerExchange components such as the PowerExchange Logger and the PowerExchange Agent during change data capture.

Consider the following relationships among these components:

- The IMS synchronous ECCR must log all changes to a single PowerExchange Logger running on the same MVS image.
- The PowerExchange Logger and PowerExchange Agent must run on the same MVS image as the IMS synchronous ECCR.
- In configurations where updates to an IMS database occur on multiple MVS images, you must configure an IMS synchronous ECCR, PowerExchange Logger, and PowerExchange Agent on each MVS image. On all MVS images, configure the PowerExchange Logger to use Post-Log Merge.
- Operational issues in the PowerExchange Logger can cause IMS transactions to wait. While transactions wait, PowerExchange cannot capture changes. After you resolve the PowerExchange Logger issues, the transactions can resume and PowerExchange can capture and log change data without any data loss.

  Monitor the PowerExchange Logger closely to ensure that change data capture proceeds without interruption.

Related Topics:

- "Monitoring the PowerExchange Logger for z/OS" on page 71
- "Using Post-Log Merge" on page 90

IMS Synchronous ECCR Restrictions

The following restrictions pertain to the IMS synchronous ECCR:

- The IMS synchronous ECCR requires components from the BMC Software CHANGE RECORDING FACILITY, DATABASE INTEGRITY PLUS, or Fast Path Online Restructure/EP product. If you do not have any of these BMC Software products, you can use the *hlq*.CRG.LOAD library that PowerExchange supplies. The CRG software is based on version 5.1.00 RSL 2101 of the BMC Software products.
- The IMS synchronous ECCR does not capture changes made to IMS databases in the following situations:
  - When you run IMS migration, initialization, reorganization, or recovery utilities
  - When PROCOPT=L is specified in the program specification block (PSB)
  - When user data is in secondary indexes
  - When an update request does not change data in the segment that it updates
- The IMS synchronous ECCR does not support change data capture for the following IMS database types:
  - Hierarchical Sequential Access Method (HSAM) databases
  - Simple Hierarchical Sequential Access Method (SHSAM) databases
  - Generalized Sequential Access Method (GSAM) databases
  - Main Storage databases (MSDBs)
  - IMS Fast Path sequential dependent (SDEP) segments
  - Any IMS databases after an XRF failover
  - Block-level data-sharing IMS databases that are not in a sysplex

RELATED TOPICS:

- "Compatibility with BMC Software Products" on page 286

IMS Synchronous Change Data Capture Considerations

The following considerations pertain to IMS synchronous change data capture:

- You can capture changes to both keyed and non-keyed segments.
  For non-keyed or non-uniquely keyed segments, the IMS synchronous ECCR generates an 8-byte field that contains the relative byte address (RBA) of the segment. This RBA value is passed to the PowerExchange Logger where it is logged along with the change data.

  To use this RBA value to create a unique key field for the segment, you must create a user-defined field in the data map for the segment. Use the GetIMSRBAByLevel function in an expression to populate this field with the captured RBA value. The GetIMSRBAByLevel function enables you to get the RBA of an unkeyed or non-uniquely keyed parent segment. Then use the altered data map to create the extraction map.

  Reorganizing the IMS source database changes the RBA values of its segments. To ensure that the generated RBA value in the target is associated with the correct source data record, rematerialize the target table from the source if the source is reorganized.
- If you need to capture changes for paired logical children, use the following guidelines:
  - For virtual pairings, propagate changes from the physical child.
  - For physical pairings, use the child that contains the physical dependent segments from which you plan to propagate changes.
- In an online environment, the IMS synchronous ECCR runs as an IMS external subsystem. In this environment, IMS does not support the SETS function. However, IMS supports the SETU and ROLS functions for applications that accept the SC and RC status codes. If your application accepts the SC and RC status codes, the IMS synchronous ECCR can capture change data from the SETU and ROLS functions.
- In an IMS DBCTL environment, PowerExchange IMS synchronous CDC requires the IMS external subsystem of the ECCR to be running to capture CICS transactions. Informatica recommends that you do *not* stop the IMS external subsystem while IMS synchronous CDC is running.
- If IMS synchronous change data capture stops for any reason and updates to the data in the IMS source database are made while capture is down, PowerExchange cannot capture those changes after you activate capture again. Change capture might stop because a /SSR *x*EDP-ABORT command was issued or because a PowerExchange CDC component such as the PowerExchange Logger or PowerExchange Agent ended abnormally.
  If PowerExchange cannot capture changes and you specified ABEND for the Change Capture Error parameter at installation or for the corresponding CCERR parameter in the EDMSDIR options module, or if you issued the /SSR *x*EDP-ABORT command, IMS online transactions and BMP batch jobs that update an IMS database might also abend if PowerExchange determines that the database is of interest or of possible interest to change capture. If PowerExchange determines that the database is not of interest to change capture, the transactions and BMP batch jobs do not abend. If a DL/I batch job attempts to start while change capture is down, the job abends. If a DL/I batch job is active when change capture stops, the job abends when it attempts to access the database of interest or when it attempts to access any other database for the first time.

Configuring the IMS Synchronous ECCR

The IMS synchronous ECCR captures changes made to IMS databases. Before you can capture changes, install the modifications to DBRC and to the IMS region JCL. Then activate the IMS synchronous ECCR in the appropriate IMS regions.

Depending upon the configuration options you chose, JCL for the following IMS regions may need to be modified:

- IMS control regions
- MPP and BMP dependent regions
- DBCTL regions
- DL/I and DBB batch regions

Related Topics:

- "Compatibility with BMC Software Products" on page 286
- "Configuring IMS DBRC" on page 287
- "Configuring the IMS Region JCL" on page 288
- "MVS LNKLST Concatenation " on page 292

Compatibility with BMC Software Products

The IMS synchronous ECCR requires components from the BMC Software CHANGE RECORDING FACILITY, BMC AMI Database Integrity for IMS (formerly called DATABASE INTEGRITY PLUS), and BMC AMI Fast Path Online Restructure for IMS (formerly calledFast Path Online Restructure/EP) products.

Note: These components are also part of some other BMC Software products such as CONCURRENT REORG and BMC AMI Online Reorg for IMS (formerly called BMC MAXM Reorg/Online for IMS).

If you have one of these BMC Software products, use it instead of the PowerExchange *hlq*.CRG.LOAD library.

If you have BMC Software CHANGE RECORDING FACILITY, DATABASE INTEGRITY PLUS, or Fast Path Online Restructure/EP, verify that it meets the minimum version requirements for IMS synchronous CDC. The following table shows the minimum version by BMC product and IMS version:

BMC Software Product	Minimum Version That PowerExchange Requires
CHANGE RECORDING FACILITY	- 4.9.00 Level 1302B, for IMS Version 13 - 5.0.00 Level 1502B, for IMS Version 14 - 5.1.00 Level 1907 with BMC PTF BQQ4590, for IMS Version 15
DATABASE INTEGRITY PLUS	- 4.9.00 Level 1302B, for IMS Version 13 - 5.0.00 Level 1502B, for IMS Version 14 - 5.1.00 Level 1907 with BMC PTF BQQ4590, for IMS Version 15
Fast Path Online Restructure/EP	- 3.11.00 Level 1302B, for IMS Version 13 - 3.11.00 Level 1501B, for IMS Version 14 - 4.1.00 Level 1907 with BMC PTF BQQ4590, for IMS Version 15

The BMC product versions with which PowerExchange is certified might differ from the specified minimum versions. The current PowerExchange version has been certified with the following BMC product versions, which provide the CRG code delivered with PowerExchange:

- CHANGE RECORDING FACILITY: Version 5.1.00 Level 2101
- BMC AMI Database Integrity for IMS: Version 5.1.00 Level 2101
- BMC AMI Fast Path Online Restructure for IMS: Version 4.1.00 Level 2101

If you use a product version earlier than the certified version, consider upgrading the product to the certified version.

If you do not know the version of the BMC product that is installed, browse the BMC load library and select the CRGLEVEL and DBILEVEL load modules. The version information is on the last line, after the date. If you need assistance, call BMC Software Technical Support.

Based on whether your BMC Software product meets the minimum version requirement, complete one of the following actions:

- If the BMC Software product meets the minimum version requirement, use its BMC Software load libraries instead of the PowerExchange *hlq*.CRG.LOAD library.
- If the BMC Software product version is earlier than the minimum required version, upgrade the product before you configure IMS synchronous ECCR JCL and activate the ECCR.

Configuring IMS DBRC

PowerExchange requires modification to DBRC to allow the IMS synchronous ECCR to operate. This modification consists of including PowerExchange modules into the IMS RESLIB. The PowerExchange modules perform capture registration checks from the IMS DBRC address space.

Note: If the BMC Software product BMC AMI Database Integrity for IMS, formerly called DATABASE INTEGRITY PLUS, is installed, you do not need to install the PowerExchange version of this code. Verify that DATABASE INTEGRITY PLUS meets the minimum version requirement and then configure the IMS region JCL.

If the BMC Software product BMC AMI Database Integrity for IMS, or DATABASE INTEGRITY PLUS, is not installed, you must install the PowerExchange modification to DBRC. The PowerExchange modification creates a new load module by including load module DBICRX*vr* with IMS DBRC load module DSPCRTR0. The new load module, DBICRY*vr*, resides in the IMS RESLIB (SDFSRESL). The variable *vr* represents the version and release of the IMS system. In addition, load module DBICRT00 replaces DSPCRTR0 in the IMS RESLIB.

The following table lists the *hlq*.CRG.LOAD load modules for each IMS version that are included with load module DSPCRTR0 to create the DBICRY*vr* load module:

IMS *version.release*	CRG.LOAD Module Name	DBICRY*vr* Module Name
10.1	DBiCRXA1	DBICRYA1
11.1	DBiCRXB1	DBICRYB1
12	DBiCRXC1	DBICRYC1
13	DBiCRXD1	DBICRYD1
14	DBICRXE1	DBICRYE1
15	DBICRXF1	DBICRYF1

Informatica strongly recommends using SMP/E to install the DBRC modifications. Using SMP/E instead of manual link-edits ensures that the appropriate modules are included when you apply IMS maintenance and prevents any interruption in change data capture operation.

PowerExchange provides a sample job to use SMP/E called CRGUMOD in *hlq*.SAMPLIB. This sample job contains two SMP/E USERMODs:

- USERMOD MODDBI1 includes DBICRX*vr* from *hlq*.CRG.LOAD and DSPCRTR0 from the IMS RESLIB to create the DBICRY*vr* load module in the IMS RESLIB.
- USERMOD MODDBI2 includes DBICRT00 from *hlq*.CRG.LOAD to replace DSPCRTR0 in the IMS RESLIB.

Warning: A full IMS SYSGEN will regress the PowerExchange modifications to DBRC regardless of whether SMP/E is used or not. Prior to doing the SYSGEN, remove these USERMODs by using member CRGUREM in *hlq*.SAMPLIB. CRGUREM is sample JCL that contains SMP/E RESTORE and REJECT commands. After the SYSGEN, reapply the USERMODs to DBRC before restarting the IMS subsystem.

PowerExchange provides member CRGCLINK in *hlq*.SAMPLIB, which can be used instead of the SMP/E USERMODs. This sample JCL manually link-edits the DBICRX*vr* and the DBICRT00 modules to create the necessary combination load modules. The job places the resulting load modules in *hlq*.CRG.LOAD.

Note: The CRGCLINK JCL exists to allow temporary installation without modifying the IMS RESLIB. This JCL is useful for tests such as a proof of concept. Use the SMP/E method for permanent installation of the modifications.

Configuring the IMS Region JCL

You must modify the IMS region JCL before activating the IMS synchronous ECCR.

Complete the following tasks:

1. If you have the BMC Software CHANGE RECORDING FACILITY for IMS, DATABASE INTEGRITY PLUS, or Fast Path Online Restructure/EP product, verify that the installed versions meet the minimum version requirements for the IMS synchronous ECCR. See "Compatibility with BMC Software Products" on page 286.
2. If you do *not* have the CHANGE RECORDING FACILITY for IMS product, add the CRG.LOAD library to the IMS region JCL.
3. If you do *not* have the DATABASE INTEGRITY PLUS or Fast Path Online Restructure/EP product, add the CRG.LOAD library to the DBRC JCL.
4. Add the remaining PowerExchange libraries.
5. Configure the IMS external subsystem.
6. Provide access to the external subsystem modules.

Related Topics:

- "Verifying Installed Version of BMC Products" on page 288
- "Adding the CRG.LOAD Library to the DBRC JCL" on page 289
- "Adding the CRG.LOAD Library to the IMS Region JCL" on page 289
- "Configuring the IMS External Subsystem" on page 290
- "Adding Remaining PowerExchange Libraries " on page 289

Verifying Installed Version of BMC Products

PowerExchange has minimum version requirements for the BMC Software CHANGE RECORDING FACILITY, DATABASE INTEGRITY PLUS, and Fast Path Online Restructure/EP products. If you have these products, verify that the installed version is the same as or later than the minimum version that PowerExchange requires.

Then, perform one of the following actions:

- If the installed version is earlier than the recommended version, upgrade before proceeding.
- If the installed version meets the minimum requirements, add the remaining PowerExchange libraries.

Adding the CRG.LOAD Library to the IMS Region JCL

Complete this step if you do not have BMC Software product CHANGE RECORDING FACILITY installed. Add *hlq*.CRG.LOAD to the STEPLIB concatenation for the following IMS region JCL:

- IMS control region
- DBCTL region
- DL/I and DBB batch regions

This library must precede the IMS RESLIB. For example:

```
//STEPLIB  DD  DISP=SHR,DSN=hlq.CRG.LOAD
//         DD  DISP=SHR,DSN=IMS.SDFSRESL
```

Adding the CRG.LOAD Library to the DBRC JCL

If you do not have the BMC Software DATABASE INTEGRITY PLUS or Fast Path Online Restructure/EP product installed, complete this task.

Verify that the PowerExchange modifications have been applied to DBRC. Then add the *hlq*.CRG.LOAD library to DBRC in one of the following ways:

- Add *hlq*.CRG.LOAD to the STEPLIB concatenation in the DBRC region JCL. This library must precede the IMS RESLIB. For example:

  ```
  //STEPLIB  DD  DISP=SHR,DSN=hlq.CRG.LOAD
  //         DD  DISP=SHR,DSN=IMS.SDFSRESL
  ```
- Customize and execute the DBICOPY member in the *hlq*.SAMPLIB library. DBICOPY copies the required DATABASE INTEGRITY PLUS or Fast Path Online Restructure/EP load modules from the *hlq*.CRG.LOAD library to the IMS RESLIB.

Adding Remaining PowerExchange Libraries

You must add the EDMPARMS DD statement and update the STEPLIB DD statement with the PowerExchange *hlq*.LOAD library in the following IMS region JCL:

- IMS control region
- DBCTL region
- DBRC region
- DL/I and DBB batch regions

The EDMPARMS DD statement references the PowerExchange USERLIB data set containing the EDMSDIR module. For example:

```
//EDMPARMS DD DISP=SHR,DSN=hlq.logger_id.USERLIB
```

Add *hlq*.LOAD to the STEPLIB concatenation. This library must precede the IMS RESLIB. For example:

```
//STEPLIB  DD  DISP=SHR,DSN=hlq.CRG.LOAD
//         DD  DISP=SHR,DSN=IMS.SDFSRESL
//         DD  DISP=SHR,DSN=hlq.LOAD
```

Alternatively, you can copy the entire *hlq*.LOAD library into an existing library in the STEPLIB concatenation.

Configuring the IMS External Subsystem

The IMS synchronous ECCR operates as an IMS external subsystem.

To configure the IMS external subsystem of the ECCR, perform the following tasks:

- If you do not have any external subsystems defined, add the SSM parameter to the EXEC statement in the IMS region JCL. Alternatively, specify the SSM parameter in the DFSPB*xxx* member, where *xxx* is the RGSUF value in the IMS region JCL.
- In the IMS PROCLIB, add or modify the member that defines the external subsystem. The member name must be the four-character IMS subsystem ID followed by the SSM parameter value.
  - If you also specify the SSM parameter in MPP or BMP regions, change the members that contain the external subsystem definitions for both the control region and the dependent regions.

    If you use the SSM parameter in the IMS control region, all of the MPP and BMP dependent regions have access to the subsystems defined in the member. If you plan to use the SSM parameter in both the IMS control region and the dependent regions, you must change both SSM members because the dependent region only has access to the subsystems that are defined in both members.
  - Do not include the external subsystem in any SSM member that is used by DL/I batch procedures and jobs.
- In the external subsystem member, you can specify positional parameters that define the subsystem. Separate multiple parameters by using a comma (,).

  The following table describes these parameters:

Parameter	Required	Description
SSN	Yes	Alphanumeric MVS subsystem name for the external subsystem. This name can be up to four characters long and must match the value of the PowerExchange Agent AgentID configuration parameter.
LIT	Yes	Alphanumeric language interface token. This value can be up to four characters long and must match the value of the PowerExchange Agent AgentID configuration parameter. SSN and LIT must have the same value.
ESMT	Yes	Alphanumeric name of the external subsystem module table. This value must be EDMCESMT.
RTT	No	Not in use. However, because the parameters are positional, you must include a comma as a placeholder for this field.

Parameter	Required	Description
REO	Yes	One-character region error option code. The code determines the action IMS takes when an application program issues a request for external subsystem services before connection to the external subsystem is complete or when problems are encountered with the external subsystem. Options: - **R** (the default) - **Q** - **A** PowerExchange requires option **A**, which causes IMS to terminate the application program with abend code U3047 and discard the transaction input.
CRC	No	A one-character command recognition character (CRC), which is required to issue external subsystem commands from IMS terminals or automated operator interface (AOI) applications. To be able to issue any of the IMS external subsystem commands that PowerExchange supplies, you must specify a value for this parameter. Enter any EBCDIC value except the forward slash (/), which is reserved for IMS use. When you issue an external subsystem commands, enter /SSR followed by the CRC value and then the command name, for example: `/SSR cEDP-STAT`. **Note:** The external subsystem might require IMS user IDs and LTERM names to authorize you to issue external subsystem commands. For more information about authorization requirements, see the IBM IMS documentation.

The following example shows the fields that define the external subsystem for the IMS synchronous ECCR using the positional format:

```
PWXA,PWXA,EDMCESMT,,A,X
```

In this example, the PowerExchange AgentID is PWXA, the required REO value is A, and the CRC selected for the external subsystem commands is X.

The following example specifies an equivalent statement for the external subsystem using the keyword format:

```
SST=DB2,SSN=PWXA,LIT=PWXA,ESMT=EDMCESMT,CRC=X
```

You must specify SST=DB2 when using the keyword format.

Providing Access to the External Subsystem Modules

The IMS synchronous ECCR requires access to the IMS external subsystem modules in the IMS dependent regions.

The DFSESL DD statement specifies the library that contains the external subsystem modules. At minimum, the DD statement must contain the following libraries:

- IMS RESLIB
- PowerExchange *hlq*.LOAD

All libraries in the DFSESL concatenation must be APF-authorized.

You do not need to add the *hlq* . *logger_name* .USERLIB or *hlq* .CRG.LOAD to the DFSESL concatenation. However, the *hlq*.CRG.LOAD library must also be APF-authorized.

The IMS synchronous ECCR concatenates the data sets in the DFSESL DD statement in the control region and the data sets in the ESLLIB parameter to the data sets specified in the DFSESL DD statement in the dependent region. If necessary, the IMS synchronous ECCR allocates the DFSESL DD statement in the dependent region.

Use one or more of the following methods, which are listed in the search order, to construct the DFSESL concatenation for the dependent regions:

- Include the DFSESL DD statement in the JCL of any IMS MPP and BMP dependent regions that update databases registered for capture.
- Include the DFSESL DD statement in the IMS control region JCL.
- Specify the libraries in the ESLLIB parameter of the EDMSDIR default options module.

  The EDMSDIR module is created during PowerExchange installation. If you change the ESLLIB parameter in EDMSDIR, reassemble and relink the module by editing and running the job in the SETUPAGT member of *hlq*.RUNLIB. For the IMS synchronous ECCR to use the updated EDMSDIR, you must stop and restart the affected IMS online regions.

The following example demonstrates a DFSESL concatenation constructed by the IMS synchronous ECCR. In this example, the following statement is specified in the IMS control region:

```
//DFSESL  DD DSN=IMS.SDFSRESL,DISP=SHR
```

The EDMSDIR module specifies ESLLIB=(*hlq*.LOAD). The dependent region contains no DFSESL DD statement.

The IMS synchronous ECCR concatenates this information to produce the following DFSESL concatenation in the IMS dependent region:

```
//DFSESL  DD DSN=IMS.SDFSRESL,DISP=SHR
//        DD DSN=hlq.LOAD,DISP=SHR
```

MVS LNKLST Concatenation

Informatica strongly recommends against including the PowerExchange load libraries in the MVS LNKLST concatenation as unexpected job abends can occur. For example, IMS jobs that start prior to the PowerExchange Logger and PowerExchange Agent address spaces initializing may fail.

If the PowerExchange *hlq*.LOAD and *hlq*.CRG.LOAD libraries are included in the LNKLST concatenation, then:

- You must include the IMS RESLIB and it must be included after *hlq*.CRG.LOAD.
- The library containing EDMSDIR must be included.
- EDMSDIR should specify the option CCERR=CONT as access to any IMS database causes PowerExchange software to get control. If CCERR=ABEND is coded in EDMSDIR, access fails if the PowerExchange Agent is not active.

  Source for EDMSDIR is supplied in member SETUPAGT in the *hlq*.RUNLIB library. Change and rerun this job if changing the CCERR parameter is necessary. To use CCERR=ABEND, add the EDMPARMS DD in any batch job that updates IMS files to be captured.

If you have added the *hlq*.LOAD library to the LNKLST concatenation, you can stop an ECCR from capturing changes for a specific job by including the following DD statement:

```
//EDMNOCAP DD DUMMY
```

Activating the IMS Synchronous ECCR

You must activate the IMS synchronous ECCR to capture changes.

Before you activate the IMS synchronous ECCR, complete configuration of the IMS DBRC and IMS region JCL and activate the capture registrations.

If you activate the ECCR and open a database before you activate the capture registrations, you must close the database by using the IMS DBR command and then reopen it by using the IMS START command to capture changes.

The IMS synchronous ECCR is activated in IMS regions that contain the PowerExchange modules in the STEPLIB concatenation. You can prevent the ECCR from capturing changes for a specific job or region by adding the following DD statement to the JCL:

```
//EDMNOCAP DD DUMMY
```

1. Start the PowerExchange Listener, PowerExchange Agent, and the PowerExchange Logger for z/OS tasks. These tasks must be active before the IMS subsystem is started. Otherwise, no change data is captured.
2. Start the IMS external subsystem, if necessary. Normally, IMS starts the subsystem when the DB/DC or DBCTL region is started.

   During initialization of the IMS subsystem, the IMS synchronous ECCR starts and generates a report that begins with message PWXEDM172852I in the EDMMSG data set. The report lists the default options that are in effect. If the IMS synchronous ECCR is running in an online region, the report also contains allocation options for the DFSESL DD statement.
3. To verify that the IMS synchronous ECCR is active, check the system messages.

   The following messages are issued when using the PowerExchange *hlq*.CRG.LOAD library. The messages differ slightly if you use the BMC Software DATABASE INTEGRITY PLUS, CHANGE RECORDING FACILITY, or Fast Path Online Restructure/EP product instead of the CRG code.

   - In the DBRC region, verify that the job log (JESMGLG) contains the following messages:

     ```
     BMC2700I NO VALID DBI PASSWORD FOUND
     BMC44001I DI+ INITIALIZATION COMPLETE
     BMC44008I DI+ LABEL PROCESSING SUSPENDED
     DFS3613I - DRC TCB INITIALIZATION COMPLETE  imsid
     ```

     The variable *imsid* is the IMS subsystem name.

     Message BMC44001I indicates that the DBRC modification that the IMS synchronous ECCR requires is installed.
   - In the IMS control region, verify that the job log (JESMSGLG) contains the following messages:

     ```
     *DFS0800I AWAITING NOTIFICATION FROM SUBSYS ssid      imsid
      BMC250011I CRF V4600 12/21/07 INITIALIZATION COMPLETED, RC=0, RSN=00000000
      BMC90489W CHANGE RECORDING FACILITY COMPONENT NOT INSTALLED
      F ims_job,SSNOTimsid_ssid
     ```

     The variable *ssid* is the IMS external subsystem and *imsid* is the IMS subsystem name.

     Message BMC250011I indicates that the CHANGE RECORDING FACILITY (CRF) product, which the IMS synchronous ECCR requires, has initialized. PowerExchange generates the MVS MODIFY command following CRF activation to notify IMS that the external subsystem is active and ready to connect. Message BMC90488W can be ignored.

   The following sample messages in the EDMMSG SYSOUT data set indicate that the IMS synchronous ECCR completed initialization and successfully connected to the PowerExchange Logger:

```
PWXEDM172852I Options in effect:
              Load Library containing EDMSDIR. . . . . : HLQ.USERLIB
              EDMSDIR assembly date/time . . . . . . . : 20090513 16.46
              EDP Rollup . . . . . . . . . . . . . . . : V1020_HF1B05_20180606
              Product distribution date. . . . . . . . : 20180621
              Product distribution level . . . . . . . : 2.4.05
              Agent Id . . . . . . . . . . . . . . . . : AG2A
              Logger Id. . . . . . . . . . . . . . . . : LG2A
              SYSOUT class . . . . . . . . . . . . . . : *
              Action if ECCR error encountered . . . . : Continue
PWXEDM172886I The following Load Module replacements have been installed:
    0----+----1----+----2----+----3----+----4----+----5----+----6----+----7----+----8----+----9----+----
    $$+$$$$+$$$$$$$$$$$$$$$$$$$$$$+$+$$$$+$$$$$$$$$$+$$$$$$$$$$$$$$$$$+$$$$$$$$$$$$$$$$$$$$$$$$$$$$$+$$$
  100----+----1----+----2----+----3----+----4----+----5----+----6----+----7----+----8----+----9----+----
    $$$$$$$$$$$$$$+$$$$$$$$$$$$+$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$+$$$$$$$+$$$$$+$++$++
```

```
  200----+----1----+----2----+----3----+----4----+----5----+
    + +++++++++++++++++++++++++++++++++++++++++++++++ ++++++
PWXEDM172818I Joined XCF group 'LG2L' as member 'EDMA'
PWXEDM172841I EDM ECCR EDMA connected to EDM Logger LG2L, Log RBA=X'0000001CBF6A0000'
```

IMS Synchronous ECCR Output

The IMS synchronous ECCR generates a report at startup that displays the default options that are in effect for the ECCR. When the IMS synchronous ECCR ends, it reports the number of change records that it captured for each segment in each IMS database.

This information is written to the EDMMSG SYSOUT data set in the IMS control region. The following example shows output from ECCR startup to termination:

```
PWXEDM172852I Options in effect:
              Load Library containing EDMSDIR. . . . . : EDM.V130.124L.USERLIB
              EDMSDIR assembly date/time . . . . . . . : 20090513 16.46
              EDP Rollup . . . . . . . . . . . . . . . : V1020_HF1B05_20180606
              Product distribution date. . . . . . . . : 20180621
              Product distribution level . . . . . . . : 2.4.05
              Agent Id . . . . . . . . . . . . . . . . : 124A
              Logger Id. . . . . . . . . . . . . . . . : 124L
              SYSOUT class . . . . . . . . . . . . . . : *
              Action if ECCR error encountered . . . . : Continue
PWXEDM172886I The following Load Module replacements have been installed:
    0----+----1----+----2----+----3----+----4----+----5----+----6----+----7----+----8----+----9----+----
    $$+$$$$+$$$$$$$$$$$$$$$$$$$$$$+$+$$$$+$$$$$$$$$$+$$$$$$$$$$$$$$$$$+$$$$$$$$$$$$$$$$$$$$$$$$$$$$$+$$$
  100----+----1----+----2----+----3----+----4----+----5----+----6----+----7----+----8----+----9----+----
    $$$$$$$$$$$$$$+$$$$$$$$$$$$+$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$+$$$$$$$+$$$$$+$++$++
  200----+----1----+----2----+----3----+----4----+----5----+
    + +++++++++++++++++++++++++++++++++++++++++++++++ ++++++
PWXEDM172818I Joined XCF group '124L' as member 'EDMA'
PWXEDM172841I EDM ECCR EDMA connected to EDM Logger 124L, Log RBA=X'000000001168000'
PWXEDM172852I DFSESL DD allocation options:
              DSNs to allocate to DFSESL DD. . . . . . : EDM.IMS.EDMA13.SDFSRESL
                                                       : IMS130.SDFSRESL
                                                       : DSN130.SDSNLOAD
                                                       : EDM.PROD.LOAD
PWXEDM172820I Change Capture initialized for IMS Online on V13.0 - EDMA
PWXEDM172808I Change Capture active for IMS DBD/DSN DBLOG5OF/EDM.IMS.DBLOG5
Segment=DB#AASEG SegCode=1  Edition=0000000000000000 EDMNAME=IMS.DBLOG5OF.DB#AASEG
Segment=DB#BASEG SegCode=2  Edition=0000000000000000 EDMNAME=IMS.DBLOG5OF.DB#BASEG
Segment=DB#CASEG SegCode=3  Edition=0000000000000000 EDMNAME=IMS.DBLOG5OF.DB#BASEG
Segment=DB#BBSEG SegCode=4  Edition=0000000000000000 EDMNAME=IMS.DBLOG5OF.DB#BASEG
PWXEDM172853I Change Capture counts for IMS DBD DBLOG5OF
              Segment=DB#AASEG  ISRT=1        REPL=0        DLET=0
              Segment=DB#BASEG  ISRT=1        REPL=0        DLET=0
              Segment=DB#CASEG  ISRT=2        REPL=0        DLET=0
              Segment=DB#BBSEG  ISRT=1        REPL=0        DLET=0
PWXEDM172841I EDM ECCR EDMA disconnected from EDM Logger I24L, Log RBA=X'0000000013F80000'
PWXEDM172818I Left XCF group 'I24L' as member 'EDMA'
PWXEDM172829I EDM ECCR sent 5 records to Logger I24L (5 change records)
```

Managing IMS Synchronous CDC

This section describes how to refresh the IMS synchronous ECCR, issue commands to control ECCR processing, and stop IMS change capture processing. It also includes recovery considerations.

Refreshing the IMS Synchronous ECCR

When you register databases for CDC, refresh the IMS ECCR to activate the new or changed capture registration.

- Close, and reopen the IMS database. For more information, see your IBM documentation.

Controlling the IMS Synchronous ECCR

You can use the following types of commands to control IMS synchronous ECCR processing:

- IMS external subsystem commands that report ECCR change capture activity and override the default ECCR behavior when the IMS external subsystem or PowerExchange Logger terminates.
- A standard IMS command that displays the status of the connection to the IMS external subsystem.

IMS External Subsystem Commands

You can issue commands to the IMS external subsystem of the IMS synchronous ECCR through the subsystem routing command, /SSR. Use these commands to dynamically change how the IMS control region reacts when the ECCR cannot capture changes for an IMS database or to produce snapshot reports of IMS synchronous ECCR activity.

The following table describes the external subsystem commands:

Command	Description
/SSR *x*EDP-ABORT	Overrides the CCERR parameter option of the EDMSDIR module to ABEND. The ABEND action: - Causes transactions to pseudo-abend with a U4094 abend message if the PowerExchange Logger terminates. - Remains in effect until a process or command terminates the IMS control region or until another SSR command supersedes the *x*EDP-ABORT command.
/SSR *x*EDP-CONTINUE	Overrides the CCERR parameter option of the EDMSDIR module to CONT. The CONT action: - Instructs the IMS ECCR to not capture change data if the PowerExchange Logger or external subsystem is terminated but allows transactions to continue. In this situation, change data might be lost. - Remains in effect until a process or command terminates the IMS control region or until another SSR command supersedes the *x*EDP-CONTINUE command.
/SSR *x*EDP-STAT	Produces a report of IMS synchronous ECCR change capture activity in the EDMMSG SYSOUT data set. The report shows the number of record inserts, replacements, and deletes that the IMS ECCR has captured, by database area and segment.
/SSR *x*EDP-STATWTO	Produces a report of IMS synchronous ECCR change capture activity in the job log of the IMS region. The report shows the number of record inserts, replacements, and deletes that the IMS ECCR has captured, by database area and segment.

In these commands, substitute the *x* variable with the command recognition character (CRC) that you specified when configuring the external subsystem of the ECCR in the IMS PROCLIB. For more information, see "Configuring the IMS External Subsystem" on page 290.

IMS Command for Displaying the Connection Status for a Subsystem

You can use the following standard IMS command to display the status of the connection to the IMS external subsystem:

```
DISPLAY SUBSYS ssid
```

Note: This command also displays the CRC value that you configured for the external subsystem. For more information, see "Configuring the IMS External Subsystem" on page 290.

Command Examples

The following examples describe output of the IMS external subsystem commands and the standard IMS DISPLAY SUBSYS command:

Example 1. DISPLAY SUBSYS

This example shows the DISPLAY SUBSYS command and resulting output for the IMS external subsystem I24A:

```
R 89,/DISPLAY SUBSYS I24A
IEE600I REPLY TO 89 IS;/DISPLAY SUBSYS I24A
DFS000I     SUBSYS   CRC REGID PROGRAM  LTERM    STATUS   EDMA
DFS000I     I24A     3                           CONN     EDMA
DFS000I     *07304/211738*   EDMA
```

This output shows that the connection to the IMS external subsystem is active. It also identifies the command recognition character (CRC) that you configured for the subsystem.

Example 2. /SSR *x*EDP-ABORT

This example shows the *x*EDP-ABORT command and resulting output:

```
R 93,/SSR xEDP-ABORT.
DFS058I SSR COMMAND COMPLETED   EDMA
PWXEDM172889I Action if ECCR error encountered has been set to ABORT
```

Note: In the /SSR external subsystem commands, *x* represents the command recognition character (CRC) that you configured for the subsystem.

This command changes the CCERR option of the EDMSDIR module to ABEND.

Example 3. /SSR *x*EDP-CONTINUE

This example shows the *x*EDP-CONTINUE command and resulting output:

```
R 94,/SSR xEDP-CONTINUE.
DFS058I SSR COMMAND COMPLETED   EDMA
PWXEDM172889I Action if ECCR error encountered has been set to CONTINUE
```

This command changes the CCERR option of the EDMSDIR module to CONT.

Example 4. /SSR *x*EDP-STATWTO

This example shows the *x*EDP-STATWTO command and the resulting output that is written to the JESMSGLG log of the IMS region when none of the open databases are registered for CDC:

```
R 95,/SSR xEDP-STATWTO.
DFS058I SSR COMMAND COMPLETED   EDMA
PWXEDM172890W There are no open databases registered for capture
```

If some of the databases were registered for CDC, this report would show the same types of capture counts as in the *x*EDP-STAT command output, that is, the number of record inserts, replacements, and deletes that the IMS ECCR captured by IMS database area and segment.

Example 5. /SSR *x*EDP-STAT

This example shows the output from the *x*EDP-STAT command, which is written to the EDMMSG SYSOUT data set:

```
PWXEDM172853I Change Capture counts for IMS DBD DBLOG5OF
              Segment=DB#AASEG  ISRT=0        REPL=0        DLET=0
              Segment=DB#BASEG  ISRT=0        REPL=0        DLET=0
              Segment=DB#CASEG  ISRT=0        REPL=0        DLET=0
              Segment=DB#BBSEG  ISRT=0        REPL=0        DLET=0
```

This example indicates that the IMS synchronous ECCR has not captured any changes for the four registered segments defined by the specified IMS DBD.

Stopping IMS Synchronous Change Data Capture

You can stop IMS synchronous change data capture at various capture levels.

The following table summarizes the methods of stopping change capture by level:

Capture Level	Method
IMS database	Close the database or data set.
Any registered data object	Deactivate or delete the corresponding capture registration. Then, close or stop the database or data set, as appropriate, and refresh the ECCR.

Note: Informatica recommends that you do not stop the IMS external subsystem of the ECCR while IMS synchronous CDC is running.

Closing an IMS Database

When you close a source database or data set, the IMS synchronous ECCR no longer captures changes associated with that source. For information about closing a database or data set, see the appropriate IBM documentation.

Deactivating or Deleting Registrations

Use PowerExchange Navigator to delete or deactivate PowerExchange registrations.

Then close and reopen the IMS databases.

Application Recovery Considerations

The following section describes batch execution and recovery issues to consider when using the IMS synchronous ECCR. You may have to change existing operational recovery procedures to accommodate PowerExchange CDC.

Using Point-in-Time Recovery

Point-in-time recovery for IMS databases invalidates any change data captured to the PowerExchange Logger.

If point-in-time recovery is necessary, complete the following tasks:

1. Stop all PowerCenter sessions extracting change data for the source database.
2. Recover the source database to the correct point-in-time.

   Leave the database in read-only mode.
3. Rematerialize all targets that apply change data from that source database.
4. Use the DTLUAPPL utility to generate a new restart token for all extractions using the source database. Then, update the restart token file of all PowerCenter sessions extracting change data for the source database with the new restart token.
5. Reset the source database to read-write mode and resume normal operation.
6. Cold start all affected PowerCenter sessions.

MVS Checkpoint/Restart

You cannot use MVS Checkpoint/Restart in an IMS synchronous ECCR job.

IMS Batch Backout Utility

If a DL/I batch jobs fails and the IMS Batch Backout utility is used, consider the following:

- If the DL/I job step does not issue IMS checkpoints, recover the IMS database by:
  - Executing the Batch Backout utility.
  - Restoring an image copy taken prior to the failed job executing.
- If the DL/I job step issues IMS checkpoints:
  - Run the Batch Backout utility to remove uncommitted records caused by the failure of the job step. Using an image copy or point-in-time recovery requires synchronizing the source and target databases again.
  - Resume execution of the job step from the failed checkpoint.
- You cannot use the IMS Batch Backout utility to back out any farther than the last IMS checkpoint on the batch log.
- If IMS Dynamic Backout runs due to an abend, you do not need to run the Batch Backout utility.

Managing IMS Schema Changes

If you change the structure of an IMS database that is registered for change data capture, use this procedure to retain access to historically captured data while capturing data under the new structure.

1. Stop all update activity against the IMS database.
2. Ensure that PowerExchange has processed all changes that occurred under the old schema.
3. Make the structural changes to the IMS database.
4. Create a new PowerExchange capture registration that reflects the schema changes.
5. Restart PowerExchange processing.
6. Allow update activity to the IMS database to resume.

CHAPTER 14

Remote Logging of Data

This chapter includes the following topics:

Remote Logging Overview

You can log change data from any supported data source to PowerExchange Logger for Linux, UNIX, and Windows log files on another system.

You can log change data from data sources on an IBM i (i5/OS) or z/OS system to PowerExchange Logger log files on a Linux, UNIX, or Windows system. The PowerExchange Logger for Linux, UNIX, and Windows reads change data from PowerExchange on the source and logs the data to its log files. CDC sessions that run in continuous extraction mode can then extract the change data from the PowerExchange Logger log files instead of from the source.

The benefits of logging or relogging change data off of the source system depend on the source type and CDC environment. You can use remote logging to reduce resource consumption on the source system, move some resource-intensive CDC processing to the remote system, and reduce the network overhead of data transfer.

Related Topics:

- "Requirements for Capture Registrations" on page 302
- "Configuration Tasks for Remote Logging" on page 303
- "Customizing the dbmover Configuration File on the System to Which Data Is Logged" on page 305
- "Customizing the PowerExchange Logger Configuration File for Remote Logging" on page 303
- "Customizing the dbmover Configuration File on the PowerCenter Integration Service System" on page 307

Remote Logging of Data from Sources on IBM i or z/OS Systems

You can use the PowerExchange Logger for Linux, UNIX, and Windows to extract change data for data sources on IBM i (i5/OS) and z/OS and relog that data to a less costly Linux, UNIX, or Windows system.

Multiple PowerCenter CDC sessions can then retrieve the change data from the local PowerExchange Logger for Linux, UNIX, and Windows log files.

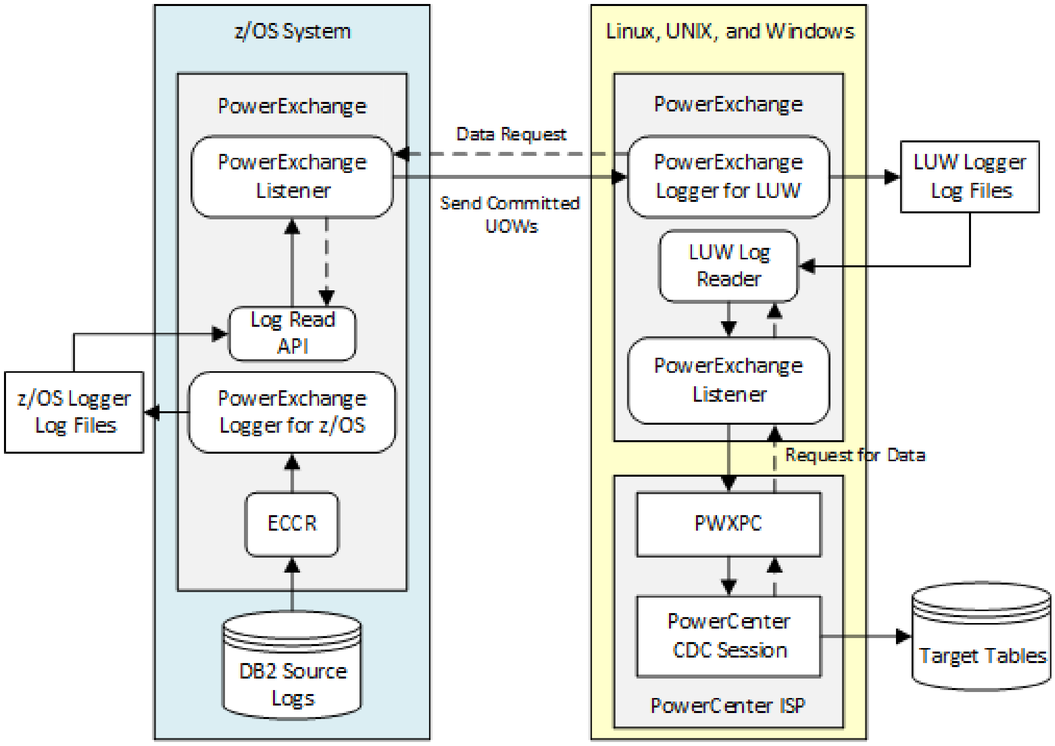
For sources on IBM i and z/OS, the remote logging of data to a Linux, UNIX, or Windows system has the following benefits:

- Moves resource-intensive, column-level processing and UOW Cleanser processing off of the IBM i or z/OS system onto the Linux, UNIX, or Windows system where the PowerExchange Logger for Linux, UNIX, and Windows runs.
- Extracts change data from the Db2 for i (i5/OS) journal receivers or PowerExchange Logger for z/OS log files on z/OS in a single pass and transmits that data over the network to the PowerExchange Logger for Linux, UNIX, and Windows. The data is then available locally for PowerCenter CDC sessions to process. This single-pass processing reduces network traffic and avoids the overhead of multiple data extraction reads.
- Reduces costly CPU usage, disk space, and CDC processing time on the IBM i or z/OS source system.

To configure this remote logging scenario, you must specify the CAPTURE_NODE statement in the PowerExchange Logger for Linux, UNIX , and Windows configuration file, pwxccl.cfg, on the system where the Logger for Linux, UNIX, and Windows runs. The CAPTURE_NODE statement specifies the node name of the PowerExchange Listener that runs on the source system. When you create the registration group in the PowerExchange Navigator, enter the node name of the PowerExchange Listener that runs on the source system in the **Location** field. In PowerCenter, configure a PWX CDC Real Time connection for the PowerCenter CDC sessions that process change data from the source. In the connection attributes, set the **Location** attribute to the node name of the PowerExchange Listener that runs on the system where the PowerExchange Logger log files reside and set the **Mapping Location** attribute to the node name of the PowerExchange Listener that runs on the source system where the extraction maps reside.

Note: When the PowerExchange Logger for Linux, UNIX, and Windows runs on the PowerCenter Integration Service Platform (ISP) machine, you can use a Local connection rather than run a PowerExchange Listener on this machine. However, Informatica recommends that you run a PowerExchange Listener on the PowerCenter ISP machine so that you can issue commands to display information about the active PowerExchange Listener tasks, print PowerExchange Listener monitoring statistics, and stop the PowerExchange Listener task, if necessary.

For example, you can configure the PowerExchange Logger for Linux, UNIX, and Windows to extract Db2 for z/OS change data from PowerExchange Logger for z/OS logs files on a z/OS system and then relog that data to PowerExchange Logger log files on the PowerCenter ISP machine. The following image shows this remote logging configuration:



In this scenario, set the PowerExchange Logger CAPTURE_NODE statement to point to the node name of the PowerExchange Listener on the z/OS system with the Db2 logs. Set the PowerCenter **Location** connection attribute to the node name of the PowerExchange Listener on the PowerCenter ISP machine where the PowerExchange Logger for Linux, UNIX, and Windows runs. Set the **Map Location** connection attribute to point to the node name of the PowerExchange Listener on the z/OS system.

The PowerExchange Logger for Linux, UNIX, and Windows sends a request for change data to the PowerExchange Listener on z/OS. This PowerExchange Listener contacts the Log Read API (LRAPI) to read captured change data from the PowerExchange Logger for z/OS log files. The PowerExchange Listener on z/OS transmits the change data in a single stream over the network to the PowerExchange Logger for Linux, UNIX, and Windows. The UOW Cleanser runs on the Powercenter ISP machine to cleanse the data, and then the PowerExchange Logger for Linux, UNIX, and Windows relogs the data in its local log files. When a Powercenter CDC session runs and requests change data for the tables of CDC interest, the PowerExchange Client for PowerCenter (PWXPC) requests change data from the PowerExchange Listener on the system with the Logger for LUW log files. The PowerExchange Listener contacts the local PowerExchange Logger Log Reader to read change data from the Logger log files. PWXPC makes the data available to the PowerCenter CDC session. Multiple PowerCenter CDC sessions can extract change data from the local PowerExchange Logger log files.

Requirements for Capture Registrations

For the PowerExchange Logger for Linux, UNIX, and Windows to log change data from a remote source, verify that the capture registrations are compatible with the following requirements:

- To use the PowerExchange Logger for Linux, UNIX, and Windows, you must configure capture registrations for partial condense processing. In the PowerExchange Navigator, select **Part** in the **Condense** list for each registration. If you have remote i5/OS or z/OS data sources with capture registrations that specify **Full** for the **Condense** option, the PowerExchange Logger for Linux, UNIX, and Windows ignores these registrations. The PowerExchange Logger also ignores any capture registration that specify **None** for the **Condense** option.
- A PowerExchange Logger for Linux, UNIX, and Windows process must be able to read all of the capture registrations that it uses from a single CCT file on the source system.
- For the remote data sources, you cannot use capture registrations that were created from data maps that use any of the following features:
  - User access methods
  - User-defined fields that invoke programs by using the CALLPROG function
  - Record-level exits

Security Settings for Data from z/OS Sources

For the highest level of security for data from z/OS data sources, set the SECURITY option to 2 in the z/OS DBMOVER configuration member where the extraction maps are located. With this setting, PowerCenter CDC sessions are permitted to extract z/OS data from PowerExchange Logger for Linux, UNIX, and Windows log files only if their user credentials pass z/OS security checking.

When defining a PWXPC connection for the CDC sessions that extract data from the PowerExchange Logger log files, enter a valid z/OS user ID and password in the **Map Location User** and **Map Location Password** connection attributes. If the location of the log files is not local, enter the z/OS user ID and password in the **User Name** and **Password** connection attributes for use by the PowerExchange Listener on the Linux, UNIX, or Windows system where the log files reside.

For data extraction, these z/OS user credentials must have the following permissions:

- READ access to the PowerExchange data set that is defined in the DTLCAMAP DD statement of the PowerExchange Listener JCL
- READ access to CAPX.CND.* resource profiles in the FACILITY class, which are managed by your z/OS security product.

For more information about security, see the *PowerExchange Reference Manual*.

Configuration Tasks for Remote Logging

To log change data to remote PowerExchange Logger for Linux, UNIX, and Windows log files and have PowerCenter CDC sessions extract data from those log files, complete the following configuration tasks:

1. Install PowerExchange on the system where the PowerExchange Logger log files will be located.
2. Customize the pwxccl.cfg configuration file on the system with the PowerExchange Logger log files.
3. Customize the dbmover configuration file on the system with the PowerExchange Logger log files.
   Copy the source-specific CAPI_CONNECTION statements from the source system to the dbmover file on the system with the PowerExchange Logger log files.

   Note: Each PowerExchange Logger must have a unique pwxccl.cfg configuration file and a unique dbmover configuration file.
4. Configure a dbmover configuration file for the PowerExchange Listener on the system with the PowerExchange Logger log files.
   You can use the same dbmover file for the PowerExchange Logger and the PowerExchange Listener. If you use different dbmover files, both files must specify the same CAPT_PATH value.

   If the PowerExchange Logger log files are on the PowerCenter Integration Service machine, you can use a local connection instead of the PowerExchange Listener for change data extractions.
5. If you are not using a "local" connection, start the PowerExchange Listener on the system with the PowerExchange Logger log files.
6. Start the PowerExchange Logger on the system with the PowerExchange Logger log files.
7. Customize the dbmover configuration file on the PowerCenter Integration Service machine.
8. Configure capture registrations for PowerExchange Logger use.
9. Configure PWX CDC Real Time connection attributes for the CDC session to extract change data from the PowerExchange Logger log files.

Customizing the PowerExchange Logger Configuration File for Remote Logging

For the PowerExchange Logger for Linux, UNIX, and Windows to log data from a remote z/OS source, you must customize the PowerExchange Logger configuration file on the system with the PowerExchange Logger log files will reside.

PowerExchange provides a sample configuration file, named pwxccl, in the PowerExchange installation directory on the Linux, UNIX, or Windows system. You can copy this file and customize the copy.

For a complete list of PowerExchange Logger configuration parameters, see the PowerExchange Logger for Linux, UNIX, and Windows chapter in the *PowerExchange CDC Guide for Linux, UNIX, and Windows*.

The following table describes the parameters that used for remote logging from a z/OS source:

Parameter	Description
CAPTURE_NODE	Required for remote logging. The node name that the PowerExchange Logger uses to retrieve capture registrations and change data from the z/OS source system. This name must be defined in a NODE statement in the dbmover configuration file on the system where the PowerExchange Logger runs. The PowerExchange Logger uses this node name to connect to the PowerExchange Listener on the source system. This name should correspond to the node name in the LISTENER statement on the source system.
CAPTURE_NODE_EPWD or CAPTURE_NODE_PWD	Optional. An encrypted password (EPWD) or clear text password (PWD) that is associated with the user ID specified in the CAPTURE_NODE_UID parameter. If you specify CAPTURE_NODE_UID, you must specify either CAPTURE_NODE_EPWD or CAPTURE_NODE_PWD. However, do not specify both CAPTURE_NODE_EPWD and CAPTURE_NODE_PWD.
CAPTURE_NODE_UID	A user ID that controls PowerExchange Logger read access to capture registrations and change data on the remote node that is specified in the CAPTURE_NODE parameter. Whether this parameter is required depends on the operating system of the remote node and the SECURITY setting in the DBMOVER configuration file for the PowerExchange Listener on that node. If CAPTURE_NODE specifies a z/OS node that has a SECURITY setting of 0, do not specify this parameter. PowerExchange uses the user ID under which the PowerExchange Listener job runs to control access to capture registrations and change data. If CAPTURE_NODE specifies a z/OS node that has a SECURITY setting of 1, you must enter a valid operating system user ID for this parameter. Otherwise, error message PWX-00231 is issued, indicating a signon failure. However, PowerExchange uses the user ID under which the PowerExchange Listener job runs to control access to capture registrations and change data. If CAPTURE_NODE specifies a z/OS node that has a SECURITY setting of 2, you must enter a valid operating system user ID for this parameter. Otherwise, error message PWX-00231 is issued, indicating a signon failure. PowerExchange uses this user ID to control access to capture registrations and change data. If the specified user ID does not have the authority that is required to read capture registrations or change data, access fails.
CONDENSENAME	Optional. A name for the command-handling service for a PowerExchange Logger for Linux, UNIX, and Windows process to which pwxcmd commands are issued. This service name must match the service name in the associated SVCNODE statement in the dbmover configuration file.
CONN_OVR	Recommended. The name of the override CAPI_CONNECTION statement to use for the PowerExchange Logger. If you do not enter CONN_OVR, the PowerExchange Logger uses the default CAPI_CONNECTION in the dbmover configuration file, if specified. For z/OS data sources, enter the name of the UOW Cleanser (UOWC) CAPI_CONNECTION statement. Informatica recommends that you specify CONN_OVR because it is the only type of override that the PowerExchange Logger can use.

Parameter	Description
DB_TYPE	Required. The source database type. For z/OS sources, options are: - **ADA**. For Adabas sources. - **DB2**. For DB2 for z/OS sources. - **DCM**. For Datacom sources. - **IDL**. For IDMS log-based CDC sources. - **IMS**. For IMS sources. - **VSM**. For VSAM sources.
DBID	Required. A source identifier, sometimes called the *instance* name, that is defined in capture registrations. When used with DB_TYPE, it defines selection criteria for capture registrations in the CCT file. This value must match the instance or database name that is displayed in the Resource Inspector of the PowerExchange Navigator for the registration group that contains the capture registrations. Enter one of the following values, depending on the source type: - For Adabas, enter the **Instance** name that is displayed for the registration group. - For Datacom, enter the **MUF Name** value that is displayed for the registration group. Alternatively, enter the value of REG_MUF parameter in the ECCRDCMP member of the RUNLIB library. - For DB2 for z/OS, enter the **Instance** name that is displayed for the registration group. This name should match the RN parameter value in the DB2 statement in the RUNLIB(REPDB2OP) member. - For IDMS Log-based CDC, enter the **Logsid** value that is displayed for the registration group. This value should match the LOGSID parameter value in the RUNLIB(ECCRIDLP) member. - For IMS, enter the **IMSID** value that is displayed for the registration group. For IMS log-based CDC, this value should match the first parameter value in the IMSID statement in the RUNLIB(CAPTIMS) member. - For VSAM, enter the **Instance** name that is displayed for the registration group.
EXT_CAPT_MASK	Required. An existing directory path and a unique prefix to be used for generating the PowerExchange Logger log files.

Customizing the dbmover Configuration File on the System to Which Data Is Logged

For the PowerExchange Logger for Linux, UNIX, and Windows to log data from a remote z/OS source, you must customize the dbmover configuration file on the system where the PowerExchange Logger log files will reside.

PowerExchange provides a sample dbmover file in the PowerExchange installation directory on the Linux, UNIX, or Windows system. You can copy this file and customize the copy. For a complete list of all dbmover configuration statements, see the *PowerExchange Reference Manual*.

The following table describes the dbmover statements that are used for remote logging:

Statement	Description
CAPT_PATH	Required. The path to the directory on the Linux, UNIX, or Windows system where the PowerExchange Logger CDCT file resides. The PowerExchange Logger stores information about its log files in the CDCT file. Each PowerExchange Logger that captures change data requires its own CDCT file.
CAPX CAPI_CONNECTION	Required. Parameters that the Consumer API (CAPI) uses for continuous extraction of change data from PowerExchange Logger for Linux, UNIX, and Windows log files. The DFLTINST parameter value in this statement must match the DBID value in the PowerExchange Logger configuration file, pwxccl.
LOGPATH	Optional. A unique path and directory for PowerExchange message log files on the Linux, UNIX, or Windows system where the PowerExchange Logger logs data in its log files.
NODE	Required. Information that PowerExchange uses to connect to the PowerExchange Listener on the system from which change data is captured. This information includes a unique user-defined node name, the TCP/IP host name, and the port number. The node name that you enter in this statement must match the CAPTURE_NODE parameter value in the PowerExchange Logger configuration file.
Source-specific CAPI_CONNECTION	Required. A named set of parameters that the CAPI uses to connect to the change stream for a source type and control CDC processing. Copy the source-specific CAPI_CONNECTION statements from the DBMOVER configuration file on the source system. For z/OS sources, copy the LRAP and UOWC CAPI_CONNECTION statements. Remove the z/OS-specific parameters from the UOWC statement.
SVCNODE	Optional. The TCP/IP port on which a command-handling service for a PowerExchange process, such as a PowerExchange Logger for Linux, UNIX, and Windows process, listens for pwxcmd commands.
TRACING	Optional. Enables PowerExchange alternative logging and specifies attributes for the alternative log files. PowerExchange uses the alternative log files instead of the default PowerExchange message log file to store messages.

Customizing the dbmover Configuration File on the PowerCenter Integration Service System

If you log change data in PowerExchange Logger for Linux, UNIX, and Windows log files on a system other than the source system, customize the dbmover configuration file on the PowerCenter Integration Service system, where the CDC sessions run, to identify the source and PowerExchange Logger nodes.

Add NODE statements for the PowerExchange Listeners that run on the following systems:

- The source system where the capture registrations reside and from which the PowerExchange Logger for Linux, UNIX, and Windows reads change data.
- The remote system where the PowerExchange Logger logs change data in its log files.

Configuring Capture Registrations for the PowerExchange Logger

For the PowerExchange Logger for Linux, UNIX, and Windows to extract change data from a remote source, the capture registrations for the source tables must specify **Part** for the **Condense** option.

Note: This requirement is not specific to remote logging. It also applies to PowerExchange Logger for Linux, UNIX, and Windows use on a source system.

If the capture registrations do not specify **Part** for the **Condense** option, you can edit the **Condense** setting. This change does not increment the registration version. You can continue to use the same registration and extraction map.

Tip: Do not add DTL_BI or DTL_CI columns to the extraction maps if you set the CAPT_IMAGE parameter to AI in the pwxccl.cfg configuration file. With the AI setting, the PowerExchange Logger stores after images only. Consequently, you cannot use before images of the data in extraction processing. Also, CDC sessions that reference any CI fields fail.

Configuring PowerCenter Connection Attributes for Extracting Data from the Log Files

For CDC sessions to extract change data from PowerExchange Logger for Linux, UNIX, and Windows log files on a system other than the source system, you must configure certain attributes on the PWX CDC Real Time connection.

The following table describes these connection attributes:

Connection Attribute	Value
Location	Enter the node name for the PowerExchange Listener that runs on the system where the PowerExchange Logger log files reside. If the log files are on the PowerCenter Integration Service machine, you can enter "local."
Map Location	Enter the node name for the location where the PowerExchange Listener on the source system stores the extraction maps. Usually, this node is the source system node.

Connection Attribute	Value
Map Location User and Map Location Password	Enter a user ID and password that can access the extraction maps. If the PowerExchange Listener runs on a source system with PowerExchange security enabled, the user ID and password depends on the SECURITY statement settings in the DBMOVER configuration file. If the first parameter in the SECURITY statement is 2 and you are extracting z/OS data from the log files, enter a valid z/OS user ID and password in these fields. Also ensure that these z/OS user credentials have the following permissions: - READ access to the PowerExchange data set that is defined in the DTLCAMAP DD statement of the PowerExchange Listener JCL - READ access to CAPX.CND.* resource profiles in the FACILITY class, which are managed by your z/OS security product
CAPI Connection Name Override	Enter the name of the CAPX CAPI_CONNECTION statement that is used by the PowerExchange Listener on the system where the PowerExchange Logger for Linux, UNIX, and Windows log files reside.

For more information about PWX CDC Real Time application connections, see *PowerExchange Interfaces for PowerCenter*.

Example of Remote Logging from a z/OS Data Source

In this example, you use a PowerExchange Logger for Linux, UNIX, and Windows instance on a UNIX system to relog change data for Db2 for z/OS data sources. The system where the PowerExchange Logger runs is separate from the PowerCenter Integration Service system where you run the CDC sessions.

The PowerExchange Logger for z/OS captures change data for registered Db2 for z/OS tables and logs that data to its log files on the z/OS system. The PowerExchange Logger for Linux, UNIX, and Windows reads data from the PowerExchange Logger for z/OS log files and relogs that data on the UNIX system. PowerCenter CDC sessions then extract change data from the PowerExchange Logger for Linux, UNIX, and Windows log files rather than from the log files on the z/OS source system.

You need the PowerExchange Logger for Linux, UNIX, and Windows to read change data for registered tables in the Db2 instance DSN9 and then relog that data to its log files on the remote UNIX system. To do so, you must customize a PowerExchange Logger for Linux, UNIX, and Windows configuration file on the UNIX system and dbmover configuration files on both the z/OS and UNIX systems. Also, for the PowerCenter CDC sessions to extract change data from the PowerExchange Logger log files on UNIX, you must add NODE statements for the source and PowerExchange Logger systems to the dbmover configuration file on the Integration Service system and configure some PWXPC connection attributes.

First install PowerExchange on all three systems. You must run a PowerExchange Listener on the source system and on the PowerExchange Logger system. A PowerExchange Listener is not required on the PowerCenter Integration Service system.

1. On the z/OS source system, ensure that the DBMOVER member in the RUNLIB library includes the following CAPI_CONNECTION statements:

   ```
   LISTENER=(MVS02,TCPIP,2480)
   /* UOW Cleanser
   ```

```
CAPI_CONNECTION=(NAME=MV2UOWC,TYPE=(UOWC,CAPINAME=M2_LRAP,RSTRADV=600,MEMCACHE=20480,
DATACLAS=UOWC))
/* Log Read API Connection
CAPI_CONNECTION=(NAME=MV2_LRAP,TYPE=(LRAP,LOG=MV2L,AGENT=MV2A))
```

2. On the UNIX system with the PowerExchange Logger for Linux, UNIX, and Windows log files, ensure that the dbmover configuration file includes the following statements:

   ```
   /*
   /* dbmover
   /*
   LISTENER=(unix1,TCPIP,2480)
   NODE=(MVS02,TCPIP,prodmvs2,2480)
   ...
   LOGPATH=/pwx/logs/mvscond
   CAPT_XTRA=/pwx/capture/mvscond/camaps
   CAPT_PATH=/pwx/capture/mvscond
   /*
   /* Source-specific CAPI Connection
   CAPI_CONNECTION=(NAME=MV2UOWC,TYPE=(UOWC,CAPINAME=M2_LRAP,RSTRADV=600,MEMCACHE=20480)
   )
   CAPI_CONNECTION=(NAME=MV2_LRAP,TYPE=(LRAP,LOG=MV2L,AGENT=MV2A))
   /*
   /* CAPX CAPI Connection for continuous extraction
   CAPI_CONNECTION=(NAME=CAPXDSN9,TYPE=(CAPX,DFLTINST=DSN9,FILEWAIT=60,RSTRADV=600))
   ```

   Note: In the CAPX CAPI_CONNECTION, the DFLTINST value is the name that is displayed in the **Instance** field for the registration group in the PowerExchange Navigator.

3. On the UNIX system with the PowerExchange Logger system log files, customize the PowerExchange Logger for Linux, UNIX, and Windows configuration file, pwxccl.cfg. For this example, include the following statements:

   ```
   /*
   /* pwxccl
   /*
   DBID=DSN9
   DB_TYPE=DB2
   CONN_OVR=MV2UOWC
   CAPTURE_NODE=MVS02
   PROMPT=Y
   EXT_CAPT_MASK=/pwx/capture/mvscond/condense
   COND_CDCT_RET_P=50
   LOGGER_DELETES_EXPIRED_CDCT_RECORDS=Y
   COLL_END_LOG=0
   NO_DATA_WAIT=0
   NO_DATA_WAIT2=10
   FILE_SWITCH_VAL=20000
   FILE_SWITCH_CRIT=R
   CAPT_IMAGE=BA
   ```

   Note: The CAPTURE_NODE parameter points to the source system node where the PowerExchange Listener processes capture requests.

4. Start the PowerExchange Listener and PowerExchange Logger for Linux, UNIX, and Windows on the UNIX system. Verify that the PowerExchange Listener is also running on the z/OS system.

5. On the PowerCenter Integration Service system, add the following NODE statements to the dbmover file:

   - A NODE statement that points to the PowerExchange Listener on the source system
   - A NODE statement that points to the PowerExchange Listener on the UNIX system with the PowerExchange Logger log files, if you not using a "local" connection

   This example uses the following NODE statements in the dbmover file on the PowerCenter Integration Service machine:

   ```
   NODE=(unix1,TCPIP,unix1,2480)
   NODE=(MVS02,TCPIP,prodmvs2,2480)
   ```

6. Create a PowerCenter mapping, session, and workflow.

7. Configure a PWX DB2zOS CDC Real Time application connection for the CDC sessions that extract change data from the PowerExchange Logger log files on the UNIX system.

   For this example, set the following connection attributes:

   - For the **Location** attribute, enter unix2 to point to the node where the PowerExchange Logger for Linux, UNIX, and Windows log files reside. CDC sessions will read data from this location.
   - For the **Map Location** attribute, enter MVS02 to point to the location of the extraction maps, which the z/OS source system node.
   - For the **Map Location User** attribute, enter a valid user ID for the map location.
   - For the **Map Location Password** attribute, enter the password for the map location user.
   - For the **CAPI Connection Name** attribute, enter CAPXDSN9 to indicate the CAPX CAPI_CONNECTION statement to use.

8. Cold start the CDC session.

   The session begins extracting change data from the PowerExchange Logger log files on the UNIX system.

Part IV: Change Data Extraction

This part contains the following chapters:

CHAPTER 15

Introduction to Change Data Extraction

This chapter includes the following topics:

Change Data Extraction Overview

PowerExchange works in conjunction with PWXPC and PowerCenter to extract captured change data and write it to one or more targets. Learn key concepts about extraction processing so that you can configure CDC sessions for efficient extraction of data and proper restart and recovery.

To extract change data that PowerExchange captured, import the metadata for the capture source into PowerCenter Designer. Use one of the following methods:

- For relational data sources, import either the extraction maps from PowerExchange or the source metadata from the database. If you import source metadata, you might need to modify the source definition in Designer to add PowerExchange-defined CDC columns or to remove any columns that are not included in the extraction map. If you import extraction maps, you do not need to manually add or remove these columns from the PowerCenter source definition.
- For nonrelational data sources, import the extraction maps from PowerExchange.

After you import the metadata, you can use the source definitions in PowerCenter to create mappings, sessions, and workflows for extracting change data from PowerExchange.

Extraction Modes

You can extract the change data that PowerExchange captured in near real time or as a batch process.

You indicate the extraction mode by setting the PowerCenter connection type and certain PowerExchange CDC configuration parameters. Some extraction modes are available only if you use PowerExchange Condense or the PowerExchange Logger for Linux, UNIX, and Windows.

Based on your extraction requirements, use one of the following extractions modes:

Real-time extraction mode

Continuously extracts change data in near real time from the change stream. Extraction processing continues until the CDC session stops or is interrupted.

To implement this mode, configure a PWX CDC Real Time application connection in PowerCenter for your data source type.

Batch extraction mode

Extracts change data from PowerExchange Condense condense files on IBM i (i5/OS) or z/OS, or from PowerExchange Logger for Linux, UNIX, and Windows log files. Data is extracted only from the files that are closed at the time the CDC session runs. The CDC session ends after it completes processing the files.

To implement this mode, configure the following items:

- In the PowerExchange Navigator, set the **Condense** option to **Part** or **Full** in the capture registrations.
- In PowerCenter, configure a PWX CDC Change application connection for your data source type.

Continuous extraction mode.

Continuously extracts change data from open and closed PowerExchange Logger for Linux, UNIX, and Windows log files in near real time.

For data sources on IBM i (i5/OS) or z/OS, this extraction mode is available only if you log data to a remote PowerExchange Logger for Linux, UNIX, and Windows on another system.

To implement this mode, configure the following items:

- In the PowerExchange Navigator, set the **Condense** option to **Part** in the capture registrations.
- In PowerCenter, configure a PWX CDC Real Time application connection for your data source type.
- Configure a CAPX CAPI_CONNECTION statement in the DBMOVER configuration file.
- If you remote logging of data from z/OS or i5/OS data sources to a PowerExchange Logger for Linux, UNIX, and Windows, configure the remote PowerExchange Logger to log change data from the source system.

PowerExchange-Generated Columns in Extraction Maps

Besides the table columns that are defined in capture registrations, extraction maps include columns that PowerExchange generates.

These PowerExchange-generated columns contain CDC-related information, such as the type of SQL change and time stamp.

When you import an extraction map in Designer, PWXPC includes the PowerExchange-generated columns in the source definition.

When you run a database row test on an extraction map, the PowerExchange Navigator displays the PowerExchange-generated columns in the results. By default, the PowerExchange Navigator hides these columns from view when you open the extraction map. To display these columns, open the extraction map, right-click anywhere within the **Extract Definition** window, and select **Show Auto Generated Columns**.

Note: By default, all columns are selected in extraction maps except the DTL__*columnname*_CNT, DTL__*columnname*_IND, and DTL__CI_*columnname* columns. To add these columns, you must edit the extraction map.

The following table describes the columns that PowerExchange generates for each change record:

Column	Description	Datatype	Length
DTL__CAPXRESTART1	Provides a binary value that represents the position of the end of the UOW for that change record followed by the position of the change record itself. The length of a sequence token varies by data source type, except on z/OS where sequence tokens for all data source types have the same length. The value of DTL__CAPXRESTART1 is also known as the *sequence token*, which when combined with the *restart token* comprises the restart token pair. A sequence token for a change record is a strictly ascending and repeatable value.	VARBIN	255
DTL__CAPXRESTART2	Provides a binary value that represents a position in the change stream that can be used to reconstruct the UOW state for the change record, with the following exceptions: - Microsoft SQL Server CDC. A binary value that contains the DBID of the distribution database and the name of the distribution server. - Change data extracted from full condense files on z/OS or i5/OS. A binary value that contains the instance name from the registration group of the capture registration. The length of a restart token varies by data source type. On z/OS, restart tokens for all data source types have the same length, except for change data extracted from full condense files. The value of DTL__CAPXRESTART2 is also known as the *restart token*, which when combined with the *sequence token* comprises the restart token pair.	VARBIN	255
DTL__CAPXROWID	For PowerExchange Express CDC for Oracle, provides the physical rowid value. PowerExchange can include rowid values in change records for Oracle tables only if the tables do not have row movement enabled. To enable the capture of rowid values, you must configure the OPTIONS ROWID=Y statement in the Express CDC configuration file. The rowid is useful for processing rows in unkeyed tables during CDC extraction sessions.	CHAR	18

Column	Description	Datatype	Length
DTL__CAPXRRN	For Db2 for i sources only, provides the relative record number up to 2,147,483,647. DTL__CAPXRNN is deprecated but still supported in existing extraction maps created before PowerExchange 10.5.	NUM32	4
DTL__CAPXEXRRN	For Db2 for i sources only, provides the relative record number, including extended values up to the system maximum value of 4,294,967,288.	DTLNUM64U	8
DTL__CAPXUOW	Provides a binary value that represents the position in the change stream of the start of the UOW for the change record.	VARBIN	255
DTL__CAPXUSER	Provides the user ID of the user who made the change to the data source, with the following exceptions: - For Adabas 8.3 CDC sources, this value is the Security User-id (SECUID) of the user if the Adabas File Definition includes the system field SY=SECUID. - For Datacom table-based CDC sources, this value is the MUF name. - For Db2 for i (i5/OS) CDC sources, this value depends on the LIBASUSER parameter in the AS4J CAPI_CONNECTION statement. If LIBASUSER=Y, this value is the library name and file name of the file where the change was made. If LIBASUSER=M, this value is the library name, file name, and data member name of the file where the change was made. If LIBASUSER=N, this value is the user ID of the user who made the change. If LIBASUSER=P, this value is the name of the program that made the change. - For Db2 for z/OS CDC sources, this value depends on the UIDFMT parameter in the LRAP CAPI_CONNECTION. Depending on the parameter setting, this value can be a Db2 connection identifier, correlation identifier, connection type, plan name, user ID, or all of these values in the format `UID:PLAN:CORR:CONN:CTYPE`. If you do not specify the UIDFMT parameter, this value is the user ID of the user who made the change. - For IDMS CDC sources, this value is the value that the user program puts in the program name field of the application subschema control block. Usually, this value is the user program name. - For IMS synchronous CDC sources, this value depends on the UIDFMTIMS parameter in the LRAP CAPI_CONNECTION statement. Depending on the parameter setting, this value can be a user ID, a PSB name, or both values in the format *userid:psbname*. If you do not specify the UIDFMTIMS parameter, the user ID is used by default. - For Microsoft SQL Server CDC sources, this value depends on the UIDFMT parameter in the MSQL CAPI_CONNECTION statement. If UIDFMT=DBNAME, this value is the SQL Server publication database name. If UIDFMT=NONE, this value is a null. - For Oracle CDC sources, this value is a user ID that PowerExchange gets from Oracle, if available. Otherwise, this value is null.	VARCHAR	255

Column	Description	Datatype	Length
DTL__CAPXTIMESTAMP	Provides the time stamp that the source DBMS records for the database change record. This value can be either the time stamp that the source DBMS writes to the change record in the database logs or the time stamp of the transaction commit on the source database. The type of time stamp depends on the source type and certain parameters: - For Db2 sources on Linux, UNIX, or Windows, the transaction commit time stamp. - For Microsoft SQL Server sources, the time at which the change was written to the distribution database. - For MySQL sources, the time at which MySQL recorded the change event in the binary log. - For Oracle sources, the timestamp type is controlled by the TIME_STAMP_MODE parameter in the OPTIONS statement of the Express CDC configuration file. - For all sources that require a UOWC CAPI_CONNECTION statement, the time stamp type is controlled by the TIMESTAMP parameter in the UOWC CAPI_CONNECTION statement in the DBMOVER file. For more detailed information about time stamps for each source type, see Appendix B, "DTL__CAPXTIMESTAMP Time Stamps" on page 395. The time stamp format is: `YYYYMMDDhhmmssnnnnnn` Where: - YYYY is the four-digit year. - MM is the month. - DD is the day. - hhmmssnnnnnn is hours, minutes, seconds, and microseconds. **Note:** Db2 on Linux, UNIX, or Windows and Oracle do not support microseconds in the time stamp.	CHAR	20

Column	Description	Datatype	Length
DTL__CAPXACTION	Indicates the type of change record that PowerExchange passed to the target during extraction processing. This indicator corresponds to the type of SQL change operation on the source database. Valid values: - **I**. Insert. - **D**. Delete. - **U**. After image of an UPDATE. - **T**. Before image of an UPDATE. (ODBC connections only) If you specify an **Image Type** of **BA** on the connection for a CDC session, PowerExchange generates a delete record followed by an insert record for a source update. In the delete record, the DTL___CAPXACTION column contains the value D. In the insert record, the DTL__CAPXACTION column contains the value I. If you specify an **Image Type** of **AI** on the connection for a CDC session, PowerExchange generates one record for an update. In this record, the DTL___CAPXACTION column contains the U value. If you use an ODBC connection to write change data to a staging table and either set the ODBC driver CAPXIMAGETYPE parameter to TU or enter the SQL escape sequence DTLIMTYPE=TU in PowerCenter, this column can contain a value of T or U. For each source update, PowerExchange delivers two records to the staging table: one for the before image and another for the after image. In the before image record, the DTL__CAPXACTION column contains the T value. In the after image record, The DTL__CAPXACTION column contains the U value.	CHAR	1
DTL__CAPXCASDELIND	For Db2 for z/OS sources only, indicates whether or not Db2 deleted the row because the table specifies the ON DELETE CASCADE clause. Valid values: - **Y.** Indicates that Db2 deleted the row because of a cascade delete rule. - **N**. Indicates that Db2 did not delete the row because of a cascade delete rule.	CHAR	1
DTL__BI_*columnname*	Provides the before image of a column that an UPDATE operation changed.	Datatype of the source column	Length of the source column
DTL__CI_*columnname*	Indicates whether or not an UPDATE operation changed the column value. Valid values: - **Y**. The column value was changed by an UPDATE operation. - **N**. The column was changed by an UPDATE operation. - *null* . The column was changed by an INSERT or DELETE operation. It was not changed by an UPDATE. **Note:** By default, the change indicator column is not included in extraction maps. To add it, you must edit an extraction map and select this auto-generated column.	CHAR	1

Column	Description	Datatype	Length
DTL__ST_*lob_columnname*	For a Db2 for z/OS LOB column, indicates whether or not the column contains all of the LOB data. The ECCR provides incomplete LOB data if the data is not stored fully inline in the base table space or exceeds 32 KB in size. Valid values: - **C**. The source column contains all of the LOB data. The ECCR was able to capture all of the LOB data because the data is stored fully inline in the base table space and does not exceed 32 KB. - **I**. The source column contains incomplete LOB data. The ECCR was unable to capture all of the LOB data because the data is stored in an auxiliary table space, or the data is stored fully inline but exceeds 32 KB in size. - *null*. The column contains null values only. If the LOB data is not stored fully inline in the base table, include the DTL__ST_lob_columnname column. When this column specifies I to indicate incomplete LOB data, you can use PowerCenter transformations to retrieve all the current LOB data for the associated source column. For an Oracle LOB column, DTL__ST_job_columnname indicates whether or not the associated source column contains the LOB data. PowerExchange Express CDC for Oracle provides complete LOB data if the data is fully stored in the row. Valid values: - **C**. The source column contains all the LOB data. PowerExchange Express CDC captured all of the LOB data because the data is stored fully inline in the row. - **I**. The source column was changed but it does not contain LOB data. PowerExchange Express CDC was not able to capture the LOB data because the data is not stored inline in the row. - *null*. The source column contains null values only. If LOB data is not stored inline in the base table, include the DTL__ST_lob_columnname column. When this column specifies I to indicate incomplete LOB data, you can use PowerCenter transformations to retrieve all the current LOB data for the associated source column. **Note:** This column is included in extraction maps by default. To remove it, open the extraction map in the PowerExchange Navigator and clear this automatically generated column.	CHAR	1
DTL__*columnname*_CNT	A binary count that PowerExchange generates for a variable length column of the type VARCHAR and VARBIN. The count is used to determine the length of the column during change data extraction processing. **Note:** By default, the binary count column is not included in extraction maps. To add it, you must edit an extraction map and select this auto-generated column.	NUM32U	0
DTL__*columnname*_IND	Indicates whether or not a nullable column contains a null. PowerExchange generates this column only for nullable columns. **Note:** By default, the null indicator column is not included in extraction maps. To add it, you must edit an extraction map and select this auto-generated column.	BIN	1

Uses of BI and CI Fields in Extraction Maps

PowerExchange captures both before images and after images of data for all SQL UPDATE operations on source columns. To access before image data to process change data in some way during CDC sessions, add before image (BI) and change indicator (CI) fields to extraction maps.

For example, you can use the BI and CI fields for the following purposes:

- To filter captured data for extraction and apply processing.
- To update primary keys on the target based on whether primary keys on the source changed.

Case 1. Filtering Change Data for Extraction and Apply Processing

If you add CI fields for one or more data columns in an extraction map, PowerExchange compares before and after images of the data captured for these columns. If an UPDATE occurred, PowerExchange sets the generated DTL__CI_*column_name* value to Y.

You can use a DTL__CI_*column_name* in WHERE clause filters for CDC sessions to filter the change stream during extraction processing. In PowerCenter, define the filters in the **Filter Override** attribute of the session properties. By using these filters, you can reduce the amount of data that PowerCenter processes.

During extraction processing, PWXPC creates SQL SELECT statements that include the WHERE clause filters. PWXPC passes these statements to PowerExchange. PowerExchange selects and returns the data that matches the WHERE conditions. PWXPC then makes this data available to the CDC sessions. Additional manipulation of the data might occur in PowerCenter, based on how you define the mappings.

To filter change data for extraction and apply processing:

1. In the PowerExchange Navigator, edit the extraction map that you plan to import as the source definition for the CDC session. For each column that you want to filter on, add a CI field.
   PowerExchange generates CI fields that have names in the format DTL__CI_*column_name*.

   For more information about adding CI fields to extraction maps, see the *PowerExchange Navigator User Guide*.
2. In PowerCenter, define WHERE clause filters in the **Filter Override** attribute of the CDC session properties.
   For the filters, enter DTL__CI_*column_name* conditions. For example, enter `DTL__CI_ACCOUNT='Y'`, where 'Y' indicates an Update occurred.

   For more information about filter overrides on CDC sessions, see *PowerExchange Interfaces for PowerCenter*.

When the CDC session runs, PWXPC provides only the change data that matches the WHERE filter to PowerCenter for extraction and apply processing.

Note: Using many filters with CI fields might noticeably increase CPU overhead.

Case 2. Updating Primary Key Fields on the Target

If the target primary key does not match the source primary key, or if the source database allows updates to primary key fields, CDC sessions cannot apply updates to target keys based on after image data only.

To prevent this problem, you can select the **BA** option for the **Image Type** attribute on PWX CDC application connections. This option causes PWXPC to generate two transactions for each source UPDATE: a DELETE followed by an INSERT. The DELETE deletes the old row based on the before image. The INSERT inserts a row based on the after image.

Alternatively, to avoid the overhead of generating two transactions for every source UPDATE, select the **AI** option for the **Image Type** attribute. Also use CI and BI columns in combination with a PowerCenter Flexible Target Key Custom transformation. With this configuration, PowerCenter generates an INSERT or UPDATE transaction only when a source UPDATE results in changes to primary key fields on the target. Complete the following steps to implement this solution.

To update primary key fields on the target using BI and CI fields:

1. In the PowerExchange Navigator, edit the extraction map that you plan to import as the source definition for the CDC session. Add both BI and CI fields for one or more of the primary key columns on the source.
2. Verify that the **Image Type** attribute on the PWX CDC application connection for the CDC session is **AI**. This setting causes PWXPC to pass Updates to the CDC session as Updates. Because you added BI and CI fields for key columns in the extraction map, Update rows for these columns include both before and after images.
3. In PowerCenter, define a Flexible Target Key Custom transformation.
   The transformation uses the DTL__CI indicator for the source key columns to detect when Updates to primary key columns on the target are needed.
4. Add the transformation to the mapping for the CDC session.

For more information about Flexible Target Key Custom transformations, see *PowerExchange Interfaces for PowerCenter*.

Restart Tokens and the Restart Token File

PowerExchange uses a pair of token values, called a restart token pair, to determine where to begin extracting change data in the change stream for each source in a CDC session. A restart token pair matches the position of a specific change record in the change stream.

You can specify restart token pairs in the restart token file. PWXPC also stores restart tokens for CDC sessions that have run in a state table or file. The token values in the restart token file override those in the state table or file.

Specify restart tokens in the restart token file in the following situations:

- For a new CDC session, specify restart token pairs for the sources in the session. You can define a unique restart token pair for each source, or use the special override statement to specify a restart token pair that pertains to all or multiple data sources. The restart tokens should represent the point-in-time in the change stream when you materialized the corresponding targets.
- If you add a data source to a CDC session, specify a restart token pair for that source.
- If you need to override token values for one or more data sources in a CDC session, use override statements in the restart token file.

A restart token pair is composed of the following token types:

Sequence token

A binary value that represents, for each change record that is read, the change stream position of the end of the UOW followed by the position of the change record. A sequence token is a strictly ascending and repeatable value.

Restart token

A binary value that represents, for each change record that is read, a change stream position that PowerExchange can use to reconstruct the UOW state for the change record.

In some cases, the restart token might contain the position of the oldest open UOW. An open UOW is a UOW for which PowerExchange has read the beginning of the UOW from the change stream but has not yet read the commit record, or end-UOW.

When a CDC session runs, PWXPC reads the token values for each source from the state table or file and also reads the restart token file. PowerExchange uses the appropriate restart token values to determine the point from which to start reading change data from the change stream for each source in the CDC session. After determining the start point, PowerExchange starts reading and passing change data to PWXPC. PWXPC uses the sequence token for a source to determine the point at which to start providing the change data for the source.

Multiple-Source Processing in CDC Sessions

When you use PWX CDC application connections to extract change data, PowerExchange reads the change stream in a single pass for all source definitions in the mapping. The sources must be of the same type and use the same change stream.

To create source definitions in Designer, import source metadata in one of the following ways:

- Import a PowerExchange extraction map by using the **Import from PowerExchange** dialog box.
- Import table definitions from a relational database by using the **Import from PowerExchange** dialog box or the **Import from Database** dialog box.

Restriction: For nonrelational sources, you must import extraction maps.

Informatica recommends that you import extraction maps. It makes creating mappings and sessions easier for the following reasons:

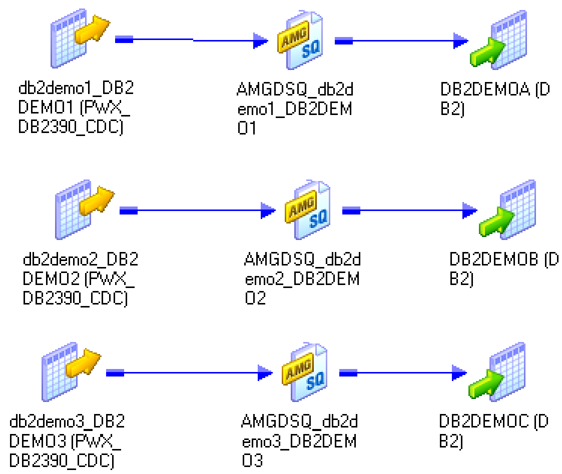
- The source definition contains the extraction map name. You do not need to provide this name when you configure the session.
- The source definition contains the PowerExchange-generated CDC columns, such as the DTL__CAPX columns. You do not need to add these columns to the source definition.

During change data extraction, PowerExchange processes all source definitions in the mapping that have the same source type. Do not include multiple data source types in the mapping. Otherwise, the CDC session fails with message PWXPC_10080.

For example, you cannot run a CDC session that contains a mapping with both VSAM and IMS source definitions, even if changes for those sources are in the same change stream. Instead, create unique a mapping and session for the VSAM sources and a separate, unique mapping and session for the IMS sources. PowerExchange reads the change stream twice: once for the session with the VSAM sources, and once for the session with the IMS sources.

The following figure shows an example mapping in PowerCenter Designer with three DB2 sources:

Mapping Designer



If you include this mapping in a session that uses a PWX DB2zOS CDC application connection, PowerExchange reads the change stream and extracts changes for all three source tables in a single pass. PowerExchange extracts change data in chronological order, based on when the UOWs completed. PowerExchange passes the change data to PWXPC, and PWXPC provides the changes to the appropriate source qualifier.

If you create a workflow that contains multiple CDC sessions, PowerExchange uses a connection for each session, even if the sessions extract change data from the same change stream, such as PowerExchange Logger for z/OS log files.

Note: Because the example mapping uses source definitions created from extraction maps, it cannot be used for bulk data movement operations. However, mappings that use source definitions created from database relational metadata can be used for either change data extraction or bulk data movement.

Commit Processing with PWXPC

The PowerCenter Integration Service, in conjunction with PWXPC, commits data to the target based on the **Commit Type** session property and the commitment control attributes specified on PWX CDC Change or Real Time application connections.

By default, the **Commit Type** session property specifies **Target** for target-based commit processing. However, the PowerCenter Integration Service always uses source-based commit processing for CDC sessions. Change the commit type to **Source**. If you retain the default value and run a CDC session, the PowerCenter Integration Service automatically uses source-based commit processing and writes message WRT_8226 in the session log. You do not need to set the **Commit Interval** session property because PWXPC ignores it.

To control when commits occur, configure committment control attributes on the PWX CDC Change and Real Time application connections.

The following table describes these connection attributes:

Connection Attribute	PWX Real Time or Change Connections	Description
Maximum Rows Per commit	Both	Maximum number of change records that PWXPC processes before it flushes the data buffer to commit the change data to the targets. If necessary, PWXPC continues to process change records across UOW boundaries until this maximum rows limit is met. PWXPC does not wait for a UOW boundary to commit the change data. Default is 0, which causes PWXPC to not use this maximum rows limit.
Minimum Rows Per commit	Real Time	Minimum number of change records that PowerExchange reads from the change stream before it passes any commit records in the change stream to PWXPC. Before reaching this minimum, PowerExchange skips commit records and passes only the change records to PWXPC. Default is 0, which causes PowerExchange to not use this minimum rows limit.
Real-time Flush Latency in milli-seconds	Real Time	Number of milliseconds that must elapse before PWXPC flushes the data buffer to commit change data to the targets. When this latency period expires, PWXPC continues to read the changes in the current UOW until it reaches the end of the UOW. Then, PWXPC flushes the data buffer to commit the change data to the targets. Default is 0, which causes PWXPC to use 2,000 milliseconds.
UOW Count	Both	Number of UOWs that PWXPC must process before flushing the data buffer to commit the change data to the targets. Default is 1.

PWXPC flushes the data buffer to commit change data to the targets when one of the following thresholds is met, whichever one is first:

- **Maximum Rows Per commit**
- **Real-Time Flush Latency in milli-seconds**
- **UOW Count**

If you specify **Minimum Rows Per commit**, this threshold must also be met before a commit occur.

After PWXPC commits the change data, it resets the UOW count, the maximum and minimum rows per commit, and the real-time flush latency timer. PWXPC continues to read change data. Whenever one of the commitment control thresholds is met, PWXPC commits change data to the targets. Commit processing continues until the CDC session is stopped, ends, or terminates abnormally. When the PWXPC CDC reader ends normally, PWXPC issues a final commit to flush all complete, buffered UOWs and their final restart tokens to the targets. Prior to ending, the PWXPC CDC reader writes the following message to the session log:

```
PWXPC_12075 [INFO] [CDCRestart] Session complete. Next session will restart at:  Restart
1 [restart1_token] : Restart 2 [restart2_token]
```

Related Topics:

- “Commitment Control Attributes” on page 336
- “Examples of Controlling Commit Processing” on page 338

Tuning Options

PowerExchange provides flexible tuning options that you can use to reduce CPU usage on a source system that has constrained CPU resources. These options can also potentially improve throughput for CDC sessions.

The tuning options move some extraction processing to another machine such as the PowerCenter Integration Service machine. If the machine to which processing is offloaded has sufficient resources, the performance of CDC sessions might improve.

The following tuning options can help you take maximum advantage of the system resources that are available and maximize throughput for CDC sessions:

- Offload processing. Use offload processing to transfer column-level extraction processing from the PowerExchange Listener on the source system to the PowerExchange client on the PowerCenter Integration Service machine. Also, if the data source type requires use of the UOW Cleanser (UOWC), offloading transfers UOWC processing to the Integration Service machine. Use offloading to help increase throughput when resources available for the PowerExchange Listener are constrained on the source system.
- Remote logging of change data. Configure a PowerExchange Logger for Linux, UNIX, and Windows instance on a system other than the source system. The PowerExchange Logger reads change data from the source and writes the data to its local log files. CDC sessions extract the change data from the PowerExchange Logger log files. This configuration moves resource-intensive, column-level processing from the source system to the PowerExchange Logger system. Use remote logging to help improve throughput for CDC sessions when resources on the source system are constrained.
- Multithreading. Enable the use of multiple worker threads for resource-intensive, column-level extraction processing. You can use multithreading on the source system to process data from Linux, UNIX, or Windows data sources, or on another system where the extraction processing runs. Enable multithreading only if extractions appear to be CPU bound. You can use multithreading with the offloading feature or remote logging.

CHAPTER 16

Extracting Change Data

This chapter includes the following topics:

Overview of Extracting Change Data

Use PowerExchange in conjunction with PWXPC and PowerCenter to extract captured change data and write the data to one or more targets.

To extract the change data that PowerExchange captures, in Designer, import metadata for the CDC sources and targets and create a mapping. Then, in Workflow Manager, create an application connection, a session, and a workflow. You can create multiple mappings, sessions, and workflows based on the same source and target definitions, if appropriate.

For relational data sources, you can import the metadata from either database definitions or PowerExchange extraction maps. For nonrelational sources, you must import the metadata from PowerExchange extraction maps.

Tip: Informatica recommends that you import the metadata from PowerExchange extraction maps. When you use extraction maps, the source definitions contain all of the PowerExchange-generated CDC columns, including any before image (BI) and change indicator (CI) columns you added. Also, you do not need to specify the extraction map name for each source in the session properties because PWXPC can derive the extraction map name from the source definition.

Before starting a CDC session for the first time, create restart tokens to define the extraction start point in the change stream. You might also need to create restart tokens to resume extraction processing in a recovery scenario.

Optionally, you can configure event table processing to stop a CDC session that uses real-time extraction mode based on user-defined events.

Also, you can use the following tuning options to help take maximum advantage of the available system resources and maximize throughput for CDC sessions:

- Offload processing. Use offload processing to transfer column-level extraction processing from the PowerExchange Listener on the source system to the PowerExchange client on the PowerCenter Integration Service machine.
- Remote logging of change data. Configure a PowerExchange Logger for Linux, UNIX, and Windows instance on a system other than the source system. The PowerExchange Logger reads change data from the source and logs it in the PowerExchange Logger log files on the other system. CDC sessions can then extract change data from the PowerExchange Logger log files.
- Multithreading. Enable the use of multiple worker threads to use multithreading for resource-intensive, column-level extraction processing. You can use multithreading on the source system if you are processing data from Linux, UNIX, or Windows data sources, or on another system where the extraction processing runs.

Task Flow for Extracting Change Data

Use this task flow to identify the tasks that you need to complete to configure and start extraction processing. You do these tasks in the PowerExchange Navigator, PowerCenter Designer, and PowerCenter Workflow Manager.

Before you begin, complete configuration of the data source and PowerExchange, and create capture registrations in the PowerExchange Navigator.

1. Edit the extraction map if necessary.

   You can make the following changes:

   - Deselect any column for which you do not want to extract change data. PowerExchange still captures change data for these columns.
   - Add change indicator (CI) and before image (BI) columns.
2. To test the extraction map, do a database row test on the extraction map in the PowerExchange Navigator.
3. In Designer, import metadata for the sources and targets.
4. In Designer, configure a mapping to extract and process change data.
5. In Workflow Manager, configure a connection and session.
6. Create restart tokens for the CDC session.
7. Configure the restart token file.
8. If you want to stop extraction processing based on user-defined events, implement event table processing.
9. To offload column-level extraction processing and UOW Cleanser processing from the source system to the PowerCenter Integration Service machine, configure offload processing. You can also use offload processing to offload change data to a remote PowerExchange Logger for Linux, UNIX, and Windows process on another machine.

   If you configure offload processing for real-time extractions, you can also configure multithreaded processing to help improve throughput.
10. Start the CDC session.

Related Topics:

- "Creating Restart Tokens for Extractions" on page 346
- "Configuring the Restart Token File" on page 347
- "Starting PowerCenter CDC Sessions" on page 353
- "Testing an Extraction Map" on page 327

Testing an Extraction Map

In the PowerExchange Navigator, perform a database row test to verify that PowerExchange can retrieve change data from a registered source based on an extraction map.

A database row test enables you to:

- Preview change data that PowerExchange captured for the registered data source.
- Preview change data that either PowerExchange Condense on i5/OS or z/OS or the PowerExchange Logger for Linux, UNIX, and Windows captured for registered source.
- Verify that the extraction map properly maps the captured change data.

1. In the PowerExchange Navigator, open the extraction group and the extraction map.
2. Select the extraction map and click **File** > **Database Row Test**.
3. In the **Database Row Test** dialog box, enter information in the following fields:

   DB Type

   An option that indicates the extraction mode:

   - **CAPXRT**. Real-time extraction mode or continuous extraction mode.
   - **CAPX**. Batch extraction mode.

   Location

   Node name for the location of the system on which the captured change data resides. This name must be defined in a NODE statement in the dbmover.cfg configuration file on the Windows machine from which you run the database row test.

   UserID and Password

   Optional. A user ID and password that provides access to the source data.

   Fetch

   To preview data, select **Data**.

   Application

   An application name. For a row test, an application name is not required. However, you must enter at least one character in this field. PowerExchange does not retain this value.

   SQL Statement

   A SQL SELECT statement that PowerExchange generates for the fields in the extraction map. You can edit this statement, if necessary.
   In the statement, a table is identified as follows:

   ```
   Schema.RegName_TableName
   ```

Where:

- *Schema* is a schema name for the extraction map.
- *RegName* is the name of the capture registration that corresponds to the extraction map.
- *TableName* is the table name of the data source.

Note: If you enter **CAPX** in the **DB Type** field, you can extract change data only after PowerExchange Condense or the PowerExchange Logger for Linux, UNIX, and Windows closes at least one condense file or log file. Otherwise, PowerExchange does not display change data and writes message PWX-04520 to the PowerExchange message log. PowerExchange also writes this message if no change data for the source has been captured, condensed, or logged.

4. Click **Advanced**.
5. Complete the fields in the **CAPX Advanced Parameters** dialog box or **CAPXRT Advanced Parameters** dialog box.
   - If you use continuous extraction mode, enter the CAPX CAPI_CONNECTION name in the **CAPI Connection Name** field.
   - If you offload change data to PowerExchange Logger for Linux, UNIX, and Windows log files on a system that is remote from the source, enter the location of the extraction maps in the **Location** field.
6. Click **OK**.
7. Click **Go**.

   The database row test returns each change from the extraction start point, by column. The results include the PowerExchange-generated CDC columns, which provide information such as the change type, timestamp, and user ID.

Configuring PowerCenter CDC Sessions

After you import metadata for CDC data sources and targets into PowerCenter, you can create a mapping, connection, and a CDC session for extracting change data. You must configure many session and connection attributes.

Changing Default Values for Session and Connection Attributes

Some PowerCenter session and application connection attributes have default values that are appropriate only for bulk data movement operations. You must edit these attributes for CDC sessions.

The following table describes the session and connection attributes that you need to set for CDC, including the recommended values:

Attribute Name	Attribute Location	Recommended Value for CDC	Description
Commit Type	Properties Tab for the session	Source	Default value is **Target**. If you accept the default, the PowerCenter Integration Service automatically overrides the default to use source-based commit processing. However, you should change this attribute to **Source** so that you can disable the **Commit On End Of File** attribute.
Commit On End Of File	Properties Tab for the session	Disabled	By default, this attribute is enabled. If you accept the default, the PowerCenter Integration Service commits the change data in the buffer to the targets when the session ends. The final commit occurs after the PWXPC CDC reader has committed all complete UOWs in the buffer, along with their restart tokens, to the targets. This timing can cause the restart tokens and target data to be out of sync. The final restart tokens might represent a point in the change stream that is earlier than final change data that the PowerCenter Integration Service commits to the targets. As a result, duplicate data might occur when the CDC session restarts. To prevent potential duplicate data, disable this attribute.
Recovery Strategy	Properties Tab for the session	Resume from last checkpoint	Default value is **Fail task and continue workflow**. To properly restart CDC session, PowerExchange CDC and PWXPC require that this option is set to **Resume from last checkpoint**.
Stop on errors	Config Object Tab for the session	1	Default value is 0. By default, the PowerCenter Integration Service does not consider errors when writing to targets as fatal. The following types of error are non-fatal: - Key constraint violations - Loading nulls into a not null field - Database trigger responses If write errors occur, change data loss might occur because PWXPC has advanced the restart tokens values. To maintain target data and restart token integrity, set this option to 1.
Application Name	Application Connection	Enter a unique name for each CDC session.	Default is the first 20 characters of the workFlow name. **Attention:** Because the default might not result in a unique name, enter a unique name.
RestartToken File Folder	Application Connection	Default value	The default is $PMRootDir/Restart. This default is acceptable for CDC.

Attribute Name	Attribute Location	Recommended Value for CDC	Description
RestartToken File Name	Application Connection	Enter a unique name for each CDC session.	If you enter an **Application Name** value, the default is that application name. If you do not enter an **Application Name** value, the default is the workflow name. **Attention:** Because a default might not result in a unique name, enter a unique restart token file name.
Number of Runs to Keep RestartToken File	Application Connection	1 or greater	Default is 0. PWXPC keeps only one backup copy of the restart token initialization and termination files. Enter a value greater than 0 to make history available for recovery purposes.

Configuring Application Connection Attributes

To extract change data, you must configure certain application connection attributes. For a complete list of all PWX CDC application connection attributes, see *PowerExchange Interfaces for PowerCenter*.

Related Topics:

- "Image Type" on page 330
- "Event Table Processing" on page 333
- "CAPI Connection Name Override" on page 331
- "Idle Time" on page 331
- "Restart Control Attributes" on page 333
- "Flush Latency" on page 334
- "Target Latency " on page 335

Image Type

Use the **Image Type** attribute to indicate how PWXPC passes captured Updates to CDC sessions that extract and apply the updates to the target.

Enter one of the following options for this attribute:

- **AI**. Process Updates as Update operations. PWXPC passes each Update as a single Update record. An Update record includes after images of the data only, unless you add before image (BI) and change indicator (CI) fields to the extraction map that you import for the source definition for the CDC session.
- **BA**. Process Updates as Deletes followed by Inserts. PWXPC passes each Update as a Delete record followed by an Insert record. The Delete record contains the before image of the data, and the Insert record contains the after image.

Default is **BA**.

If you use **BA**, PWXPC generates, for each captured Update operation, a Delete record that contains the before image of the data and an Insert record that contains the after image. If you also define BI and CI fields for some columns in the extraction map that you import for the source definition, PWXPC populates the BI and CI fields with data in both the generated Delete and Insert records. However, for any Insert and Delete operations captured from the source, the BI and CI fields in the generated Delete and Insert records contain Null values.

If you specify **AI**, you can still use before images of the data, if available, in extraction processing. PWXPC can embed before-image data and after-image data in the same Update row. To embed before-image data, you must complete the following configuration tasks:

- In the PowerExchange Navigator, add BI and CI fields to the extraction map that you plan to import for the source definition in PowerCenter.
- If you use batch or continuous extraction mode, enter BA for the CAPT_IMAGE parameter in the PowerExchange Condense or PowerExchange Logger for Linux, UNIX, and Windows configuration file. This setting causes both before and after images to be stored in the PowerExchange Logger log files or PowerExchange Condense condense files. When CDC sessions run, they extract data from these files.

Informatica recommends that you use the **AI** setting if you want to process before images of data. CDC sessions can process a single Update record more efficiently than separate Delete and Insert records to get the before image data.

For example, embed before-image data and after-image data in the same Update row to handle changes to primary keys. Relational databases that allow changes to primary keys, such as Db2 for z/OS, treat these Updates as equivalent to deleting the row and readding it with a new key value. To enable PowerExchange to detect primary key changes, include BI and CI fields for the primary key columns in the extraction map for the source definition. Then, in PowerCenter, define a Flexible Target Key Custom transformation to apply the changes to the target as a Delete followed by an Insert. Include the transformation in the mapping for the CDC session. If a target relational database does not allow changes to primary keys, updates to primary keys fail.

Note: To use a Flexible Target Key Custom transformation, you must set the **Image Type** attribute to **AI** and configure BI and CI fields in the PowerExchange extraction map for the source.

For more information about adding BI and CI columns, see the *PowerExchange Navigator User Guide*.

CAPI Connection Name Override

If you define multiple CAPI_CONNECTION statements in the DBMOVER configuration file, you can use the **CAPI Connection Name Override** connection attribute to select one of the statements for a CDC session.

PowerExchange allows a maximum of eight CAPI_CONNECTION statements in the DBMOVER configuration file. You might want to use multiple CAPI_CONNECTION statements to extract changes for multiple source types with a single PowerExchange Listener on a single machine. For example, you can extract changes for Oracle and Db2 sources through a single PowerExchange Listener by specifying multiple CAPI_CONNECTION statements.

If you use CDC offload processing, you must define the CAPI_CONNECTION statements in the dbmover.cfg file on the PowerCenter Integration Service machine. If you do not use CDC offload processing, you must define the CAPI_CONNECTION statements on the system where the change data resides.

To specify the CAPI_CONNECTION statement to use for a specific CDC session, enter the name of the CAPI_CONNECTION statement in the **CAPI Connection Name Override** connection attribute. By using the override instead of a default CAPI_CONNECTION statement, you clearly indicate which statement to use for a session.

Idle Time

Use the **Idle Time** connection attribute to indicate whether a CDC session that uses real-time or continuous extraction mode runs continuously or shuts down after it reaches the end-of-log (EOL).

You can specify that PowerExchange wait for a certain period without change activity before shutting down.

Enter one of the following values:

- -1. The CDC session runs continuously. PowerExchange returns an end-of-file (EOF) only when you manually stop the CDC session.
- 0. After reaching the EOL, PowerExchange returns an EOF and the CDC session ends.
  If you want a CDC session to end periodically on an active system that is rarely idle, enter 0.
- *n*. After reaching the EOL, PowerExchange waits the specified number of seconds, *n*. If PowerExchange receives no change data of interest during this time interval, PowerExchange sends an EOF to the PowerCenter Integration Service and the CDC session ends successfully.
  If you enter a low value, such as 1, the CDC session might end before PowerExchange has read all available data in the change stream.

Default is -1.

PowerExchange determines the EOL by using the current end of the change stream at the point that PowerExchange started to read the change stream. PowerExchange uses the concept of EOL because the change stream is usually not static. The actual EOL is continually moving forward. After PowerExchange reaches the EOL, it writes message PWX-09967 in the PowerExchange message log.

Often, CDC sessions that run in real-time or continuous extraction mode use the default value of -1. You can manually stop a long-running CDC session by using the PowerCenter Workflow Monitor, pmcmd commands, or the PowerExchange STOPTASK command.

If you set the **Idle Time** attribute to 0, when PowerExchange reaches the EOL, it returns an EOF to PWXPC. PWXPC and the PowerCenter Integration Service then perform the following processing:

1. PWXPC flushes all buffered UOWs and ending restart tokens to the targets.
2. The CDC reader ends.
3. After the PowerCenter Integration Service finishes writing the flushed data to the targets, the writer ends.
4. After any post-session commands and tasks run, the CDC session ends.

If you set the **Idle Time** attribute to a positive number, the following processing occurs:

1. PowerExchange reads the change stream until it reaches EOL and then the **Idle Time** wait interval begins.
2. If more data is in the change stream after the EOL, PowerExchange continues to read the change stream, looking for change data of interest to the CDC session, as follows:
   - If the idle time expires before PowerExchange reads a change record of interest for the CDC session, PowerExchange stops reading the change stream.
   - If PowerExchange reads a change record of interest to the CDC session, PowerExchange restarts the timer, passes the change data to PWXPC, and continues to read the change stream. This processing continues until the idle time expires.
3. After the idle time expires, PowerExchange passes an EOF to PWXPC.
4. PWXPC and the PowerCenter Integration Service perform the same processing as when the **Idle Time** value is 0 and the CDC session ends.

When a CDC session ends because the idle time elapsed or a PowerExchange STOPTASK command was issued, PWXPC writes the following message in the session log:

```
[PWXPC_10072] [INFO] [CDCDispatcher] session ended after waiting for [idle_time]
seconds. Idle Time limit is reached
```

If you stop a continual CDC session with the PowerExchange STOPTASK command, PWXPC substitutes 86400 for the *idle_time* variable in the PWXPC_10072 message.

Note: If you specify both the **Reader Time Limit** and **Idle Time** attributes, the PowerCenter Integration Service stops reading data from the source when one of these attribute conditions is met, whichever one is first.

Because the reader time limit does not result in normal termination of a CDC session, Informatica recommends that you use only the idle time limit.

Restart Control Attributes

Use PWXPC restart control attributes to identify restart information to use for a CDC session. The restart information determines the point from which PowerExchange starts reading change data for the session.

Specify restart control attributes in the following situations:

- When you create CDC session.
- When you add a source to an existing CDC session and need to specify restart information for that source.
- When you want to override some restart information that is in the state table or file for a CDC session.

The following table describes the restart control attributes that you can enter on a PWX CDC application connection:

Connection Attribute	Description
Application Name	A unique application name for the CDC session. The application name is case sensitive and cannot exceed 20 characters. Default is the first 20 characters of the workflow name. Because the default might not result in a unique name, Informatica recommends that you enter a unique name.
RestartToken File Folder	Directory name on the PowerCenter Integration Service machine that contains the restart token override file. Default is $PMRootDir/Restart.
RestartToken File Name	The unique file name of the restart token file. This file is in the directory that is specified in the **RestartToken File Folder** attribute. PWXPC uses the contents of this file, if any, in conjunction with the state table or state file to determine the restart point for the CDC session. Default is the **Application Name** value, or if you do not specify the application name, default is the workflow name.

Attention: The values for the **Application Name** and **RestartToken File Name** attributes must be unique for each CDC session. If either one of these values is not unique, unpredictable results might occur, including session failure and potential data loss.

Event Table Processing

Use event table processing to stop the extraction of changes based on user-defined events, such as an end-of-day event.

For example, to stop an extraction process every night, after all changes for the day are processed, write a change to the event table at midnight. This change triggers PowerExchange to stop reading change data and shut down the extraction process after the current UOW completes.

Use the following rules and guidelines:

- You can use event table processing only with real-time or continuous extraction modes.
- You must create the event table and define the applications that can update the table.
- You must register the event table for change data capture from the PowerExchange Navigator.

- A CDC session monitors a single event table. Each user-defined event requires its own event table and a separate extraction process.
- The event table and all of the source tables in the CDC session must be of the same source type.

Implementing Event Table Processing

Use this procedure to implement event table processing. With event table processing, you can stop change data extraction processing based on user-defined events.

1. Create an event table.

   The event table must be of the same source type and on the same machine as the change data to be extracted. For example, if you extract Db2 change data on z/OS, the event table must be a Db2 table in the same Db2 subsystem as the Db2 source tables for the extraction.
2. In the PowerExchange Navigator, create a capture registration for the event table.

   When you create the capture registration, the PowerExchange Navigator generates a corresponding extraction map.
3. In PowerCenter, create a CDC connection and session.

   In the **Event Table** attribute on the PWX CDC Real Time application connection, enter the name of the extraction map associated with the capture registration that you created.
4. Define applications that write an update to the event table whenever the defined event occurs.

   PowerExchange reads the update and places an end-of-file (EOF) in the change stream. PWXPC processes the EOF, passes it to the PowerCenter Integration Service, and then shuts down the PowerExchange reader. The PowerCenter Integration Service completes writing all of the data that is in the pipeline to the targets and then ends the CDC session.

Flush Latency

PowerExchange reads change data into a buffer on the source system, or into a buffer on the PowerCenter Integration Service machine if you use offload processing. The PowerExchange Consumer API (CAPI) periodically flushes the buffer to transfer the change data to PWXPC on the PowerCenter Integration Service machine.

The CAPI flushes the buffer to PWXPC when the one of the following events occurs:

- The buffer becomes full.
- The CAPI timeout value that is specified by the **PowerExchange Latency in seconds** attribute on the PWX CDC Real Time connection expires.
- A commit point occurs.

To specify the flush latency for CDC sessions that run in real-time or continuous extraction mode, set the **PWX Latency in seconds** attribute on the PWX CDC Real Time application connection. This attribute specifies the maximum time that PowerExchange waits for more change data before flushing data to PWXPC. This attribute applies to PowerExchange on the source system, or to the PowerExchange client on the PowerCenter Integration Service machine if you use offload processing.

For CDC sessions that use batch extraction mode, PowerExchange always uses 2 seconds for the flush latency.

PowerExchange writes message PWX-09957 to the PowerExchange message log to identify the CAPI timeout value based on the **PWX Latency in seconds** attribute. If you select **Retrieve PWX Log Entries** on the application connection, PWXPC also writes this message in the session log.

After PowerExchange flushes the change data, PWXPC provides the data to the source qualifiers in the CDC session for further processing. Then the PowerCenter Integration Service commits the data to the targets.

Note: The **PWX Latency in seconds** value also affects how fast a CDC session responds to a stop command from Workflow Monitor or pmcmd program. Before PWXPC can process a stop request, it must wait for PowerExchange to return control to it. Use the default value of 2 seconds for the **PWX Latency in seconds** attribute to avoid unacceptable delays in stop command processing.

Target Latency

Target latency is the total time for applying change data to the targets.

This total includes the time that PWXPC takes to extract change data from the change stream and the time that PowerCenter Integration Service takes to apply that change data to the targets. If extraction and apply processing occurs quickly, target latency is low.

The values for the commitment control attributes affect target latency. When you set the commitment control attributes, balance target latency requirements with resource consumption on the PowerCenter Integration Service machine and the target databases.

Lower target latency values result in higher resource use. The increased resource use occurs because the PowerCenter Integration Service must flush the change data more frequently. Also, the target databases must process more commit requests.

The following table describes the default values for the commitment control attributes, which provide the lowest latency:

Attribute	Default
Maximum Rows Per commit	0, which disables this attribute
Minimum Rows Per commit	0, which disables this attribute
Real-time Flush Latency in milli-seconds	0, which is equivalent to 2000 milliseconds or 2 seconds
UOW Count	1

These values decrease target latency because PWXPC commits changes after each UOW or on UOW boundaries. However, these values can have the following drawbacks:

- Highest resource consumption on the source system, PowerCenter Integration Service machine, and target databases
- Decreased throughput for the CDC sessions because PWXPC flushes change data too frequently for the PowerCenter Integration Service or target databases to handle this processing

To lower resource consumption and potentially increase throughput for CDC sessions, enter a value greater than the default value for one of the following attributes:

- **Minimum Rows Per commit**
- **UOW Count**
- **Real-time Flush Latency in milli-seconds**

Then disable the other attributes.

Commitment Control Attributes

PWXPC, in conjunction with PowerExchange and the PowerCenter Integration Service, controls the timing of commit processing for CDC sessions based on commitment control attributes on PWX CDC connections.

Commit processing is not controlled by a single commitment control attribute. When setting these attributes, try to balance performance and resource consumption with latency requirements.

The **Maximum Rows Per commit**, **Real-Time Flush Latency in milli-seconds**, and **UOW Count** attributes control the timing of real-time flushes of change data to the targets. The **Minimum Rows Per commit** attribute controls if a commit can occur.

Set one or more of the following commitment control attributes on PWX CDC connections:

Maximum Rows Per commit

Maximum number of change records in a source UOW that PWXPC processes before flushing the data buffer to commit the change data to the targets.

Use this attribute to have PWXPC commit change data to the targets without waiting for the UOW boundary, or end-UOW, to be met. This type of commit is called a *subpacket commit*. By using subpacket commits for large UOWs, you can minimize use of storage on the PowerCenter Integration Service machine and locking contention on the target databases.

Attention: Because PWXPC can commit the change data to the targets between UOW boundaries, relational integrity (RI) might be compromised. Do not use this connection attribute if you have targets in the CDC session with RI constraints.

After the maximum rows limit is met, PWXPC flushes the change data from the buffer on the PowerCenter Integration Service machine and commits the data to the targets. PWXPC also writes message PWXPC_12128 to the session log. After commit processing completes, the RDBMS releases locks on the target databases and PowerCenter Integration Service can reuse the buffer space for additional change records.

The maximum rows limit is cumulative across all sources in the CDC session. PWXPC issues a real-time flush when the limit is met, regardless of the number of sources with changes.

PWXPC resets the maximum rows limit when a real-time flush occurs. The flush can occur because of the maximum rows limit, UOW count limit, or real-time flush latency timer.

If PWXPC reaches a UOW boundary and the maximum row limit has not been met, PWXPC continues to process change records across UOW boundaries.

Use a maximum rows limit if you have extremely large UOWs in the change stream that might cause the following problems:

- Locking issues on the target database
- Resource issues on the PowerCenter Integration Service node

For example, you have a large UOW with 10,000 updates for a single source, and you set the **Maximum Rows per Commit** attribute to 1000. In this case, PWXPC issues a subpacket commit after each 1,000 change records.

Or, you might have a UOW that contains updates for more than one source. For example, the UOW contains 900 updates for source 1, 100 updates for source 2, and then 500 more updates for source 1. If you set the **Maximum Rows per Commit** attribute to 1000, PWXPC issues a subpacket commit after reading 1,000 change records, or after processing the updates for source 2.

Default is 0, which causes PWXPC to not use this maximum rows limit. If you specify 0 or do not enter a value for the maximum rows limit, commits occur only on UOW boundaries.

If you specify a low maximum rows limit, the CDC session uses more system resources on the PowerCenter Integration Service machine and target systems. This increased resource use occurs because PWXPC flushes data to the targets more frequently.

Note: The **Maximum Rows Per commit** attribute is a count of the records within a UOW. The **UOW Count** attribute is a count of complete UOWs.

Minimum Rows Per commit

Minimum number of change records that PowerExchange must pass to PWXPC before passing a commit record. Until the minimum rows limit is met, PowerExchange discards any commit records that it reads from the change stream and passes only change records to PWXPC. After the minimum rows limit is met, PowerExchange passes the next commit record it encounters to PWXPC and then resets the minimum rows counter.

If the change stream has many small UOWs, you can set the **Minimum Rows Per commit** attribute to create larger UOWs of a more uniform size. Online transactions that run in transaction control systems such as CICS and IMS often commit after only a few changes, which results in many, small UOWs in the change stream. PowerExchange and PWXPC process a few large UOWs more efficiently than many small UOWs. By using the minimum rows limit to increase the size of UOWs, you can improve CDC processing efficiency.

The minimum rows limit does not impact the relational integrity of the change data because PowerExchange does not create additional commit points in the change data. PowerExchange skips some of the original commit records in the change stream.

Default is 0, which causes PowerExchange to not use this minimum rows limit.

If you enter a minimum rows limit, PowerExchange changes the number of change records in a UOW to match or exceed this limit.

Note: PWXPC does not commit change data to the targets based on the minimum rows limit. PWXPC commits change data to the targets based on the **Maximum Rows Per commit**, **Real-Time Flush Latency in milli-seconds**, and **UOW Count** attributes.

Real-Time Flush Latency in milli-seconds

For real-time or continuous extraction mode, the number of milliseconds that must elapse before PWXPC flushes the data buffer to commit change data to the targets. After the flush latency interval expires and PWXPC reaches a UOW boundary, PWXPC issues a real-time flush to commit change data and restart tokens to the targets. PWXPC also writes message PWXPC_10082 in the session log.

PWXPC resets the flush latency interval when a real-time flush occurs. The flush can occur because of the maximum rows limit, UOW count limit, or real-time flush latency timer.

Valid values for the real-time flush latency are:

- -1. Disables data flushes based on time.
- 0 through 2000. Sets the interval to 2000 milliseconds, or 2 seconds.
- 2000 through 86400. Sets the interval to the specified number of milliseconds.

Default is 0.

If you set the flush latency interval value is 0 or greater, PWXPC flushes the change data for all complete UOWs after the interval expires and the next UOW boundary occurs. The lower you set the flush latency interval, the faster PWXPC commits change data to the targets. If you require a low latency for applying changes to the targets, enter a low value for the flush latency interval.

However, if you specify a low flush latency interval, the CDC session might consume more system resources on the PowerCenter Integration Service and target systems. This increased consumption occurs because PWXPC commits change data to the targets more frequently.

UOW Count

Number of complete UOWs that PWXPC reads from the change stream before flushing change data to the targets. When PWXPC reads change data from PowerExchange and provides it to the source qualifier in the CDC session, the count of the UOWs begins.

After the UOW count limit is met, PWXPC issues a real-time flush to commit the change data and restart tokens to the targets. PWXPC also writes message PWXPC_10081 in the session log.

PWXPC resets the UOW count after a real-time flush occurs because of the UOW count limit or the real-time flush latency interval.

Valid values for UOW count are:

- -1 or 0. PWXPC does not use the **UOW Count** attribute to control commit processing.
- 1 through 999999999. PWXPC flushes change data after reading the specified number of UOWs.

Default is 1.

The lower you set the UOW count value, the faster the PowerCenter Integration Service commits change data to the target. If you require the lowest possible latency, enter a UOW count of 1. However, a low latency might result in the session using more system resources on the PowerCenter Integration Service and the target systems.

Attention: In the session properties, verify that the **Commit Type** attribute specifies **Source** and that the **Commit at End of File** attribute is disabled. The **Commit at End of File** attribute is enabled by default. If you accept the default, the PowerCenter Integration Service writes additional data to the targets after the CDC reader has committed the restart tokens and shut down. When you restart the CDC session, the session might write duplicate data to the targets.

Examples of Controlling Commit Processing

Review the following examples to learn how to use the commitment control attributes to control commit processing with PWXPC.

Example 1. Subpacket Commit and UOW Count

This example uses the **Maximum Rows Per commit** and **UOW Count** attributes to control commit processing.

The change data is composed of UOWs of the same size. Each UOW contains 1,000 change records.

The following table describes the commitment control attribute values that this example uses:

Attribute	Value
Maximum Rows Per commit	300
Minimum Rows Per commit	0, which disables this attribute
Real-time Flush Latency in milli-seconds	0, which is equivalent to 2 seconds
UOW Count	1

Based on the maximum rows value, PWXPC flushes the data buffer after reading the first 300 records in a UOW. This action commits the change data to the targets. PWXPC continues to commit change data to the targets every 300 records.

PWXPC commits on UOW boundaries only for the UOW count and real-time flush latency interval. If the real-time flush latency interval expires before PWXPC reads 300 change records, PWXPC still commits based on the maximum rows value because that threshold is met before a UOW boundary occurs.

When the end of the UOW is read, PWXPC commits the change data because the **UOW Count** value is 1. PWXPC resets the UOW and maximum row counters and the real-time flush latency timer each time it commits. Because all of the UOWs have the same number of change records, PWXPC continues to read change data and to commit the data to the targets at the same points in each UOW.

In this example, PWXPC commits change data at the following points:

- 300 change records based on the maximum rows value
- 600 change records based on the maximum rows value
- 900 change records based on the maximum rows value
- 1,000 change records based on the UOW count value

Example 2. UOW Count and Time-Based Commits

This example uses the **UOW Count** and **Real-time Flush Latency in milli-seconds** attributes to control commit processing. The change data consists of UOWs of varying sizes.

The following table describes the commitment control attribute values that this example uses:

Attribute	Value
Maximum Rows Per commit	0, which disables this attribute
Minimum Rows Per commit	0, which disables this attribute
Real-time Flush Latency in milli-seconds	5000, which is equivalent to 5 seconds
UOW Count	1000

Initially, PWXPC reads 900 complete UOWs in 5 seconds. Because the real-time flush latency interval has expired, PWXPC flushes the data buffer to commit the change data to the targets. PWXPC then resets both the UOW counter and real-time flush latency timer. When PWXPC reaches UOW 1,000, PWXPC does not commit change data to the targets because the UOW counter was reset to 0 after the last commit.

PWXPC reads the next 1,000 UOWs in 4 seconds, which is less than the real-time flush latency timer. PWXPC commits this change data to the target because the UOW counter has been met. After this commit, PWXPC then resets the real-time flush latency timer and the UOW counter.

PWXPC continues to read change data and commit the data to the targets, based on the UOW count or the real-time flush latency flush time, whichever limit is met first.

In this example, PWXPC commits change data at the following points:

- After UOW 900 because the real-time latency flush latency timer matched first.
- After UOW 1,900 because the UOW count matched first during the second commit cycle.

Example 3. Minimum Rows and UOW Count

This example uses the **Minimum Rows Per commit** and **UOW Count** attributes to control commit processing.

The change data consists of UOWs of the same size. Each UOW contains ten change records.

The following table describes the commitment control attribute values that this example uses:

Attribute	Value
Maximum Rows Per commit	0, which disables this attribute
Minimum Rows Per commit	100
Real-time Flush Latency in milli-seconds	-1, which disables this attribute
UOW Count	10

PWXPC passes the minimum rows value to PowerExchange and requests change data from the change stream. Because the minimum rows value is 100, PowerExchange skips the commit records of the first nine UOWs. When PowerExchange reads the last change record in the tenth UOW, the minimum rows limit is met. So, PowerExchange passes the commit record for the tenth UOW to PWXPC and resets the minimum rows counter. PWXPC increases the UOW counter to one.

PowerExchange and PWXPC continue to read the change data until the UOW counter is 10. At this point, PWXPC flushes the data buffer to commit the change data to the targets and resets the UOW counter.

PWXPC commits change data after 1,000 change records, or after every 10 UOWs, because each UOW contains 10 change records and the **UOW Count** is 10.

Recovery and Restart Processing for CDC Sessions

If you select the **Resume from last checkpoint** option for the **Recovery Strategy** attribute in a CDC session that extracts change data, PWXPC and PowerCenter provide recovery and restart processing for that session.

If a session fails, the PowerCenter Integration Service recovers the session state of operation, and PWXPC recovers the restart information.

PWXPC saves restart information for all sources that are in a CDC session. The restart information for CDC sessions, including the restart tokens, originates from PowerExchange on the system from which the change data is extracted. You can include both relational and nonrelational targets in a single CDC session. PWXPC uses one of the following locations to store and retrieve restart information, based on the target type:

- For relational targets, PWXPC uses recovery state tables in the target databases. PWXPC, in conjunction with the PowerCenter Integration Service, commits both the change data and the restart tokens for that data in the same commit operation. This commit ensures that the applied data and the restart tokens are in-sync.
- For nonrelational targets, PWXPC uses the recovery state file that is in the shared location on the PowerCenter Integration Service machine. PWXPC, in conjunction with the PowerCenter Integration Service, writes the change data to the target files and then writes the restart tokens to the recovery state file. As a result, duplicate data might be applied to the targets when you restart the failed CDC sessions.

The PowerCenter Integration Service saves the session state of operation and maintains target recovery tables. The PowerCenter Integration Service stores the session state of operation in the shared location that is specified in $PMStorageDir. The PowerCenter Integration Service saves relational target recovery information in the target database.

When you run a CDC session that uses a resume recovery strategy, PWXPC writes the following message to the session log to indicate that recovery is in effect:

```
PWXPC_12094 [INFO] [CDCRestart] Advanced GMD recovery in effect. Recovery is automatic.
```

When you recover or restart a CDC session, PWXPC uses the saved restart information to resume reading the change data from the point of interruption. The PowerCenter Integration Service restores the session state of operation, including the state of each source, target, and transformation. PWXPC, in conjunction with the PowerCenter Integration Service, determines how much of the source data it needs to reprocess. PowerExchange and PWXPC use the restart information to determine the correct point in the change stream from which to restart extracting change data and then applying it to the targets.

If you run a session with resume recovery strategy and the session fails, do not change the mapping, the session, or the state information before you restart the session. PowerCenter and PWXPC cannot guarantee recovery if you make any of these changes.

Restriction: If any of the targets in the CDC session use the PowerCenter File Writer to write CDC data to flat files, do not use a resume recovery strategy. Restart tokens for all targets in the CDC session, including relational targets, will be compromised if a flat file target is in the same session. Data loss or duplication might occur.

PowerCenter Recovery Tables for Relational Targets

When the PowerCenter Integration Service runs a CDC session that has a resume recovery strategy, it writes information to recovery tables on the target database system.

When the PowerCenter Integration Service recovers the session, it uses the information in the recovery tables to determine where to begin loading data to target tables. PWXPC also uses information in the recovery tables to determine where to begin reading the change stream.

If you want the PowerCenter Integration Service to create the recovery tables, grant table creation privileges to the database user name that is configured in the target database connection. Otherwise, you must create the recovery tables manually.

For relational targets, the PowerCenter Integration Service creates the following recovery tables in the target database:

PM_RECOVERY

Contains target load information for the session run. The PowerCenter Integration Service removes the information from this table after each successful session and initializes the information at the beginning of subsequent sessions.

PM_TGT_RUN_ID

Contains information the PowerCenter Integration Service uses to identify each target on the database. The information remains in the table between session runs. If you manually create this table, you must create a row and enter a value other than zero for LAST_TGT_RUN_ID to ensure that the session recovers successfully.

PM_REC_STATE

Contains state and restart information for CDC sessions. PWXPC stores the application name and restart information for all sources in the CDC session. The PowerCenter Integration Service stores any state information for the session. Unlike the session state information, restart information persists in this table across successful sessions. The PowerCenter Integration Service updates it with each commit to the target tables.

If you edit or drop the recovery tables before you recover a session, the PowerCenter Integration Service cannot recover the session. Also, PWXPC cannot restart the CDC session from the point of interruption.

If you disable recovery, the PowerCenter Integration Service does not remove the recovery information from the target database. Also, PWXPC no longer updates the restart information in the target database.

Recovery State Table

The recovery state table, PM_REC_STATE, contains state and CDC restart information for a CDC session. This table resides in the same target database as the target tables.

The PowerCenter Integration Service creates an entry in the state table for each CDC session. These entries can comprise more than one row. CDC sessions with heterogeneous target tables have state table entries in each unique relational target database and an entry in a state file on the PowerCenter Integration Service machine for each nonrelational target. For example, a CDC session that targets Oracle and SQL Server tables and a MQ Series queue has an entry in the state table in the target Oracle database, in the state table in the target SQL Server database, and in the state file on the PowerCenter Integration Service machine.

Each session entry in a state table contains a number of repository identifiers and execution state data such as the checkpoint number and CDC restart information. The following columns can contain PWXPC-specific restart information:

APPL_ID

Contains the value the PWXPC creates by appending the task instance ID of the CDC session to the value that you specify in the **Application Name** attribute in the source PWX CDC application connection. When this value matches an APPL_ID value for a row in the state table, the PowerCenter Integration Service, in conjunction with PWXPC, selects the row from the state table for the CDC session.

STATE_DATA

Contains the restart information for the session in a variable-length, 1,024-byte binary column. When the PowerCenter Integration Service commits change data to the targets tables, it also commits the restart information for that data in this column. PWXPC uses the restart information from this column to perform restart processing for the CDC session.

If the amount of restart information for a session exceeds 1,024 bytes, the PowerCenter Integration Service adds additional rows to accommodate the remainder of the restart information. For each row added, the PowerCenter Integration Service increases the value of the SEQ_NUM column by one, starting from zero.

PowerCenter Recovery Files for Nonrelational Targets

If you configure a resume recovery strategy for a CDC session, the PowerCenter Integration Service stores the session state of operation in the shared location, $PMStorageDir, on the PowerCenter Integration Service machine. For nonrelational targets, the PowerCenter Integration Service also stores the target recovery status in a recovery state file in the shared location on the PowerCenter Integration Service machine. PWXPC stores the restart information for nonrelational target files in this state file.

Recovery State File

For all nonrelational targets in a CDC session, the PowerCenter Integration Service uses a recovery state file on the PowerCenter Integration Service machine.

Nonrelational target files include MQ Series message queues, PowerExchange nonrelational targets, and other PowerCenter nonrelational targets.

CDC sessions with heterogeneous target tables have state table entries in each unique relational target database and an entry in a state file on the PowerCenter Integration Service machine for each nonrelational target.

The PowerCenter Integration Service creates the recovery state file in the shared location, $PMStorageDir. The file name has the following prefix:

```
pm_rec_state_appl_id
```

PWXPC creates the value for the *appl_id* variable in the file name by appending the task instance ID of the CDC session to the value that you specify in the **Application Name** attribute in the source PWX CDC application connection. The PowerCenter Integration Service uses various task and workflow repository attributes to complete the file name. The message CMN_65003, which the PowerCenter Integration Service writes to the session log, contains the complete file name.

Application Names

PWXPC, in conjunction with the PowerCenter Integration Service, uses the application name you specify as part of the key when it stores and retrieves the restart information for a CDC session.

When you configure the PWX CDC application connection for a CDC session, enter a unique value for the **Application Name** attribute. PWXPC appends the repository task instance ID for the CDC session to this value to create the APPL_ID value in the recovery state table and the *appl_id* portion of the recovery state file name.

Because the value of the APPL_ID column and the state recovery file contains the task instance ID for the CDC session, changes to the session can affect restart processing. If you add or remove sources or targets for a CDC session, you must use the restart token file to provide restart tokens and then cold start the session.

Restart Processing for CDC Sessions by Start Type

How you start a CDC session affects how PWXPC determines the restart points for sources in the session. Each source has its own restart point.

For each start type, PWXPC determines the restart point as follows:

- For a cold start, PWXPC uses the restart token file to acquire restart tokens for all data sources. PWXPC does not read the state tables or state file and does not attempt to recover the session. The CDC session continues to run until it is stopped or interrupted.
- For a warm start, PWXPC reconciles the restart tokens that are in the restart token file with the restart tokens in the state tables and state file. If necessary, PWXPC performs recovery processing. The session continues to run until it is stopped or interrupted.
- For a recover start, PWXPC reads the restart tokens from any applicable state tables and state file. If necessary, PWXPC performs recovery processing. PWXPC updates the restart token file with the restart tokens for each source in the CDC session, and then the session ends.

Before you run a CDC session for the first time, create and populate the restart token file with restart token pair for each source in the session. Each restart token pair should match a point in the change stream where the source and target are in a consistent state.

For example, materialize a target table and stop update activity on the source. To define a start or restart point, specify a special override statement that contains the CURRENT_RESTART option in the restart token file. Use the restart token file that has the file name that matches the restart token file name in the PWX CDC application connection. When you cold start the CDC session, PWXPC requests that PowerExchange use the current end-of-log as the extraction start point. You can then resume update activity on the sources.

If you cold start a CDC session and a restart token file does not exist, the PowerCenter Integration Service runs the session. PWXPC passes Null restart tokens for all sources to PowerExchange. PowerExchange issues message PWXPC_12060 to indicate that the restart tokens for each source are Null and then assigns the default restart point to each source.

Attention: If you use Null restart tokens, the CDC session might have incorrect results. Provide valid restart tokens when you cold start CDC sessions.

Default Restart Points for Null Restart Tokens

If PowerExchange receives null restart tokens for all sources in a CDC session, it uses the default restart points.

For all z/OS data sources, the default restart points vary by extraction mode, as follows:

- For batch extraction mode and continuous extraction mode, the default restart point is the oldest condense file that is recorded in the CDCT file.
- For real-time extraction mode, the default restart point is the best available restart point, as determined by the PowerExchange Logger for z/OS. The best available restart point is one of the following:
  - Oldest restart point for which an archive log is available.
  - The current active log if no archive logs are available.

PowerExchange uses the default restart point only if all sources in a CDC session have null restart tokens. If some sources have non-null restart tokens, PWXPC assigns the oldest restart point from those tokens to any sources for which no restart tokens are specified.

For example, a new CDC session contains the sources A, B, and C. The restart token file contains restart tokens for sources A and B. The restart point for source A is older than that for source B. Source C does not have existing or supplied restart tokens. Because some sources in the CDC session have explicit restart points, PWXPC does not assign null restart tokens to source C. Instead, PWXPC assigns the restart point for source A to source C because this restart point is the oldest one supplied.

Determining the Restart Tokens for Cold Start Processing

When you cold start a CDC session, PWXPC uses the restart token file to determine the restart tokens for all sources. PWXPC ignores any entries in the state tables or state file for the sources in the CDC session.

More specifically, PWXPC uses one of the following methods to determine the restart tokens:

- If the restart token file is empty or does not exist, PWXPC assigns null restart tokens to all sources in the CDC session.
- If the restart token file contains only explicit override statements, PWXPC performs the following processing:
  - Assigns the restart tokens in the explicit override statements to the specified sources.
  - Assigns the oldest supplied restart point to any sources for which an explicit override statement was not specified.
- If the restart token file contains only the special override statement, PWXPC assigns the restart tokens in the special override statement to all sources.
- If the restart token file contains a special override statement and explicit override statements, PWXPC performs the following processing:
  - Assigns the restart tokens in the explicit override statements to the specified sources.
  - Assigns the restart tokens in the special override statement to all remaining sources.

Determining the Restart Tokens for Warm Start Processing

When you warm start a CDC session, PWXPC uses the state tables and state file, in conjunction with restart token file, to determine the restart tokens for all sources.

More specifically, PWXPC uses one of the following methods to determine the restart tokens:

- If the restart token file is empty or does not exist and there is no matching entry in a state table or state file, PWXPC assigns null restart tokens to all sources in the session.
- If the restart token file is empty or does not exist and if some but not all sources have a matching entry in a state table or a state file, PWXPC performs the following processing:
  - Assigns any restart tokens found in a state table and state file to the appropriate sources.
  - Assigns the oldest available restart point to all sources that do not have restart tokens.
- If the restart token file is empty or does not exist and if all sources have an entry in a state table or state file, PWXPC uses the restart tokens from the state tables or state file.
- If the restart token file contains explicit override statements and no sources have a matching entry in a state table or no state file, PWXPC performs the following processing:
  - Assigns the restart tokens in the explicit override statements to the specified sources.
  - Assigns the oldest supplied restart point to all sources that do not have restart tokens.
- If the restart token file contains explicit override statements and if some but not all sources have a matching entry in a state table or a state file, PWXPC performs the following processing:
  - Assigns the restart tokens in the explicit override statements to the specified sources.
  - Assigns restart tokens from a state table or state file to the appropriate sources, provided that the tokens have not been supplied in the restart token file.
  - Assigns the oldest available restart point to all sources that do not have restart tokens supplied in the restart token file or from a state table or state file.
- If the restart token file contains explicit override statements and if all sources have an entry in a state table or a state file, PWXPC performs the following processing:
  - Assigns the restart tokens in the explicit override statements to the specified sources.
  - Assigns the restart tokens from state tables or the state file to all remaining sources that do not have restart tokens supplied in the restart token file.
- If the restart token file contains only the special override statement, PWXPC assigns the restart tokens in the special override statement to all sources.
- If the restart token file contains a special override statement and explicit override statements, PWXPC performs the following processing:
  - Assigns the restart tokens in the explicit override statements to the specified sources.
  - Assigns the restart tokens in the special override statement to all remaining sources.

Creating Restart Tokens for Extractions

Before you begin extracting change data, you must create restart tokens to indicate the extraction start point.

When generating restart tokens, consider the following points:

- The optimal start point matches the point in the change stream at which you last synchronized the source and target. This point marks the end of the change stream, or current end-of-log (EOL), if you stop update activity on the source, as recommended, until after target materialization and restart token generation are complete.
- On z/OS, the sequence tokens have the same length for all source types.
- If you use PowerExchange Condense with Full condense processing, PowerExchange uses the sequence token to determine the point from which to start reading change data from condense files, and uses the restart token to verify that the source instance is correct for the starting change record. The sequence token represents the full condense file and the position of the change record in that file. The restart token contains the source instance name from the registration group.

To create restart tokens for the current EOL, use one the following methods:

PWXPC restart token file

To generate current restart tokens for a CDC session that uses real-time or continuous extraction mode, specify the CURRENT_RESTART option on the RESTART1 and RESTART2 special override statements in the PWXPC restart token file. When the CDC session runs, PWXPC requests that PowerExchange provide restart tokens for the current EOL. PWXPC uses the restart information to locate the extraction start point.

Database row test

In the PowerExchange Navigator, perform a database row test with a SELECT CURRENT_RESTART SQL statement.

DTLUAPPL utility

Run the DTLUAPPL utility with the GENERATE RSTKKN option.

If you use the DTLUAPPL utility or PowerExchange Navigator to generate restart tokens, enter the token values in the PWXPC restart token file before you start the CDC session.

You can also construct restart tokens by using the RBA or LRSN of an event mark record in the PowerExchange Logger log files. You can use the EDMXLUTL utility to generate event marks. Also, the following PowerExchange ECCRs for z/OS data sources generate event marks in the some situations:

- The DB2 ECCR generates an event mark when it reads a quiesce point from the DB2 logs. DB2 creates quiesce points when you use the DB2 QUIESCE utility.
- The IMS log-based ECCR generates an event mark when it reads records that the DTLCUIML utility created in the IMS logs.
- The Adabas ECCR generates an event mark when it reads an Adabas PLOG data set.

Displaying Restart Tokens

You can display restart token values in the output from a database row test, extraction session, or DTLUAPPL PRINT function.

If you run a database row test on an extraction map from the PowerExchange Navigator, the output includes a restart token pair for each row of change data. The following columns show the token values:

- DTL__CAPXRESTART1 shows the sequence token value.
- DTL__CAPXRESTART2 shows the restart token value.

If you include the DTL__CAPXRESTART1 and DTL__CAPXRESTART2 columns in the PowerCenter source definition, PowerExchange provides the restart tokens for each row when you extract change data in a CDC session.

When a CDC session runs, PowerExchange and PWXPC display restart token values in the following messages:

- In messages PWX-04565 and PWX-09959, the sequence token is in the Sequence field and restart token is in the PowerExchange Logger field.
- In messages PWXPC_12060 and PWXPC_12068, the sequence token is in the Restart Token 1 field and the restart token is in the Restart Token 2 field.
- In messages PWXPC_10081, PWXPC_10082, and PWXPC_12128, the sequence token is the first token value and the restart token is the second token value.

If you use the DTLUAPPL utility to generate restart tokens, you can use the PRINT statement to display the generated values. In the PRINT output, DTLUAPPL displays the sequence token, without the usual trailing eight zeros, in the Sequence field and displays the restart token in the Restart field.

Configuring the Restart Token File

When you configure the CDC session in PowerCenter, specify the name and location of the restart token file.

To specify the restart token file, enter the following attributes on the PWX CDC application connection for the source:

RestartToken File Folder

Enter the name of the directory that contains the restart token file. If you use the default value of $PMRootDir/Restart and the Restart directory does not exist, PWXPC creates the directory. PWXPC does not create any restart token directory under another name.

RestartToken File Name

Enter a unique name for the restart token file. If you do not specify this value, PWXPC uses the value in the **Application Name** attribute, if present. Otherwise, PWXPC uses the workflow name. Because this name must be unique, Informatica recommends that you always specify a value for the **RestartToken File Name** attribute.

When you run a CDC session, PWXPC verifies that the restart token file exists. If one does not exist, PWXPC uses the name specified in this attribute to create an empty restart token file.

Restriction: The value of **RestartToken File Name** attribute in must be unique for every CDC session. Non-unique file names can cause unpredictable results, such as change data loss and session failures.

To find the restart token file name for a CDC session, use the following methods:

- For CDC sessions that have run, look for message PWXPC_12057 in the session log. This message indicates the restart token file directory and file name.
- In Workflow Manager, look for the restart token file folder and file name in the attributes on the PWX CDC application connection associated with the source in the CDC session. If the restart token file name is not present, PWXPC uses the application name, if specified. Otherwise, PWXPC uses the workflow name.

Before you run a CDC session the first time, configure the restart token file to indicate the point in the change stream from which to start extracting change data. Later, you might need to modify the restart token file to add sources to a CDC session or to indicate the point from which to restart change data extraction.

Restart Token File Statements

You can optionally specify explicit override statements, a special override statement, and comments in the restart token file.

These statements have the following uses:

- **Explicit override statements**. Specifies a restart token pair or the CURRENT_RESTART option for a specific source. If you use the PowerExchange Logger for Linux, UNIX, and Windows, you can use an explicit override statement to define a restart point based on a date and time in the Logger logged data. In all cases, you must provide the PowerExchange extraction map name for the source object. You can define multiple explicit override statements in the restart token file, each for a different source.
- **Special override statement**. Specifies a restart token pair or the CURRENT_RESTART option for all sources in a CDC session. You can provide a specific restart token pair or request that PowerExchange use the current restart point. You can define only one special override statement in the restart token file. You can also define explicit override statements in the same file to specify source-specific restart points.
- **Comments**. Specifies any comments that you want to add to the restart token file.

General Syntax Rules and Guidelines

When defining explicit override statements, special override statements, and comments in a restart token file, use the following rules and guidelines:.

- Statements can begin in any column.
- All statements are optional.
- Do not include blank lines between statements.
- Comment lines must begin with `<!--`.
- In a restart token file, you can specify one or more explicit override statements and only one special override statement.
- Explicit override statements for a source take precedence over the special override statement, if defined.
- On warm start, explicit override statements and the special override statement take precedence over any restart token values stored for sources in the start table or file.

Explicit Override Statements

Use explicit override statements to specify an extraction restart point for a specific source in a CDC session. You can specify multiple explicit override statements, each for a different source.

When you warm start a CDC session, the explicit override statement for a source object overrides the restart tokens in the state table or state file for that source. You can use explicit override statements in conjunction with special override statements to provide override restart tokens for all sources in a CDC session.

An explicit override statement for a source can specify either a pair to restart tokens that define a specific point in the change stream or the CURRENT_RESTART option for the current end of the change stream. Alternatively, if you use the PowerExchange Logger for Linux, UNIX, and Windows with a CDC application connection, you can optionally define an explicit override statement that specifies a time-based restart point for extraction processing in the Logger log files.

To specify restart tokens for a source, enter a pair of statements, each containing the extraction map name and a sequence token (restart1) or restart token (restart2) value. Use the following syntax:

```
extractionMapName=restart1_token
extractionMapName=restart2_token
```

Note: Because a source can have multiple extraction maps with distinct names, you might need to define multiple pairs of explicit override statements for a source.

For z/OS sources, if you use the default value of Y for the FUZZYRSTART parameter in the LRAP CAPI_CONNECTION statement, you can enter a restart2 position other than a begin-uow position from which to start extraction processing in the PowerExchange Logger for z/OS logs. In the following example, the *restart2_token* value points to a RBA position that does not coincide with a begin-uow record and the *restart1_token* value points to a position before the *restart2_token* position:

- For the *restart1_token* value, specify `000000000001000000000000000000000000000000000000`. This value consists of 48 zeroes with a "1" in the twelfth position. With this value, the *restart2_token* value will determine the records to be returned by the extraction.
- For the *restart2_token* value, specify a value that consists of a 6-byte Logger ID in EBCDIC format (padded with spaces) + a 6-byte RBA position + 8 zeroes. The RBA position can be any RBA in the logs near where you want to restart extraction processing. For example: `E2C2F2D340400000000AEF4000000000`

With these restart token settings, PowerExchange begins extraction processing at the first record that is at or past the *restart1_token* position and in the first UOW that is returned based on the *restart2_token* position.

To specify the current end of the change stream as the restart point, use the following syntax:

```
extractionMapName=CURRENT_RESTART
```

To specify a time-based restart point in the PowerExchange Logger logged data, enter a pair of statements, one containing the RESTART_TIME option and the other containing a date and time value. Use the following syntax:

```
extractionMapName=RESTART_TIME
extractionMapName=datetime
```

Parameter descriptions:

extractionMapName

The name of an extraction map for the data source. To determine the extraction map name, use one of the following methods:

- For CDC data map sources, see the **Schema Name Override** and **Map Name Override** attributes in the session properties. These attributes override the schema name and map name in the source extraction map. Or, in Designer, see the **Schema Name** and **Map Name** values in the source Metadata Extensions.
- For relational sources, see the **Extraction Map Name** attribute in the session properties.

Note: After the extraction map has been used to extract change data, the table name is appended to this value in the format *extractionMapName_tableName*. Use the full name when defining an explicit override statement.

restart1_token

The sequence token portion of a restart token pair. This value varies based on data source type.

restart2_token

The restart token portion of a restart token pair. This value based on data source type.

CURRENT_RESTART

The option that generates a pair of restart tokens that mark the current end of the change stream. The PWXPC CDC reader opens a separate connection to PowerExchange, requests the generation of current restart tokens, and then provides the token values to the applicable source.

Optionally, you can generate current restart tokens in the **Database Row Test** dialog box of the PowerExchange Navigator.

Restriction: Use the CURRENT_RESTART option only for CDC sessions that use real-time extraction mode or continuous extraction mode.

RESTART_TIME

If you use the PowerExchange Logger for Linux, UNIX, and Windows log files, this option allows you to specify a date and time value as the restart point for extraction processing in the Logger log files.

datetime

The date and time to use as the restart point in PowerExchange Logger for Linux, UNIX, and Windows log files. This value must be in the format YYYYMMDDhhmmssuuuuuu, where YYYY is a four-digit year, MM is the month, DD is the day of the month, hh is hours, mm is minutes, ss is seconds. and uuuuuu is microseconds.

Special Override Statement

Use a special override statement to specify a pair of restart tokens or the CURRENT_RESTART option as the restart point for a CDC session.

When you warm start the CDC session, the special override statement overrides the restart tokens in the state table or state file for the session. You can use the special override statement in conjunction with explicit override statements, which pertain to specific sources. In this case, the special override statement sets a restart point for all sources in the CDC session except those for which an explicit override statement is defined.

A special override statement is composed of a pair of RESTART1 and RESTART2 statements. Use the following syntax:

```
RESTART1={restart1_token|CURRENT_RESTART}
RESTART2={restart2_token|CURRENT_RESTART}
```

You can specify only one pair of these statements in the restart token file.

For z/OS sources, if you use the default value of Y for the FUZZYRSTART parameter in the LRAP CAPI_CONNECTION statement, you can enter a *restart2_token* position other than a begin-uow position from which to start extraction processing in the PowerExchange Logger for z/OS logs. In the following example, the *restart2_token* value points to a RBA position that does not coincide with a begin-uow record and the *restart1_token* value points to a position before the *restart2_token* position:

- For the *restart1_token* value, specify `000000000001000000000000000000000000000000000000`. This value consists of 48 zeroes with a "1" in the twelfth position. With this value, the *restart2_token* value will determine the records to be returned by the extraction.
- For the *restart2_token* value, specify a value that consists of a 6-byte Logger ID in EBCDIC format (padded with spaces) + a 6-byte RBA position + 8 zeroes. The RBA position can be any RBA in the logs near where you want to restart extraction processing. For example: `E2C2F2D340400000000AEF4000000000`

With these restart token settings, PowerExchange begins extraction processing at the first record that is at or past the *restart1_token* position and in the first UOW that is returned based on the *restart2_token* position.

Parameter descriptions:

restart1_token

The sequence token portion of a restart token pair. This value varies based on data source type.

restart2_token

The restart token portion of a restart token pair. This value varies based on data source type.

CURRENT_RESTART

The option for generating a pair of restart tokens that mark the current end of the change stream. The PWXPC CDC reader opens a separate connection to PowerExchange, requests the generation of current restart tokens, and then provides the token values to all applicable sources.

Optionally, you can generate current restart tokens in the **Database Row Test** dialog box of the PowerExchange Navigator.

Restriction: Use the CURRENT_RESTART option only for CDC sessions that use real-time extraction mode or continuous extraction mode.

Comment Statement

You can use the comment statement anywhere in the restart token file. Comment statements must begin with `<!--`.

For example:

```
<!-- my comments
```

Example Restart Token File

This example restart token file is for a CDC session with seven source tables. The file includes explicit override statements that provide restart tokens for three source tables and a special override statement that provides restart tokens for the remaining tables.

The restart token file contains the following statements:

```
<!-- Restart Tokens for existing tables -->
Restart1=000000AD775600000000000000AD77560000000000000000
Restart2=C1E4E2D34040000000AD5F2C00000000
<!-- Restart Tokens for the Table: rrtb0001_RRTB_SRC_001 -->
d1dsn9.rrtb0001_RRTB_SRC_001=0000060D1DB2000000000000060D1DB20000000000000000
d1dsn9.rrtb0001_RRTB_SRC_001=C1E4E2D340400000013FF36200000000
<!-- Restart Tokens for the Table: rrtb0001_RRTB_SRC_002 -->
d1dsn9.rrtb0002_RRTB_SRC_002=000000A3719500000000000000A371950000000000000000
d1dsn9.rrtb0002_RRTB_SRC_002=C1E4E2D3404000000968FC6000000000
<!-- Restart Tokens for the Table: rrtb0001_RRTB_SRC_004 -->
d1dsn9.rrtb0004_RRTB_SRC_004=000006D84E780000000000006D84E7800000000000000000
d1dsn9.rrtb0004_RRTB_SRC_004=C1E4E2D3404000000060D1E610000000
```

When you warm start the CDC session, PWXPC reads the restart token file to process any override statements for restart tokens. In this case, the restart token file overrides all restart tokens for all sources in the CDC session. After resolving the restart tokens for all sources, PWXPC writes message PWXPC_12060 to the session log with the following information:

```
===============================
Session restart information:
===============================
Extraction Map Name           Restart Token 1                                     Restart Token 2                   Source
d1dsn9.rrtb0001_RRTB_SRC_001  0000060D1DB2000000000000060D1DB20000000000000000    C1E4E2D340400000013FF36200000000  Restart file
d1dsn9.rrtb0002_RRTB_SRC_002  000000A3719500000000000000A371950000000000000000    C1E4E2D3404000000968FC6000000000  Restart file
d1dsn9.rrtb0003_RRTB_SRC_003  000000AD775600000000000000AD77560000000000000000    C1E4E2D34040000000AD5F2C00000000  Restart file (special override)
d1dsn9.rrtb0004_RRTB_SRC_004  000006D84E780000000000006D84E7800000000000000000    C1E4E2D3404000000060D1E610000000  Restart file
d1dsn9.rrtb0005_RRTB_SRC_005  000000AD775600000000000000AD77560000000000000000    C1E4E2D34040000000AD5F2C00000000  Restart file (special override)
d1dsn9.rrtb0006_RRTB_SRC_006  000000AD775600000000000000AD77560000000000000000    C1E4E2D34040000000AD5F2C00000000  Restart file (special override)
d1dsn9.rrtb0007_RRTB_SRC_007  000000AD775600000000000000AD77560000000000000000    C1E4E2D34040000000AD5F2C00000000  Restart file (special override)
```

PWXPC indicates the source of the restart token values for each source. For the sources that had explicit override statements in the restart token file, PWXPC writes “Restart file” in the Source column.

For the sources to which PWXPC assigns the special override restart tokens, PWXPC writes “Restart file (special override)” in the Source column.

CHAPTER 17

Managing Change Data Extractions

This chapter includes the following topics:

Starting PowerCenter CDC Sessions

Use Workflow Manager, Workflow Monitor, or pmcmd to start a workflow or task for a CDC session. You can do a cold start, warm start, or recovery start. The method you use determines how PWXPC gets the restart information.

Also, you can start the entire workflow, part of a workflow, or a task in the workflow.

Use one of the following methods to start a CDC session:

Cold start

To cold start a CDC session, use the Cold Start command in Workflow Manager or Workflow Monitor. You can also use the pmcmd starttask or startworkflow commands with the norecovery option. A CDC session that uses real-time or continuous extraction mode runs continuously until it is stopped or interrupted. A CDC session that uses batch extraction mode runs until it reaches the end of log (EOL) or it is stopped or interrupted.

When you cold start a CDC session, PWXPC uses the restart token file to acquire restart tokens for all sources. PWXPC does not read the state tables or file or makes any attempt to recover the session.

Warm start

To warm start a CDC session, use the Start or Restart commands in Workflow Manager or Workflow Monitor. You can also use the pmcmd starttask or startworkflow commands. A CDC session that uses real-time or extraction mode runs continuously until it is stopped or interrupted. A CDC session that uses batch extraction mode runs until it reaches EOL or it is stopped or interrupted.

When you warm start a CDC session, PWXPC reconciles any restart tokens provided in the restart token file with any restart tokens that exist in the state tables or file. If necessary, PWXPC performs recovery processing.

Recovery start

To start recovery for a CDC session, use the Recover command from Workflow Manager or Workflow Monitor. You can also use the pmcmd recoverworkflow command or the starttask or startworkflow commands with the recovery option. When recovery completes, the CDC session ends.

When you recover a CDC session, PWXPC reads the restart tokens from any applicable state tables or state file. If necessary, PWXPC performs recovery processing. PWXPC updates the restart token file with the restart tokens for each source in the CDC session. Then the session ends. To begin extracting change data again, either cold start or warm start the session.

Cold Start Processing

To cold start workflows and tasks, use the Cold Start command in Workflow Manager or Workflow Monitor. Alternatively, you can use the pmcmd starttask or startworkflow commands with the norecovery option.

After you request a cold start for a CDC session, the following processing occurs:

1. PWXPC writes the following message in the session log:
   ```
   PWXPC_12091 [INFO] [CDCRestart] Cold start requested
   ```
2. PWXPC reads the restart tokens from only the restart token file and associates a restart token with each source in the session.
3. PWXPC creates the initialization restart token file with the initial restart tokens.
4. PWXPC commits the restart tokens for each source to the appropriate state tables or state file and then writes message PWXPC_12104 to the session log.
5. PWXPC passes the restart tokens to PowerExchange. PowerExchange begins extracting change data and passing the data to PWXPC for processing.
6. PWXPC continues processing change data from PowerExchange and committing the data and restart tokens to the targets. This processing continues until the session ends or you stop it.

Warm Start Processing

To warm start workflows and tasks, use the Start or Restart command in Workflow Manager or Workflow Monitor. Alternatively, you can use the pmcmd starttask or startworkflow commands.

When you warm start a workflow or task, PWXPC automatically performs recovery. You do not need to recover failed workflows and tasks before you restart them.

After you request a warm start for a CDC session, the following processing occurs:

1. PWXPC writes the following message in the session log:
   ```
   PWXPC_12092 [INFO] [CDCRestart] Warm start requested. Targets will be resynchronized
   automatically if required
   ```
2. PWXPC queries the PowerCenter Integration Service about the commit levels of all targets. If all targets in the session have the same commit level, PWXPC skips recovery processing.
3. PWXPC reconciles the restart tokens from the restart token file and from the state tables or file.

   Restriction: If a CDC session requires recovery processing, PWXPC does not use the restart token file. Consequently, you cannot override restart tokens for sources.
4. PWXPC creates the initialization restart token file with the reconciled restart tokens.
5. If recovery is required, PWXPC re-reads the change data for the last unit-of-work (UOW) that was committed to the targets with the highest commit level and then flushes the data to the targets with lower commit levels. The PowerCenter Integration Service commits flushed change data and restart tokens to any relational targets and updates any nonrelational files.

6. If recovery is not required and the reconciled restart tokens differ from those in the state tables or state file, PWXPC commits the reconciled restart tokens and then writes message PWXPC_12104 to the session log.
7. PWXPC passes the restart tokens to PowerExchange. PowerExchange begins extracting change data and passing the data to PWXPC for processing.
8. PWXPC continues processing change data from PowerExchange and commits the data and restart tokens to the targets. This processing continues until the session ends or you stop it.

Recovery Processing

To recover workflows and tasks, use the Recover command in Workflow Manager or Workflow Monitor. Alternatively, you can use the pmcmd recoverworkflow command, or the starttask or startworkflow command with the recovery option.

Use the recovery start method to populate the restart token file with the restart tokens for all sources in a CDC session. You can then cold start the CDC session or verify that the targets and restart tokens are in a consistent state. However, you do not need to recover failed workflows and tasks before you restart them because PWXPC automatically performs recovery processing when you warm start a workflow or task.

After you request recovery for a CDC session, the following processing occurs:

1. PWXPC writes the following message in the session log:
   ```
   PWXPC_12093 [INFO] [CDCRestart] Recovery run requested. Targets will be
   resynchronized if required and processing will terminate
   ```
2. PWXPC queries the PowerCenter Integration Service about the commit levels of all targets. If all targets in the session have the same commit level, PWXPC skips recovery processing.
3. PWXPC reads the restart tokens from the recovery state tables or state file.

   Restriction: If a CDC session requires recovery processing, PWXPC does not use the restart token file. Consequently, you cannot override restart tokens for sources.
4. PWXPC creates the initialization restart token file with the reconciled restart tokens.
5. If recovery is required, PWXPC re-reads the change data for the last UOW that was committed to the targets with the highest commit level and then flushes the data to the targets with lower commit levels. The PowerCenter Integration Service commits any flushed change data and restart tokens to any relational targets, and updates any nonrelational files.
6. PWXPC updates the restart token file with the final restart tokens, creates the termination restart token file, and ends.

To process change data from the point of recovery, warm start or cold start the workflow or task.

Stopping PowerCenter CDC Sessions

You can stop CDC sessions from PowerCenter or PowerExchange.

In PowerCenter, issue the Stop or Abort command in Workflow Monitor. Alternatively, use the pmcmd stoptask, stopworkflow, aborttask, or abortworkflow commands.

- If you issue the Stop command in Workflow Monitor or use the pmcmd stoptask or stopworkflow command, the PWXPC CDC reader and PowerCenter Integration Service complete processing all of the data in the pipeline and shut down. Then, the CDC session ends.

- If you issue the Abort command in Workflow Monitor or use the pmcmd aborttask or abortworkflow command, the PowerCenter Integration Service waits 60 seconds to allow the readers and writers to complete processing all of the data in the pipeline and shut down. If the PowerCenter Integration Service cannot finish processing and committing data within this period, it kills the DTM process and ends the CDC session.

For more information about these PowerCenter commands, see the *Informatica Command Reference* or *PowerCenter Workflow Basics Guide*.

In PowerExchange, issue the PowerExchange Listener STOPTASK command in one of the following ways:

- From the command line on the system where extraction processing occurs
- From the PowerExchange Navigator
- With the DTLUTSK utility
- With the pwxcmd program

When you issue the STOPTASK command, PowerExchange stops the extraction task in the PowerExchange Listener and passes an EOF to the PowerCenter Integration Service. Then the CDC session ends. For more information about the STOPTASK command, see the *PowerExchange Command Reference*.

Stop Command Processing

After you issue a stop command in PowerCenter or PowerExchange, the following processing occurs:

Note: To stop CDC sessions and workflows, you can use the Stop command in Workflow Monitor or the pmcmd stopttask or stopworkflow command. Alternatively, you can use the PowerExchange STOPTASK command.

1. If you use a PowerCenter stop command, the PowerCenter Integration Service requests PWXPC to stop.

   If you use the PowerExchange STOPTASK command, PowerExchange sends an EOF to PWXPC.
2. When PWXPC receives an EOF, it flushes any complete and uncommitted UOWs and the associated restart tokens to the targets. PWXPC then writes messages PWXPC_12101 and PWXPC_12068 to the session log.
3. The PowerCenter Integration Service processes all of data in the pipeline and writes it to the targets.
4. The PowerCenter Integration Service sends an acknowledgment to PWXPC indicating that the targets have been updated.
5. PWXPC writes the termination restart token file, and then writes the message PWXPC_12075 to the session log.
6. The PWXPC CDC reader shuts down.
7. The PowerCenter Integration Service performs any post-session tasks and ends the session.

Terminating Conditions

You can have CDC sessions stop based on user-defined events or at EOL if you configure certain terminating conditions.

When PWXPC encounters a terminating condition, it stops reading change data from sources, flushes change data to the targets, and passes an EOF to the PowerCenter Integration Service. The PowerCenter Integration Service commits the data to the targets and ends the CDC session.

Use the following connection attributes and features as terminating conditions:

Event table processing

Create an event table and a capture registration for the table. Then specify the extraction map for the table in the **Event Table** attribute of the PWX CDC Real Time application connection for the CDC session. After PowerExchange reads a change record for the event table, it passes an EOF to PWXPC to end the CDC session.

Idle time

Enter 0 for the **Idle Time** attribute on a PWX CDC Real Time application connection. Then, whenever PowerExchange reaches EOL, it passes an EOF to PWXPC to end the CDC session.

Batch extraction mode

If you use batch extraction mode, PowerExchange reads all closed PowerExchange Condense condense files or PowerExchange Logger for Linux, UNIX, and Windows log files. Then PowerExchange passes an EOF to PWXPC to end the CDC session.

Changing PowerCenter CDC Sessions

Use this procedure to change CDC sessions. You might need to add or remove sources and targets.

After you change a CDC session, you must cold start it. Because a cold start is required, you must also get the latest restart tokens for the original sources before restarting the session. To do so, you can perform a recovery.

To change a CDC session:

1. Stop the workflow.
2. After the workflow ends, recover the CDC session.

   When you recover tasks, PWXPC writes the ending restart tokens for all sources in a CDC session to the restart token file that you specified on the PWX CDC application connection.
3. Make changes to the session or workflow, if necessary.
4. Verify that the restart token file in the source CDC connection points to the same restart token file updated in the recovery.
5. If you add sources to the CDC session, add statements to the restart token file that provide restart tokens for the additional sources.
6. If you remove sources from the CDC session, update the restart token file to remove their restart tokens.
7. Cold start the CDC session.

Examples of Adding Sources and Creating Restart Tokens

The following examples show how to add sources to CDC sessions and create restart tokens for those sources.

The first example uses the CURRENT_RESTART option of the special override statement in the restart token file to generate current restart tokens. The second example uses DTLUAPPL to generate current restart tokens.

Example 1. Creating Current Restart Tokens with Special Override Statements

This example adds a source table, RRTB_SRC_004, to a CDC session that has three other sources. You edit the restart token file to generate restart tokens that represent the current end of the change stream for the additional source.

In the restart token file, you define special override statements with CURRENT_RESTART option for the RRTB_SRC_004 source.

For the other three sources, you retain the existing restart points.

To add a source with CURRENT_RESTART restart tokens:

1. In Workflow Monitor, use the Stop command to stop the workflow.
2. After the workflow stops, select the Recover Task command to run a recovery session.

   PWXPC writes the following messages in the session log:

```
PWXPC_12060 [INFO] [CDCRestart]

================================
Session restart information:
================================
Extraction Map Name            Restart Token 1                                   Restart Token 2                   Source
d1dsn9.rrtb0002_RRTB_SRC_002   000000AD220F00000000000000AD220F0000000000000000   C1E4E2D34040000000AD0D9C00000000   GMD storage
d1dsn9.rrtb0001_RRTB_SRC_001   000000AD220F00000000000000AD220F0000000000000000   C1E4E2D34040000000AD0D9C00000000   GMD storage
d1dsn9.rrtb0003_RRTB_SRC_003   000000AD220F00000000000000AD220F0000000000000000   C1E4E2D34040000000AD0D9C00000000   GMD storage
```

   PWXPC also writes the restart tokens in the restart token file that is identified the CDC application connection attributes.
3. Edit the mapping, session, and workflow to add the source RRTB_SRC_004.
4. Edit the restart token file to add RESTART1 and RESTART2 special override statements that specify the CURRENT_RESTART option for the RRTB_SRC_004 source.

   The updated file appears as follows:

```
<!-- existing sources
d1dsn9.rrtb0001_RRTB_SRC_001=000000AD220F00000000000000AD220F0000000000000000
d1dsn9.rrtb0001_RRTB_SRC_001=C1E4E2D34040000000AD0D9C00000000
d1dsn9.rrtb0002_RRTB_SRC_002=000000AD220F00000000000000AD220F0000000000000000
d1dsn9.rrtb0002_RRTB_SRC_002=C1E4E2D34040000000AD0D9C00000000
d1dsn9.rrtb0003_RRTB_SRC_003=000000AD220F00000000000000AD220F0000000000000000
d1dsn9.rrtb0003_RRTB_SRC_003=C1E4E2D34040000000AD0D9C00000000
<!-- new source
RESTART1=CURRENT_RESTART
RESTART2=CURRENT_RESTART
```

5. Cold start the session.

   PWXPC connects to PowerExchange and generates restart tokens that match the current end of the change stream for the RRTB_SRC_004 source. PWXPC passes the generated restart tokens to PowerExchange to begin change data extraction. Because the restart points for the other sources are earlier than the restart point for RRTB_SRC_004, PWXPC does not pass any change data for RRTB_SRC_004 until it reads the first change after the generated restart point.

Example 2. Creating Current Restart Tokens with the DTLUAPPL Utility

This example adds the source table, RRTB_SRC_004, to a CDC session that has three other sources. You use the DTLUAPPL utility to generate restart tokens that represent the current end of the change stream.

For the other three sources, you retain the existing restart points.

1. In Workflow Monitor, use Stop command to stop the workflow.
2. After the workflow stops, select the Recover Task command to run a recovery session.

PWXPC writes the following messages in the session log:

```
PWXPC_12060 [INFO] [CDCRestart]

===============================
Session restart information:
===============================
Extraction Map Name          Restart Token 1                                   Restart Token 2                    Source
d1dsn9.rrtb0002_RRTB_SRC_002   000000AD220F00000000000000AD220F0000000000000000   C1E4E2D34040000000AD0D9C00000000   GMD storage
d1dsn9.rrtb0001_RRTB_SRC_001   000000AD220F00000000000000AD220F0000000000000000   C1E4E2D34040000000AD0D9C00000000   GMD storage
d1dsn9.rrtb0003_RRTB_SRC_003   000000AD220F00000000000000AD220F0000000000000000   C1E4E2D34040000000AD0D9C00000000   GMD storage
```

PWXPC also writes the restart tokens in the restart token file that is identified in the CDC application connection attributes.

3. Edit the mapping, session, and workflow to add the source RRTB_SRC_004.
4. Run the DTLUAPPL utility with RSTTKN GENERATE parameter to generate restart tokens that represent the current end of the change stream for the additional source.

   Use the following DTLUAPPL control cards:

   ```
   mod  APPL dummy DSN7 rsttkn generate
      mod rsttkn rrtb004
   end appl dummy
   print appl dummy
   ```

   The PRINT command produces the following output:

   ```
   Registration name=<rrtb004.1> tag=<DB2DSN7rrtb0041>
                Sequence=<00000DBF240A0000000000000DBF240A00000000>
                Restart =<C1E4E2D3404000000DBF238200000000>
   ```

   You can add eight zeros to the end of the Sequence value to create the sequence value for the restart token file.
5. Edit the restart token file to add the source and its restart tokens.

   The updated file contains the following lines:

   ```
   <!-- existing sources
   d1dsn9.rrtb0001_RRTB_SRC_001=000000AD220F00000000000000AD220F0000000000000000
   d1dsn9.rrtb0001_RRTB_SRC_001=C1E4E2D34040000000AD0D9C00000000
   d1dsn9.rrtb0002_RRTB_SRC_002=000000AD220F00000000000000AD220F0000000000000000
   d1dsn9.rrtb0002_RRTB_SRC_002=C1E4E2D34040000000AD0D9C00000000
   d1dsn9.rrtb0003_RRTB_SRC_003=000000AD220F00000000000000AD220F0000000000000000
   d1dsn9.rrtb0003_RRTB_SRC_003=C1E4E2D34040000000AD0D9C00000000
   <!-- new source
   d1dsn9.rrtb0004_RRTB_SRC_004=00000DBF240A0000000000000DBF240A0000000000000000
   d1dsn9.rrtb0004_RRTB_SRC_004=C1E4E2D3404000000DBF238200000000
   ```
6. Cold start the session.

   PWXPC passes the restart tokens to PowerExchange to begin change data extraction. Because the restart points for the other sources are earlier than the restart point for RRTB_SRC_004, PWXPC does not pass any change data for RRTB_SRC_004 until it reads the first change after the generated restart point.

Recovering PowerCenter CDC Sessions

You can use Workflow Manager, Workflow Monitor, or pmcmd to recover an entire workflow or a task in a workflow for a CDC session that fails.

A CDC session can fail for the following reasons:

- Permanent errors, such as source or target data errors
- Transitory or environmental errors, such as infrastructure problems, server failures, and network availability issues

If you run a session with a resume recovery strategy and the session fails, do not edit the state information or the mapping for the session before you restart the session.

If a session fails because of transitory or environmental errors, restart the session after you have corrected the errors. When you warm start a CDC session, PWXPC automatically performs recovery, if required. Alternatively, you can recover a CDC session, and then restart the session.

If a CDC session fails because of permanent errors, such as SQL or other database errors, you must correct the errors before restarting the CDC session. With some failures, you can correct the error and then restart the CDC session. In other cases, you might need to rematerialize the target table from the source table before you start extracting and applying change data again. If you rematerialize the target table, provide restart tokens that match the materialization point in the change stream, and then cold start the CDC session.

Restriction: If a CDC session requires recovery processing, you cannot override the restart tokens because PWXPC does not read the restart token file.

Example of Session Recovery

This example describes recovery processing for a CDC session with relational targets.

Assume that you aborted the CDC session from the Workflow Monitor and then issued the Restart Task command to restart the session.

PWXPC automatically performs a recovery processing when the session warm starts and writes the following message in the session log:

```
PWXPC_12092 [INFO] [CDCRestart] Warm start requested. Targets will be resynchronized
automatically if required
```

PWXPC then reads the restart tokens from the state tables and writes message PWXPC_12060 in the session log. This message records the restart tokens for the session and its sources, for example:

```
PWXPC_12060 [INFO] [CDCRestart]

===============================
Session restart information:
===============================
Extraction Map Name             Restart Token 1                                     Restart Token 2                      Source
d1dsn8.rrtb0004_RRTB_SRC_004    00000FCA65840000000000000D2E004A00000000FFFFFFFF    C1E4E2D3404000000D21B1A500000000     GMD storage
d1dsn8.rrtb0009_RRTB_SRC_009    00000FCA65840000000000000D2E004A00000000FFFFFFFF    C1E4E2D3404000000D21B1A500000000     GMD storage
d1dsn8.rrtb0005_RRTB_SRC_005    00000FCA65840000000000000D2E004A00000000FFFFFFFF    C1E4E2D3404000000D21B1A500000000     GMD storage
d1dsn8.rrtb0006_RRTB_SRC_006    00000FCA65840000000000000D2E004A00000000FFFFFFFF    C1E4E2D3404000000D21B1A500000000     GMD storage
d1dsn8.rrtb0008_RRTB_SRC_008    00000FCA65840000000000000D2E004A00000000FFFFFFFF    C1E4E2D3404000000D21B1A500000000     GMD storage
d1dsn8.rrtb0003_RRTB_SRC_003    00000FCA65840000000000000D2E004A00000000FFFFFFFF    C1E4E2D3404000000D21B1A500000000     GMD storage
d1dsn8.rrtb0002_RRTB_SRC_002    00000FCA65840000000000000D2E004A00000000FFFFFFFF    C1E4E2D3404000000D21B1A500000000     GMD storage
d1dsn8.rrtb0001_RRTB_SRC_001    00000FCA65840000000000000D2E004A00000000FFFFFFFF    C1E4E2D3404000000D21B1A500000000     GMD storage
d1dsn8.rrtb0007_RRTB_SRC_007    00000FCA65840000000000000D2E004A00000000FFFFFFFF    C1E4E2D3404000000D21B1A500000000     GMD storage
```

If PWXPC detects that recovery is required, PWXPC writes message PWXPC_12069 in the session log. This message usually includes the restart tokens for both the begin-UOW and end-UOW for the oldest uncommitted UOW that PWXPC re-reads during recovery. PWXPC usually stores end-UOW restart tokens in the state table or state file. However, if you specify a **Maximum Rows Per commit** threshold on the connection, PWXPC can commit change data and restart tokens between UOW boundaries. As a result, the restart tokens might not represent an end-UOW.

The following example PWXPC_12069 message includes “from” restart tokens that are the same as those in the example PWXPC_12060 message:

```
PWXPC_12069 [INFO] [CDCRestart] Running in recovery mode. Reader will resend the oldest uncommitted UOW to resync targets:
from:  Restart 1 [00000FCA65840000000000000D2E004A00000000FFFFFFFF] : Restart 2 [C1E4E2D3404000000D21B1A500000000]
  to:  Restart 1 [00000FCA65840000000000000D300D8000000000FFFFFFFF] : Restart 2 [C1E4E2D3404000000D21B1A500000000].
```

Because this session specifies a maximum rows threshold, the restart token values in the Restart 2 fields in both the “from” and “to” restart tokens is the begin-UOW value. The sequence token values in the Restart 1 fields represent the start and end change records in the UOW that is displayed in the Restart 2 field.

During recovery processing, PWXPC reads the change data records between the restart points that are defined by the two restart token values in the PWXPC_12069 message. Then PWXPC issues a commit for the change data and restart tokens. The PowerCenter Integration Service writes the change data to the target tables and writes the restart tokens to the state table. Then the session ends.

Part V: Monitoring and Tuning

This part contains the following chapters:

CHAPTER 18

Monitoring CDC Sessions

This chapter includes the following topics:

Monitoring Overview

PowerExchange, PWXPC, and PowerCenter issue messages that you can use to monitor the progress of CDC sessions.

PWXPC can also display progress and statistical information about CDC sessions in PowerCenter Workflow Monitor.

Related Topics:

- "Monitoring CDC Sessions in PowerExchange" on page 363
- "Monitoring CDC Sessions in PowerCenter" on page 371

Monitoring CDC Sessions in PowerExchange

You can use certain PowerExchange messages and commands to monitor the extraction of change data by CDC sessions.

Use the following types of PowerExchange messages and output for monitoring extractions:

- Read progress messages. You can request that PowerExchange write messages that indicate the number of change records read by a CDC session.
- Extraction statistics messages. When extraction sessions end, PowerExchange writes messages that include statistical information about the change records processed.
- Multithreaded processing statistics messages. You can request that PowerExchange write statistical information about CDC sessions that use multithreaded processing.
- DISPLAY ACTIVE or LISTTASK command. Use one of these PowerExchange Listener commands, based on your operating system and mode of command execution, to list active CDC sessions. For more information about these commands, see the *PowerExchange Command Reference*.

Read Progress Messages

You can request that PowerExchange write read progress messages to the PowerExchange message log file. These messages indicate the number of change records read for a CDC session.

If you select the **Retrieve PWX log entries** option on the PWX CDC application connection, PWXPC also writes these messages in the session log.

To have PowerExchange write read progress messages, include the following statements in the DBMOVER configuration file:

PRGIND=Y

Enter Y to have PowerExchange write PWX-04587 messages to the PowerExchange message log file. These messages indicate the number of records read for a CDC session. Default is N.

PRGINT=*records*

Enter the number of records that PowerExchange must read before writing PWX-04587 messages to the PowerExchange message log file. Default is 250 records.

For example, to have PowerExchange write read progress messages after reading 100 records, specify the following statements:

```
PRGIND=Y
PRGINT=100
```

PWX-04587 messages have the following format:

```
PWX-04587 int_server/workflow_name/session_name: Records read=records
```

Where:

- *int_server* is the name of the PowerCenter Integration Service.
- *workflow_name* is the name of the workflow that contains the CDC session.
- *session_name* is the name of the CDC session.
- *records* is the cumulative number of records read since the CDC session started.

For example, for a CDC session named s_cdc_DB2_SQL_stats runs, PowerExchange writes the following messages:

```
PWX-04587 intserv/wf_cdc_mon_stats/s_cdc_DB2_SQL_stats: Records read=100
PWX-04587 intserv/wf_cdc_mon_stats/s_cdc_DB2_SQL_stats: Records read=200
PWX-04587 intserv/wf_cdc_mon_stats/s_cdc_DB2_SQL_stats: Records read=300
```

PowerExchange continues to write PWX-04587 messages for this CDC session until the session ends. In the PowerExchange message log file, each of these messages has a date and time stamp. Use this information to determine the speed with which PowerExchange processes change data from the change stream.

Extraction Statistics Messages

When a CDC session ends, PowerExchange writes messages that contain statistical information about extraction processing for the session.

These messages are:

- PWX-04578. PowerExchange writes this message for each source in the CDC session. The message includes the number of Insert, Update, Delete, Commit, and total records read for the source.
- PWX-04588. PowerExchange writes this message for the entire CDC session. This message includes the total number of records read for the session.

Important: The statistical information in the PowerExchange messages represents the change data that PowerExchange read for a CDC session. This information might not reflect the data that was applied to the targets. For statistical information about the change data applied to a target, review the session log.

Multithreaded Processing Statistics

If you use multithreaded processing, you can configure PowerExchange to issue messages that contain statistics on multithreaded extraction processing.

To issue these messages, you must specify the SHOW_THREAD_PERF statement in the DBMOVER configuration file on the PowerCenter Integration Service machine:

```
SHOW_THREAD_PERF=number_of_records
```

This statement specifies the number of records PowerExchange must process before writing statistics messages about multithreaded extraction processing to the PowerExchange message log file. For more information about this statement, see the *PowerExchange Reference Manual*.

If you select the **Retrieve PWX log entries** attribute on the application connection for the CDC session, PWXPC writes these messages in the session log. Also, you must specify 1 or greater for the **Worker Threads** attribute on the application connection to implement multithreaded processing so that statistics can be generated.

PowerExchange writes the following messages during each statistics interval:

- PWX-31255. Cycle time, which is the total time that PowerExchange on the PowerCenter Integration Service machine spent processing the change data before passing it to PWXPC. This message includes the total percentage of time and average, minimum, and maximum times in microseconds.
- PWX-31256. I/O time, which is the time that PowerExchange on the PowerCenter Integration Service machine spent reading change data from the PowerExchange Listener on the source system. This message includes the I/O percentage of the total time and average, minimum, and maximum times in microseconds.
- PWX-31257. Parsing time, which is the time that PowerExchange on the PowerCenter Integration Service machine spent in column-level processing for the change records on all threads. This message includes the parsing percentage of the total time and average, minimum, and maximum times in microseconds.
- PWX-31258. External time, which is the time that PowerExchange on the PowerCenter Integration Service machine spent combining the change records from all threads back into a single UOW to pass to PWXPC and for PWXPC to flush the data to PowerCenter. This message includes the external percentage of the total time and average, minimum, and maximum times in microseconds.
- PWX-31259. Delay time, which is the time that the PowerExchange on the PowerCenter Integration Service machine waited to receive new change records to process from the PowerExchange Listener on the source system. This message includes the delay percentage of the total time and average, minimum, and maximum times in microseconds.

For example, if you specify SHOW_THREAD_PERF=10000, PowerExchange writes the following messages after reading 10,000 change records and reaching the next UOW boundary:

```
PWX-31254 PowerExchange threading stats for last 10000 rows. Cycle (array) size is 25
rows. 0 out of array occurred.
PWX-31255 Cycle  time: 100% (avg:      5709 min:     4741 max:      7996 usecs)
PWX-31256 IO     time:   4% (avg:       235 min:       51 max:      1021 usecs)
PWX-31257 Parse  time:  79% (avg:      4551 min:     4102 max:      5495 usecs)
PWX-31258 Extern time:  20% (avg:      1145 min:      618 max:      3287 usecs)
PWX-31259 Delay  time:   0% (avg:         7 min:        4 max:       165 usecs)
PWX-31254 PowerExchange threading stats for last 100000 rows. Cycle (array) size is 25
rows. 0 out of array occurred.
PWX-31255 Cycle  time:  99% (avg:      5706 min:     4735 max:      7790 usecs)
PWX-31256 IO     time:   4% (avg:       234 min:       51 max:       950 usecs)
```

```
PWX-31257 Parse  time:  79% (avg:      4549 min:     4108 max:      5425 usecs)
PWX-31258 Extern time:  20% (avg:      1144 min:      616 max:      3242 usecs)
PWX-31259 Delay  time:   0% (avg:         7 min:        4 max:       115 usecs)
```

If the parsing and external processing times are greater than the I/O time, you can increase the number of threads for the CDC session to try to improve throughput.

PowerExchange Listener DISPLAY ACTIVE or LISTTASK Command

Run the PowerExchange Listener DISPLAY ACTIVE or LISTTASK command to display CDC sessions that are active in the PowerExchange Listener.

The specific command name and syntax depends on how you issue the command, as follows:

- Issue the DISPLAY ACTIVE command from the command line on the system where the PowerExchange Listener runs. For more information, see the *PowerExchange Command Reference*.
- Use the pwxcmd program to issue the listtask command to a PowerExchange Listener that runs on the local system or a remote system. For more information, see the *PowerExchange Command Reference*.
- In the PowerExchange Navigator, issue the LISTTASK command from the **Database Row Test** dialog box. For more information, see the *PowerExchange Navigator User Guide*.
- If you run the PowerExchange Listener as an application service in the Informatica domain, run the infacmd pwx program to issue the ListTaskListener command. For more information, see the *Informatica Command Reference*.

In the command output, the **PwrCntrSess** field displays the PowerCenter session name in the following format:

```
integration_server_name/workflow_name/session_name
```

For example, when two CDC sessions are active, the DISPLAY ACTIVE or LISTTASK command produces the following output:

```
PWX-00711 Active tasks:
PWX-00712 TaskId=1, Partner=10.10.10.01, Port=2480, PwrCntrSess=intserv1/workflow1/cdc_sess1,
Application=appl_name1, Status=Active, AM=CAPXRT, Mode=Read, Process=,  SessId=
PWX-00729 Userid=userid, Client=clientid, File=capture_registration_file_name, Table=table_name,
DB=database_name
PWX-00712 TaskId=2, Partner=10.10.10.02, Port=2480, PwrCntrSess=intserv2/workflow2/cdc_sess2,
Application=appl_name2, Status=Active, AM=CAPXRT, Mode=Read, Process=,  SessId=
PWX-00729 Userid=userid, Client=clientid, File=capture_registration_file_name, Table=table_name,
DB=database_name
PWX-00713 2 active tasks
PWX-00709 0 Dormant TCBs
```

PowerExchange Listener DISPLAYSTATS Command

You can use the PowerExchange Listener DISPLAYSTATS or pwxcmd displaystats command to publish monitoring statistics for a PowerExchange Listener that runs on i5/OS, Linux, zLinux, UNIX, Windows, or z/OS.

Before you run the command, configure the following statements in the DBMOVER configuration file:

- Specify the MONITOR parameter in the STATS statement in the DBMOVER configuration file to enable PowerExchange to collect these statistics. You can include the *interval* subparameter to publish the statistics at a regular interval as well as on demand.
- For the proper display of monitoring output on z/OS, set the LOG_LINE_LIMIT statement to 132. Otherwise, the lines might wrap awkwardly, making the output hard to read.

You can issue the command in any of the followings ways:

- From the command line on the Linux, UNIX, Windows, or zLinux system where the PowerExchange Listener runs.

- With the MVS MODIFY (F) command on the z/OS system where the PowerExchange Listener runs.
- With the pwxcmd program from a remote Linux, UNIX, and Windows system to a Listener on any supported operating system.

  Note: You must use this method to publish monitoring statistics for a PowerExchange Listener on i5/OS on demand.

The command syntax depends on the operating system type and whether you use pwxcmd. For more information, see the *PowerExchange Command Reference*.

Depending on which command parameter you use, you can publish one of the following types of reports:

- **Listener**. Reports PowerExchange Listener summary statistics on memory usage, CPU processing time, and activity on behalf of client requests. These statistics include counts of client tasks, connections, number of messages sent and received, bytes of data sent and received, and netport jobs (z/OS only). These statistics include both bulk data movement and CDC tasks.

  Note: If you run a PowerExchange Listener Service in the Informatica Domain, you can use the infacmd pwx displayStatsListener command to publish these statistics. For more information, see the *Informatica Command Reference*.
- **Accessmethods**. Reports statistics on PowerExchange Listener message and data transfer activity by client task and access method. For each active task and access method combination, these statistics include the number of rows read and written, bytes of data read and written, the source or target file name or data map file name, and the CPU processing time. For CDC requests that use the CAPX or CAPXRT access method, the report also includes counts of the SQL inserts, updates, and deletes that the task processed.
- **Clients**. Reports information about the active client tasks that are running under the PowerExchange Listener. For each task, the statistics show some or all of the following information: the status, access method, read or write mode, process name and session ID if available, CPU processing time, and start date and time. The statistics also include the client port number and IP address. If the client is PowerCenter, the statistics include the PowerCenter session ID and the application name for CDC.

By default, the Listener report is published.

The reports for a PowerExchange Listener on z/OS are similar to those for a PowerExchange Listener on i5/OS, Linux, zLinux, UNIX, or Windows.

The following example Listener report is for a PowerExchange Listener on z/OS:

```
PWX-00723 Command <displaystats Listener> succeeded
PWX-37101  Listener <PWXLST  > ASID=375 (x'177') UserID=AUSRID
PWX-37102   Memory
PWX-37103    Region below 16-MB line:  In Use        108 KB  Limit Value       9192 KB  Free       9084 KB
PWX-37104    Region above 16-MB line:  In Use      53912 KB  Limit Value    1675264 KB  Free    1621352 KB
PWX-37117   CPU Time
PWX-37118    TCB Time   = 0 SRB Time     = 0  zIIP-NTime = 0
PWX-37119    Listener   = 0 hrs, 0 mins, 1 secs, 275762 mcrs
PWX-37106   Cumulative Requests
PWX-37107    Total Tasks=       11 Active Tasks =         3 HWM Tasks =         3 Maxtasks  =        50
PWX-37108    Connections=       11 Accepted     =        11 Active    =         0
PWX-37109    Msgs Sent  =        0 Msgs Received=        22
PWX-37110    Data Sent  =        0 Data Received=      7304
PWX-37111    NetportJobs=        0
```

The **Memory**, **TCB Time**, **SRB Time**, and **NetportJobs** values are specific to the PowerExchange Listener on z/OS. For a PowerExchange Listener on i5/OS, Linux, UNIX, or Windows, the report displays the total memory usage.

You can use this report determine if the number of client tasks is reaching the limit that is set in the MAXTASKS statement of the DBMOVER configuration file. Compare the **HWM Tasks** value to the **Maxtasks** value. If the HWM Tasks value reaches the MAXTASKS limit, PowerExchange Listener processing might be delayed, which can cause reduced throughput and connection timeouts.

The following example accessmethods report is for a PowerExchange Listener on z/OS, but the same fields are displayed for a PowerExchange Listener on i5/OS, Linux, UNIX, Windows, or zLinux:

```
PWX-00723 Command <displaystats AccessMethods> succeeded
PWX-37201   Active Access Methods
PWX-37202    Task ID    = 42412 AM          =     CAPXRT
PWX-37203                       Rows read   =       1029  Rows written  =          0
PWX-37204                       Bytes read  =     116277  Bytes written =          0
PWX-37205                       File        = d2ivd0.d002root_ROOT
PWX-37206                       Table       = <Capture Extract Realtime>
PWX-37208                       Inserts     =        564  Updates       =          0  Deletes     =        465
PWX-37121                       CPU time    = 0 hrs, 0 mins, 0 secs, 299809 mcrs
PWX-37202    Task ID    = 42414 AM          =       NRDB
PWX-37203                       Rows read   =         10  Rows written  =          0
PWX-37204                       Bytes read  =        570  Bytes written =          0
PWX-37205                       File        = ABC.VSAM.MASTER_REC
PWX-37206                       Table       = <Non-relational source>
PWX-37202    Task ID    = 42414 AM          =       KSDS
PWX-37203                       Rows read   =         10  Rows written  =          0
PWX-37204                       Bytes read  =        800  Bytes written =          0
PWX-37205                       File        = XYQ.TEST.V1.KSDS
PWX-37206                       Table       = XYQ.TEST.V1.KSDS
PWX-37121                       CPU time    = 0 hrs, 0 mins, 0 secs, 76151 mcrs
```

For the CAPXRT and CAPX access methods, the report includes the number of SQL inserts, updates, and deletes that the task processed for a CDC request.

A client task can have multiple access methods, for example, one for reading source data and one for mapping nonrelational source data to a relational format. In the example output, task 42414 uses the NRDB access method with the data map file specified in the **File** field to map nonrelational data to a relational format. The same task uses the KSDS access method to retrieve data from the KSDS data set specified in the **File** field.

The following example clients report is for a PowerExchange Listener on Windows, but the same fields are displayed for a PowerExchange Listener on i5/OS, Linux, zLinux, UNIX, or z/OS:

```
PWX-00723 Command <displaystats Clients> succeeded
PWX-37112   Active Tasks
PWX-37113    Task ID    = 41942 Status       = Active
PWX-37114                       Port         = 2480  Partner = 127.0.0.1
PWX-37115                       PwrCntrSess  = N/A
PWX-37207                       Application  = N/A
PWX-37116                       AM           = NRDB  Mode    = Read  Process = DTLLST3 SessionId =
PWX-37121                       CPU time     = 0 hrs, 0 mins, 0 secs, 62400 mcrs
PWX-37122                       Start time   = 2014-05-01 14:21:37
PWX-37113    Task ID    = 41943 Status       = Active
PWX-37114                       Port         = 2480  Partner = 127.0.0.1
PWX-37115                       PwrCntrSess  = N/A
PWX-37207                       Application  = N/A
PWX-37116                       AM           = NRDB  Mode    = Read  Process = DTLLST3 SessionId =
PWX-37121                       CPU time     = 0 hrs, 0 mins, 0 secs, 124800 mcrs
PWX-37122                       Start time   = 2014-05-01 14:22:01
```

The **Partner** field displays the IP address of the client that issued the request that caused the PowerExchange Listener to create the task. This value begins with ::ffff for an IPv6 address.

For more information about the fields in each of these reports, see the *PowerExchange Command Reference*.

PowerExchange Logger for Linux, UNIX, and Windows Monitoring Statistics

You can use the PowerExchange Logger DL and DG commands or the pwxcmd displaystats -tp {logger| groups} command to publish monitoring statistics on demand for a PowerExchange Logger process and its tasks or for PowerExchange Logger group definitions. Also, you can configure the PowerExchange Logger to print monitoring statistics at a specific interval and when it shuts down.

Before you can publish monitoring statistics on demand, at shutdown, or at a specific interval, you must configure the STATS=(MONITOR) parameter in the PowerExchange Logger configuration file, pwxccl.cfg, to enable collection of the statistics. In this parameter, you can include the optional *interval* subparameter to publish the statistics at a regular interval.

To publish monitoring statistics on demand, use the following commands:

- Issue the DL and DG commands from the command line window on the Linux, UNIX, or Windows system where the PowerExchange Logger runs. The PowerExchange Logger must be running in the foreground.
- Issue the pwxcmd displaystats -tp logger or pwxcmd displaystats -tp groups command from a Linux, UNIX, or Windows system to the PowerExchange Logger on a remote system or the same system. You must use this method to issue the command to a PowerExchange Logger process that runs in background mode.
- Issue the PowerExchange Logger SHUTCOND or SHUTDOWN command. The Logger then publishes summary statistics when it stops.

For more information about the command syntax, see the *PowerExchange Command Reference*.

The statistics are displayed on screen and printed to the PowerExchange message log.

DL Logger Report

The DL and pwxcmd displaystats -tp logger commands produce statistics for the PowerExchange Logger process and its tasks. The following example report shows these statistics:

```
PWX-26011 Command handler received command "DS"
PWX-00723 Command <display L stats> succeeded
PWX-37130   PWXCCL pid = 7144       Writer status = Reading or waiting for source data
PWX-37134   CPU Time =    0:00:02.589616
PWX-37131   Memory  (Current/Total/Maximum)
PWX-37132    Controller: (981/983/1849) KB    Command Handler: (0/0/34) KB    Writer: (5127/5147/5181)
KB
PWX-37135   Status  7144                  Totals  I=000000024344 U=000000000000 D=000000024336
C=000000004004 Total=000000052684
PWX-37136    CurrFileOpened : 2015-08-11 13:20:39 I=000000024344 U=000000000000 D=000000024336
C=000000004004 Total=000000052684
PWX-37137     Active Cycle  : 2015-08-11 13:21:01 I=000000024344 U=000000000000 D=000000024336
C=000000004004 Total=000000052684
```

This report contains the following fields:

- PWXCCL pid. The process ID of the PowerExchange Logger process.
- Writer status. The status of the PowerExchange Logger Writer subtask at the time the command was issued.
- CPU Time. The amount of CPU time used by the PowerExchange Logger since it started.
- Controller. The amount of memory in kilobytes that the PowerExchange Logger Controller has used.
- Command Handler. The amount of memory in kilobytes that the PowerExchange Logger Command Handler has used.
- Writer. The amount of memory in kilobytes that the PowerExchange Logger Writer subtask has used.
- Status. The process ID of the PowerExchange Logger process.
- I, U, D, C, and Total. Counts of inserts, updates, deletes, and commits that the PowerExchange processed, with the total for all of these operation types. These values are reported for the PowerExchange Logger process, the currently open log file, and the active logging cycle.
- CurrentFileOpened. The timestamp that indicates when the log file was opened.
- Active Cycle. The timestamp that indicates when the active logging cycle started.

DG Logger Group Definition Reports

The DG and pwxcmd displaystats -tp groups commands produce statistics for each PowerExchange Logger group definition that is definition. A *group definition* defines a set of PowerExchange Logger log files for a group of registered source tables. The following example report shows these statistics:

```
PWX-26011 Command handler received command "DG"
PWX-37138   Grp: dtld004 Regs=1 IUD=000000000000 C=000000000000 Unflushed=000000000000
PWX-37138   Grp: dtld003 Regs=2 IUD=000000000470 C=000000000028 Unflushed=000000000000
PWX-37138   Grp: dtld002 Regs=2 IUD=000000003276 C=000000000196 Unflushed=000000000000
```

This report contains the following fields:

- Grp. The name of the group definition.
- Regs. The number of capture registrations in the group.
- IUD. the total number of inserts, updates, and deletes processed for the group.
- C. The number of commits processed for the group.
- Unflushed. The number of change records for the group that have not yet been flushed to PowerExchange Logger log files on disk.

If no PowerExchange Logger groups are defined, the command reports the following monitoring statistics for the PowerExchange Logger, as if all of the registrations were in one group named "condenseO":

```
PWX-26011 Command handler received command "DG"
PWX-37138   Grp: c:\pwx\capture/condenseO Regs=5 IUD=000000032292 C=000000001931 Unflushed=000000034223
PWX-37139       FirstRec=2015-05-22 13:59:10.603648  Open file=c:\pwx\capture/
condenseO.CND.CP150707.T1816001
PWX-37140       BeginSeq =000000009DE600000000000000088D800000000 BeginRstrt
=D4C9C7D340400000000037DA00000000
PWX-37141       LastSeq  =00000158743800000000000000158728600000000
PWX-37142       CommitSeq=000001589B24000000000000001589B2400000000
CommitRstrt=D4C9C7D340400000000037DA00000000
```

- FirstRec. The timestamp of the first record in the open Logger log file.
- BeginSeq. The sequence token of the earliest record in the open Logger log file.
- BeginRstrt. The restart token of the earliest record in the open Logger log file.
- LastSeq. The sequence token of the last change record in the Logger log file that is not followed by a commit record. This value should be greater than the CommitSeq value.
- CommitSeq. The sequence token of the last commit record in the Logger log file.
- CommitRstrt. The restart token of the last commit record in the Logger log file.

Summary Statistics at Logger Shutdown

To print summary monitoring statistics when the PowerExchange Logger shuts down, specify the STATS=(MONITOR) parameter in the pwxccl.cfg file, either with or without the *interval* subparameter. The Logger shuts down when it reaches the end of its batch run or when you issue a Logger SHUTCOND or SHUTDOWN command.

The following summary monitoring messages are included in the shutdown output:

```
PWX-00723 Command <Shutdown stats> succeeded
PWX-37130   PWXCCL pid = 9064       Writer status = Shutting down
PWX-37134   CPU Time =    0:00:00.686404
PWX-37131   Memory  (Current/Total/Maximum)
PWX-37132    Controller: (476/477/1853) KB    Command Handler: (476/477/1853) KB    Writer: (0/0/0) KB
PWX-37105    Total Memory 16468 KB
PWX-37135   Status  9064                 Totals  I=000000001404 U=000000000000 D=000000001404
C=000000000228 Total=000000003036
PWX-37136    CurrFileOpened : 2016-08-19 10:37:47 I=000000000000 U=000000000000 D=000000000000
C=000000000000 Total=000000000000
PWX-37137     Active Cycle  : 2016-08-19 10:37:47 I=000000001404 U=000000000000 D=000000001404
C=000000000228 Total=000000003036
```

Note: If you print summary statistics for a PowerExchange Logger that runs on a SUSE Linux version 11 machine, the PWX-37105 message incorrectly reports 0 KB as the total amount of memory that the PowerExchange Logger used. This problem does not occur if the Logger runs on a later SUSE Linux version.

Monitoring Interval Statistics

You can print the same monitoring statistics that are printed by the DL command at a specific interval if you specify the STATS=(MONITOR) parameter with the *interval* subparameter in the pwxccl.cfg file.

The following interval-based statistics are written to the PowerExchange message log:

```
PWX-37130   PWXCCL pid = 7144       Writer status = Reading or waiting for source data
PWX-37134   CPU Time =    0:00:02.589616
```

```
PWX-37131   Memory  (Current/Total/Maximum)
PWX-37132    Controller: (981/983/1849) KB    Command Handler: (0/0/34) KB    Writer: (5127/5147/5181)
KB
PWX-37135   Status  7144                 Totals  I=000000024344 U=000000000000 D=000000024336
C=000000004004 Total=000000052684
PWX-37136    CurrFileOpened : 2015-08-11 13:20:39 I=000000024344 U=000000000000 D=000000024336
C=000000004004 Total=000000052684
PWX-37137     Active Cycle  : 2015-08-11 13:21:01 I=000000024344 U=000000000000 D=000000024336
C=000000004004 Total=000000052684
```

A subset of these monitoring statistics are printed on screen:

```
PWX-37132    Controller: (981/983/1849) KB    Command Handler: (0/0/34) KB    Writer: (5127/5147/5181)
KB
PWX-37135   Status  7144                 Totals  I=000000024344 U=000000000000 D=000000024336
C=000000004004 Total=000000052684
PWX-37136    CurrFileOpened : 2015-08-11 13:20:39 I=000000024344 U=000000000000 D=000000024336
C=000000004004 Total=000000052684
PWX-37137     Active Cycle  : 2015-08-11 13:21:01 I=000000024344 U=000000000000 D=000000024336
C=000000004004 Total=000000052684
```

Monitoring CDC Sessions in PowerCenter

In PowerCenter, you can monitor the progress of CDC sessions.

Use the following information to monitor CDC sessions:

- Messages in the session log. PWXPC writes messages to the session log.
- Performance details in Workflow Monitor. If you configure a CDC session to report performance details, you can monitor the progress of the session in Workflow Monitor.

For more information about PowerCenter monitoring options, see the *PowerCenter Performance Tuning Guide*.

Session Log Messages

You can use messages that PWXPC and PowerCenter write to the session log to monitor the progress of CDC sessions.

When PWXPC flushes change data, PWXPC writes one of the following messages in the session log to indicate the reason for the flush:

```
PWXPC_10081 [INFO] [CDCDispatcher] raising real-time flush with restart tokens
[restart1], [restart2] because the UOW Count [count] is reached
```

```
PWXPC_10082 [INFO] [CDCDispatcher] raising real-time flush with restart tokens
[restart1], [restart2] because Real-time Flush Latency [latency] is reached
```

```
PWXPC_12128 [INFO] [CDCDispatcher] raising real-time flush with restart tokens
[restart1], [restart2] because the Maximum Rows Per commit [count] is reached
```

You can use the restart tokens in these PWXPC flush messages to monitor the processing of the change data.

For each PWXPC flush message, PowerCenter writes a WRT_8160 message after committing change data to the targets. This message displays the source-based commit statistics.

Performance Details in Workflow Monitor

In Workflow Monitor, you can view performance details in the run properties for a CDC session to assess the efficiency of the CDC session and extraction processing.

If session performance is degraded, you can use data in the Performance Counter column to determine the bottleneck.

PWXPC does not store performance details in the repository so you cannot view performance details for previous executions of a CDC session.

To enable the collection of performance details, select **Collect performance data** on the **Properties** tab of the CDC session properties.

When the CDC session runs, PWXPC refreshes performance statistics every 10 seconds.

If you enable a resume recovery strategy for the CDC session, PWXPC displays data for all Performance Counter fields.

The following table describes the Performance Counter fields:

Performance Counter Field	Description
1 PowerExchange CDC Reader Status:	Current status of the PWXPC reader, as indicated by one of the following values: - **No Data To Process**. In the last read, PowerExchange did not pass data to PWXPC. - **Restart Advance**. PowerExchange passed restart tokens to PWXPC but did not pass change data. - **Processing Data**. PowerExchange passed change data and restart tokens to PWXPC for processing.
1.1 Time Last Data Row Read	Time, in milliseconds, that PWXPC took to read the data last received from PowerExchange.
1.2 Data Rows In Current Interval	Number of change records received from PowerExchange during the current statistics interval.
1.3 End Packets In Current Interval	Number of UOWs received from PowerExchange during the current statistics interval.
1.4 Data Read Rate In Current Interval (rows/sec)	Number of change records read per second by PowerExchange during the current statistics interval. The value varies, based on the quantity of change data: - If PowerExchange is reading large amounts of change data from the change stream, this value is usually large and reflects the maximum PowerExchange throughput. - If PowerExchange is waiting for change data at the end of the change stream, this value is small. The following factors can increase this value: - Large network bandwidth - CDC offload processing - Multithreaded processing
1.5 Mean Data Read Rate (rows/sec)	Mean number of change records that PowerExchange read per second, from the start of the CDC session.
1.6 Max Data Read Rate (rows/sec)	Maximum number of change records that PowerExchange read per second during a statistics interval, from the start of the CDC session.

Performance Counter Field	Description
2 PowerCenter Processing Status:	Overall status of the CDC session, as indicated by one of the following values: - **Idle**. Waiting for change data. - **Processing Data**. Data is being processed. - **Recovery Disabled**. If a resume recovery strategy is not enabled, the PWXPC CDC reader cannot get PowerCenter status information.
2.1 Time Of Last Commit	Time stamp of the last commit to a target.
2.2 Rows Processed To Commit In Current Interval	Number of change records that the PWXPC reader flushed during the current statistics interval. This count includes the change records in all committed UOWs. Some of these UOWs might have started before the current statistics interval began.
2.3 Commit Rate In Current Interval (rows/sec)	Processing rate, in number of change records per second, for the change records for the UOW that was last committed during the current statistics interval. This processing includes reading the UOW from PowerExchange and committing the change data to the targets. The following factors can affect this rate: - Number of available DTM buffers - Responsiveness of the target - Number of transformations in the pipeline
2.4 Mean Commit Rate (rows/sec)	Mean number of change records per second for the rate displayed in **2.3 Commit Rate In The Current Interval**. This value differs from the **2.6 Mean Throughput Rate** value in that it takes into account only the time when the session is actively processing data. This value does not reflect processing overlap in PowerCenter.
2.5 Max Commit Rate (rows/sec)	Maximum number of change records per second for the commit rate displayed in **2.3 Commit Rate In The Current Interval**, from the start of the CDC session.
2.6 Mean Throughput (rows/sec)	Mean rate of processing for the CDC session.
2.7 Max Throughput (rows/sec)	Maximum throughput for the CDC session.
2.8 Commits In Current Interval	Number of commits processed to completion by the target during the current statistics interval.
2.9 Commits Pending	Number of commits that the PWXPC reader issued but that have not yet reached the targets. A large value might indicate problems with target responsiveness.
3 Capture Timestamps	-
3.1 Timestamp On Last End Packet Read	The capture timestamp, DTL__CAPXTIMESTAMP, from the last UOW read for a source in the CDC session.
3.2 Timestamp On Last Target Commit	The capture timestamp, DTL__CAPXTIMESTAMP, from the last UOW committed to the target.
4 Totals	-
4.1 Elapsed Time	Total elapsed time for the CDC session.

Performance Counter Field	Description
4.2 Rows Read	Total number of change records read from PowerExchange.
4.3 End Packets Read	Total number of UOWs read.
4.4 Time in PowerExchange Processing	Total time of PowerExchange processing for the CDC session.
4.5 Rows Processed	Total number of change records processed through PowerCenter and committed to the targets.
4.6 Commits to Target	Total number of flushes that the PWXPC reader issued and that were committed to the targets.
4.7 TS on Last Commit minus TS at Commit (2.1-3.2)	Result from subtracting **3.2 Timestamp On Last Target Commit** value from the **2.1 Time Of Last Commit** value. If this result is negative, the value is enclosed in parentheses.

Viewing Performance Details in Workflow Monitor

In Workflow Monitor, view performance details for a CDC session to assess the efficiency of the CDC sessions.

1. In Workflow Monitor, right-click a session and select **Get Run Properties**.
2. In the **Properties** window, click the **Performance** area.

   The **Performance Counter** column displays a source qualifier from the CDC session. The **Counter Value** column displays the PowerCenter node name.
3. To view performance details, select the source qualifier.

   Note: For PWXPC to display performance details for a CDC session that ended, you must select performance details while the session is still running.

   PowerCenter displays data in the **Performance Counter** fields in the **Performance** area.

CHAPTER 19

Tuning CDC Sessions

This chapter includes the following topics:

Tuning Overview

PowerExchange and PowerCenter provide options that you can use to tune CDC sessions. These tuning options can help you increase throughput, reduce overhead on the source system, and improve CDC efficiency.

Use any of the following options to tune CDC sessions:

- PowerExchange DBMOVER statements. Customize certain statements in the DBMOVER configuration file to make tuning adjustments such as changing buffer sizes or disabling compression or traces.
- PowerCenter connection attributes. Customize PWX CDC application connection attributes to make tuning adjustments such as disabling encryption or compression, reducing commit processing, or enabling offload processing and multithreaded processing.
- Buffer memory. Set the PowerCenter **DTM Buffer Size** and **Default Buffer Block Size** session properties to generate a large number of small blocks. For CDC, this strategy improves session performance and prevents wasted buffer space.
- Offload processing. Use offload processing to transfer column-level extraction processing from the PowerExchange Listener on the source system to the PowerExchange client on the PowerCenter Integration Service machine. Also, if the data source type requires use of the UOW Cleanser (UOWC), offloading transfers UOWC processing to the PowerCenter Integration Service machine. Offloading helps increase throughput when resources available for the PowerExchange Listener are constrained on the source system.
- Multithreaded processing. Enable the use of multiple worker threads for resource-intensive, column-level extraction processing. You can use multithreading on the source system to process data from Linux, UNIX, or Windows data sources if the PWX connection for the CDC session has a location of local. You can also use multithreading for extracting change data from the systems other than the source system

when offload processing is in effect. Enable multithreading only when extractions appear to be CPU bound.

- Workload Manager (WLM) service classes. Assign each of the following types of PowerExchange CDC started tasks or jobs to an appropriate WLM service class based on your business requirements: PowerExchange Listener, PowerExchange Agent, PowerExchange Logger, Post-Log Merge jobs, PowerExchange ECCRs, and PowerExchange Condense. A service class includes a goal and importance level, which WLM uses to prioritize work requests for z/OS shared resources.

Note: You can also log data to a PowerExchange Logger for Linux, UNIX, and Windows instance on a system that is remote from the source system. In certain situations, this configuration can reduce resource consumption on the source system, move column-level and UOW Cleanser processing to the remote system, and reduce the network overhead of data transfer. For more information, see Chapter 14, "Remote Logging of Data" on page 299.

Related Topics:

- "PowerCenter Connection Attributes for Tuning CDC Sessions " on page 379
- "PowerExchange DBMOVER Statements for Tuning CDC Sessions" on page 376
- "Tuning Commit Processing" on page 381

PowerExchange DBMOVER Statements for Tuning CDC Sessions

You can customize certain statements in the dbmover.cfg configuration file to tune CDC sessions.

Customize any of the following parameters to try to increase throughput or reduce CPU use:

APPBUFSIZE=*bytes*

The maximum application data buffer size, in bytes, that PowerExchange uses to read or write data. This buffer type can exist on a source or target system.

If you use a remote target system, PowerExchange usually writes change data to its application data buffer on the source system until the buffer is full. PowerExchange then sends the change data to a sending TCP/IP buffer on the source system. TCP/IP transports the change data to a receiving TCP/IP buffer on the target system. PowerExchange on the target system reads the change data from the TCP/IP buffer into its application data buffer. PWXPC then reads the change data and passes it to PowerCenter. PowerCenter processes the data and applies it to the targets.

Enter an APPBUFSIZE value that is greater than the maximum size of any single data row to be sent.

Valid values are from 34816 through 8388608. Default is 256000.

If the target is remote, enter the same APPBUFSIZE value in the DBMOVER configuration files on the source and target systems.

When the APPBUFSIZE value is not optimal, PowerExchange writes message PWX-01295 in the PowerExchange message log file on the source system. This message recommends a minimum application buffer size.

If dynamic application buffer sizing is enabled, the APPBUFSIZE statement defines the initial size of the application data buffer for all connections made during a PowerExchange Listener run. PowerExchange resizes the application data buffer dynamically for individual connections as needed. Dynamic application buffer sizing is enabled by default. You can explicitly enable it by specifying Y for the APPBUFSIZEDYN statement in the DBMOVER configuration file.

APPBUFSIZEDYN={N|Y}

Specifies whether to enable dynamic application buffer sizing.

The DBMOVER APPBUFSIZE statement defines the initial size of the application buffer for all connections made during a PowerExchange Listener run. If APPBUFSIZEDYN=Y, PowerExchange resizes the application buffers for individual connection as needed.

The APPBUFSIZEDYN statement applies to PowerExchange connections to data sources with either fixed-length or variable-length records. A variable-length record is a record with at least one variable-length field. A variable-length field has a datatype of VARCHAR or VARBIN.

For each connection to a data source with variable-length records, PowerExchange resizes the application buffer when it encounters a record that is too large to fit into the buffer. PowerExchange increases the size of the application buffer to a value of ten times the size of the record that has overflowed, up to the maximum application buffer size of 8 MB. The new size remains in effect for the duration of the Listener run or until the application buffer is resized again. PowerExchange never decreases the application buffer size for a connection after the Listener run has started.

For each connection to a data source with fixed-length records, PowerExchange determines the record length when the connection is opened and resizes the application buffer once, up to the maximum application buffer size of 8 MB, as needed.

CAPI_CONNECTION=(...,(TYPE={UDB|UOWC},MEMCACHE=*cache_size*, ...))

The maximum memory cache size, in kilobytes, that PowerExchange can allocate to reconstruct complete UOWs. This MEMCACHE parameter is specified only in the UDB or UOWC CAPI_CONNECTION statements.

Enter a number from 0 through 2147483647. Default is 1024. If you enter 0, the memory cache size is unlimited.

PowerExchange keeps all changes in each UOW in cache until processing the end-UOW record. PowerExchange incrementally allocates memory cache up to the limit that this parameter specifies. If the MEMCACHE value is too small to hold all of the changes in a UOW in cache, the changes spill to a disk file.

Each UOW spill file contains one UOW. A UOW might require multiple UOW spill files to hold all of the changes for that UOW. If the change stream contains multiple large UOWs and the memory cache is insufficient, PowerExchange might create numerous UOW spill files.

PowerExchange processes the change stream more efficiently if it does not need to use UOW spill files. In addition to degrading extraction performance, large numbers of UOW spill files can cause a disk space shortage.

The default value of 1024 is appropriate if the change stream contains many small UOWs. If you have UOWs larger than 1024 KB, increase this value or enter 0. PowerExchange processes a UOW more efficiently if all of the changes are cached in memory. For most environments, a good starting value is 10240.

Attention: PowerExchange allocates memory cache for each connection for change data extraction processing. To prevent excessive memory use, use a MEMCACHE value that is reasonable for the extraction processing load and number of CDC sessions that run concurrently. If the value is too large and you run many concurrent sessions, memory constraints might occur.

CAPI_CONNECTION=(...(TYPE={MSQL|UDB|UOWC},RSTRADV=*rstr_seconds*, ...))

Time interval, in seconds, that PowerExchange waits before advancing restart and sequence tokens for a registered data source during periods when UOWs do not include any changes of interest for the data source. When the wait interval expires, PowerExchange returns the next committed "empty UOW," which includes only updated restart information.

This RSTRADV parameter is specified only in CAPI_CONNECTION statements of the following types:

- MSQL
- UDB
- UOWC

Enter a number from 0 through 86400.

If you do not specify RSTRADV, PowerExchange does not advance restart and sequence tokens for a registered source during periods when PowerExchange receives no changes of interest. In this case, when PowerExchange warm starts, it reads all changes, including those not of interest for CDC, from the restart point.

PowerExchange resets the wait interval to 0 when one of the following events occur:

- PowerExchange completes processing a UOW that includes changes of interest.
- PowerExchange returns an empty UOW because the wait interval expired without PowerExchange receiving any changes of interest.

For sources with low change activity, you can use the RSTRADV parameter to periodically advance to the restart tokens for those sources. Advancing the restart tokens speeds up restart processing for CDC sessions by minimizing the amount of change data that must be reprocessed.

For example, if you specify 5, PowerExchange waits 5 seconds after it completes processing the last UOW or after the previous wait interval expires. Then PowerExchange returns the next committed empty UOW that includes the updated restart information and resets the wait interval to 0.

A low value can cause the **UOW Count** option on the PWX CDC connection to match more quickly than expected. When the UOW counter matches, PWXPC flushes the data buffer and commits restart tokens to the targets. Excessive flush activity can adversely affect performance on the PowerCenter Integration Service machine and on the target databases.

Attention: A value of 0 can degrade performance. In addition to the UOWs that contain changes for registered sources of interest, PowerExchange returns an empty UOW for every UOW that does not contain changes for the registered sources of interest.

LISTENER=(*node_name*,TCPIP,*port*,*send_bufsize*,*receive_bufsize*,*send_size*,*receive_size*, ...)

A TCP/IP port on which a named PowerExchange Listener process listens for work requests.

The *send_bufsize* and *receive_bufsize* positional parameters define the data portion of the TCP/IP send and receive buffer sizes that PowerExchange uses. If you do not specify these values, PowerExchange uses the operating system defaults.

To increase throughput, try increasing the *send_bufsize* and *receive_bufsize* values in the LISTENER statement in the DBMOVER configuration file on the source system. For help in determining the best values to use, contact your network administrator.

NODE=(*node_name*,TCPIP,*host_name*,*port*,*send_bufsize*,*receive_bufsize*,*send_size*,*receive_size*, ...)

A TCPIP host name and port that PowerExchange uses to contact a PowerExchange Listener process.

The *send_bufsize* and *receive_bufsize* positional parameters define the data portion of the send and receive buffer sizes that PowerExchange uses. If you do not specify these values, PowerExchange uses the operating system defaults.

To increase throughput, try increasing the *send_bufsize* and *receive_bufsize* values in the NODE statement in the DBMOVER configuration file on the target system. For help in determining the best values to use, contact your network administrator.

TRACE=(*trace_id*,*trace_level*,99)

Activates PowerExchange diagnostic traces that Informatica Global Customer Support uses to solve problems with PowerExchange code.

TRACE statements can severely impact PowerExchange performance. Use these statements only at the direction of Informatica Global Customer Support.

After Informatica Global Customer Support diagnoses the problem, remove or comment out all TRACE statements in the DBMOVER configuration files on all systems.

For more information about these DBMOVER statements, see the *PowerExchange Reference Manual*.

PowerCenter Connection Attributes and Session Properties

You can use certain PowerCenter connection attributes and session properties for tuning CDC sessions.

PowerCenter Connection Attributes for Tuning CDC Sessions

In PowerCenter, you can customize some attributes on the PWX CDC connections to tune CDC sessions.

The following table describes the connection attributes that you can optionally use for tuning:

Connection Option	Description	Tuning Suggestion
Compression	Controls whether to compress source data during the PowerCenter session. Default disables compression.	Do not use compression.
Encryption Type	Type of data encryption that PowerExchange uses. Default is None for no encryption.	Do not use encryption.

Connection Option	Description	Tuning Suggestion
Image Type	Indicates how PWXPC passes captured Updates to CDC sessions that extract and apply the updates to the target. Options are: - **AI**. Process Updates as Update operations. PWXPC passes each Update as a single Update record. An Update record includes after images of the data only, unless you add before image (BI) and change indicator (CI) fields to the extraction map that you import for the source definition for the CDC session. - **BA**. Process Updates as Deletes followed by Inserts. PWXPC passes each Update as a Delete record followed by an Insert record. The Delete record contains the before image of the data, and the Insert record contains the after image. Default is BA. If you specify AI, you can still use before images of the data, if available, in extraction processing. PWXPC can embed before-image data and after-image data in the same Update row. To embed before-image data, you must complete the following configuration tasks: - In the PowerExchange Navigator, add BI and CI fields to the extraction map that you plan to import for the source definition in PowerCenter. - If you use batch or continuous extraction mode, enter BA for the CAPT_IMAGE parameter in the PowerExchange Condense or PowerExchange Logger for Linux, UNIX, and Windows configuration file. This setting stores both before and after images in the PowerExchange Logger log files or PowerExchange Condense condense files. When CDC sessions run, they extract data from these files.	Set to AI.
UOW Count	The number of UOWs that PWXPC reads from the source before it flushes the data buffer to commit the change data to the targets. Default is 1.	To improve efficiency on the PowerCenter Integration Service machine and the target databases, increase this value to reduce commit processing.
Real-time Flush Latency in mill-seconds	The frequency, in milliseconds, with which PWXPC flushes the data buffer to commit the change data to the targets. Default is 0, which is equivalent to 2 seconds.	To improve efficiency on the PowerCenter Integration Service machine and the target databases, increase this value to reduce commit processing.
PWX Latency in seconds	Maximum time, in seconds, that the PowerExchange instance on the source waits for more change data before flushing data to PWXPC on the PowerCenter Integration Service machine. Default is 2.	Use the default value.

Connection Option	Description	Tuning Suggestion
Minimum Rows Per commit	Minimum number of change records that PowerExchange reads from the change stream before it passes any commit records to PWXPC. Default is 0, which means that PWXPC ignores this option.	If UOWs usually contain few changes, increase this value to increase the size of the UOWs. This practice can improve efficiency on the PowerCenter Integration Service machine and on the target databases by reducing commit processing.
Offload Processing	Controls whether PowerExchange uses CDC offload processing. Offload processing transfers resource-intensive column-level and UOW Cleanser processing from the source system to another system. Default is No.	If resource constraints exist on the source system and you need to increase CDC throughput, consider enabling offload processing.
Worker Threads	Controls whether PowerExchange uses multiple threads for resource-intensive, column-level extraction processing. You can use multithreading on the source system to process data from Linux, UNIX, or Windows data sources, or on another system for extraction processing when offload processing is in effect. Enable multithreading only when extractions appear to be CPU bound. Enter the number of threads that you want PowerExchange to use. Valid values are 1 through 64. Default is 0, which causes PowerExchange to not use multithreaded processing.	Enter a number greater than 0.
Array Size	If the **Worker Threads** value is greater than zero, indicates the size of the storage array, in number of records, for the threads. Valid values are 25 through 5000. Default is 25.	Informatica recommends that you use the default value of 25 unless you are able to test and determine that the extra memory that is allocated to a larger array size has been beneficial and has not degraded server performance. If you make these determinations, Informatica recommends that you use an array size of 500 to 1000 with offload and multithreaded processing enabled. **Attention:** If you enter a large array size value, have large records, or run many sessions that use multithreading concurrently, memory shortages might occur on the PowerCenter Integration Service machine.

For more information about PWX CDC connection attributes, see *PowerExchange Interfaces for PowerCenter*.

Tuning Commit Processing

To tune commit processing and performance of CDC sessions, you can adjust commitment control attributes on the PWX CDC application connection.

If the session log for a CDC session contains PWXPC flush messages followed by PowerCenter source-based commit messages, the session might be reading change data faster than the data is applied to the targets.

To try to resolve this issue, adjust the following commitment control attributes on the PWX CDC connection, based on the most prevalent type of flush message in the session log:

- If PWXPC_10081 flush messages are the most prevalent messages, try increasing the **UOW Count**.
- If PWXPC_10082 flush messages are the most prevalent messages, try increasing the **Real-time Flush Latency in milli-seconds**.

If PWXPC flushes change data too frequently, too many commitment control attributes might be specified on the PWX CDC connection. In this case, specify a single commitment control attribute and disable the other ones.

If the change stream contains many small UOWs, you can use the **Minimum Rows Per commit** option to create larger UOWs of more uniform size. PowerExchange and PWXPC can process a few large UOWs more efficiently than many small UOWs. By using the **Minimum Rows Per commit** option to increase the size of UOWs, you can improve CDC processing efficiency.

Also, performance of the target database can impact the performance of the CDC session. Contact your database administrator to verify that database access is optimal.

PowerCenter Session Properties for Tuning Buffer Memory

When you run a CDC session, the PowerCenter Data Transformation Manager (DTM) allocates buffer memory to the session based on the **DTM Buffer Size** value on the **Properties** tab of the session properties. The DTM divides the memory into buffer blocks based on the **Default Buffer Block Size** setting on the **Config Object** tab of the session properties.

If you suspect that buffer memory is insufficient, enable the collection of performance details in the CDC session. Then review the difference between the performance counters **4.1 Time in PowerExchange Processing** and **4.4 Elapsed Time**. If the elapsed time is much larger that the PowerExchange processing time, buffer memory constraints might exist. To improve performance of the CDC session, try adjusting the **DTM Buffer Size** and **Default Buffer Block Size** properties.

For optimal CDC performance, set these session properties to create a large number of small blocks. Informatica recommends the following settings:

- For the **DTM Buffer Size**, specify 128 MB, 256 MB, 512 MB, 1 GB, or 2 GB.
- For the **Default Buffer Block Size**, specify 32 KB.

Do *not* set these session properties to **auto**. The **auto** option creates a small number of large blocks, which can degrade CDC session performance. The **auto** option is intended for bulk data load processing.

CDC Offload Processing

CDC offload processing transfers column-level processing of change data from the PowerExchange Listener on the source system to the PowerExchange client on the PowerCenter Integration Service machine.

For data sources for which PowerExchange uses the UOW Cleanser (UOWC), offload processing also transfers UOWC processing to the PowerCenter Integration Service machine. These data sources include z/OS data sources and Db2 for i (i5/OS) sources.

Use offload processing when resources on the source system are constrained. In this situation, offload processing can help increase throughput for CDC sessions.

Related Topics:

- "Rules and Guidelines for CDC Offload Processing" on page 383
- "Enabling Offload Processing for CDC Sessions" on page 383
- "Example of CDC Offload Processing with a z/OS Source " on page 384

Rules and Guidelines for CDC Offload Processing

Before implementing CDC offload processing, review the following rules and guidelines:

- You must copy the appropriate source-specific CAPI_CONNECTION statements from the DBMOVER configuration file on the source system to the PowerCenter Integration Service machine.
- PowerExchange does not support CDC offload processing for capture registrations that you create from data maps that use any of the following options:
  - User access methods
  - User-defined fields that invoke programs by using the CALLPROG function
  - Record-level exits

Enabling Offload Processing for CDC Sessions

To use CDC offload processing, you must configure some PWX CDC connection attributes. Also, you must add the source-specific CAPI_CONNECTION statements to the DBMOVER configuration file on the PowerCenter Integration Service machine.

1. Configure the attributes for offload processing on the PWX CDC Real Time application connection for the CDC session.

   The following table describes these attributes:

Connection Attribute	Description
Location	Specifies the node name of the system on which the change data resides. This node name must match the name of a NODE statement in the dbmover.cfg configuration file on the PowerCenter Integration Service machine.
Offload Processing	Controls whether PowerExchange uses CDC offload processing. When offload processing is enabled, PowerExchange transfers column-level processing of the change data and any UOW Cleanser (UOWC) processing from the source system to the PowerCenter Integration Service machine. Options are: - **No**. Disables offload processing. - **Yes**. Enables offload processing. - **Auto**. PowerExchange determines whether to enable or disable offload processing. Default is No.
CAPI Connection Name	Specifies the name of the source CAPI_CONNECTION statement in the dbmover.cfg on the PowerCenter Integration Service machine.

2. Copy the source-specific CAPI_CONNECTION statements from the DBMOVER configuration file on the source system to the dbmover.cfg configuration file on the PowerCenter Integration Service machine.

   For z/OS data sources, copy CAPI_CONNECTION statements of the types LRAP and UOWC.

3. Remove all z/OS-specific parameters from the UOWC CAPI_CONNECTION statement in the dbmover.cfg file on the PowerCenter Integration Service machine.

Related Topics:

- "Example of CDC Offload Processing with a z/OS Source " on page 384
- "CDC Offload Processing" on page 382
- "Rules and Guidelines for CDC Offload Processing" on page 383

Example of CDC Offload Processing with a z/OS Source

In this example, you enable a CDC session with a PWX CDC Real Time connection to use offload processing for change data extraction from a data source on a z/OS system.

The source data remains on z/OS but all column-level and UOW Cleanser (UOWC) processing is offloaded to the PowerCenter Integration Service machine.

On the z/OS source system, the DBMOVER member in the RUNLIB library includes the following CAPI_CONNECTION statements:

```
CAPI_CONNECTION=(NAME=MV2UOWC,TYPE=(UOWC,CAPINAME=M2_LRAP,RSTRADV=600,MEMCACHE=20480,DATA
CLAS=UOWC))
```

```
CAPI_CONNECTION=(NAME=MV2_LRAP,TYPE=(LRAP,LOG=MV2L,AGENT=MV2A))
```

1. Copy the UOWC and LRAP CAPI_CONNECTION statements from the DBMOVER member on z/OS to the dbmover.cfg configuration file on the PowerCenter Integration Service machine.

   Remove z/OS-specific parameters, such as DATACLAS, from the UOWC CAPI_CONNECTION statement.

   This example uses the following CAPI_CONNECTION statements in the dbmover.cfg file on the PowerCenter Integration Service machine:

   ```
   CAPI_CONNECTION=(NAME=MV2UOWC,TYPE=(UOWC,CAPINAME=M2_LRAP,RSTRADV=600,MEMCACHE=20480)
   )
   ```

   ```
   CAPI_CONNECTION=(NAME=MV2_LRAP,TYPE=(LRAP,LOG=MV2L,AGENT=MV2A))
   ```

2. Stop the CDC session.
3. Update the following attributes on the PWX CDC Real Time application connection for the CDC session:
   - For the **Offload Processing** option, select **Yes**.
   - For the **CAPI Connection Name** attribute, enter the name of the UOWC CAPI_CONNECTION statement. In this example, the name is MV2UOWC.
4. Restart the CDC session.

Related Topics:

- "Enabling Offload Processing for CDC Sessions" on page 383
- "CDC Offload Processing" on page 382
- "Rules and Guidelines for CDC Offload Processing" on page 383

Multithreaded Processing

Multithreaded processing uses multiple worker threads to distribute resource-intensive, column-level processing across multiple CPUs. Use multithreading if a single CPU cannot optimally handle extraction processing.

By default, PWXPC uses a single thread to process change data on the PowerCenter Integration Service machine. When you enable multithreading, PWXPC uses multiple threads to process change records.

Rules and Guidelines for Multithreaded Processing

Multithreaded processing can help improve performance for CDC sessions in specific situations.

Use the following rule and guidelines to determine when multithreaded processing is useful and how to set the **Worker Threads** attribute:

- Use multithreaded processing when the PWX reader thread of a CDC session uses 100% of a single CPU on a multiple-CPU server on the PowerCenter Integration Service machine. In this situation, multithreading improves throughput by spreading PowerExchange processing across multiple threads. Otherwise, multithreading does not improve throughput.
- For optimal performance, verify that the value of the **Worker Threads** attribute does not exceed the number of installed or available processors on the PowerCenter Integration Service machine.
- When defining the PWX CDC application connection, you must either set the **Location** attribute to "local" to enable the extraction to access the source locally, or set the **Offload Processing** attribute to **Yes** to offload extraction processing.
- If processing slows or hangs for CDC sessions that use multiple worker threads, increase the MAXTASKS value in the DBMOVER configuration file to help improve performance.

Enabling Multithreaded Processing for CDC Sessions

To use multithreaded processing, you must configure some PWX CDC connection attributes.

The following table describes the PWX CDC Real Time application connection attributes that are required to enable multithreaded processing for a CDC session:

Connection Attribute	Description
Worker Threads	Specifies the number of threads that PowerExchange uses on the PowerCenter Integration Service machine to process change data. Default is 0.
Array Size	If the **Worker Threads** value is greater than zero, specifies the size of the storage array, in number of records, for each thread. Default is 25.

Using WLM Service Classes to Prioritize PowerExchange CDC Started Tasks on z/OS

The Workload Manager (WLM) is a z/OS component that dynamically manages workload requests for z/OS shared resources, such as storage, CPU, and I/O devices, across one or more z/OS images based on service classes that you define.

You define service classes by using IBM z/OS WLM tools, such as the WLM ISPF application. Each service class includes a goal and importance level, which prioritize work based on your business requirements. Because of the nature of PowerExchange CDC tasks, Informatica recommends that you use *execution velocity goals*. To achieve your performance goals for change data capture and delivery, work with your z/OS system programmer to assign the PowerExchange CDC started tasks or jobs to the appropriate service classes.

Assign each of the following types of PowerExchange started tasks or jobs to an appropriate service class:

- PowerExchange Listener
- PowerExchange Agent
- PowerExchange Logger for z/OS
- Post-Log Merge jobs
- PowerExchange ECCRs
- PowerExchange Condense

When determining the service class to use, consider the resource usage characteristics and performance goal for each task type.

PowerExchange Listener - Service Class Criteria

The PowerExchange Listener provides access to the captured change data that is in PowerExchange Logger for z/OS log files to the PowerCenter extraction workflows that process and deliver the change data.

For a PowerExchange Listener started task on z/OS that participates in CDC, determine the appropriate WLM service class to use based on the Listener resource usage characteristics and performance criteria in this topic. If you use the same PowerExchange Listener for bulk data movement, also see the topic on assigning a service class in the "Monitoring and Tuning" chapter of the *PowerExchange Bulk Data Movement Guide*.

A PowerExchange Listener that participates in CDC has the following resource usage characteristics:

- CPU usage is moderate. It depends on the volume and complexity of change data that the Listener is reading.

  Note: The use of offload processing reduces the CPU cycles for processing change data on the z/OS system by transferring some processing to the PowerCenter Integration Service machine. For more information, see "CDC Offload Processing" on page 382.
- I/O activity is moderate. It depends on the volume of change data that the Listener is reading.
- Virtual memory usage varies, depending on the number of concurrently active Listener subtasks. Each request to read change data is handled by a separate subtask.

The performance-related requirements for the PowerExchange Listener depend on the your change data delivery requirements, as follows:

- If you run PowerCenter Real Time CDC sessions that use continuous extraction mode and need to deliver change data to the target with minimum latency, assign the PowerExchange Listener and PowerExchange Logger for z/OS to the same service class. This service class configuration enables the PowerExchange Listener to keep up with the PowerExchange Logger processing of change data.
- If you run PowerCenter CDC sessions that periodically deliver change data in batch mode either from PowerExchange Logger log files or from condense files, assign the PowerExchange Listener to a service class that is used by batch jobs.

PowerExchange Agent - Service Class Criteria

The PowerExchange Agent provides system-level services to the other PowerExchange started tasks that are involved in CDC processing. The PowerExchange Agent runs as a started task in a separate address space.

When determining the WLM service class to use for the PowerExchange Agent, use the following criteria:

- The PowerExchange Agent has the following resource usage characteristics:
  - Very low CPU usage
  - Very low I/O activity
  - Very low virtual memory usage
  - Not affected by change capture activity
- Because the PowerExchange Agent performs work on behalf of the other PowerExchange CDC components, Informatica recommends that you assign it to a service class that has the same priority as the other CDC components or a higher priority than the other CDC components. Because the PowerExchange Agent has very low resource usage, consider running it in the service class SYSSTC.

PowerExchange Logger for z/OS - Service Class Criteria

The PowerExchange Logger for z/OS reads the captured change data from an in-memory buffer and moves the data to the Logger active log data set. The PowerExchange Logger also reads change data from its log files in response to requests from the PowerExchange Listener subtasks that service PowerCenter CDC workflows.

When determining the WLM service class to use for the PowerExchange Logger for z/OS, consider the PowerExchange Logger resource usage characteristics and performance requirements.

The PowerExchange Logger has the following resource usage characteristics:

- CPU usage is low to medium, depending on the volume of change data that is being captured and that is being read.
- I/O rates vary, depending on the volume of change data that is being captured and that is being read.
- Virtual memory usage varies, depending on the number and size of the PowerExchange Logger active log data sets.

The PowerExchange Logger performance requirements depend on the type of ECCRs that are sending change data to the Logger and your change data delivery requirements, as follows:

- For the IMS synchronous ECCR, CICS/VSAM ECCR, and Batch VSAM ECCR, the PowerExchange Logger must be assigned to a service class that the same priority as the processes that perform the changes (that is, the IMS region, CICS region, or address space of the batch job) or that has a higher priority than these processes. If the PowerExchange Logger uses a lower priority, it might delay the processes. For more information, see "Monitoring the PowerExchange Logger for z/OS" on page 71.

- For the log-based ECCRS that capture change data from online database log files asynchronously, the PowerExchange Logger performance requirements depend on your extraction requirements.
  - If you run PowerCenter Real Time CDC sessions that use continuous extraction mode and need to deliver captured change data to the target with minimum latency, assign the PowerExchange Logger and the database processes that perform the changes to the same service class. With this service class configuration, the PowerExchange Logger can keep up with these database processes.
  - If you run PowerCenter CDC sessions that extract change data in batch mode from either PowerExchange Logger log files or from condense files, assign the PowerExchange Logger to a service class that is used by batch jobs.

Post-Log Merge Jobs - Service Class Criteria

In an environment with multiple z/OS LPARs, processes on different LPARs can write changes to the same VSAM file or IMS database. To capture changes in this environment, you must run a PowerExchange Logger for z/OS on each LPAR. Also configure a Post-Log Merge job or started task to retrieve change data from these Loggers and then merge the changes in chronological order during extraction processing.

When determining the WLM service class to assign to Post-Log Merge jobs, consider the resource usage characteristics and performance requirements of these jobs.

Note: The service class of a Post-Log Merge job does not affect the performance of change capture processing but can affect the performance of PowerCenter extraction processing.

Post-Log Merge jobs have the following resource usage characteristics:

- CPU usage is low to medium, depending on the volume of change data that the PowerExchange Logger is capturing and the volume of change data this is being read from the PowerExchange Logger log files.
- Virtual memory use is low.

Post-Log Merge jobs have the following performance criteria, depending on the type of extraction processing:

- If you run PowerCenter Real Time CDC sessions that use continuous extraction mode and need to deliver captured change data to the target with minimum latency, assign the Post-Log Merge job to the same service class that is used by the processes that perform the changes on the source VSAM file or IMS database. With this service class configuration, the Post-Log Merge job can keep up with the database processes that are performing the changes.
- If you run PowerCenter CDC sessions that extract change data in batch mode, assign the Post-Log Merge job to a service class that is used by batch jobs.

PowerExchange ECCRs - Service Class Criteria

PowerExchange ECCRs capture changes that are made to sources registered for change data capture.

The IMS synchronous ECCR, CICS/VSAM ECCR, and Batch VSAM ECCR capture changes as they occur. Because they run within the IMS region, CICS region, or address space of the batch job that makes the changes, they use the WLM service class of the region or batch job. Other types of ECCRs run as separate started tasks or jobs that read changes from database log files. You can assign these log-based ECCRs to an appropriate WLM service class.

When determining the WLM service class to use for the PowerExchange log-based ECCRs, consider their resource usage characteristics and performance requirements.

The PowerExchange log-based ECCRs have the following resource usage characteristics:

- CPU usage is moderate. It depends on the volume of source database changes and the volume of change data that the ECCR is capturing.

- I/O activity is moderate. It depends on the volume of source database changes and the volume of change data that the ECCR is capturing.
- Virtual memory usage depends on the number of capture registrations.

The performance requirements for the PowerExchange log-based ECCRs depend on the type of ECCR and type of extraction, as follows:

- The DB2 for z/OS and Datacom table-based ECCRs can capture change data from the online database log files. For these ECCRs, the service class depends on your change data extraction requirements, as follows:
  - If you run PowerCenter Real Time CDC sessions that use continuous extraction mode and need to deliver captured change data to the target with minimum latency, assign the PowerExchange ECCR and the database processes that log the changes to the same service class. With this service class configuration, the PowerExchange ECCR can keep up with these database processes.
  - If you run PowerCenter CDC sessions that periodically extract change data in batch mode from either PowerExchange Logger log files or from condense files, assign the PowerExchange ECCR to a service class that is used by batch jobs.
- The Adabas, IMS log-based, and IDMS log-based ECCRs extract changes from archived database log files in asynchronous mode. PowerCenter CDC sessions that extract these changes run periodically. Assign these ECCRs to a service class that is used by batch jobs.

PowerExchange Condense - Service Class Criteria

PowerExchange Condense is an optional component that reads change data from PowerExchange Logger log files and writes the data to condense files. If multiple changes have been made to the same record, PowerExchange Condense reduces the volume of the change data by storing only the oldest before image and the latest after image of that record. PowerExchange Condense also re-sequences the change records into the transaction commit order and eliminates any change records that were rolled back.

When determining the WLM service class to assign to PowerExchange Condense, consider the PowerExchange Condense resource usage characteristics and performance requirements.

- PowerExchange Condense has the following resource usage characteristics:
  - CPU usage is moderate.
  - CPU usage depends on the volume of log data that PowerExchange Condense extracts from the PowerExchange Logger log files.
  - I/O rates vary, depending on the volume of change data that PowerExchange Condense extracts from the PowerExchange Logger log files.
  - Virtual memory usage depends on the number of capture registrations.
- Because PowerExchange Condense runs asynchronously, you can assign the PowerExchange Condense started task or job to a service class that is used by batch jobs.

CHAPTER 20

zIIP Exploitation

This chapter includes the following topic:

PowerExchange zIIP Exploitation

The IBM System z Integrated Information Processor (zIIP) is designed to help free up general computing capacity and lower the overall total cost of computing for certain data and transaction processing workloads on z/OS. The zIIP can execute any suitable workload provided that software is designed to run the workload on the zIIP.

If you have one or more zIIPs installed, you can configure the PowerExchange Listener on z/OS so that some of its work is offloaded to a zIIP. If multiple PowerExchange Listeners are running, you can configure each of them to offload work to a zIIP.

To be eligible to run on a zIIP, work must meet the following requirements:

- Run in a WorkLoad Manager enclave that is classified as being able to offload to a zIIP, also called a System Utility Processor (SUP)
- Run in an enclave System Request Block (SRB)

Programs that run in an SRB must meet the following requirements:

- Run in Supervisor state, key zero.
- Do not issue SVCs except for SVC 13 (ABEND).
- For subroutines, do not call another subroutine.

DBMOVER Statements for PowerExchange zIIP Exploitation

The following DBMOVER statements control zIIP configuration:

SUP_SSNAME=*subsystem_name*

Defines the subsystem name that identifies the PowerExchange Listener started task to the IBM Workload Manager for offloading work to a zIIP. If your system includes multiple Listeners, you can define a different name for each Listener. Enter a name of up to eight characters.

Default is PWXLSTNR.

SUP_SSTYPE=*subsystem_type*

Defines the name that the IBM Workload Manager uses as the subsystem type for the enclave SRB under which work is dispatched on the zIIP. Enter a name of up to four characters.

Default is PWX.

USESUP={N|Y}

Controls whether PowerExchange offloads zIIP-enabled PowerExchange Listener functions to a zIIP. Specify USESUP=Y to enable offloading to a zIIP.

WORKCLASS

Defines the transaction name for Workload Manager classification. Enter a name of up to eight characters.

Default is PWXWORK.

z/OS System Log Messages for PowerExchange zIIP Exploitation

PowerExchange issues messages to the z/OS system log to report the status of PowerExchange zIIP operations.

The message IDs have the following form:

```
PWXmmm34xxs
```

The string *mmm* represents the calling routine and might be helpful to Informatica Global Customer support if you receive an error message.

xx are the last two digits of the nessage number.

The code *s* is either I for an informational message or E for an error message.

Use these messages to determine whether zIIP configuration was successful, as follows:

- Informational messages indicate successful configuration. The absence of these messages might indicate that prerequisites for zIIP offloading were not satisfied. For more information, see "Configuring PowerExchange to Offload Work to a zIIP" on page 391.
- Error messages indicate an error condition that, in most cases, requires you to call Informatica Global Customer Support.
- Messages PWX*mmm*3412E and PWX*mmm*3414E indicate possible error conditions but might not require you to contact Informatica Global Customer Support if rc = 4.

For more information, See *PowerExchange Message Reference Volume 1*.

Configuring PowerExchange to Offload Work to a zIIP

Before you configure PowerExchange to offload work to a zIIP, verify that the following prerequisites are satisfied:

- The system callable services library SYS1.CSSLIB is available through the LNKLST contatenation or the LPALIB data set.
- The projected usage function (PROJECTCPU) in the IEAOPT*xx* member in the system PARMLIB is enabled. If you enable zIIP usage on a system without a zIIP, and PROJECTCPU is set to FALSE, the system does not project CPU usage as if a zIIP were present, and PowerExchange reports RC = 4 from IWM4EOCT. PowerExchange continues to run zIIP-enabled functions in SRB mode.
- All the libraries in the PowerExchange Listener STEPLIB concatenation are APF-authorised.

- The DBMOVER configuration member does not include any TRACE statements.

1. Include the USESUP=Y statement in the DBMOVER configuration file on z/OS, and optionally include the following statements:
    - SUP_SSNAME
    - SUP_SSTYPE
    - WORKCLASS
2. Add PWX to the IBM Workload Manager for z/OS (WLM):
    a. From the main menu of the WLM ISPF application, add **PWX** as a subsystem type, or specify whatever value you specified for the SUB_SSTYPE statement in the DBMOVER configuration member.

    b. For each PowerExchange Listener, add a work qualfier with a type of SI (system instance) to the list. The name must match the value in the DBMOVER SUP_SSNAME statement (default PWXLSTNR).

    c. Optionally, change the default transaction name by using the TN qualifier type. This value must match the value in the DBMOVER WORKCLASS statement (default PWXWORK).

    d. Check the job log to verify that zIIP enablement is successful.

    If zIIP enablement is successful, the z/OS system log includes informational messages such as the following ones:

```
PWXDSP3400I Checking number_of_entries entries in PCCA vector table...
PWXDSP3401I Cpu 00 Serial FF04EEC52098 Type CP   Rel. Speed 1
PWXDSP3401I Cpu 01 Serial FF04EEC52098 Type CP   Rel. Speed 1
PWXDSP3401I Cpu 06 Serial FF04EEC52098 Type zIIP Rel. Speed 1
PWXDSP3403I 1 Processor available for zIIP offload
PWXWCO3405I Connect to WLM Sub = PWX  Subn = GRAPWX   token = 140C2118
PWXWCF3409I Classify work to WLM Service class = 00238000
PWXWCE3411I WLM Create Enclave function = PWXFUNC  enclave token = 0000003C00000033
PWXWSE3415I WLM Set Rules tok = PWXR id = IWMOCT   ver = 00 cnt = 01 Dur = 1000000 Pct = 100
DTL-00607 Listener NODE1 VRM 9.5.0 Build DEV_BUILD started.
```

    If the job log does not include messages that indicate that zIIP was successfully enabled, verify that the prerequisites for zIIP enablement are satisfied. If not all libraries in the PowerExchange Listener STEPLIB concatenation are APF-authorized, or if the DBMOVER configuration member includes a TRACE statement, zIIP exploitation is disabled.

APPENDIX A

CDC for z/OS Troubleshooting

This appendix includes the following topics:

CDC for z/OS Troubleshooting Overview

This chapter provides general troubleshooting information to assist you when problems occur when you use PowerExchange.

If you cannot resolve the problem, contact Informatica Global Customer Support.

Verifying That Basic CDC Requirements Are Met

If PowerExchange is not capturing changes from a data source on z/OS, verify that the following requirements are met:

- ❑ The PowerExchange Agent is active.
- ❑ The PowerExchange Logger for z/OS is active and connected to the PowerExchange Agent.
- ❑ The ECCR for the data source is active.
- ❑ The ECCR is capturing change data.
  For DB2 for z/OS, IMS, and VSAM sources, check messages PWXEDM172808I and PWXEDM172809I to determine if change data capture is active for each registration and that the ECCR is capturing changes.
- ❑ For DB2 for z/OS sources, the source tables must be defined with the DATA CAPTURE CHANGES option.
- ❑ The capture registrations that you created for data sources in the PowerExchange Navigator are correct and active.
- ❑ The data source is being updated by an application.

Gathering Operating Environment Information

Before you contact Informatica Global Customer Support, gather information about the problem and your CDC environment for diagnostic use.

The following table identifies the information that you should gather, depending on your system characteristics:

System Characteristic	Required Information
Problem description and related output	Description of the problem. Message output. Description of your troubleshooting procedure.
Processor	CPU type.
z/OS operating system	z/OS operating system version, release, and maintenance level including APARs.
SMS use	Whether SMS is being used.
System security	Security product.
	Security package version and release.
PowerExchange version	PowerExchange product version, release, and any installed hotfix or EBF.
PowerExchange CDC source	Source database type, version and release, and any maintenance that is applied.
CDC target	Target operating system type, version and release, and any maintenance that is applied. The target operating system can be a Linux, UNIX, or Windows system or another z/OS system. Target database type, version and release, and any maintenance that is applied. The target can be a PowerCenter target.
PowerExchange Agent	A copy of all PowerExchange Agent output.
PowerExchange Logger for z/OS	A copy of all PowerExchange Logger output.
PowerCenter version	PowerCenter version, release, and any maintenance.

APPENDIX B

DTL__CAPXTIMESTAMP Time Stamps

This appendix includes the following topic:

Time Stamps That Are Reported in the DTL__CAPXTIMESTAMP Field by Data Source

The time stamp that PowerExchange reports in the generated DTL__CAPXTIMESTAMP field in change records depends on the data source type and on certain parameter settings.

For PowerExchange data sources on z/OS, the TIMESTAMP parameter in the UOWC CAPI_CONNECTION controls the type of time stamp that PowerExchange reports in the DTL__CAPXTIMESTAMP field. If you set the TIMESTAMP parameter to COMMIT, PowerExchange reports the time stamp of the transaction commit on the source for all changes in the transaction. If you use the default parameter value of LOG, PowerExchange retrieves the time stamp from the source database logs. In this case, the time stamp type depends on the source type.

The following table describes the time stamps that PowerExchange reports when you use the default value of LOG for the TIMESTAMP parameter:

Data Source Type	Time Stamp Type
Adabas	The HDDATE time stamp from the PLOG block header, which indicates when the block was written. **Note:** In Adabas environments with a low level of update activity, the same time stamp might be reported for multiple updates that occurred at different times.
Datacom table-based CDC	The Coordinated Universal Time (UTC) time or local time when the change record was written to the Datacom LXX log. The LOCAL_TIME parameter in the ECCR configuration member, ECCRDCMP, controls whether the UTC or local time is used.
Db2 for i (i5/OS)	An i5/OS journal time stamp that reflects when the change was recorded in the journal.
Db2 for z/OS	The time at which the DB2 ECCR captured the change data record. Each record in a UOW has a different time stamp. Usually, this time stamp is a UTC value that reflects the time zone of the DB2 for z/OS system.

Data Source Type	Time Stamp Type
IDMS	The time at which the change data record was written to the IDMS log file. This time stamp is equivalent to the storeclock (STCK) time stamp. It does not reflect the local time zone.
IMS log-based CDC	The time at which the change was recorded in the IMS logs.
IMS synchronous CDC	The time at which the change occurred.
Batch VSAM and CICS/VSAM	The time at which the change record was captured. Each record in a UOW has a different time stamp. Usually, this time stamp is a UTC value.

For other data sources that do not use the UOWC CAPI_CONNECTION statement, PowerExchange determines the appropriate time stamp to report in the DTL__CAPXTIMESTAMP field. For PowerExchange Express CDC for Oracle sources, the TIME_STAMP_MODE parameter in the OPTIONS statement of the Express CDC configuration file controls the time stamp type.

The following table describes the time stamp types that PowerExchange reports for these data sources:

Data Source Type	Time Stamp Type
Db2 on Linux, UNIX, or Windows	The time stamp of the transaction commit. This time stamp is an ascending virtual time stamp (VTS) of the Db2 system, which usually corresponds to the UTC value.
Microsoft SQL Server	The time at which the change was written to the distribution database.
MySQL	The time stamp of the change event that MySQL recorded in the binary log.
PowerExchange Express CDC for Oracle	The time stamp type is controlled by the TIME_STAMP_MODE parameter setting in the OPTIONS statement of the Express CDC configuration file. - If you use the default value of LOGTIME, PowerExchange reports the time stamp of the change on source database, as recorded in the redo logs. This time stamp reflects the local time zone. - If you specify COMMITTIME, PowerExchange reports the time stamp of the transaction commit on the source database. - If you specify BEGINTIME, PowerExchange reports the time stamp of the begin UOW log record.
PostgreSQL	The time of the transaction commit.

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