



Informatica® Multidomain MDM
10.1 and later

Zero Downtime Upgrade Guide for IBM DB2

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Preface

Follow the instructions in the Informatica® *Multidomain MDM Zero Downtime Upgrade Guide* to upgrade Multidomain MDM in a zero downtime environment. Zero Downtime is an optionally licensed feature that enables you to minimize disruptions while you upgrade Multidomain MDM.

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CHAPTER 1

Introduction to Zero Downtime

This chapter includes the following topics:

- [Zero Downtime Overview, 7](#)
- [Prerequisites, 7](#)
- [Upgrade Process, 8](#)

Zero Downtime Overview

When you need to ensure uninterrupted access to master data, implement a zero downtime environment. In a zero downtime environment, you can maintain access to data in the MDM Hub Store while you upgrade Multidomain MDM. You need a source database in a production environment and a target database in a secondary environment. When the data changes in the source database, the changes are replicated to the target database.

When you need to upgrade Multidomain MDM, you make the target database active while you update the source database. After you finish updating Multidomain MDM, you can replicate the changes that occurred in the target database to the source database.

You use Oracle GoldenGate to configure and manage a zero downtime environment for Multidomain MDM. For more information about Oracle GoldenGate, visit the Oracle website.

Prerequisites

Before you begin, install the required software and set up the source database and target database environments. For more information, see the *Multidomain MDM Zero Downtime Installation Guide for IBM DB2*.

To perform the upgrade with zero downtime, you must be familiar with the upgrade procedures for the Hub Store, the Hub Server, and the Process Server. For more information, see the *Multidomain MDM Upgrade Guide* for your environment.

Upgrade Process

The upgrade process leads you through a series of steps to prepare to replicate changes that occur while you upgrade Multidomain MDM.

The upgrade process contains the following steps:

1. Prepare the environment.
2. Edit the sample scripts.
3. Upgrade the target system.
4. Make the target system the active environment.
5. Run backfill tasks.
6. Clean the environments.
7. Start replication on the target system.
8. Switch users to the target system.
9. Upgrade the source system.

CHAPTER 2

Replication

This chapter includes the following topics:

- [Prepare the Environment, 9](#)
- [Edit Scripts for IBM DB2 Database, 10](#)
- [Upgrade the Target System, 11](#)
- [Make the Target Database the Active Environment, 12](#)
- [Run Backfill Tasks, 14](#)
- [Clean the Environments, 15](#)
- [Start Replication on the Target System, 16](#)
- [Switch Users to the Target System, 16](#)
- [Upgrade the Source System, 16](#)

Prepare the Environment

From the passive environment, which begins as the target system, verify that your local machine can access the node and databases.

1. in the passive environment, verify that a node exists for the source database in the active environment.

```
db2 => list node directory
```

2. If the node that hosts the source database does not appear in the results, catalog a node.

For example, catalog a node called SRCNODE.

```
db2 => catalog tcpip node SRCNODE remote IP address server database port
```

3. Catalog the source database that resides on the node.

For example, catalog a database called SRCDB that resides on SRCNODE.

```
db2 => catalog db SRCDB as SRC1 at node SRCNODE
```

Note: If you have a database of the same name on your local machine, specify an alias for the source database by using the following format: db SRCDB as SRC1.

4. Verify that the catalog contains the source database on the node.

The following image shows the source database, which is correctly identified as a remote database.

```
db2 => list db directory
```

```
db2 -  
  
Database 2 entry:  
  
Database alias           =  
Database name           = SRCDB  
Node name               = SRCNODE  
Database release level  = d.00  
Comment                 =  
Directory entry type    = Remote  
Catalog database partition number = -1  
Alternate server hostname =  
Alternate server port number =
```

Edit Scripts for IBM DB2 Database

Multidomain MDM ships with sample scripts for the upgrade. Edit the scripts to replace the sample values with the values that you use in your environment.

If you did not install Zero Downtime and Oracle GoldenGate, ask the person who performed the installation for the values to use. The values might be in a planning document. For more information, see the planning section in the *Multidomain MDM Zero Downtime Installation Guide for IBM DB2*.

1. On the target system, navigate to the following directory:

```
<MDM installation directory>/database/db2/zdt/samples/TARGET/upgradeors
```

2. Open each of the following files in the `/TARGET/upgradeors` directory, edit the example values to match your system values, and save the files.

```
Z0_STOP_REPLICATION_REPLAY.db2
Z1_START_REPLICATION_REPLAY.db2
Z2_WAIT_REPLAY_CATCHUP.db2
Z3_DISABLE_ALL_BATCH.db2
Z4_ENABLE_ALL_WRITE_SIF_AT_TARGET.db2
Z5_SYNCHRONIZE_SEQUENCES.db2
Z6_DISABLE_ALL_WRITE_SIF_AT_SOURCE.db2
Z7_STOP_REPLICATION.db2
Z8_CM_DIRTY_IND_to_0.db2
Z9_ENABLE_ALL_BATCH.db2
ZA_STOP_AND_REMOVE_SRC.db2
ZA_STOP_AND_REMOVE_TGT.db2
ZB_17-218-19-20.db2
ZC_CONFIG_EVENT_QUEUE.db2
ZD_CONFIG_GGS_EXTRACT.db2
ZEA_PREPARE_BACKUP_AT_ENVB.db2
ZEB_RESTORE_ENVA.db2
ZF_INSTALL_ZDT_ENVA.db2
ZG_CONFIGURE_EVENT_QUEUE_ENVA.db2
ZH_CONFIGURE_SEQUENCES_ENVA.db2
ZI_CONFIGURE_REPLICAT_ENVA.db2
ZJ_START_ZDT_ENVA.db2
```

Upgrade the Target System

Stop the replication process on the target system and upgrade Multidomain MDM. While you upgrade the target system, Oracle GoldenGate keeps a record of the changes that occur in the source database.

Note: You must stop the processes before you upgrade so that the CMXZDT packages can be recompiled at the end of the upgrade.

1. On the target system, at a command prompt, navigate to the following directory:
`<MDM installation directory>/database/db2/zdt/samples/TARGET/upgradeors`
2. If any .log files exist in this directory from a previous upgrade, delete them.
3. Stop the replication process between the source system and the target system by running the following script:

```
.../upgradeors > db2 -tvf Z0_STOP_REPLICATION_REPLAY.db2
```

The processes stop and the `ACTIVE_UPGRADE_IND` property is set to 1. You can verify that the processes are stopped by using the **Oracle GoldenGate Command Interface for DB2** on both systems.

Type `info all`. On the target system, the REPLICAT groups R_ENVB and R_ENVBU are stopped. On the source system, the EXTRACT groups E_ENVA and P_ENVA are running.

4. Upgrade Multidomain MDM software on the target system. For instructions, see the *Multidomain MDM Upgrade Guide* for your environment.
5. If the upgrade process adds new columns or tables, you must map them before restarting the replication processes.
 - a. Delete the checkpoint tables and replicats.
 - Drop the GGS_CHECKPOINT and GGS_CHECKPOINT_LOX tables
 - Delete all the REPLICATE processes on the target where the process name starts with R_*
 - b. For each changed base object, disable mapping by running the following command:

```
CALL CMXZDT.DISABLE_BO_REPLICATION('<C_BO_NAME>')
```

where C_BO_NAME is the name of a changed base object table.
 - c. Delete the checkpoint tables and replicats again.
 - Drop the GGS_CHECKPOINT and GGS_CHECKPOINT_LOX tables
 - Delete all the REPLICATE processes on the target where the process name starts with R_*
 - d. Remap the cross-reference table by running the following command:

```
CALL CMXZDT.remap_table_replication('C_BO_NAME_XREF','C_BO_NEWNAME_XREF')
```

where C_BO_NAME_XREF is the name of the cross-reference table associated with a changed base object, and C_BO_NEWNAME_XREF is the name of another cross-reference table.
6. If you are upgrading the ORS schema and the MDM Hub is changing data or reloading data during the upgrade, start the reload of data to the base object table from the cross-reference table.

Make the Target Database the Active Environment

After you upgrade Multidomain MDM on the target system, you need to restart the stopped replication processes, catch up with changes that occurred in the source database, and then make the target system the active environment.

Run the scripts in the specified order. To monitor the progress of the scripts, open the `cmx_debug_TGTDB.log` file. You can verify that the scripts end successfully in the log file or in the command prompt window.

1. Start the replication processes by running the following script:

```
.../upgradeors > db2 -tvf Z1_START_REPLICATION_REPLAY.db2
```

2. Catch up with changes by running the following script:

```
.../upgradeors > db2 -tvf Z2_WAIT_REPLAY_CATCHUP.db2
```

Oracle GoldenGate copies all changes that were not yet replicated from the source database to the target database. To monitor the progress, open the `cmx_debug_TGTDB.log` file. The process ends when the last event in the event queue is handled.

3. After the replication process ends, disable all batch jobs on the source database by running the following script:

```
.../upgradeors > db2 -tvf Z3_DISABLE_ALL_BATCH.db2
```

In the source database, the BATCH_DISABLED_IND property is set to 1 in the C_REPOS_ZDT_STATUS table.

4. Allow SIF calls to write to the target database by running the following script:

```
.../upgradeors > db2 -tvf Z4_ENABLE_ALL_WRITE_SIF_AT_TARGET.db2
```

In the target database, the WRITE_SIF_API_DISABLED_IND property is set to 0 in the C_REPOS_ZDT_STATUS table.

5. Synchronize sequences by running the following script:

```
.../upgradeors > db2 -tvf Z5_SYNCHRONIZE_SEQUENCES.db2
```

The sequence values on the target database are set to a higher value than the last sequence value on the source database.

6. Prevent SIF calls from writing to the source database by running the following script:

```
.../upgradeors > db2 -tvf Z6_DISABLE_ALL_WRITE_SIF_AT_SOURCE.db2
```

In the source database, the WRITE_SIF_API_DISABLED_IND property is set to 1 in the C_REPOS_ZDT_STATUS table.

7. Stop the replication process between the source system and the target systems by running the following script:

```
.../upgradeors > db2 -tvf Z7_STOP_REPLICATION.db2
```

You can verify that the processes are stopped by using the **Oracle GoldenGate Command Interface for DB2** on both systems. Type `info all`. On the target system, the REPLICAT groups R_ENVB and R_ENVBV are stopped. On the source system, the EXTRACT groups E_ENVA and P_ENVA are stopped.

8. Update the base object tables in the target database by running the following script:

```
.../upgradeors > db2 -tvf Z8_CM_DIRTY_IND_to_0.db2
```

In the target database, the CM_DIRTY_IND property is set to 0 in the base object tables.

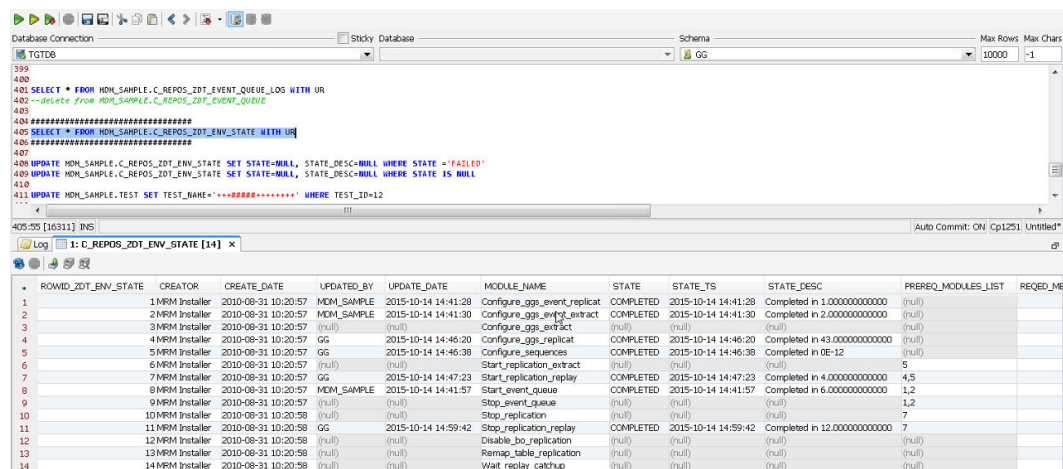
9. Enable batch jobs in the target database by running the following script:

```
.../upgradeors > db2 -tvf Z9_ENABLE_ALL_BATCH.db2
```

10. Apply custom moving scripts.

The C_REPOS_ZDT_ENV_STATE table contains the scripts, when the script ran last, and the status of each script.

The following image shows the table with some scripts completed.



ROWID	ZDT_ENV_STATE	CREATOR	CREATE_DATE	UPDATED_BY	UPDATE_DATE	MODULE_NAME	STATE	STATE_TS	STATE_DESC	PREREQ_MODULES_LIST	REQD_MSE
1		1 MRM Installer	2010-08-31 10:20:57	MDM_SAMPLE	2015-10-14 14:41:28	Configure_ggs_event_replicat	COMPLETED	2015-10-14 14:41:28	Completed in 1.00000000000000	(null)	
2		2 MRM Installer	2010-08-31 10:20:57	MDM_SAMPLE	2015-10-14 14:41:30	Configure_ggs_envtp_extract	COMPLETED	2015-10-14 14:41:30	Completed in 2.00000000000000	(null)	
3		3 MRM Installer	2010-08-31 10:20:57	(null)	(null)	Configure_ggs_envtp_extract	(null)	(null)	(null)	(null)	
4		4 MRM Installer	2010-08-31 10:20:57	GG	2015-10-14 14:46:20	Configure_ggs_replicat	COMPLETED	2015-10-14 14:46:20	Completed in 43.00000000000000	(null)	
5		5 MRM Installer	2010-08-31 10:20:57	GG	2015-10-14 14:46:38	Configure_sequences	COMPLETED	2015-10-14 14:46:38	Completed in 0E-12	(null)	
6		6 MRM Installer	2010-08-31 10:20:57	(null)	(null)	Start_replication_extract	(null)	(null)	(null)	5	
7		7 MRM Installer	2010-08-31 10:20:57	GG	2015-10-14 14:47:23	Start_replication_replay	COMPLETED	2015-10-14 14:47:23	Completed in 4.00000000000000	4,5	
8		8 MRM Installer	2010-08-31 10:20:57	MDM_SAMPLE	2015-10-14 14:41:57	Start_event_queue	COMPLETED	2015-10-14 14:41:57	Completed in 6.00000000000000	1,2	
9		9 MRM Installer	2010-08-31 10:20:57	(null)	(null)	Stop_event_queue	(null)	(null)	(null)	1,2	
10		10 MRM Installer	2010-08-31 10:20:58	(null)	(null)	Stop_replication	(null)	(null)	(null)	7	
11		11 MRM Installer	2010-08-31 10:20:58	GG	2015-10-14 14:59:42	Stop_replication_replay	COMPLETED	2015-10-14 14:59:42	Completed in 12.00000000000000	7	
12		12 MRM Installer	2010-08-31 10:20:58	(null)	(null)	Disable_bjo_replication	(null)	(null)	(null)	(null)	
13		13 MRM Installer	2010-08-31 10:20:58	(null)	(null)	Remap_table_replication	(null)	(null)	(null)	(null)	
14		14 MRM Installer	2010-08-31 10:20:58	(null)	(null)	Wait_replay_catchup	(null)	(null)	(null)	(null)	

Run Backfill Tasks

Clean up obsolete objects, set trust for the backfill tasks, and then run the backfill tasks.

Note: The zero downtime process does not replicate the backfill table C_REPOS_ZDT_BACKFILL_TASK. You must perform this step manually.

1. Clean up obsolete objects by running the following command:

```
CALL CMXZDT.CLEANUP_OBSOLETE_OBJECTS(?,?)
```

2. If you are upgrading the Operational Reference Store schema or applying an Multidomain MDM HotFix or Emergency Bug Fix (EBF), populate the backfill table C_REPOS_ZDT_BACKFILL_TASK for base objects to indicate that trust backfill is required for this upgrade.

For example, the following command shows how to set a trust backfill for the base object table C_CUSTOMER that affects write and read activities and that has a sequence of one:

```
CALL CMXZDT.add_backfill_task('TRUST_BACKFILL', 'C_CUSTOMER','B', 1)
```

In the command, use the data in the repository metadata.

3. Run the backfill batch job for each base object. You can run the batch backfill job from the Hub Console or by using a SIF API.

To run the backfill batch job from the MDM Hub Console, use the Batch Viewer tool.

- a. In the MDM Hub Console, open the Batch Viewer tool.
- b. From the Batch Viewer navigation pane, select the base object that you want to backfill.
If the backfill batch job does not appear in the batch viewer for the base object, select **Batch Viewer** > **Refresh**.
- c. To backfill only dirty records, enable the **For dirty records only** check box.
- d. Run the backfill batch job.

To run the backfill batch job from a soap request, use a SIF API.

- a. Ensure the MDM Hub Server is running.
- b. Specify the scope of the backfill batch job.
 - To backfill all base objects, use `ExecuteBatchBackfillAll`.
 - To backfill a single base object, use `ExecuteBatchBackfill` and specify the base object table name.
- c. Specify if you want to backfill all records or only dirty records.
 - To run the backfill on all records, set the `dirtyOnlyInd` parameter to `false`. Default is `false`.
 - To run the backfill on dirty records only, set the `dirtyOnlyInd` parameter to `true`.
- d. Comment out the `rowidObjectTable` element in the request.

For example, the following code sample shows an `ExecuteBatchBackfill` request to backfill the dirty records in the C_BO_TRUST base object table:

```
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:urn="urn:siperian.api">
  <soapenv:Header/>
  <soapenv:Body>
    <urn:ExecuteBatchBackfill>
      <urn:username>jsmith</urn:username>
      <urn:password>
        <urn:password>password</urn:password>
      </urn:password>
      <urn:orsId>localhost-SRCDB-MDM_SAMPLE</urn:orsId>
      <urn:asynchronousOptions>
        <urn:isAsynchronous>>false</urn:isAsynchronous>
      </urn:asynchronousOptions>
    </urn:ExecuteBatchBackfill>
  </soapenv:Body>
</soapenv:Envelope>
```

```

        </urn:asynchronousOptions>
        <urn:tableName>C_BO_TRUST</urn:tableName>
        <!--urn:rowidObjectTable?</urn:rowidObjectTable-->
        <urn:dirtyOnlyInd>false</urn:dirtyOnlyInd>
    </urn:ExecuteBatchBackfill>
</soapenv:Body>
</soapenv:Envelope>

```

4. If you are upgrading the ORS schema and the MDM Hub is changing data or reloading data during the upgrade, start the reload of data to the base object table from the cross-reference table.

Clean the Environments

You must remove process artifacts that are related to Oracle GoldenGate from the systems. If any items remain, errors occur when you install and start the event queue and the replication processes.

1. Clean the environment on the source system by running the following script:

```
.../upgradeors > db2 -tvf ZA_STOP_AND_REMOVE_SRC.db2
```

2. Clean the environment on the target system by running the following script:

```
.../upgradeors > db2 -tvf ZA_STOP_AND_REMOVE_TGT.db2
```

3. Run the following script:

```
.../upgradeors > db2 -tvf ZB_17-18-19-20.db2
```

4. Verify that the Oracle GoldenGate environment is clean on the source system and the target system.

From a command prompt, navigate to the Oracle GoldenGate installation directory, and check the following directories:

- `dirchk`. Verify that the directory is empty.
- `dirdat`. Verify that the directory is empty.
- `dirprm`. Verify that `mgr.prm` is the only file in this directory.
- `dirrpt`. Verify that `mgr.rpt` is the only file in this directory.

5. Verify that the Oracle GoldenGate checkpoint tables are dropped from the target database and the source database.

In a database tool, log in to each database and verify that the following tables were dropped from the Operational Reference Store schemas:

- `GGS_EVENT_CHECKPOINT`
- `GGS_EVENT_CHECKPOINT_LOX`
- `GGS_CHECKPOINT`
- `GGS_CHECKPOINT_LOX`

6. Verify that the log files are removed from the source database and the target database.

From a command prompt, navigate to the database directory, and check the following directories:

- `ARCHIVELOGS`. Verify that the directory is empty.
- `LOGS`. Verify that the directory is empty.

Start Replication on the Target System

The target system is now the active environment. Set up Oracle GoldenGate to record changes that occur in the target database while you upgrade software on the source system.

1. On the active target system, install and start the event queue by running the following script:

```
.../upgradeors > db2 -tvf ZC_CONFIG_EVENT_QUEUE.db2
```

You can verify that the processes are running by using the **Oracle GoldenGate Command Interface for DB2**. Type `info all`. On the target system, the EXTRACT groups EQENVB and PQENVB are running, and the REPLICAT group RQENVB is also running.

2. Configure the main extract and pump processes by running the following script:

```
.../upgradeors > db2 -tvf ZD_CONFIG_GGS_EXTRACT.db2
```

A .def file is created in the dirprm directory. The file has the same name as the schema for the Operational Reference Store, and contains the table definitions. You can open this file and watch as the table definitions are added. When `End of definition` appears, the file is complete and the processes are started. You can verify that the processes are running by using the **Oracle GoldenGate Command Interface for DB2**. Type `info all`. On the target system, the EXTRACT groups E_ENVB and P_ENVB are running.

Switch Users to the Target System

Redirect users to the target system.

Upgrade the Source System

At this point, the target system is the active environment and the source system is the passive environment. Back up the target database and restore it to the source system. Upgrade Multidomain MDM. Set up Oracle GoldenGate to send changes from the active target database to the passive source database.

1. Back up the target database.
2. Copy the backup of the target database to the source system, and restore the backup.

```
.../upgradeors > db2 -tvf ZEB_RESTORE_ENVA.db2
```

The restored database does not include the stored procedures.

3. Update the stored procedures.
 - a. Navigate to the following directory: `<MDM installation directory>/resources/database/db2/zdt`
 - b. Run the following script: `db2_zdt_install.bat`
 - c. At the prompts, enter values for the source database.

4. Identify the source system as the passive environment by running the following script:

```
.../upgradeors > db2 -tvf ZF_INSTALL_ZDT_ENVA.db2.db2
```

The table C_REPOS_ZDT_STATUS is updated. The REPLICATION_TARGET_ID is set to 1.

5. On the source system, upgrade Multidomain MDM. For instructions, see the *Multidomain MDM Upgrade Guide* for your environment.

6. Install and start the event queue on the source system by running the following script:

```
.../upgradeors > db2 -tvf ZG_CONFIGURE_EVENT_QUEUE_ENVA.db2
```

You can verify that the processes are running by using the **Oracle GoldenGate Command Interface for DB2** on the source system. Type `info all`. The EXTRACT groups EQENVA and PQENVA are running, and the REPLICAT group RQENVA is also running.

7. Synchronize sequences by running the following script:

```
.../upgradeors > db2 -tvf ZH_CONFIGURE_SEQUENCES_ENVA.db2
```

8. Install the event queue on the source system by running the following script:

```
.../upgradeors > db2 -tvf ZI_CONFIGURE_REPLICAT_ENVA.db2
```

You can verify that the processes are running by using the **Oracle GoldenGate Command Interface for DB2** on the passive source system. Type `info all`. The REPLICAT groups R_ENVA and R_ENVAU are installed but stopped.

9. Start the event queue on the source system by running the following script:

```
.../upgradeors > db2 -tvf ZJ_START_ZDT_ENVA.db2
```

The REPLICAT groups R_ENVA and R_ENVAU are running.