# IMS/DB CDC on z/OS Platforms

This section describes the Attunity IMS/DB CDC agent. It includes the following topics:

Overview

Functionality

Configuration Properties

Change Metadata

Transaction Support

Security

Data Types

Configuring the DFSFLGX0 Exit

Setting-up the IMS/DB CDC Agent in Attunity Studio

Troubleshooting

## Overview

The Attunity Stream CDC solution for IMS/DB captures changed IMS/DB segments that are passed to the DFSFLGX0 (LOGWRT) IMS user exit, and saves them in an MVS logstream. The IMS/DB CDC Agent polls the logstream for the changes.

Attunity supports two IMS LOGWRT exit modules in the <HLQ>.LOAD library: DFSFLGXS and DFSFLGX0. DFSFLGXS should be used with IMS/DB across multiple ZOS LPARS. Otherwise, DFSFLGX0 should be used.

Creating a CDC solution for IMS/DB is executed in Attunity Studio.

A staging area is used, enabling the elimination of uncommitted changes from being captured, and to reduce the number of the change events generated. For more information, see The Staging Area.

## Functionality

The Attunity Stream CDC IMS/DB Batch solution uses its own DFSFLGX0 IMS/DB exit routine for capturing the IMS/DB changes. If another DFSFLGX0 user exit is already used, the Attunity CDC solution cannot be implemented. The IMS/DB CDC agent supports the basic functionality for all CDC agents.

-Supported Versions

See the customer support section at www.attunity.com for the currently supported

IMS/DB versions.

## Configuration Properties

This section describes the configuration properties for the IMS/DB CDC agent. You can edit the properties using Attunity Studio. The IMS/DB CDC has the following types of properties:

* CDC Logger Properties
* CDC$PARM Properties
* CDC Agent Properties

### CDC Logger Properties

Logger Name: the name of the MVS logstream used for the data capture.

### CDC$PARM Properties

-CDC$PARM is the name of DD card that defines a QSAM data set or PDS member that

contains the parameters for a DFSFLGX0 user exit. For an explanation on how to create

this and its syntax see Creating and Configuring the CDC$PARM Data Set. The

following list describes the CDC$PARM properties:

BUFFER\_NUM: The logstream buffer number. The valid values are Default-30.

BUFFER\_SIZE: The logstream buffer size. The valid values are Default-22550 bytes.

DEBUG: If this is ON the debug information is printed using WTO. The default value is OFF.

LOGSTREAM: The logstream name. The default value for the DFSFLGX0 module is ATTUNITY.IMS.DCAPDATA. The default value for the DFSFLGXS module is ATTUNITY.IMS.DCAPSYST.

DATASHARING: Set this to ON when IMS is used in a SYSPLEX environment. In this case, the MVS Logger defined using the LOGSTREAM property should be created as the MVS System Logger on Coupling Facility. The default value is OFF for DFSFLGX0 and ON for DFSFLGXS.

### CDC Agent Properties

To edit the CDC agent properties, open the Attunity Studio Design perspective and find the binding for the CDC solution you created. The binding contains the name of the CDC solution with the suffix \_ag added to it. Open the adapter with the name of the solution and the suffix \_ag to edit the properties. For information on how to edit adapter properties in Attunity Studio, see Configuring Application Adapters.

The agent properties described below are configured if you want the CHECKPOINT to be sent to IMS/DB instance. If the checkpoint is not configured, the changes may be captured by DFSFLGX0 exit with a delay, if the IMS/DB Control Region executes a small amount of updates.

There are also additional properties that are common to all Attunity CDC agents. For a description of the common Attunity CDC agent properties, see Common CDC Agent Properties.

envImsBatch: When this property is set to true (the default), the IMS/DB CHECKPOINT command will not be issued. Set this property to false if you want the last changes in the IMS/DB REGION to be written to the MVS Logger. In this case, the agent sends the IMS/DB CHECKPOINT command using MCS or by replying to an IMS/DB DFS996I message.

checkPointFrequency: The frequency for issuing checkpoints. The default value is 60 (seconds). The smallest time frequency supported is 10 seconds.

consoleCheckPoint: Set to true to use and extended MCS console. If false a reply to WTOR is used. The default value is true.

imsJobName: IMS job name for the IMS/DB for which the WTOR reply to the message DFS996I should be sent. This must be provided if be provided if more than one IMS/DB instances run on a Z/OS box.

consoleCheckPointCommand: The command that should be sent to the MCS console. The default value is "/CHE."

returnLastContextOnIdle: If true, the precise machine timestamp is set as the last context if no relevant updates have occurred.

## Change Metadata

Changes are captured and maintained in a change table. The table contains the original table columns and CDC header columns. The header columns are described in the following table:

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Table 71–1 Header Columns

Column Name Description

context The record’s current context.

operation This column lists the operations available for the CDC agent.

The available operations are:

INSERT

DELETE

UPDATE

BEFOREIMAGE

COMMIT

ROLLBACK

transactionID The operation’s transaction ID.

tableName The name of the table where the change was made.

For INSERT, UPDATE, and BEFOREIMAGE operations, the

owner name and then the table name are displayed.

For COMMIT and ROLLBACK operations, this value is the same

as the OPERATION value.

timestamp The date and time of the occurrence.

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## Transaction Support

IMS/DB CDC supports transactions within IMS/DB transaction boundaries. However, no compensating records are available in the log in case of rollback.

## Security

The IMS/DB CDC adapter connects to the MVS logstream with an authorization level of READ. The DFSFLGX0 user exit connects to the logstream with an authorization level of WRITE. To determine the proper security authorizations see the MVS Auth Assm Services Reference ENF-IXG IBM manual.

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Notes:

To access a logstream in an application with a READ authorization level, set the READ access to RESOURCE(<logstream name>) in SAF class CLASS(LOGSTRM).

To update a logstream in a program with a WRITE authorization level, set the ALTER access to RESOURCE(<logstream name>) in SAF class CLASS(LOGSTRM).

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### Data Types

All data types supported by the IMS/DB data source are supported by the IMS/DB CDC solution.

## Configuring the DFSFLGX0 Exit

To use the DFSFLGX0 exit, carry out the following procedures:

MVS Logstream Creation

Creating and Configuring the CDC$PARM Data Set

Update the IMS Environment

Adjust the DBD for the Relevant Databases

### MVS Logstream Creation

A sample job for the creation of the DASD MVS logstream called ATTUNITY.IMS.DCAPDATA is supplied in the <HLQ>.USERLIB(LOGCRIMS) member. For additional information, see the MVS Setting Up a Sysplex IBM manual.

### Managing the MVS Logstream

The ATYLOGR program that is provided is used to manage MVS logstreams. It provides the following options:

Delete all events

Delete events to a specific timestamp

Print events between two timestamps

Print all events from the oldest to a selected timestamp

Print all events from the newest to a selected timestamp

Print all events

A sample job for managing MVS Logstreams called ATTUNITY.CDC.VSAMBTCH is supplied in the <HLQ>.USERLIB(RUNLOGR) member.

## Creating and Configuring the CDC$PARM Data Set

The CDC$PARM is the DD card name used for configuring the DFSFLGX0 exit. It can be any QSAM data set or member with the LRECL=80 definition. For example, you can build it as a member of the <HLQ>.USERLIB library.

The data set contains parameters, one parameter on a line, according to the follow syntax:

<parameter name>=<parameter value>

The parameters and their valid values are described in CDC$PARM Properties.

## Update the IMS Environment

If you use IMS Data Sharing, copy the supplied DFSFLGXS exit module from the Attunity supplied <HLQ>.LOAD library to the IMS SDFSRESL library and rename it to DFSFLGX0. Otherwise, copy the supplied DFSFLGX0 exit module.

If you need to change the default value of any CDC$PARM property, you must update the IMS Environment as follows:

1. Define the CDC$PARM data set and provide the required properties.

2. Add the CDC$PARM DD card to the IMS Control Region and batch jobs.

3. Restart the IMS Control Region.

Adjust the DBD for the Relevant Databases

You must do the following to adjust the DBD for the relevant databases:

Adjust the DBD for each IMS/DB database that is included in your CDC solution, defining the usage of DFSFLGX0 exit, by adding the following parameter to the DBD macro:

EXIT= (\*, KEY, NOPATH, DATA, LOG, (CASCADE, KEY, NODATA, NOPATH))

Note: The value NODATA in the cascade above indicates that no data is returned from non-key fields. If you delete a parent record, the child records are also deleted, but the data is returned only for the key field. In this case, the non-key fields for the child records are empty.

Recompile DBD and the corresponding PSB and ACB objects, then restart the IMS Control Region.

### Setting-up the IMS/DB CDC Agent in Attunity Studio

You set-up the IMS/DB CDC agent by creating a CDC solution in the Attunity Studio CDC Solution Perspective. Follow the directions for Creating a CDC Solution with Attunity Studio. The IMS/DB agent configuration uses the standard solution except for:

### Configuring the CDC Service

After you set up the IMS/DB CDC agent, follow the directions in Setting the envlmsBatch Property. This is done in the Attunity Studio Design perspective.

Before setting-up the IMS/DB CDC agent, make sure that:

The IMS system and logstream are properly configured, as described in Configuring the DFSFLGX0 Exit.

The security measures are implemented, as described in Security.

If you did not import the metadata while creating the CDC solution, see Setting the envlmsBatch Property.

### Configuring the CDC Service

For configuring the IMS/DB CDC service, carry out the following procedure.

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Note: When you set up an IMS/DB CDC solution, you must know

what type of IMS data source you are using.

For more information on using the IMS/DB DLI data source, see

Defining the IMS/DB DLI Data Source Connection.

For more information on using the IMS/DB DBCTL data source,

see, Defining the IMS/DB DBCTL Data Source Connection

For more information on using the IMS/DB DBDC data source,

see Configuring the IMS/DB DBDC Data Source

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To configure the CDC Service

1. In the CDC Solution perspective, click Implement.
2. Click the CDC Service link.

The CDC Service dialog box opens.

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Figure 71–1 CDC Logger Definition Window

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1. Under CDC Logging, select the CDC logging level:

None

internalCalls

Info

Debug

API

1. Under Stream Position, select one of the following:

now: The stream processor begins to process requests and return events from the time the stream position is set.

manual: The stream processor is paused and waits until a statement is sent to the Control Table to begin processing requests and returning events.

You can use the Attunity Query Tool to send the required query.

If you are using an event-based CDC solution, see Setting the Stream Position for infomation on how to manually set the stream position.

If you are using an SQL-based CDC solution, the information is found here:

Setting the Stream Position.

1. Under Change Capture Event Setting, select the Include a capture of before-image records check box if you want to include the before image information.
2. Under Logger name, enter the Logger Name and specify the name for the logger, as entered in the IMS system fix 80 file. This is configured when Configuring the DFSFLGX0 Exit. the default name for the logger is ATTUNITY.IMS.DCAPDATA. If you changed the name when configuring IMS, then enter the new name in this field.
3. Click Finish.

To set up the stream service, follow the instructions in Stream Service.

### Setting the envlmsBatch Property

If using IMS/DB DBDC or IMS/DB DBCTL data sources, then set the envImsBatch agent property to False to receive the latest changes to the data. Carry out this procedure in the Design perspective of Attunity Studio. Before you begin, make sure you are in the Design perspective.

To set the envImsBatch property to False

1. Expand the new binding created when you set up the IMS CDC solution and expand the Adapter, as shown in the following figure:

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Figure 71–2 The Configuration view

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1. Right-click the adapter for the change data capture, and select Edit Adapter.
2. Select the Properties tab from the adapter editor.
3. Change the value for the envImsBatch property to False, as shown in the following figure:

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Figure 71–3 The Adapter Properties tab

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1. Click the Save button in the toolbar to save the change.

### Working with Metadata

If you do not carry out a full import in the metadata as part of the CDC solution, you must make sure that the capturedTable->dbdName attribute is set explicitly in the table dbcommand if full import has not been done. You do this using the following Nav\_Util command:Nav\_Util edit table.

Edit the table, and set the dbdName attribute in the dbCommand element for each captured table.

To import the metadata from another source, click the Metadata link when Creating a CDC Solution with Attunity Studio. For more information on importing IMS metadata, see Setting Up IMS/DB Metadata.

## Troubleshooting

This section describes how to troubleshoot the IMS/CDC agent.

Review the following checklist:

Look for any errors in the IMS job.

Ensure a message similar to the following appears under the IMS:

DD JESYSMSG:

DFSFLGX0 Attunity CDC \*Active\*

Use the IMS RUNLOGR utility which is available at:

HLQ.USERLIB (RUNLOGR)

Where HLQ is the high-level qualifier where Attunity Server is installed, as shown in the following example:

//RUNLOGR JOB 'RR','TTT',MSGLEVEL=(1,1),CLASS=A,

// MSGCLASS=X,NOTIFY=&SYSUID,REGION=8M

//\*

//LOGR EXEC PGM=ATYLOGR,

//\*PARM=('/DEBUG ATTUNITY.IMS.DCAPDATA MAXLEN 1024 ',

// PARM=('/NAME ATTUNITY.IMS.DCAPDATA MAXLEN 1024 ',

// 'PRINT FROM 2005-03-13,02:13:57 TO 2007-10-27,02:38:23')

//\* 'DELETE ALL')

//\* 'DELETE TO 2004-10-28,02:17:11')

//\* 'DELETE TO YOUNGEST')

//\* 'PRINT FROM 2003-12-23,22:07:16 TO 2004-10-27,02:38:23')

//\* 'PRINT FROM OLDEST TO 2007-10-27,02:38:23')

//\* 'PRINT FROM 2004-10-27,02:51:57 TO YOUNGEST')

//\* 'PRINT FROM OLDEST TO YOUNGEST')

//STEPLIB DD DISP=SHR,DSN=TEST.AC4800.LOADCDCY

To use RUNLOGR, un-comment the option you want to use and submit the member. The following options are available:

* Delete all events.
* Delete events to a specific timestamp.
* Delete the newest events.
* Print all the events from the oldest to a specified timestamp.
* Print events between two timestamps.
* Print all the events from the newest to a specified timestamp.
* Print all the events.