Informatica® Multidomain MDM
10.4 HotFix 1

Zero Downtime Installation Guide for Oracle

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10.4 HotFix 1
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Preface

Follow the instructions in the Informatica® *Multidomain MDM Zero Downtime Installation Guide* to set up a zero downtime environment for Multidomain MDM. Zero Downtime is an optionally licensed feature that enables you to minimize disruptions while you upgrade Multidomain MDM. In addition to the installation steps, the guide also includes pre-installation and post-installation requirements.

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CHAPTER 1

Configure Zero Downtime

This chapter includes the following topics:

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. 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.

Zero Downtime Replication with Two Systems

When an organization maintains parallel environments, you run Multidomain MDM on two systems. Data is replicated from the source system to the target system.

The following image shows an example of a source system and a target system:
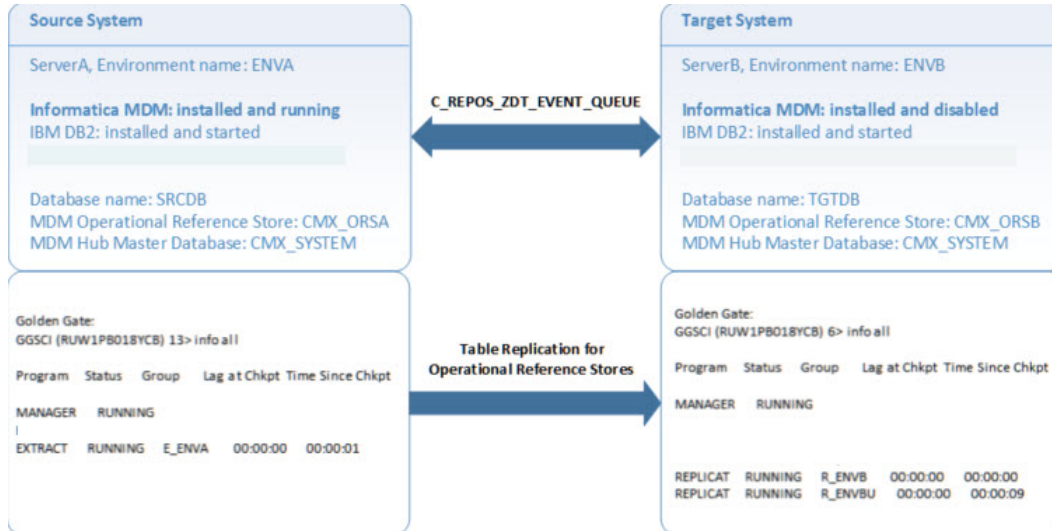
You can install Oracle GoldenGate on the source system or target system hosts. However, it is recommended to install Oracle GoldenGate on a separate host.

The name of the MDM Hub Master Database can be different. The Operational Reference Store schema or user name can be different, but the structure of the schemas and primary key values of the MDM metadata table `C_REPOS_SYSTEM` must be identical.

Oracle GoldenGate replicates the tables in Operational Reference Store, from the source system to the target system.

Other Replication Scenarios

Other types of replications scenarios are possible.

Replication of multiple Operational Reference Store schemas

If you have multiple Operational Reference Store (ORS) schemas within the same Oracle instance, each ORS requires its own set of Oracle GoldenGate processes. Set up the processes for each additional ORS schema in the same way that you set up the first schema.

Replication of schemas that are not ORS schemas

You can replicate other types of schemas by using Oracle GoldenGate. Follow the Oracle GoldenGate documentation to set up replication processes for these schemas.

Replication of non-Informatica tables within the ORS schema

Tables that are not natively part of an ORS are not replicated through Zero Downtime. Follow the Oracle GoldenGate documentation to set up replication processes for these tables.

Review the Requirements

Install the required software on the source system and on the target system. Ensure that you install the same versions of the required software on both systems.

You need the following software:

- Multidomain MDM version 10.4 HotFix 1 or later with a supported version of Oracle database.
- Microsoft Visual C++ 2005 Redistributable Package (x86) installed as administrator: http://www.microsoft.com/en-us/download/details.aspx?id=3387
- Oracle GoldenGate for Oracle *release*, where *release* matches the installed version of Oracle database, downloaded from: http://www.oracle.com/technetwork/middleware/goldengate/downloads/index.html

  Important: To verify which versions of Oracle database and Oracle GoldenGate were supported for your version of Multidomain MDM, see the Product Availability Matrix for the Multidomain MDM version.

  The following table summarizes some of the tested combinations:

Multidomain MDM Version	Oracle GoldenGate Version
9.7.1 HotFix 7	12.1.2.1
10.0 and 10.1	11.2.1.0.18
10.2	12.1.2.1
10.3	12.3.0.1
10.3 HotFix 1	12.3.0.1 or 18.1.0.0.0*
10.4 HotFix 1	12.3.0.14 or 18.1*

* This version requires that you grant DBA privileges to the GGUser.

Port Numbers Used by Oracle GoldenGate

When the source database and target database reside on different servers, you must open the ports that are used by Oracle GoldenGate. You need one port for Oracle GoldenGate Manager plus one port for each process you run.

For Zero Downtime, you run Oracle GoldenGate Manager and five processes in each environment. Therefore, you need six open ports on the active environment and six open ports on the passive environment. By default, the Oracle GoldenGate port range is 7809-7820.

For information about specifying ports for remote network communications, see the following topics in the *Oracle® GoldenGate Administering Oracle GoldenGate for Windows and UNIX*:

- Maintaining Ports for Remote Connections through Firewalls: https://docs.oracle.com/goldengate/1212/gg-winux/GWUAD/wu_manager.htm#GWUAD142
- Creating the Manager Parameter File: https://docs.oracle.com/goldengate/1212/gg-winux/GWUAD/wu_manager.htm#GWUAD145

CHAPTER 2

Prepare the Environment for Oracle Databases

This chapter includes the following topics:

Ensure the Source and Target Schemas are Identical

Back up the Oracle source database that contains the MDM Hub Store. Then copy and restore the backup on the target database. When you are finished, the target database has the same tablespaces as the source database.

Important: During the upgrade, you must drop the source schema, re-create it from the target schema, and then import the database dump file. Do not attempt to bypass this process by applying a change list, because the schemas must be exactly the same in both databases for the replication to work. To avoid making inadvertent changes, enable Production Mode on the source and target databases. Log in to the Hub Console, select the Databases tool, select the database, and enable Production Mode. In future, if you need to apply a change list to the target database, you can disable Production Mode and apply the change list.

Edit the Samples

This guide contains sample code and scripts. To use the samples, copy the samples and substitute your own values. The samples use the forward slash in paths. Ensure that you use the file path separator that works with your operating system.

Install Zero Downtime

Install the Zero Downtime (ZDT) utility on the same host where you will run the GoldenGate and ZDT processes.

Install Informatica MDM Zero Downtime

You can install MDM ZDT on a separate host or on the source or target system. The ZDT installation process installs the Oracle GoldenGate command files. The command files contain a list of commands that you can use with the Oracle GoldenGate Software Command Interface (GCSCI).

1. In the command prompt, navigate to the following directory:

    ```
    <MDM Hub installation directory>/hub/server/resources/zdt
    ```

2. Extract the `zdt.zip` file to a local directory.

3. In the command prompt, go to the following directory:

    ```
    <Extracted zdt.zip files>/zdt_utility/bin
    ```

4. To install MDM ZDT, enter the following command:

    ```
    sip_ant.bat install_utility
    ```

5. To generate and validate the Oracle GoldenGate command files, enter the following command:

    ```
    sip_ant.bat generate_zdt
    ```

Install Oracle GoldenGate

Install Oracle GoldenGate on the source system and the target system.

Note: For system requirements and alternative installation instructions, see the Oracle GoldenGate documentation on the Oracle website.

1. Copy the downloaded Oracle GoldenGate .zip file to the system.

2. Extract the .zip file to a local directory named `GGS`.

3. Verify that the following system environment variables are set to the Oracle instance that you use with Informatica MDM: ORACLE_HOME and ORACLE_SID.

4. From a command prompt, navigate to the `GGS` directory.

5. **Windows only**. Enter the following command: `INSTALL ADDSERVICE ADDEVENTS`

    ```
    D:\GGS>INSTALL ADDSERVICE ADDEVENTS
    GoldenGate messages installed successfully.
    Service 'GGSMGR' created.
    Install program terminated normally.
    ```

6. Start the Oracle GoldenGate Command Interpreter:

    ```
    GGS> GGSCI
    ```

7. Create the subdirectories.

    ```
    GGSCI> CREATE SUBDIRS
    ```

The following directories appear under the `GGS` directory:

Directory Name	Contains
`dirprm`	Parameter files
`dirrpt`	Report files
`dirchk`	Checkpoint files
`dirpcs`	Process status files
`dirsql`	SQL script files
`dirdef`	Database definition files
`dirdat`	Extract data files
`dirtmp`	Temporary files
`dirout`	Stdout files

Start the GoldenGate Manager

Start the GoldenGate Manager on the source system and the target system.

1. At a command prompt, create the parameter file.

    ```
    GGSCI> EDIT PARAMS MGR
    ```

2. If you are prompted to create a new file `mgr.prm`, click **Yes**.

3. In the file, add `PORT` *port_number*, where *port_number* is the port that GoldenGate Manager uses. Save the file.

4. Start the GoldenGate Manager.

    ```
    GGSCI> START MGR
    ```

5. Verify the port used by the GoldenGate Manager.

    ```
    GGSCI> INFO MGR
    ```

    A message confirms that the GoldenGate Manager is running with the port number that you assigned in the `mgr.prm` file.

    Note: For all subsequent steps, the GoldenGate Manager must be running.

Prepare the Oracle Databases

Use Oracle SQL*Plus (`sqlplus`) to run the SQL scripts and the wrapped source code files. Prepare the databases on the source and target systems. Before you begin, ensure that you open the ports that Oracle GoldenGate requires, and the source and target schemas are the same.

Configure the Oracle databases with directory permissions, and then enable replication and logging on the databases. From the Hub Console, enable ZDT on the source and target schemas. A DBA must grant execute permissions to the GoldenGate user on both the source and target systems. Do not insert or update data in either database until you finish installing and configuring ZDT successfully.

Tip: If you must update GoldenGate Manager data in the source database while installing ZDT, use system change number (SCN) during the data export. Oracle GoldenGate can use the SCNs to replicate the changes after the installation is complete. For more information, see the Oracle GoldenGate documentation.

1. As the SYSDBA user, enable replication on the source and target databases.

   ```
   ALTER SYSTEM SET enable_goldengate_replication=true;
   ```

2. Open the repository database `C_REPOS_DATABASE`, and set the `GLOBAL_NOLOGGING_IND` to `0` on the source and target databases.

3. As the schema user, enable logging for all tables in the schema. Repeat on both databases.

   a. Create a `nologging.sql` file in the current directory.

   b. In the command prompt, enter the following command:

      ```
      spool nologging.sql
      set pagesize 5000
      select 'ALTER TABLE ' || TABLE_NAME || ' LOGGING;' from user_tables where
      LOGGING != 'YES' and TABLE_NAME like 'C^_%' ESCAPE '^';
      exit
      ```

   c. After the script completes its run, open the `nologging.sql` file, remove headers, and save.

   d. At an sqlplus prompt, log in to the schema as the ORS user and run the edited `nologging.sql` file.

      ```
      SQL> @nologgging.sql
      ```

   e. For each base object in `C_REPOS_TABLE`, set the `NOLOGGING_IND` indicator to `0`. Repeat on both databases.

      Note: Exclude all table names ending with _STRP. The _STRP tables must have `NOLOGGING_IND` set to `1` for the metadata validation to succeed.

      For example, replace `C_REPOS_TABLE` in the following sample script with the name of a base object and run the script:

      ```
      UPDATE C_REPOS_TABLE SET NOLOGGING_IND = 0 WHERE NOLOGGING_IND = 1 and
      table_name != 'C_RBO_CLASS' and table_name != 'C_RBO_HIERARCHY' and table_name !
      = 'C_RBO_REL_TYPE';
      ```

4. As a schema user, open the Hub Console, and enable the ZDT mode for both schemas.

5. Optionally, to verify that the settings are correct, open the repository table `C_REPOS_DB_RELEASE` as the schema user and verify the following settings:

   - `ZDT_IND` is set to `1`.

   - `GLOBAL_NOLOGGING_IND` is set to `0`.

6. As the SYSDBA user, add supplemental log data for the source database.

   Note: Optional. The `ALTER DATABASE ADD SUPPLEMENTAL LOG DATA` command adds supplemental log data to the source database.

   ```
   C:> sqlplus connect sys as sysdba;
   SQL> -- make sure you had previously shutdown normally
   SQL> STARTUP MOUNT;
   SQL> ALTER DATABASE ARCHIVELOG;
   SQL> ALTER DATABASE OPEN;
   SQL> ALTER DATABASE ADD SUPPLEMENTAL LOG DATA;
   SQL> ALTER SYSTEM SWITCH LOGFILE;
   SQL> EXIT
   ```

7. As the SYSDBA user, create a user for GoldenGate replication and grant execute permissions to the GoldenGate user on both the source and target systems.

```
grant create session, connect, resource, dba to ggadmin;
grant select any dictionary to ggadmin;
grant create view to ggadmin;
grant execute on dbms_lock to ggadmin;
exec dbms_goldengate_auth.grant_admin_privilege ('GGADMIN');
grant flashback any table to ggadmin;
```

Note: To use Oracle GoldenGate for Oracle version 12.3.0.14 or later, you must grant these execute permissions.

Populate the Schemas

The `deploy_zdt` command automatically updates the C_REPOS_ZDT_STATUS repository table in the source and target systems.

The following table summarizes the columns updated in the C_REPOS_ZDT_STATUS repository table:

Column Name	Source Schema Value	Target Schema Value
REPLICATION TARGET IND	0	1
LOCAL ENVIRONMENT NAME	ENVA	ENVB
LOCAL SCHEMA NAME	cmx_ors_a	cmx_ors_b
LOCAL TRAIL PATH	D:/ggs/dirdat/ENVA/	D:/ggs/dirdat/ENVB/
PUMP RMTHOST	[target host name]	[source host name]
PUMP MGRPORT	[target goldengate mgr port, such as 9999]	[source goldengate mgr port, such as 9999]
REMOTE TRAIL PATH	D:/ggs/dirdat/ENVB	D:/ggs/dirdat/ENVA
REMOTE ENVIRONMENT NAME	ENVB	ENVA
REMOTE SCHEMA NAME	cmx_ors_b	cmx_ors_a
REGULAR_STREAM_ID	C	C
EVENT_QUEUE_ID	Q	Q
EXTRACT_PREFIX	E	E
REPLICAT_PREFIX	R	R

Note: The default values from the inserts for the ENVA and ENVB directory for C_REPOS_ZDT_STATUS must be sufficient for most environments.

Configure and Deploy the Data Stream

Configure and deploy the data stream on both systems.

1. In the command prompt, go to the following directory

   ```
   zdt_utility\bin
   ```

2. To deploy the ZDT setup, run the following command.

   ```
   sip_ant.bat deploy_zdt
   ```

3. From the ggsci prompt, run the `info all` command.

4. Verify that the `info all` summary displays four processes including the MGR process, each with a status of RUNNING.

   - Data extract processes have the prefixes E_. These processes extract data from the source system.

   - Data replication processes have the prefix R_. These processes replicate data on the target system.

   The following sample output shows that one replication process does not run:

   ```
   GGSCI (hostname) 13> info all

   Program      Status      Group       Lag            Time Since Chkpt

   MANAGER      RUNNING
   EXTRACT      RUNNING     E_ENVA      00:00:00       00:00:08
   REPLICAT     ABENDED     R_ENVB      169:25:21      00:00:02
   REPLICAT     RUNNING     R_ENVBU     00:00:00       00:00:07
   ```

If a process does not run, see the log files in the `ggs/dirrpt` directory. You have separate .dsc and .rpt files for each process. For more information about troubleshooting process errors, see the Oracle GoldenGate documentation for administrators.

CHAPTER 3

Troubleshooting

This chapter includes the following topics:

Troubleshooting the installation

If you encounter issues while installing Zero Downtime (ZDT), clean your environment and try again. If the problem persists, contact Informatica Global Customer Support.

1. In the command line, run the `sip_ant.bat undeploy_zdt` command to clean the environment, uninstall the ZDT baseline, and remove ZDT replication.

2. To clean the passive environment, perform the following manual tasks:

   a. Remove all the files related to the environment.
   ```
   <GoldenGate install directory>/dirchk
   del *

   <GoldenGate install directory>/dirdat
   del enva/*
   del envb/*

   <GoldenGate install directory>/dirrpm
   del e_env*.prm*
   del *.def

   <GoldenGate install directory>dirrpt
   del *.dsc
   del e_env*.rpt
   del r_env*.rpt
   del rqenv*.rp
   ```

   b. Remove the ZDT event queue in the environment.

3. Install ZDT.

Metadata validation fails

If the metadata validation fails, check all the tables ending in _STRP. If `NOLOGGING` is set to `1`, change it to `0`.

Replication is not working

If the deploy_zdt call does not complete, the ZDT replication might not work between the source and target databases.

1. Check that all the Oracle GoldenGate processes are running. Restart any processes that are not in the RUNNING state.
   In this example, ENVA contains the source database and ENVB contains the target database.

   ```
   EXTRACT RUNNING E_ENVA
   REPLICAT ABENDED R_ENVB
   REPLICAT RUNNING R_ENVBU
   ```

   In this example, the R_ENVB process is in the ABENDED state. Try restarting the process.

2. Insert an event directly into the C_REPOS_ZDT_EVENT_QUEUE table in the source database. Open the same table in the target database. If the event appears in the target database table, replication is working in this direction. Repeat the verification process from the target database to ensure that the replication works in the other direction as well.

   For example, the following code adds an event to the table on ENVA:

   ```
   insert into C_REPOS_ZDT_EVENT_QUEUE ( 'enva', -1, 'test', '', 'envb', 'test',
   CURRENT_TIMESTAMP, 'EVENT_TOKEN' );
   ```

3. If the Oracle GoldenGate processes are running without errors, but the message queue replication is not working, you need to troubleshoot your environment. Navigate to the Oracle GoldenGate directory `dirrpt` and check the .rpt files for information about potential problems.
   For more information about replication issues, see the following Oracle articles on Metalink:

   1. Main Note - Oracle GoldenGate - Troubleshooting (Doc ID 1306476.1)

   2. Master Note - Oracle GoldenGate: Initial Load Techniques and References (Doc ID 1311707.1)

   3. DB Transactions Missing from Oracle GoldenGate Trail Files (Doc ID 1364852.1)

   4. POC for golden gate