Informatica® Multidomain MDM
10.3 HotFix 2

Resource Kit Guide

Informatica Multidomain MDM Resource Kit Guide
10.3 HotFix 2
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Preface

This guide describes how to install, configure, and use the Informatica® Multidomain MDM Resource Kit.

Note: This guide is written for a technical audience: service developers, database administrators, system administrators, and other implementers who are responsible for Informatica MDM Hub installation and setup tasks. Familiarity with the database environment on which you are installing the Resource Kit and knowledge of Oracle administration is assumed. For administration and configuration information, see the *Multidomain MDM Configuration Guide*.

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To find online support resources on the Informatica Network, visit https://network.informatica.com and select the eSupport option.

Part I: Introduction

This part contains the following chapter:

CHAPTER 1

Introduction

This chapter includes the following topics:

Overview

The Informatica MDM Hub Resource Kit is a set of examples and utilities that assist you in integrating the Informatica MDM Hub into your applications and workflows.

Informatica Resource Kit Documentation

The Informatica MDM Hub Resource Kit includes the following documentation for the Informatica MDM Resource Kit:

- *Sample application documentation*
- *Informatica PowerCenter Custom Transform for MDM User Guide*

These files are located in the Resource Kit in the specific sample application folders (for example, BPM) within the samples folder.

Informatica Sample ORS

The sample Operational Reference Store (ORS) is used by multiple sample applications included with the Resource Kit. The sample ORS includes the files that you require to create a sample ORS schema.

Note: Install the Informatica sample ORS in your database and register it with the Hub Server before you install the sample applications. For more information about how to install and register the sample ORS, see the *Multidomain MDM Installation Guide*.

Sample Applications and Utilities

The Informatica MDM Hub Resource Kit includes the following set of sample applications and utilities:

- LookupWebServiceExample
- IDD Demo
- BDDUserExit
- SSO
- PartyWebServiceExample
- SAMProvidersExample
- Business Process Management (BPM)
- MetCommand Utility
- CleanseAdapterExample
- MetModelConverter
- Password Encryption Tool Utility
- Data Encryption Utilities
- siperian-common.jar
- Java and JavaScript code for making business entity services calls
- BESExternalCall

Note: For more information, see the readme.txt file for each sample application or utility. ReadMe files are located in the Resource Kit Samples and Utilities folder.

LookupWebServiceExample

LookupWebServiceExample is an example of a web service for exposing the cross reference services for the entities managed by the MDM Hub and code translation services for the lookup codes defined in the MDM Hub.

IDD Demo

The IDD Demo is a sample of Informatica Data Director (IDD), which is a data governance application for Informatica MDM Hub. Business users can use IDD to effectively create, manage, consume, and monitor master data.

The Resource Kit contains sample configuration files that you can use to configure the IDD Demo application.

To set up the IDD Demo, use the configuration tool with one of the following files:

- `IDDConfig.xml` sets up the Data Director application for the sample schema that is included in the Resource Kit. The file contains task configuration for the Siperian workflow adapter.

- `IDDConfig_ActiveVOS.xml` sets up the Data Director application for the sample schema that is included in the Resource Kit. The file contains task configuration for the Informatica ActiveVOS® workflow adapter that is based on subject areas.

- `IDDConfig_ActiveVOS_BE.xml` sets up the Data Director application for the sample schema that is included in the Resource Kit. The file contains task configuration for the Informatica ActiveVOS workflow adapter that is based on business entities.

BDDUserExit

The BDDUserExit is a set of sample user exits that you can use as a template to build user exit JAR files. You can use user exits to add custom business logic to standard IDD operations.

Single Sign-On (SSO)

SSO contains a set of sample modules that you can build in IDD or the MDM Hub. Use SSO samples to allow third-party application users to use external Single-Sign-On provider to log in to IDD.

The Resource Kit includes SSO sample modules for Google and Salesforce. The Google SSO module uses redirection to an external form for authentication. The Salesforce SSO module authenticates through a secured connection to the Salesforce application.

For more information about configuring SSO, see the *Multidomain MDM Data Director Implementation Guide*.

PartyWebServiceExample

PartyWebServicesExample is an example of a set of composite web services built around the Informatica Sample Schema. The web services are built using the Axis web services framework and the SIF APIs are used to access the hub.

SAMProvidersExample

The SAMProvidersExample gives you basic instructions to build custom security providers. The JAR file that is built by this sample application is installed through the Security Providers tool in the Hub Console. For more information about security providers, see the *Multidomain MDM Security Guide*.

ActiveVOS Projects

ActiveVOS zip files contain the default workflows for the business entity workflow adapter and the subject area workflow adapter.

The BPM sample folder in the Resource Kit contains ActiveVOS projects with predefined business process execution language definitions and predefined roles.

The folder `<MDM Hub installation directory>\hub\resourcekit\samples\BPM\ActiveVOS` contains the following archive files:
BeMDMWorkflow.zip

> Contains the BeMDMWorkflow project and the BeCommonMDM project. The BeMDMWorkflow project contains predefined business process execution language definitions and predefined roles. The

BeCommonMDM project contains supporting resources. The projects work with the ActiveVOS workflow adapter that is based on business entities.

MDMWorkflow.zip

Contains the MDMWorkflow project and the CommonMDM project. The MDMWorkflow project contains predefined business process execution language definitions and predefined roles. The CommonMDM project contains supporting resources. The projects work with the ActiveVOS workflow adapter that is based on subject areas.

The folder `<MDM Hub installation directory>\hub\resourcekit\avossdk` contains the following archive files:

avossdk.zip

Contains the ActiveVOS Orchestration project and an associated library. If you want to develop a workflow for the MDM Hub, import the Orchestration project into ActiveVOS Designer. This creates a template workflow project in which you can implement custom workflows.

If you want to create a custom workflow in ActiveVOS Designer without the template, you must import the library folder into your ActiveVOS project. The library contains JAR files that are required for ActiveVOS projects. You must also set the security payload in the SIF or REST requests accordingly.

MetCommand Utility

MetCommand is a simple command-line wrapper for the Informatica MDM Hub Repository Manager APIs. These APIs are used to manage the metadata (export, import, validate) in the Informatica MDM Hub. It can be used in situations where it is desirable to execute these APIs as part of a script - to automate the promotion of design objects from one ORS to another.

CleanseAdapterExample

The CleanseAdapterExample allows you to create cleanse adapters to work with your specific, non-supported cleanse engine. For more information about supported cleanse adapters, see the *Multidomain MDM Cleanse Adapter Guide*.

MetModelConverter

MetModelConverter is a command-line utility that converts Common Warehouse Metamodel to Informatica MDM Hub Change List XML format. It demonstrates how Informatica MDM Hub Repository Manager can be used to integrate 3rd party software like ERWIN.

Password Encryption Tool Utility

The Password Encryption tool is a command-line utility for encrypting your secured database passwords. Instructions for using this utility are located in the .

Data Encryption Utilities

You can use the data encryption utilities available in the Resource Kit to configure data encryption for the MDM Hub.

The following data encryption samples and utilities are included in the Resource Kit:

Data Encryption Library Files

The data encryption library files are required by the MDM Hub to be bundled in the data encryption JAR file.

DataEncryptor interface

The DataEncryptor interface defines the `encrypt` and `decrypt` methods that you need to implement for data encryption in the MDM Hub.

Sample Data Encryption Properties File

The sample data encryption properties file includes parameters that the data encryption implementation requires. The name of the properties file is `dataencryption.properties`. You can customize the sample properties file to specify the options for the data encryption implementation.

Sample DataEncryption Interface Implementation

The sample DataEncryption interface implementation uses the InformaticaDataEncryptor class to implement the DataEncryptor interface. Refer to the sample implementation to create a custom encryption algorithm. The mainClass property in the data encryption properties file must refer to the class name that you use in the interface implementation.

Ant Build File

The Ant build file, `build.xml`, creates the data encryption JAR file.

siperian-common.jar

The siperian-common.jar file contains resources such as Hub exception classes, language bundles, and licensing utilities. The siperian-common.jar file is used by the MDM Hub components including custom applications that call SIF APIs.

Sample Java and JavaScript Code for Business Entity Services

The resource kit contains sample Java code to make Enterprise Java Bean (EJB) business entity service calls. The resource kit also contains sample JavaScript code to make Representational State Transfer (REST) business entity service calls.

Each sample creates a person base object record, adds multiple child records, deletes one child record, and then deletes the person record and all child records.

The resource kit contains the following samples:

Java code to make EJB business entity service calls

- Sample Java code based on standard Service Data Objects (SDO) classes. The sample is in the following file in the resource kit: `C:\<MDM Hub installation directory>\hub\resourcekit \samples\COS\source\java\com\informatica\mdm\sample\cs\DynamicSDO.java`

- Sample Java code based on Java classes that the MDM Hub generates based on the business entity and business entity services configuration. The sample is in the following file in the resource kit: `C: \<MDM Hub installation directory>\hub\resourcekit\samples\COS\source\java\com \informatica\mdm\sample\cs\GeneratedSDO.java`

Javascript code to make REST business entity service calls

- Sample Javascript code to run Representational State Transfer (REST) business entity service calls. The sample is in the following file in the resource kit: `C:\<MDM Hub installation directory>\hub \resourcekit\samples\COS\source\resources\webapp\rest-api.html`

To build the project, open the build.xml file located in `C:\<MDM Hub installation directory>\hub \resourcekit\samples\COS`. Copy all the files listed in `<target name="init">` to `C:\<MDM Hub installation directory>\hub\resourcekit\samples\COS\lib`.

For more information about configuring business entity services, see the *Multidomain MDM Business Entity Services Guide*.

Security Payload Generator Utility

The security payload generator utility generates a security payload that is used as part of the process of encrypting and decrypting hashed passwords in the MDM Hub.

The folder `<MDM Hub installation directory>\hub\resourcekit\security_payload_generator_lib` contains the security payload generator utility and associated JAR files that are required for the utility to run.

BESExternalCall

The BESExternalCall sample contains Java code to implement custom logic and validation for business entity services. The sample demonstrates how to call external providers to analyze and validate business entity data. You can configure external callouts for certain steps in the business entity execution logic. You must build and deploy the external web services. The BESExternalCall sample provides the code to build the `bes-external-call.ear` file that you must deploy on the application server.

To understand the external services, operations, methods, and the data types that the service methods exchange, see the following files:

- `bes-external-call.xsd` file in the directory `<infamdm installation directory>\hub\server\lib\mdm-spi.jar`
- `custom-logic-service.wsdl` file in the directory `<infamdm installation directory>\hub\resourcekit \samples\BESExternalCall`

Use the Ant build file, `build.xml` in the directory `<infamdm installation directory>\hub\resourcekit \samples\BESExternalCall` to build the `bes-external-call.ear` file.

BPM SDK

The Informatica MDM Hub Resource Kit installer provides the option to install the BPM SDK. The BPM SDK is installed at the following location:

```
<Resourcekit_Home>\bpmsdk
```

The SDK lets you develop adapters using the BPM SDK interfaces to integrate to an external workflow engine. The BPM adapters developed using the BPM SDK can be uploaded to the MDM Hub. The adapter implementation can be used by the Hub and IDD to communicate with a BPM engine.

For more information on BPM adapter implementation, refer to the *BPM Adapter SDK Implementation Guide*.

PowerCenter Custom Transform for MDM

The Informatica MDM Hub Resource Kit installer provides the option to install the resources associated with PowerCenter Custom Transform for MDM.

The resources for PowerCenter Custom Transform for MDM are installed at the following location:

```
<Resourcekit_Home>\pc_mdm_adapter
```

You can use PowerCenter Custom Transform for MDM to integrate Informatica PowerCenter with the Informatica MDM Hub for Oracle, for staging data from landing tables to staging tables. For more information on PowerCenter Custom Transform for MDM, refer to the *PowerCenter Custom Transform for MDM User Guide*.

SIF SDK

The Informatica MDM Hub Resource Kit installer also installs the Services Integration Framework (SIF). The SIF is the part of Informatica MDM Hub that interfaces with client programs. Logically, it serves as a middle tier in the client/server model. It enables you to implement request/response interactions using any of the following architectural variations:

- Loosely coupled web services using the SOAP protocol.
- Tightly coupled Java remote procedure calls based on Enterprise JavaBeans (EJBs).
- Asynchronous Java Message Service (JMS)-based messages.
- XML documents going back and forth via Hypertext Transfer Protocol (HTTP).

Each of the above SIF protocols sits on top of the native Informatica MDM Hub protocol, which accepts requests in the form of XML documents or EJBs and returns responses the same way.

You copy the SIF SDK to any client system on which you wish to develop and run programs to interact with Informatica MDM Hub via SIF. If you can run a Java virtual machine (JVM) on the client system, you can use the Java classes included in the SIF SDK. The SDK installs the SIF-SDK in the following location:

```
<Resourcekit_Home>\sdk\sifsdk
```

You can configure the SDK to use any SIF protocol. If you cannot run a JVM, then you must explicitly use web services (for example, on a pure .NET system) or JMS (for example, on a mainframe system), or XML over HTTP.

For a complete description of the Informatica SIF-SDK, see the *Multidomain MDM Services Integration Framework Guide*. This guide refers to these Java classes by the name of the first class you must instantiate, SiperianClient.

SIF API Javadoc

The Informatica MDM Hub Resource Kit installer installs the Java documentation for the SIF API in the following locations:

```
<Resourcekit_Home>\sdk\sifsdk\javadoc
<Resourcekit_Home>\sdk\sip-plugin\javadoc
```

You can view the associated Java packages and classes using the index.html file. The index.html file is located in the following directory:

```
<Resourcekit_Home>\sdk\sifsdk\javadoc\index.html
```

Open **index.html** to see a right-hand frame and two left-hand frames. The left frames provide links to the pages for all packages and all classes. The lower left frame displays the links associated with the package you select in the upper left frame. You can select **All Classes** in the upper left frame to see a combined list of classes from all packages in the lower left frame.

The right frame changes to show the pages you select. Begin by exploring the classes of the `com.siperian.sif.message` package. Most of the classes used in application programs are in this package and its sub-packages.

User Exits Javadoc

The Informatica MDM Hub Resource Kit includes the Javadoc for user exits.

When you install the Informatica MDM Hub Resource Kit, the installer installs the Java documentation for user exits in the following location:

```
<Resourcekit_Home>\sdk\userexitSDK\javadoc
```

You can use the `index.html` file to view the associated Java packages and classes. The `index.html` file is located in the following directory:

```
<Resourcekit_Home>\sdk\userexitSDK\javadoc\index.html
```

Open `index.html` to see a right-hand frame and two left-hand frames. The left frames provide links to the pages for all packages and all classes. The lower left frame displays the links associated with the package you select in the upper left frame. You can select **All Classes** in the upper left frame to see a combined list of classes from all packages in the lower left frame.

The right frame changes to show the pages you select. Explore the classes of the `com.informatica.mdm.userexit` package. Classes that you can use in user exits are in the `com.informatica.mdm.userexit` package.

SSA-NAME3

The Informatica MDM Hub Resource Kit installer provides the option to install SSA-NAME3. It provides the libraries that are required to use the Population Override Manager and the SSA-Name3 Edit Rules Wizard to customize match population.

SSA-Name3 resources are copied to the following location:

```
<Resourcekit_Home>\ssaname3
```

You can use SSA-NAME3 to enable application programs to search and match records in databases using people's names, organization names, addresses, identity numbers, dates and other identification data.

Part II: Samples and Examples

This part contains the following chapter:

CHAPTER 2

Informatica Data Director Sample

This chapter includes the following topics:

Informatica Data Director Sample Overview

The Resource Kit contains sample configuration files that you can use with the Data Director application. Database administrators and other technical members of an MDM implementation team can use the sample configuration to help familiarize themselves with Data Director.

Data Director is a data governance application for the MDM Hub. Business users can use Data Director to effectively create, manage, consume, and monitor master data.

The sample application contains predefined base objects, such as address, account, or product, that are useful for any business implementation. The sample application also contains some test data. The sample application is useful as a starting point for new users of the Data Director.

To set up the Data Director sample, you can use the configuration tool to import one of the following files:

- `IDDConfig.xml` sets up the Data Director application for the sample schema that is included in the Resource Kit. The file contains task configuration for the Siperian workflow adapter.

- `IDDConfig_ActiveVOS.xml` sets up the Data Director application for the sample schema that is included in the Resource Kit. The file contains task configuration for the Informatica ActiveVOS workflow adapter that is based on subject areas.

- `IDDConfig_ActiveVOS_BE.xml` sets up the Data Director application for the sample schema that is included in the Resource Kit. The file contains task configuration for the Informatica ActiveVOS workflow adapter that is based on business entities.

  Note: You must configure a default approval workflow trigger for the sample schema. You must also configure a task templates and task triggers for the merge workflow and the unmerge workflow.

For more information about importing an Data Director application, see the *Multidomain MDM Data Director Implementation Guide.*

Prerequisites

To use the Data Director sample, ensure that you complete the following prerequisites:

- Confirm that the MDM Hub, cleanse adapters, and Cleanse Match Servers are configured correctly in your environment. For more information, see the *Multidomain MDM Installation Guide* for your platform.

- Use Operational Reference Store schemas that contain some test data. For the Data Director sample application, use the sample schema, `mdm_sample.zip`, which accompanies the Resource Kit. This Operational Reference Store must be registered in the Hub Console. For sample schema installation instructions, see the *Multidomain MDM Installation Guide*.

- Use an MDM Hub user account with unrestricted privileges to the target Operational Reference Store schema.

Sample Components

The Data Director sample includes the following components:

- Data Director configuration files.
  - `IDDConfig.xml` sets up the Data Director application for the sample schema that is included in the Resource Kit. The file contains task configuration for the Siperian workflow adapter.
  - `IDDConfig_ActiveVOS.xml` sets up the Data Director application for the sample schema that is included in the Resource Kit. The file contains task configuration for the Informatica ActiveVOS workflow adapter that is based on subject areas.
  - `IDDConfig_ActiveVOS_BE.xml` sets up the Data Director application for the sample schema that is included in the Resource Kit. The file contains task configuration for the Informatica ActiveVOS workflow adapter that is based on business entities.

- Sample data in the `mdm_sample.zip` file, which is in the sample schema folder.

- A `bdd_help_templates.zip` file that you can use to create custom help. The file includes a readme text file and two documents.

- A `readme.txt` file.

- Other auxiliary files such as message bundles and localized message bundles.

Informatica Data Director Sample Setup

Use the Data Director configuration tool to create the Data Director application for your schema.

The configuration tool creates an XML configuration file for the Data Director application. You can export, manually edit, and then import the XML configuration file back into the tool for subsequent deployment.

The Resource Kit also includes separate, pre-configured sample configuration files. Import the configuration file to file to try out Data Director features.

You can import one of the following configuration files:

- `IDDConfig.xml` sets up the Data Director application for the sample schema that is included in the Resource Kit. The file contains task configuration for the Siperian workflow adapter.

- `IDDConfig_ActiveVOS.xml` sets up the Data Director application for the sample schema that is included in the Resource Kit. The file contains task configuration for the Informatica ActiveVOS workflow adapter that is based on subject areas.

- `IDDConfig_ActiveVOS_BE.xml` sets up the Data Director application for the sample schema that is included in the Resource Kit. The file contains task configuration for the Informatica ActiveVOS workflow adapter that is based on business entities.

For more information about importing Data Director configuration files, see the *Multidomain MDM Data Director Implementation Guide*.

Informatica Data Director Configuration Tool Interface

You can use the Informatica Data Director configuration tool to configure an application for Informatica Data Director.

The following image shows the main screen of the Informatica Data Director configuration tool:
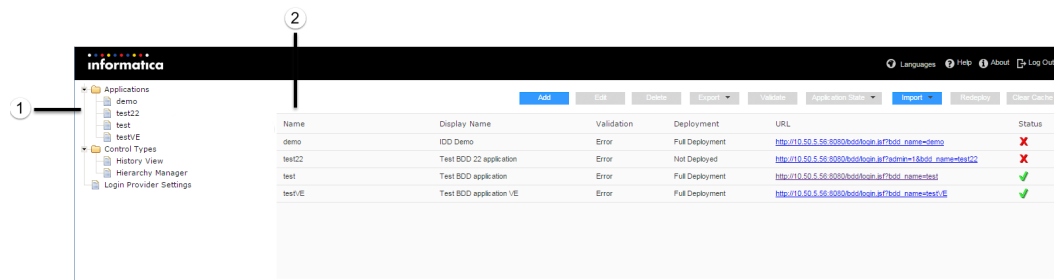
1. Tree view
2. Main panel

Launching the Informatica Data Director Configuration Tool

You can log in to the Data Director configuration tool with the same administrator login and password that you use to log into the Hub Console.

1. Enter the following URL in your browser: `http://<host>:<port>/bdd/config`.

   The Login page appears.

2. Click **Log In**.

   The main screen of the configuration tool appears.

Creating the Informatica Data Director Application

Use the configuration tool to create the Data Director application for your schema. In this example, you use the mdm_sample data as your schema and you name the sample application "Demo".

1. To add an Data Director application, click **Add** from the main screen of the configuration tool.

   The **Add Application** window appears.

2. In the **Name** field, enter `Demo`.

3. For Display Name, enter `IDD Demo`.

4. For Description, enter `IDD for Demo ORS`.

5. Click **OK**.

   The Demo application appears on the main screen of the configuration tool.

6. To edit the application details, select the **Demo** application from the tree view.

7. In the Logical ORS database section, click **Add**.

   The **Add Logical ORS** dialog box appears.

8. In the **Name** field, enter `Demo`.

9. Select **mdm_sample** as the Operational Reference Store database.

10. Click **OK**.

11. Select **Default|Master** as the Hierarchy Manager configuration.

12. Click **Bind**.

    The **Bind Logical ORS** dialog box appears.

13. By default, **mdm_sample** appears as the Operational Reference Store to bind.

14. Click **OK**.

    The following image shows the Demo application that you configured in Data Director.
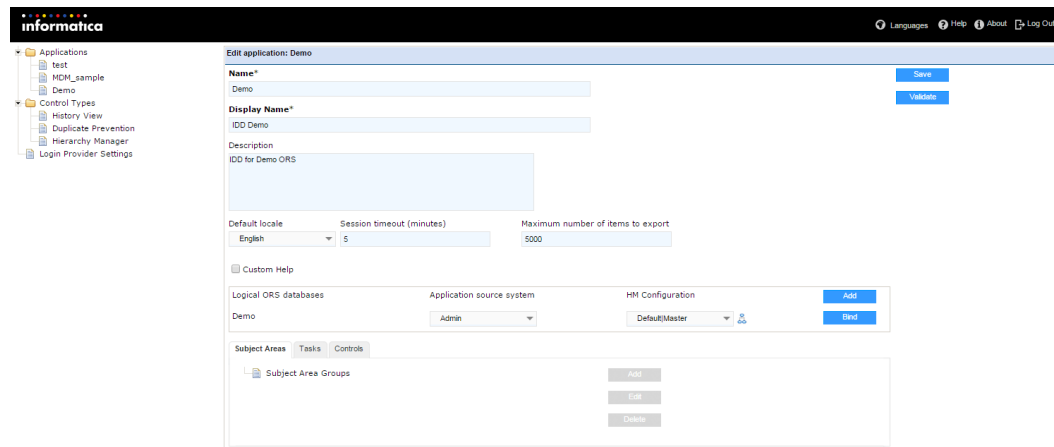
Adding a Subject Area Group

You expose base objects in the Data Director application when you define the subject areas that appear for the users. The first part of a subject area definition is to add a subject area group. You want to define a subject area group called "Customers."

1. In the Subject Areas section of the configuration tool, select the **Subject Area Groups** node.

   The **Add** button changes to an **Add Subject Area Group** button.

2. Click **Add Subject Area Group**.

   The **Subject Area Group** window appears.

3. In the **Name** field, enter `Customers`.

4. For Display Name, enter `Customers`.

5. For Logical ORS, specify `Demo`.

6. For Primary Table, specify `Party`.

7. Click **OK**.

   The following image shows the Customers subject area group that you created.
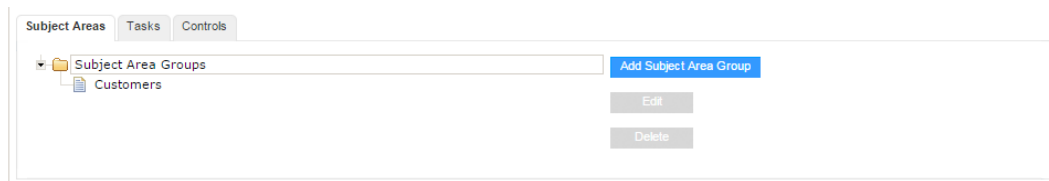
Adding a Subject Area

Subject areas appear under subject area groups in the Informatica Data Director application. You want to define a Person subject area inside the Customers subject area group.

1. Select the **Customers** node in the subject areas tree.

   The **Add Subject Area Group** button changes to an **Add Subject Area** button.

2. Click **Add Subject Area**.

   The **Subject Area** window appears.

3. Enter `Person` in both the Name and Display Name fields.

4. For HM Entity Type, select **Person**.

   The Subtype Column field and Subtype Value field populate accordingly.

5. Select **PKG Person IDD Search** as the search result display package.

6. In the Layout tab, click **Change Column Selection** to select which columns to display for this subject area.

   The **Column Selection** dialog box appears.

7. Select **Rowid Object**, **First Name**, **Last Name**, and any other available columns that you want to display for this subject area and click **Add**.

8. Click **OK**.

   The fields that you selected appear in the Layout tab.

9. Click the **Match Settings** tab.

10. Specify the **IDL** match rule set for duplicate matching.

11. To use both automatic and manual match rules in the rule set, select **Both** as the match type.

12. Click **OK**.

    The following image shows the Person subject area under the Customers subject area group.
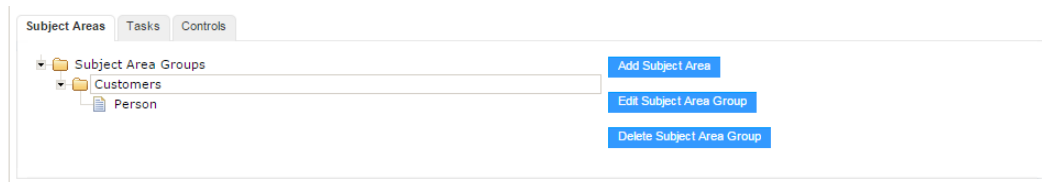
Adding Subject Area Children

To enable a user to drill-down on customer record information in the Data Director application, you want to add child views to the Person subject area. Examples of child views include addresses, telephone number, email address, and notes.

1. Select the **Person** node in the Subject Areas tree.

   The **Add Subject Area** button changes to an **Add Subject Area Child** button.

2. Click **Add Subject Area Child**.

   The **Subject Area Child** window appears.

3. In the **Name** field, enter `Addresses`.

4. For Display Name, enter `Addresses`.

5. Because Person to Address is a many-to-many relationship, select **Part of** as the child type.

6. Select **Address** as the match path to child.

7. Select **Table** as the default view.

8. Click **Change Column Selection**.

9. Select the available columns that you want to display for this subject area child and click **Add**.

10. Click **OK**.

    The fields that you selected appear in the Layout tab.

11. Click **OK**.

    You have added the child Addresses to the subject area Person.

12. Repeat steps 1 to 11 to add a telephone number child tab.

    Select **1-Many** as the child type and **Telecom** as the match path to child.

13. Repeat steps 1 to 11 to add an email address child tab.

    Select **1-Many** as the child type and **Electronic Address** as the match path to child.

14. Repeat steps 1 to 11 to add a Person Details child tab.

    Select **1-Many** as the child type and **Person Details** as the match path to child.

15. Click **Save** to commit the changes.

    The following image shows the Addresses child view that you created.
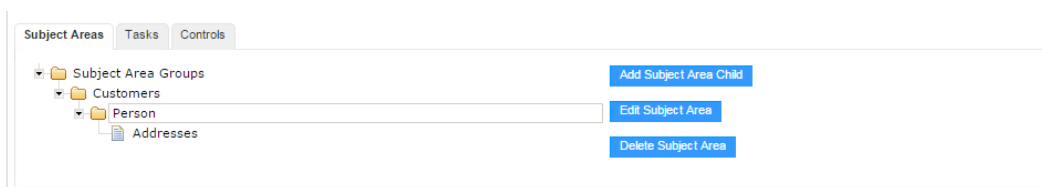
Validating the IDD Application Configuration

You must validate the Demo application before you can deploy it in Data Director. You validate an application in the configuration tool.

1. Select the **demo** node from the Applications tree view.
2. Click **Validate**.

    The Validation Results window appears.

    Note: If there are no fatal errors, users can log into this application. Ignore any other errors.
3. Click **OK**.

Deploying the IDD Application

After you validate the sample application, you can deploy it in the Data Director.

▶   On the main screen of the configuration tool, select **Application State** > **Full Deployment**.

    After some time, the deployment state of the application changes from Not Deployed to Full Deployment. The application is ready to use.

Testing the Subject Area Configuration

When the Data Director application has a deployed status, you can log in to the application and test the configuration.

1. In the configuration tool, click the link in the URL column to launch the Demo application.
2. Log in with the same administrator login and password that you use to log in to the Hub Console.

    The dashboard for the Demo application opens.
3. To configure your dashboard, click **Change Layout**.

    The **Change Layout** dialog box appears.
4. Select from the Available Items list and move items to the Currently Active Items list to display on your dashboard.
5. Click **Save**.
6. Click the **Data** tab.
7. To add a Person, select **Customers** > **New** > **Person**.
8. Enter sample data for all attributes. To add attributes on a child tab, click **New**.
9. Click **Save**.

Additional Configuration

To further familiarize yourself with the Data Director configuration tool, you can create more subject areas to expose other objects from the Operational Reference Store and the sample data.

For more information about subject area configuration and deployment of Data Director applications, see the *Multidomain MDM Data Director Implementation Guide*.

If you want, you can define a query for the subject area. For more information about query creation, see the *Multidomain MDM Data Director User Guide*.

Additional Customization of the IDD Application

You can export the Data Director application configuration for additional customization.

To export the application configuration for additional customization, log in to the Data Director configuration tool. Select the Data Director application to export and click the **Export** button. You can then save the Data Director configuration to an external source, such as your hard drive.

The exported application configuration file is a ZIP file that contains the following files:

- BDDConfig.xml
- BDDBundle.properties
- BDDBundle_en.properties
- BDDHelp.zip
- MetadataBundle.properties
- MetadataBundle_en.properties
- MessageBundle.properties
- MessageBundle_en.properties
- ErrorCodeBundle.properties
- ErrorCodeBundle_en.properties

The properties files contain localization information. You can create localization support for other locales if you create other localized properties files and import them through the configuration tool.

The BDDConfig.xml file contains the configuration that you created through the configuration tool in XML format. You can manually update this file to further customize your Data Director application. For more information, see the *Multidomain MDM Data Director Implementation Guide*.

Part III: Tools and Utilities

This part contains the following chapters:

CHAPTER 3

Configuration Automation Tools

This chapter includes the following topics:

Configuration Automation Tools Overview

You can automate the configuration tasks, such as configuring users, registering security providers, and deploying Data Director applications. To automate the configuration tasks, run the configuration automation tools that are in the Resource Kit.

The configuration automation tools are in the `MDMAutomation.zip` file that is included in the Resource Kit.

The `MDMAutomation.zip` file is in the following directory:

On UNIX. `<Resource Kit installation directory>/automation/Misc_Automation`

On Windows. `<Resource Kit installation directory>\automation\Misc_Automation`

You can automate the following configuration tasks:

- Acquiring and releasing locks on metadata
- Generating and deploying ORS-Specific JMS schemas and Services Integration Framework APIs
- Configuring MDM Hub users
- Synchronizing users through LDAP servers
- Registering security providers
- Importing and exporting Data Director applications

Before You Automate Configuration Tasks

Before you use the configuration automation tools, perform the following tasks:

1. Prepare the configuration automation tools.
2. Configure the MDM Hub environment properties.
3. Set the Java `CLASSPATH` environment variable.
4. Verify the automation properties configuration.
5. Configure logging for the automation tasks.

Step 1. Preparing the Configuration Automation Tools

Before you use the configuration automation tools, extract the `MDMAutomation.zip` file and configure the automation properties. To be able to run the automation tools, you need to extract the `MDMAutomation.zip` file and configure the automation properties.

1. Find the `MDMAutomation.zip` file in the following directory:

   ```
   <infamdm installation directory>\hub\resourcekit\automation\Misc_Automation
   ```

2. Extract the `MDMAutomation.zip` file that contains the automation tools.
3. Copy the following JAR files from the MDM Hub installation to the directory where the configuration automation tools are extracted:
   - siperian-api.jar
   - siperian-common.jar
   - siperian-server.jar

   The JAR files are in the following directory:
   ```
   <infamdm installation directory>\hub\server\lib
   ```
   The JAR files provide access to the Hub Server, Informatica Data Director, and the Services Integration Framework APIs.

Step 2. Configuring the MDM Hub Environment Properties

Configure the MDM Hub environment properties in the `automation.properties` file. You need to set the MDM Hub environment properties for the automation tools to be able to access the MDM Hub.

1. Open the `automation.properties` file.

   The `automation.properties` file is in the `MDMAutomation.zip` file, which is in the following directory:

   ```
   <Resource Kit installation directory>\automation\Misc_Automation
   ```

2. Edit the MDM Hub environment properties in the `automation.properties` file:

The following table describes the MDM Hub environment properties:

Property	Description
appserver.type	Required. Type of application server, such as jboss, weblogic, or websphere.
appserver.version	Required. Version of the application server.
jboss.hostname	Required. Name of the machine that hosts JBoss.
jboss.remote_port	Required. The JBoss remote port number.
websphere.hostname	Required. Name of the machine that hosts WebSphere.
websphere.rmi_port	Required. The WebSphere RMI port number.
weblogic.hostname	Required. Name of the machine that hosts WebLogic.
weblogic.port	Required. Port number on which the WebLogic Server is listening.
weblogic.login	Required. Name of the user for the WebLogic installation.
weblogic.password	Required. Password that corresponds to the WebLogic user.
MDMAdminUsername	Required. User name of the MDM Hub administrative user.
MDMAdminPassword	Required. Clear text password that corresponds to the MDM Hub administrative user. Use either the `MDMAdminPassword` or the `MDMAdminEncryptedPassword` property.
MDMAdminEncryptedPassword	Required. Encrypted password that corresponds to the MDM Hub administrative user. Use either the `MDMAdminPassword` or the `MDMAdminEncryptedPassword` property.

Sample Automation Properties Settings

The following sample shows the MDM Hub properties for the JBoss environment:

```
## Application server type and version. Application server type can be jboss or weblogic
or websphere.
appserver.type=jboss
appserver.version=7.2

## JBoss credentials for JBoss EAP 6.1 or JBoss 7.2
jboss.hostname=10.2.63.248
jboss.remote_port=4447

## MDM administrative user credentials
MDMAdminUsername=admin
MDMAdminEncryptedPassword=A75FCFBCB375F229
```

Step 3. Setting the CLASSPATH Environment Variable

To be able to run the configuration automation tools, set the `CLASSPATH` environment variable.

▶ Set the `CLASSPATH` environment variable to contain the path to the directory in which you extract the `MDMAutomation.zip`.

For example, you might extract the `MDMAutomation.zip` to the `C:\infamdm\hub\resourcekit\automation\Misc_Automation\MDMAutomation` directory.

Step 4. Configuring the Logging Settings

Configure logging for the configuration automation tools in the automation log properties file, `log4j.properties`. You configure logging to be able to troubleshoot configuration issues.

1. Copy the `log4j.properties` file packaged in `MDMAutomation.jar`, which is in the `MDMAutomation.zip` file.

   The `MDMAutomation.zip` file is in the following directory:

   On UNIX. `<Resource Kit installation directory>/automation/Misc_Automation`

   On Windows. `<Resource Kit installation directory>\automation\Misc_Automation`

2. Open the `log4j.properties` file from the location to which you copied the file.

3. To set the log level category in the `rootLogger` parameter.

   The following table describes the log level categories:

Log Level Category	Description
INFO	Provides information about the success or failure of a configuration automation process. Set to INFO to get the success and failure indication. Default is INFO.
DEBUG	Provides detailed information for debugging a configuration automation process. It provides information such as the EJB that is called, connection details, and the names of temporary files. Set to DEBUG for the most detailed logging.
WARNING	Provides information about the success or failure of a configuration automation process including any related warnings. You can usually ignore warnings.
ERROR	Provides information about any errors that might cause the configuration automation process to fail. Set to ERROR to get the success and failure indication along with any reasons for failure.
FATAL	Provides information about errors in command usage that fail to run the configuration automation process. Set to FATAL to capture errors at the command usage level.

4. Edit the values for the log file properties.

The following table describes the log file properties:

Property Name	Description
File	Name of the log file. Default is `MDMAutomation.log`.
MaxFileSize	Maximum size of the log file after which the MDM Hub performs a log rolling procedure to archive the existing log information. The log file rolling prevents the MDM Hub from overwriting log files with new information. Default is 10 MB.
MaxBackupIndex	The number of times you want the log files to roll. Default is `5`.

5. Save and close the `log4j.properties` file.

6. Replace the `log4j.properties` file in `MDMAutomation.jar`.

Sample Automation Log Properties File

The following sample shows a `log4j.properties` file:

```
log4j.rootLogger=info, stdout, file

log4j.appender.stdout=org.apache.log4j.ConsoleAppender
log4j.appender.stdout.layout=org.apache.log4j.PatternLayout
log4j.appender.stdout.layout.ConversionPattern=[%d{ISO8601}] [%t] [%-5p] %c: %m%n

log4j.appender.file=org.apache.log4j.RollingFileAppender
log4j.appender.file.File=MdmAutomation.log
log4j.appender.file.MaxFileSize=10MB
log4j.appender.file.MaxBackupIndex=5
log4j.appender.file.layout=org.apache.log4j.PatternLayout
log4j.appender.file.layout.ConversionPattern=[%d{ISO8601}] [%t] [%-5p] %c: %m%n
```

Step 5. Verify the Automation Properties Configuration

After you configure the automation properties for the MDM Hub environment and set the CLASSPATH environment variable, verify the connection to the Hub Server. A successful connection to the Hub Server indicates that the automation properties configuration is correct.

1. To verify the connection to the Hub Server, run the following command:

    On UNIX. `AppserverContext.sh`

    On Windows. `AppserverContext.cmd`

    The connection to the Hub Server fails or succeeds.

2. Verify the log information in the automation log file.

    The automation log file is in the following directory:
    On UNIX. `/MDMAutomation/MDMAutomation.log`

    On Windows. `\MDMAutomation\MDMAutomation.log`

    The default automation log file name is `MDMAutomation.log`.

    The log information indicates whether the MDM Hub environment settings in the `automation.properties` file is correct or not.

3. If the automation log file indicates that the MDM Hub environment settings in the `automation.properties` file is not correct, correct the settings and run the `AppserverContext` command.

Automation of Configuration Tasks

Use the automation configuration tools to automate configuration tasks.

You can automate the following configuration tasks:

- Acquiring and releasing locks
- Generating and deploying ORS-specific JMS schemas and Services Integration Framework APIs
- Configuring Users
  You can perform the following user configuration tasks:
  - Registering users with the MDM Hub Master Databases
  - Registering users with Operational Reference Stores
  - Assigning roles to users
  - Deleting users in the MDM Hub Master Database.
- Synchronizing users through LDAP servers
  You can perform the following user synchronization tasks:
  - Connecting to LDAP servers
  - Searching an entity in LDAP
  - Synchronizing users with roles through LDAP servers
  - Synchronizing users with user groups through LDAP servers
- Registering authentication providers
- Importing and exporting Informatica Data Director applications
  You can perform the following Informatica Data Director import and export tasks:
  - Importing and deploying Informatica Data Director to an existing application
  - Importing and deploying Informatica Data Director as a new application
  - Exporting the Informatica Data Director application to a `.zip` file

Acquiring and Releasing Locks

To change the metadata in the Hub Store, you need to acquire a lock on the repository tables. You need to release the locks after you change the metadata. To acquire and release locks without using the Hub Console, use the configuration automation tool.

1. Open a command prompt.
2. Navigate to the directory where you extracted the `MDMAutomation.zip` file.
3. To acquire and release locks, run the following command:

   On UNIX. `AcquireReleaseLock.sh`

   On Windows. `AcquireReleaseLock.cmd`

   Locks on the repository are acquired or released.

Generating and Deploying ORS-Specific JMS Schemas and Services Integration Framework APIs

You can automate the process to generate and deploy ORS-specific JMS schemas and Services Integration Framework (SIF) APIs. Configure the base objects and packages of the Operational Reference Store before you generate ORS-specific JMS schemas and APIs.

1. Determine the Operational Reference Store database ID.

   a. Start the Hub Console, change the database to the MDM Hub Master Database, and click **Connect**.

   b. Start the **Databases** tool under the Configuration workbench.

   c. Click the Operational Reference Store for which you want to determine the database ID.

      The Database Properties table appears.

   d. Note the database ID from the Database Properties table.

2. To generate and deploy ORS-specific JMS schemas or SIF APIs, run the following command:

   On UNIX. `GenerateDeployORSSpecificSchema.sh <Operational Reference Store ID> <SIF|JMS>`

   On Windows. `GenerateDeployORSSpecificSchema.cmd <Operational Reference Store ID> <SIF|JMS>`

   To generate and deploy ORS-specific JMS schemas, specify JMS in the second argument of the command.

   To generate and deploy SIF APIs, specify SIF in the second argument of the command.

   The ORS-specific JMS schemas or Services Integration Framework APIs are generated and deployed.

Configuring Users

You need to configure users that want to access the MDM Hub resources. Some users might be external to the MDM Hub, such as in an LDAP server or in Kerberos. You can use the configuration automation tools to configure users for the MDM Hub.

Users might have different roles. A role represents a set of privileges to access secure MDM Hub resources. You assign roles to users in order for the users to gain privileges.

You can also configure user groups, which is a logical collection of user accounts. User groups simplify security administration.

You can perform the following user configuration tasks:

- Register users with an MDM Hub Master Database.
- Assign users to Operational Reference Stores.
- Assign roles to users.
- Delete users in the MDM Hub Master Database.
- Synchronize users through LDAP servers.

Creating and Registering Users in an MDM Hub Master Database

You need to create and register users that need access to the MDM Hub in the MDM Hub Master Database.

1. Configure the user registration properties in the `automation.properties` file.

   The following table describes the properties in the `automation.properties` file that you need to configure:

Property	Description
MDM.number.of.new.users	Required. Number of new users that you want to create. You can create a maximum of 1000 users.
MDM.new.user.firstname<n>	Required. First name of the user that you want to create.
MDM.new.user.middlename<n>	Optional. Middle name of the user that you want to create.
MDM.new.user.lastname<n>	Required. Last name of the user that you want to create.
MDM.new.user.email<n>	Required. Email address of the user that you want to create.
MDM.new.user.username<n>	Required. User name of the user that you want to create.
MDM.new.user.password<n>	Required. Password to access the account of the user that you want to create.
MDM.new.user.isExternalAuthentication<n>	Required. Specifies whether or not the user is externally authenticated. If set to `N`, ensure that you set the `MDM.new.user.password<n>` property.
MDM.new.user.isAdministrator<n>	Required. Specifies whether or not the user is an administrator.
MDM.new.user.defaultDatabaseId<n>	Required. ID of the default Operational Reference Store.

2. Open a command prompt and navigate to the following directory:

   On UNIX.`<Resource Kit installation directory>/automation/Misc_Automation`

   On Windows.`<Resource Kit installation directory>\automation\Misc_Automation`

3. To create and register users in the MDM Hub Master Database, run the following command:

   On UNIX. `CreateUsers.sh`

   On Windows. `CreateUsers.cmd`

   The users are created and registered with the MDM Hub Master Database.

Sample Automation Properties Settings

The following sample shows the settings for creating and registering five users that need to access the MDM Hub Master Database:

```
## List of new users that you want to create

MDM.number.of.new.users=5

MDM.new.user.firstname0=Bill
MDM.new.user.middlename0=Henry
MDM.new.user.lastname0=Jones
```

```
MDM.new.user.email0=bill@gmail.com
MDM.new.user.username0=bjones
MDM.new.user.password0=
MDM.new.user.isExternalAuthentication0=Y

MDM.new.user.firstname1=Jake
MDM.new.user.middlename1=
MDM.new.user.lastname1=Russel
MDM.new.user.email1=Rjake@gmail.com
MDM.new.user.username1=jrussel
MDM.new.user.password1=randomPassword1
MDM.new.user.isExternalAuthentication1=N
MDM.new.user.defaultDatabaseId1=orcl.informatica.com-MDM_SAMPLE

MDM.new.user.firstname2=Emerson
MDM.new.user.middlename2=Joseph
MDM.new.user.lastname2=Bentley
MDM.new.user.email2=JBen@gmail.com
MDM.new.user.username2=ebentley
MDM.new.user.password2=
MDM.new.user.isExternalAuthentication2=Y
MDM.new.user.defaultDatabaseId2=orcl.informatica.com-MDM_SAMPLE
MDM.new.user.isAdministrator2=Y

MDM.new.user.firstname3=Warren
MDM.new.user.middlename3=
MDM.new.user.lastname3=Edward
MDM.new.user.email3=EdW@gmail.com
MDM.new.user.username3=wedward
MDM.new.user.password3=randomPassword3
MDM.new.user.isExternalAuthentication3=N
MDM.new.user.isAdministrator3=Y

MDM.new.user.firstname4=John
MDM.new.user.middlename4=
MDM.new.user.lastname4=Smith
MDM.new.user.email4=jsmt@gmail.com
MDM.new.user.username4=jsmith
MDM.new.user.password4=
MDM.new.user.isExternalAuthentication4=Y
```

Assigning Users to Operational Reference Stores

After you create and register users with the MDM Hub Master Database, grant users access to Operational Reference Stores. Use the automation tool to assign users to the Operational Reference Stores.

1. Ensure that the users are created and registered with the MDM Hub Master Database.

   You can register users through the Hub Console or by using the `CreateUsers` command.

2. Determine the Operational Reference Store database ID.

3. If user names include spaces or special characters, configure the properties to assign users to Operational Reference Stores in the `automation.properties` file:

The following table describes the properties in the `automation.properties` file that you need to configure:

Property	Description
MDM.number.of.user_ors_relationships	Required. Number of users that you want to assign to an Operational Reference Store.
MDM.user_ors_rel.username<n>	Required. User name of a user that you want to assign to an Operational Reference Store.
MDM.user_ors_rel.databaseIds<n>	Required. Operational Reference Store ID.

4. Open a command prompt and navigate to the following directory:

   On UNIX.`<Resource Kit installation directory>/automation/Misc_Automation`

   On Windows.`<Resource Kit installation directory>\automation\Misc_Automation`

5. To assign users to Operational Reference Stores, run one of the following commands:

   • When user names include spaces or special characters, run the following command:
     On UNIX. `AssignUsersToDatabases.sh`

     On Windows. `AssignUsersToDatabases.cmd`

   • When user names do not include spaces or special characters, run the following command:
     On UNIX. `AssignUsersToDatabases.sh <list of registered users> <list of registered Operational Reference Store database IDs>`

     On Windows. `AssignUsersToDatabases.cmd <list of registered users> <list of registered Operational Reference Store database IDs>`

     In the command, provide the list of registered users and the list of registered Operational Reference Store database IDs with comma delimiters but no space between each list item.

   The users are assigned to the Operational Reference Stores.

Sample Automation Properties Settings

The following sample shows the settings for registering three users with Operational Reference Stores:

```
## List of relationships that you want to create between new users and the Operational
Reference Store (ORS)

MDM.number.of.user_ors_relationships=3

MDM.user_ors_rel.username0=bjones
MDM.user_ors_rel.databaseIds0=orcl.informatica.com-MDM_SAMPLE, orcl-CMX_ORS,
orcl.informatica.com-RETAIL

MDM.user_ors_rel.username1=ebentley
MDM.user_ors_rel.databaseIds1=orcl.informatica.com-MDM_SAMPLE

MDM.user_ors_rel.username2=jsmith
MDM.user_ors_rel.databaseIds2=orcl-CMX_ORS, orcl.informatica.com-MDM_SAMPLE
```

Assigning Roles to Users

You can assign roles to users that are registered in an Operational Reference Store. Before you assign roles to users, the roles must exist in the Operational Reference Stores. Roles have special privileges associated with them. When you assign roles to users, the users inherit the privileges of the role.

1. Ensure that the users is registered in the Operational Reference Store.

2. Ensure that roles exist in the Operational Reference Store.

3. Configure the `automation.properties` file.

   The following table describes the properties in the `automation.properties` file that you need to configure:

Property	Description
MDM.number.of.user_roles_relationships	Required. Number of users to which you want to assign roles. You can create a maximum of 1000 relationships each time you run the command to assign roles to users.
MDM.user_roles_rel.username<n>	Required. User name of a user to which you want to assign a role.
MDM.user_roles_rel.databaseIds<n>	Required. Operational Reference Store ID.
MDM.user_roles_rel.roles<n>	Required. Name of a role that you want to assign to a user. The must exist in the Operational Reference Store. Separate each role with a comma.

4. Open a command prompt and navigate to the following directory:

   On UNIX.`<Resource Kit installation directory>/automation/Misc_Automation`

   On Windows.`<Resource Kit installation directory>\automation\Misc_Automation`

5. To assign roles to users, run the following command:

   On Windows. `AssignRolesToUser.cmd`

   On UNIX. `AssignRolesToUser.sh`

   Roles are assigned to the Operational Reference Store users.

   Note: If a user is not registered with the Operational Reference Store, the MDM Hub generates the following error:

   ```
   com.delos.cmx.server.datalayer.repository.ReposException: SIP-10318: Could not get
   user for role due to data access error.
   ```

Sample Automation Properties Settings

The following sample shows the settings for assigning roles to three users that are registered in Operational Reference Stores:

```
## List of new user-role relationships that you want to create

MDM.number.of.user_roles_relationships=3

MDM.user_roles_rel.username0=sabbasi
MDM.user_roles_rel.databaseId0=orcl.informatica.com-MDM_SAMPLE
MDM.user_roles_rel.roles0=Manager

MDM.user_roles_rel.username1=wbuffett
MDM.user_roles_rel.databaseId1=orcl.informatica.com-MDM_SAMPLE
MDM.user_roles_rel.roles1=Data Steward,Manager, Super User
```

```
MDM.user_roles_rel.username2=lpage
MDM.user_roles_rel.databaseId2=orcl-CMX_ORS
MDM.user_roles_rel.roles2=Data Steward, Manager
```

Deleting a User in the MDM Hub Master Database

You can delete a user that is registered in the MDM Hub Master Database.

Note: The user name that you specify is not case sensitive.

1. Open a command prompt and navigate to the following directory:

    On UNIX.`<Resource Kit installation directory>/automation/Misc_Automation`

    On Windows.`<Resource Kit installation directory>\automation\Misc_Automation`

2. To delete a user, run the following command:

    On Windows. `DeleteUsers.cmd -u <user name>`

    On UNIX. `DeleteUsers.sh -u <user name>`

    The user that you specify is deleted from the MDM Hub Master Database.

Deleting Multiple Users in the MDM Hub Master Database

You can delete users that are registered in the MDM Hub Master Database. Before you delete users, determine the number of users that you want to delete. Each time you run the command, you can delete a maximum of 1000 users.

1. Edit the `automation.properties` file.

    The following table describes the properties in the `automation.properties` file that you need to configure:

Property	Description
MDM.number.of.delete.users	Required. The total number of users that you want to delete. You can delete a maximum of 1000 users each time you run the command to delete the MDM Hub users.
MDM.delete.user.username<n>	Required. User name of a user that you want to delete.

2. Open a command prompt and navigate to the following directory:

    On UNIX.`<Resource Kit installation directory>/automation/Misc_Automation`

    On Windows.`<Resource Kit installation directory>\automation\Misc_Automation`

3. To delete users, run the following command:

    On Windows. `DeleteUsers.cmd`

    On UNIX. `DeleteUsers.sh`

    The users that you specify in the `automation.properties` file are deleted from the MDM Hub Master Database.

Sample Automation Properties Settings

The following sample shows the settings for deleting five users that are registered in the MDM Hub Master Database:

```
## List of users that you want to delete

MDM.number.of.delete.users=5

MDM.delete.user.username0=bgates
MDM.delete.user.username1=sabbasi
MDM.delete.user.username2=lellison
MDM.delete.user.username3=wbuffett
MDM.delete.user.username4=lpage
```

Synchronizing Users through LDAP Servers

You can synchronize the MDM Hub users in the LDAP servers with the MDM Hub Operational Reference Stores.

You need to synchronize users through the LDAP servers in the following situations:

- When the MDM Hub users that belong to roles are maintained in an LDAP server
- When the MDM Hub users that belong to user groups are maintained in an LDAP server

To synchronize users through the LDAP servers, configure the following types of properties in the `automation.properties` file:

- LDAP server connection
- Search base
- User synchronization

Before you synchronize through the LDAP servers, you might want to search for users in the LDAP servers.

Connecting to LDAP Servers

Before you can perform any configuration task that is related to the LDAP server, connect to the LDAP server to verify the connection.

1. Edit the LDAP server connection properties in the `automation.properties` file.

   The following table describes the properties in the `automation.properties` file that you need to configure:

Property	Description
LDAP.Server	Required. URL to connect to the LDAP server.
LDAP.Username	Required. User name to access the LDAP server. If the LDAP server search is not secure, you do not need a user name.
LDAP.Password	Required. Password to access the LDAP server. If the LDAP server search is not secure, you do not need a password.

2. To connect to an LDAP server, run the following command:

   On Windows. `LdapConnection.cmd`

   On UNIX. `LdapConnection.sh`

   The MDM Hub must connect to the LDAP server.

Sample Automation Properties Settings

The following sample shows the settings to connect to an LDAP server and search for entities:

```
## Properties for LDAP connection
LDAP.Server=ldap://localhost:389
LDAP.Username=sjohn
LDAP.Password=xxxxxxxx
```

Searching an Entity in LDAP

You can search for entities, such as user name, in the LDAP server that you want to synchronize with the MDM Hub.

1. Ensure that you are connected to the LDAP server.
2. Specify the search base in the `automation.properties` file.

   The following table describes the properties in the `automation.properties` file that you need to configure:

Property	Description
LDAP.SearchBase	Required. Specifies the starting point for the search in the LDAP directory tree.

3. Run the command to verify the LDAP server connection.

   On Windows. `LdapConnection.cmd`

   On UNIX. `LdapConnection.sh`

4. Run the command to search for an entity in the LDAP server.

   On Windows. `LdapConnection.cmd -search <entity name>`

   On UNIX. `LdapConnection.sh -search <entity name>`

   The entity that you specify is retrieved from the LDAP server.

Sample Automation Properties Settings

The following sample shows the settings to search for a user in an LDAP server:

```
## Properties for LDAP search

LDAP.SearchBase=dc=example,dc=com
LDAP.attribute_name.for.user.firstname=cn
LDAP.attribute_name.for.user.middlename=
LDAP.attribute_name.for.user.lastname=sn
```

Synchronizing Users with Roles through an LDAP Server

You can synchronize users in an LDAP server with the associated roles in Operational Reference Stores. Before the synchronization, ensure that the LDAP server has users and roles. You can synchronize users in an LDAP server with roles in multiple Operational Reference Stores.

1. Add the LDAP server properties in the `automation.properties` file.

   The following table describes the properties in the `automation.properties` file that you need to configure:

Property	Description
LDAP.Server	Required. URL to connect to the LDAP server.
LDAP.Username	Required. User name to access the LDAP server. If the LDAP server search is not secure, you do not need a user name.
LDAP.Password	Required. Password to access the LDAP server. If the LDAP server search is not secure, you do not need a password.
LDAP.SearchBase	Required. Specifies the starting point for the search in the LDAP directory tree.
LDAP.number.of.ldaproles	Required. Number of roles in the Operational Reference Stores for which you want to synchronize users.
LDAP.rolename.for.ldap.search<n>	Required. Name of a role in the LDAP server.
LDAP.role.attribute_name.for.userlist<n>	Required. Name of an attribute for a role in an LDAP server that is associated with a user in an Operational Reference Store.
LDAP.MDM.ORS.databaseId<n>	Required. ID of the Operational Reference Store that has a role associated with a user in the LDAP server.
LDAP.MDM.rolename<n>	Required. Name of a role in the Operational Reference Store that corresponds to a role in the LDAP server.
LDAP.attribute_name.for.user.firstname	Required. First name of a user in the LDAP server. Use the property if you want to synchronize the first name of a user from the LDAP server with the Operational Reference Store.
LDAP.attribute_name.for.user.middlename	Optional. Middle name of a user in the LDAP server. Use the property if you want to synchronize the middle name of a user from the LDAP server with the Operational Reference Store.
LDAP.attribute_name.for.user.lastname	Required. Last name of a user in the LDAP server. Use the property if you want to synchronize the last name of a user from the LDAP server with the Operational Reference Store.
LDAP.attribute_name.for.username	Required. An attribute of the user in the LDAP server, other than a common name or a user ID, such as Security Access Manager account name. Use the property to synchronize an attribute other than a common name or a user ID from the LDAP server with the Operational Reference Store.

Property	Description
LDAP.attribute_name.for.user.email	Required. Email address of the user that you want to create.
LDAP.strip_slashes_from_usernames	Optional. Specifies whether to remove slashes from user names. For example, when a user name such as `Boyd\` is part of a search filter expression such as `(&(CN=Boyd\)`, the following error might occur: `InvalidSearchFilterException: Unbalanced parenthesis` In a search expression, slashes might be treated as escape characters resulting in an unbalanced parenthesis error. To make the synchronization process work in such scenarios, you might need to remove slashes from the user names. You can configure the following values: - no. Retains slashes in the user names. - yes. Removes slashes from the user names. Default is `no`.
LDAP.cleanup.before.sync	Optional. Specifies whether to remove all the users that are assigned in an Operational Reference Store before synchronizing users with roles. You can configure the following values: - true. Removes the users that are assigned in an Operational Reference Store, and then assigns the users to roles. If you run the command to synchronize users with the `-u` option, a single user assignment is removed. Otherwise, all user assignments are removed. - false. Retains the users that are assigned in an Operational Reference Store. Default is `true`.

2. Run the command to verify the LDAP server connection.

    On Windows. `LdapConnection.cmd`

    On UNIX. `LdapConnection.sh`

3. Ensure that users and roles are created in the LDAP server and that these have corresponding roles and users in the MDM Hub.

4. Run one of the following commands to synchronize users from the LDAP server roles to the MDM Hub roles:

    - **Synchronize a single user.**
      On Windows. `LdapUserSynchronization.cmd -u <case sensitive user name>`

      On UNIX. `LdapUserSynchronization.sh -u <case sensitive user name>`

      Note: Optionally, to make the user an administrator, include `-admin true` in the command.

      The synchronization process assigns the user to roles.

    - **Synchronize multiple users.**
      On Windows. `LdapUserSynchronization.cmd`

      On UNIX. `LdapUserSynchronization.sh`

      The synchronization process assigns the users to roles.

Sample Automation Properties Settings

The following sample shows the settings to synchronize users in an LDAP server with the associated roles in Operational Reference Stores:

```
LDAP.number.of.ldaproles=3

LDAP.rolename.for.ldap.search0=cn=MDM_Sample_DataSteward_role
LDAP.role.attribute_name.for.userlist0=member
LDAP.MDM.ORS.databaseId0=orcl.informatica.com-MDM_SAMPLE
LDAP.MDM.rolename0=Data Steward

LDAP.rolename.for.ldap.search1=cn=MDM_Sample_readonly_role
LDAP.role.attribute_name.for.userlist1=member
LDAP.MDM.ORS.databaseId1=orcl.informatica.com-MDM_SAMPLE
LDAP.MDM.rolename1=Manager

LDAP.rolename.for.ldap.search2=cn=cmx_ors_readonly_role
LDAP.role.attribute_name.for.userlist2=member
LDAP.MDM.ORS.databaseId2=orcl-CMX_ORS
LDAP.MDM.rolename2=readonly_role
```

Synchronizing Users with User Groups through an LDAP Server

You can synchronize users in an LDAP server with the MDM Hub user groups. Before the synchronization, the LDAP server must have users and groups. You can synchronize users in an LDAP server with user groups in multiple Operational Reference Stores in the MDM Hub.

1. Edit the LDAP server properties in the `automation.properties` file.

   The following table describes the properties in the `automation.properties` file that you need to configure:

Property	Description
LDAP.Server	Required. URL to connect to the LDAP server.
LDAP.Username	Required. User name to access the LDAP server. If the LDAP server search is not secure, you do not need a user name.
LDAP.Password	Required. Password to access the LDAP server. If the LDAP server search is not secure, you do not need a password.
LDAP.SearchBase	Required. Specifies the starting point for the search in the LDAP directory tree.
LDAP.number.of.ldapgroups	Required. Number of user groups in the Operational Reference Stores for which you want to synchronize users.
LDAP.groupname.for.ldap.search<n>	Required. Name of a user group in the LDAP server.
LDAP.group.attribute_name.for.userlist<n>	Required. Name of an attribute for a user group in an LDAP server that is associated with a user in an Operational Reference Store.
LDAP.MDM.ORS.group.databaseId<n>	Required. ID of the Operational Reference Store that has a user group associated with a user in the LDAP server.

Property	Description
LDAP.MDM.groupname<n>	Required. Name of a user group in the Operational Reference Store that corresponds to a user group in the LDAP server.
LDAP.attribute_name.for.user.firstname	Required. First name of a user in the LDAP server. Use the property if you want to synchronize the first name of a user from the LDAP server with the Operational Reference Store.
LDAP.attribute_name.for.user.middlename	Optional. Middle name of a user in the LDAP server. Use the property if you want to synchronize the middle name of a user from the LDAP server with the Operational Reference Store.
LDAP.attribute_name.for.user.lastname	Required. Last name of a user in the LDAP server. Use the property if you want to synchronize the last name of a user from the LDAP server with the Operational Reference Store.
LDAP.attribute_name.for.username	Required. An attribute of the user in the LDAP server, other than a common name or a user ID, such as Security Access Manager account name. Use the property to synchronize an attribute other than a common name or a user ID from the LDAP server with the Operational Reference Store.
LDAP.attribute_name.for.user.email	Required. Email address of the user that you want to create.
LDAP.strip_slashes_from_usernames	Optional. Specifies whether to remove slashes from user names. For example, when a user name such as `Boyd\` is part of a search filter expression such as `(&(CN=Boyd\)`, the following error might occur: `InvalidSearchFilterException: Unbalanced parenthesis` In a search expression, slashes might be treated as escape characters resulting in an unbalanced parenthesis error. To make the synchronization process work in such scenarios, you might need to remove slashes from the user names. You can configure the following values: - no. Retains slashes in the user names. - yes. Removes slashes from the user names. Default is `no`.
LDAP.cleanup.before.sync	Optional. Specifies whether to remove all the users that are assigned in an Operational Reference Store before synchronizing users with roles. You can configure the following values: - true. Removes the users that are assigned in an Operational Reference Store, and then assigns the users to roles. If you run the command to synchronize users with the `-u` option, a single user assignment is removed. Otherwise, all user assignments are removed. - false. Retains the users that are assigned in an Operational Reference Store. Default is `true`.

2. To verify the LDAP server connection, run the following command:

On Windows. `LdapConnection.cmd`

On UNIX. `LdapConnection.sh`

3. Ensure that users and user groups are created in the LDAP server and that these have corresponding users and user groups in the MDM Hub.

4. To synchronize users from the LDAP server user groups to the MDM Hub user groups, run the following command:

    On Windows. `LdapGroupSynchronization.cmd`

    On UNIX. `LdapGroupSynchronization.sh`

    The synchronization process assigns the users to their user groups.

Sample Automation Properties Settings

The following sample shows the settings to synchronize three users in an LDAP server with the associated user groups in Operational Reference Stores:

```
LDAP.number.of.ldapgroups=3

LDAP.groupname.for.ldap.search0=cn=mdm_sample_management
LDAP.group.attribute_name.for.userlist0=member
LDAP.MDM.ORS.group.databaseId0=orcl.informatica.com-MDM_SAMPLE
LDAP.MDM.groupname0=management

LDAP.groupname.for.ldap.search1=cn=mdm_sample_dev
LDAP.group.attribute_name.for.userlist1=member
LDAP.MDM.ORS.group.databaseId1=orcl.informatica.com-MDM_SAMPLE
LDAP.MDM.groupname1=dev

LDAP.groupname.for.ldap.search2=cn=mdm_sample_qa
LDAP.group.attribute_name.for.userlist2=member
LDAP.MDM.ORS.group.databaseId2=orcl.informatica.com-MDM_SAMPLE
LDAP.MDM.groupname2=qa
```

Registering Security Providers

A security provider is a third-party application that provides security services, such as authentication and authorization, for users that access the MDM Hub. Security providers are part of some MDM Hub security deployment scenarios. Also, the MDM Hub comes with a set of default internal security providers.

You can automate the procedure to register security providers that authenticate users by validating their identity.

Registering Authentication Providers

To register an authentication provider, add the associated login module to the MDM Hub.

1. Configure the `automation.properties` file.

The following table describes the properties in the `automation.properties` file that you need to configure:

Property	Description
MDM.security_provider.login_module.template	Required. Name of the template that has the settings for the login module of the security provider.
MDM.security_provider.login_module.name	Required. Name of the login module.
MDM.security_provider.login_module.description	Required. Description of the login module.
MDM.security_provider.login_module.enabled	Required. Specifies whether the login module is enabled or disabled.
MDM.security_provider.login_module.position	Required. Position of login module with respect to the existing login module.
MDM.security_provider.login_module.no_of_properties	Required. Total number of login modules.
MDM.security_provider.login_module.properties_name<n>	Required. Name of the login module.
MDM.security_provider.login_module.properties_value<n>	Required. Value of the login module.

2. To register an authentication provider, run the following command:

   On Windows. `AddLoginModule.cmd`

   On UNIX. `AddLoginModule.sh`

   The authentication provider is registered with the MDM Hub.

Sample Automation Properties Settings

The following sample shows the settings to register four login modules in an authentication provider:

```
MDM.security_provider.login_module.template=MicrosoftActiveDirectory-template

MDM.security_provider.login_module.name=SB1 AD Login Module
MDM.security_provider.login_module.description=
MDM.security_provider.login_module.enabled=Yes

MDM.security_provider.login_module.position=top

MDM.security_provider.login_module.no_of_properties=4

MDM.security_provider.login_module.properties_name0=java.naming.factory.initial
MDM.security_provider.login_module.properties_value0=com.sun.jndi.ldap.LdapCtxFactory

MDM.security_provider.login_module.properties_name1=java.naming.provider.url
MDM.security_provider.login_module.properties_value1=ldap://localhost:389/

MDM.security_provider.login_module.properties_name2=uidAttributeID
MDM.security_provider.login_module.properties_value2=sAMAccountName

## In case any value has single slash ('\'), replace it with double slashes ('\\').
MDM.security_provider.login_module.properties_name3=username.prefix
MDM.security_provider.login_module.properties_value3=SB1A\\
```

Importing and Exporting Informatica Data Director Applications

You can import Data Director configurations and applications. Also, you can export the Data Director applications as `.zip` files.

Use the automation tools for the following import and export tasks for the Data Director applications:

- To import and deploy Data Director to an existing application, run the `IddImportToExistingApp` command.
- To import and deploy Data Director as a new application, run the `IddDeployment` command.
- To export the Data Director application to a `.zip` file, run the `IddGetApp` command.

Importing and Deploying Informatica Data Director to an Existing Application

If an Informatica Data Director (IDD) property file or a configuration file is updated, you can import the changes to the application through the command line. The command imports one type of change each time you run it. If an application has multiple changes, such as changes in the configuration and changes in the `BDDHelp` file, run the command for each type of change.

1. Edit the `automation.properties` file.

   The following table describes the properties in the `automation.properties` file that you need to configure:

Property	Description
MDM.master_database.type	Required. Type of database that you use. Based on the database that you use, set to one of the following values: - oracle - db2 - sqlserver
MDM.master_database.server	Required. Name of the machine that hosts the MDM Hub Master Database.
MDM.master_database.portnumber	Required. Port number of the MDM Hub Master Database.
MDM.master_database.servicename	Required. Applicable to Oracle only. Name of the Oracle service if the selected Oracle connection type is SERVICE.
MDM.master_database.dbname	Required. Applicable to IBM DB2 and Microsoft SQL Server. Name of the database instance.
MDM.master_database.username	Required. User name to access the MDM Hub Master Database.
MDM.master_database.password	Required. Password to access the MDM Hub Master Database.

Property	Description
MDM.temp_directory_name	Required. Name of the temporary directory.
MDM.delete_temp_directory_name	Optional. Specifies whether you want to delete or retain files and directories in the temporary directory. You might want to retain files and directories in the temporary directory for troubleshooting issues. Set to `no` to retain files and directories in the temporary directory. If you set the value to any value other than `no`, all the files and directories in the temporary directory are deleted.

2. To import and deploy IDD to an existing application, run the following command:

   On Windows. `IddImportToExistingApp.cmd <IDD application name> -<Configuration change type> <file name of the file with configuration changes>`

   On UNIX. `IddImportToExistingApp.sh <IDD application name> -<Configuration change type> <File with configuration changes>`

   The following table describes the types of configuration changes and the associated files:

Configuration Change Type	Description
BDDConfiguration	Changes to the IDD configuration. The changes are made to the `BDDConfig.xml` file.
BDDBundle	Changes to the IDD bundle. The changes are made to the `BDDBundle[_locale].properties` file.
MetadataBundle	Changes to the metadata bundle. The changes are made to the `MetadataBundle[_locale].properties` file.
MessagesBundle	Changes to the message bundle. The changes are made to the `MessagesBundle[_locale].properties` file.
ErrorCodeBundle	Changes to the error code bundle. The changes are made to the `ErrorCodeBundle[_locale].properties` file.
BDDHelp	Changes to the IDD online help. The changes are made to the `BDDHelp[_locale].zip` file.
CustomBDDHelp	Changes to the custom IDD online help. The changes are made to the `CustomBDDHelp[_locale].zip` file.
ApplicationLogo	Changes to the IDD application logo. The changes are made to the `logo.gif|logo.jpg|logo.jpeg|logo.png` file.
DataImportTemplate	Changes to the IDD data import template. The changes are made to the `data-import-template-config.xml` file.

3. Restart the application server.

   The IDD application is validated and is moved to one of the following application states in which it was before changes were imported:

   • Full Deployment

- Limited Deployment
- Not Deployed

4. If validation errors appear during the application server restart, manually fix the validation errors and restart the import process.

Sample Automation Properties Settings

The following sample shows the settings to import and deploy an Informatica Data Director application to an existing application:

```
## Properties for IDD import and deployment

MDM.master_database.type=oracle
MDM.master_database.server=localhost
MDM.master_database.portnumber=1521
MDM.master_database.servicename=orcl.informatica.com
MDM.master_database.username=cmx_system
MDM.master_database.password=!!cmx!!

MDM.temp_directory_name=temp

MDM.delete_temp_directory=yes
```

Importing and Deploying Informatica Data Director as a New Application

You can deploy an Informatica Data Director (IDD) application configuration file or a compressed version of the complete IDD application through the command line.

1. Edit the `automation.properties` file.

   The following table describes the properties in the `automation.properties` file that you need to configure:

Property	Description
MDM.master_database.type	Required. Type of database that you use. Based on the database that you use, set to one of the following values: - oracle - db2 - sqlserver
MDM.master_database.server	Required. Name of the machine that hosts the MDM Hub Master Database.
MDM.master_database.portnumber	Required. Port number of the MDM Hub Master Database.
MDM.master_database.servicename	Required. Applicable to Oracle only. Name of the Oracle service if the selected Oracle connection type is SERVICE.
MDM.master_database.dbname	Required. Applicable to IBM DB2 and Microsoft SQL Server. Name of the database instance.
MDM.master_database.username	Required. User name to access the MDM Hub Master Database.

Property	Description
MDM.master_database.password	Required. Password to access the MDM Hub Master Database.
MDM.temp_directory_name	Required. Name of the temporary directory.
MDM.delete_temp_directory_name	Optional. Specifies whether you want to delete or retain files and directories in the temporary directory. You might want to retain files and directories in the temporary directory for troubleshooting issues. Set to `no` to retain files and directories in the temporary directory. If you set the value to any value other than `no`, all the files and directories in the temporary directory are deleted.

2. To import and deploy IDD as a new application, run the command to deploy an IDD application.

Option	Command
Deploy the IDD application configuration file.	**On Windows.** `IddDeployment.cmd -config_xml <IDD XML Configuration file> -database_id <Operational Reference Store ID>` **On UNIX.** `IddDeployment.sh -config_xml <IDD XML Configuration file> -database_id <Operational Reference Store ID>`
Deploy the IDD application compressed file.	**On Windows.** `IddDeployment.cmd -config_zip <IDD application ZIP file> -database_id <Operational Reference Store ID>` **On UNIX.** `IddDeployment.sh -config_zip <IDD application ZIP file> -database_id <Operational Reference Store ID>`

3. Restart the application server.

   The IDD application is validated. If the validation is successful, the IDD application is deployed in the application server.

4. If validation errors appear during the application server restart, manually fix the validation errors and start the import process again.

Sample Automation Properties Settings

The following sample shows the settings to import and deploy an Informatica Data Director application to a new application:

```
## Properties for IDD import and deployment

MDM.master_database.type=oracle
MDM.master_database.server=localhost
MDM.master_database.portnumber=1521
MDM.master_database.servicename=orcl.informatica.com
MDM.master_database.username=cmx_system
MDM.master_database.password=!!cmx!!

MDM.temp_directory_name=temp

MDM.delete_temp_directory=yes
```

Exporting the Informatica Data Director Application to a ZIP file

You can export an Informatica Data Director (IDD) application to a `.zip` file through the command line. You can import and deploy the `.zip` IDD application file as a new application.

1. Edit the `automation.properties` file.

   The following table describes the properties in the `automation.properties` file that you need to configure:

Property	Description
MDM.master_database.type	Required. Type of database that you use. Based on the database that you use, set to one of the following values: - oracle - db2 - sqlserver
MDM.master_database.server	Required. Name of the machine that hosts the MDM Hub Master Database.
MDM.master_database.portnumber	Required. Port number of the MDM Hub Master Database.
MDM.master_database.servicename	Required. Applicable to Oracle only. Name of the Oracle service if the selected Oracle connection type is SERVICE.
MDM.master_database.dbname	Required. Applicable to IBM DB2 and Microsoft SQL Server. Name of the database instance.
MDM.master_database.username	Required. User name to access the MDM Hub Master Database.
MDM.master_database.password	Required. Password to access the MDM Hub Master Database.
MDM.temp_directory_name	Required. Name of the temporary directory.
MDM.temp_directory_name	Optional. Specifies whether you want to delete or retain files and directories in the temporary directory. Set to one of the following values: - no. Retain files and directories in the temporary directory - yes. Files and directories in the temporary directory are deleted

2. To export the IDD application to a `.zip` file, run the following command:

   On Windows. `IddGetApp.cmd <IDD application name> <Name of the ZIP file>`

   On UNIX. `IddGetApp.sh <IDD application name> <Name of the ZIP file>`

   The IDD application is exported to a `.zip` file in the current directory.

Sample Automation Properties Settings

The following sample shows the settings to export an Informatica Data Director application to a `.zip` file:

```
## Properties for IDD import and deployment

MDM.master_database.type=oracle
MDM.master_database.server=localhost
MDM.master_database.portnumber=1521
MDM.master_database.servicename=orcl.informatica.com
MDM.master_database.username=cmx_system
MDM.master_database.password=!!cmx!!
```

```
MDM.temp_directory_name=temp

MDM.delete_temp_directory=yes
```

Automation Properties File

The automation properties file, `automation.properties`, contains the properties to configure the automation tools.

The `automation.properties` file is in the `MDMAutomation.zip` file, which is in the following directory:

On UNIX. `<Resource Kit installation directory>/automation/Misc_Automation`

On Windows. `<Resource Kit installation directory>\automation\Misc_Automation`

Automation Properties

To automate configuration tasks, configure properties for the tasks that you need to automate in the `automation.properties` file.

MDM Hub Environment Properties

Before you automate any configuration task, set the MDM Hub environment properties.

The following table describes the properties to set for the MDM Hub environment:

Property	Description
appserver.type	Required. Type of application server, such as jboss, weblogic, or websphere.
appserver.version	Required. Version of the application server.
jboss.hostname	Required. Name of the machine that hosts JBoss.
jboss.remote_port	Required. The JBoss remote port number.
websphere.hostname	Required. Name of the machine that hosts WebSphere.
websphere.rmi_port	Required. The WebSphere RMI port number.
weblogic.hostname	Required. Name of the machine that hosts WebLogic.
weblogic.port	Required. Port number on which the WebLogic Server is listening.
weblogic.login	Required. Name of the user for the WebLogic installation.
weblogic.password	Required. Password that corresponds to the WebLogic user.
MDMAdminUsername	Required. User name of the MDM Hub administrative user.

Property	Description
MDMAdminPassword	Required. Clear text password that corresponds to the MDM Hub administrative user. Use either the `MDMAdminPassword` or the `MDMAdminEncryptedPassword` property.
MDMAdminEncryptedPassword	Required. Encrypted password that corresponds to the MDM Hub administrative user. Use either the `MDMAdminPassword` or the `MDMAdminEncryptedPassword` property.

User Configuration Properties

Set the user configuration properties to automate user configuration tasks.

The following table describes the properties that you need to configure to automate user configuration:

Property	Description
MDM.number.of.new.users	Required. Number of MDM Hub users that you want to create. You can create a maximum of 1000 users.
MDM.new.user.firstname<n>	Required. First name of the user that you want to create. Define the `MDM.new.user.firstname<n>` property for each user. The value of `<n>` for the first user is 0. For each additional user, increment the value of `<n>` by 1.
MDM.new.user.middlename<n>	Optional. Middle name of the user that you want to create. Define the `MDM.new.user.middlename<n>` property for each user. The value of `<n>` for the first user is 0. For each additional user, increment the value of `<n>` by 1.
MDM.new.user.lastname<n>	Required. Last name of the user that you want to create. Define the `MDM.new.user.lastname<n>` property for each user. The value of `<n>` for the first user is 0. For each additional user, increment the value of `<n>` by 1.
MDM.new.user.email<n>	Required. Email address of the user that you want to create.
MDM.new.user.username<n>	Required. User name of the user that you want to create. Define the `MDM.new.user.username<n>` property for each user. The value of `<n>` for the first user is 0. For each additional user, increment the value of `<n>` by 1.
MDM.new.user.password<n>	Required. Password to access the account of the user that you want to create. Define the `MDM.new.user.password<n>` property for each user. The value of `<n>` for the first user is 0. For each additional user, increment the value of `<n>` by 1.

Property	Description
MDM.new.user.isExternalAuthentication<n>	Required. Specifies whether or not the user is externally authenticated. Define the `MMDM.new.user.isExternalAuthentication<n>` property for each user. The value of `<n>` for the first user is 0. For each additional user, increment the value of `<n>` by 1. You can configure the following values: - Y. Indicates that the user is externally authenticated. - N. Indicates that the user is internally authenticated in the MDM Hub. If set to `N`, ensure that you set the `MDM.new.user.password<n>` property.
MDM.new.user.isAdministrator<n>	Required. Specifies whether or not the user is an administrator. Define the `MDM.new.user.isAdministrator<n>` property for each user. The value of `<n>` for the first user is 0. For each additional user, increment the value of `<n>` by 1. You can configure the following values: - Y. Indicates that the user is an administrator. - N. Indicates that the user is not an administrator.
MDM.new.user.defaultDatabaseId<n>	Required. ID of the default Operational Reference Store. Define the `MDM.new.user.defaultDatabaseId<n>` property for each user. The value of `<n>` for the first user is 0. For each additional user, increment the value of `<n>` by 1. If you do not set the `MDM.new.user.defaultDatabaseId<n>` property, the user is registered with the MDM Hub Master Database.
MDM.number.of.user_ors_relationships	Required. Number of relationships between users and Operational Reference Stores that you want to create. You can create a maximum of 1000 relationships each time you run the command to register users with Operational Reference Stores.
MDM.user_ors_rel.username<n>	Required. User name of a user that you want to register with an Operational Reference Store. Define the `MDM.user_ors_rel.username<n>` property for each user. The value of `<n>` for the first user is 0. For each additional user, increment the value of `<n>` by 1.
MDM.user_ors_rel.databaseIds<n>	Required. Operational Reference Store ID. Define the `MDM.user_ors_rel.databaseIds<n>` property for each user. The value of `<n>` for the first user is 0. For each additional user, increment the value of `<n>` by 1. If you want to register a user with multiple Operational Reference Stores, separate each Operational Reference Store ID with a comma.
MDM.number.of.user_roles_relationships	Required. Number of relationships between user and roles that you want to create. You can create a maximum of 1000 relationships each time you run the command to assign roles to users.
MDM.user_roles_rel.username<n>	Required. User name of a user that you want to assign to a role. Define the `MDM.user_roles_rel.username<n>` property for each user. The value of `<n>` for the first user is 0. For each additional user, increment the value of `<n>` by 1.

Property	Description
MDM.user_roles_rel.databaseIds<n>	Required. Operational Reference Store ID. Define the `MDM.user_roles_rel.databaseId<n>` property for each user. The value of `<n>` for the first user is 0. For each additional user, increment the value of `<n>` by 1. If you want to assign a user to multiple Operational Reference Stores, separate each Operational Reference Store ID with a comma.
MDM.user_roles_rel.roles<n>	Required. Name of a role that you want to assign to a user. Separate each role with a comma. Define the `MDM.user_roles_rel.roles<n>` property for each user. The value of `<n>` for the first user is 0. For each additional user, increment the value of `<n>` by 1.
MDM.number.of.delete.users	Required. The total number of users that you want to delete. You can delete a maximum of 1000 users each time you run the command to delete the MDM Hub users.
MDM.delete.user.username<n>	Required. User name of a user that you want to delete. Define the `MDM.delete.user.username<n>` property for each user that you want to delete. The value of `<n>` for the first user is 0. For each additional user, increment the value of `<n>` by 1.

LDAP Server User Synchronization Properties

Set the LDAP Server user synchronization properties to configure to automate the synchronization of MDM Hub users between LDAP servers and the MDM Hub.

The following table describes the properties that you need to configure to automate the synchronization of MDM Hub users:

Property	Description
LDAP.Server	Required. URL to connect to the LDAP server.
LDAP.Username	Required. User name to access the LDAP server. If the LDAP server search is not secure, you do not need a user name.
LDAP.Password	Required. Password to access the LDAP server. If the LDAP server search is not secure, you do not need a password.
LDAP.SearchBase	Required. Specifies the starting point for the search in the LDAP directory tree. For example, to query the entire directory, specify the root of the directory tree. To query a specific organizational unit in the directory, specify the root of the organizational unit in the directory tree. A search base can include the following objects: - cn. common name - ou. organizational unit - o. organization - c. country - dc. domain A search base consists of multiple objects separated by commas.

Property	Description
LDAP.attribute_name.for.user.firstname	Required. First name of a user in the LDAP server. Use the property if you want to synchronize the first name of a user from the LDAP server with the Operational Reference Store.
LDAP.attribute_name.for.user.middlename	Optional. Middle name of a user in the LDAP server. Use the property if you want to synchronize the middle name of a user from the LDAP server with the Operational Reference Store.
LDAP.attribute_name.for.user.lastname	Required. Last name of a user in the LDAP server. Use the property if you want to synchronize the last name of a user from the LDAP server with the Operational Reference Store.
LDAP.attribute_name.for.username	Required. An attribute of the user in the LDAP server, other than a common name or a user ID, such as Security Access Manager account name. Use the property to synchronize an attribute other than a common name or a user ID from the LDAP server with the Operational Reference Store.
LDAP.number.of.ldaproles	Required. Number of roles in the Operational Reference Stores for which you want to synchronize users.
LDAP.rolename.for.ldap.search\<n>	Required. Name of a role in the LDAP server. Define the `LDAP.rolename.for.ldap.search<n>` property for each role. The value of `<n>` for the first role is 0. For each additional role, increment the value of `<n>` by 1.
LDAP.attribute_name.for.user.email	Required. Email address of a user in the LDAP server. Use the property if you want to synchronize the email address of a user from the LDAP server with the Operational Reference Store.
LDAP.strip_slashes_from_usernames	Optional. Specifies whether to remove slashes from user names. You can configure the following values: - no. Retains slashes in the user names. - yes. Removes slashes from the user names. Default is `no`. For example, when a user name such as `Boyd\` is part of a search filter expression such as `(&(CN=Boyd\)`, the following error might occur: `InvalidSearchFilterException: Unbalanced parenthesis` In a search expression, slashes might be treated as escape characters resulting in an unbalanced parenthesis error. To make the synchronization process work in such scenarios, you might need to remove slashes from the user names.
LDAP.cleanup.before.sync	Optional. Specifies whether to remove all the users that are assigned in an Operational Reference Store before synchronizing users with roles. You can configure the following values: - true. Removes the users that are assigned in an Operational Reference Store, and then assigns the users to roles. If you run the command to synchronize users with the `-u` option, a single user assignment is removed. Otherwise, all user assignments are removed. - false. Retains the users that are assigned in an Operational Reference Store. Default is `true`.

Property	Description
LDAP.role.attribute_name.for.userlist<n>	Required. Name of an attribute for a role in an LDAP server that is associated with a user in an Operational Reference Store. Define the `LDAP.role.attribute_name.for.userlist<n>` property for each attribute. The value of `<n>` for the first attribute is 0. For each additional attribute, increment the value of `<n>` by 1.
LDAP.MDM.ORS.databaseId<n>	Required. ID of the Operational Reference Store that has a role associated with a user in the LDAP server. Define the `LDAP.MDM.ORS.databaseId<n>` property for each Operational Reference Store. The value of `<n>` for the first Operational Reference Store is 0. For each additional Operational Reference Store, increment the value of `<n>` by 1.
LDAP.MDM.rolename<n>	Required. Name of a role in the Operational Reference Store that corresponds to a role in the LDAP server. Define the `LDAP.MDM.rolename<n>` property for each role. The value of `<n>` for the first role is 0. For each additional role, increment the value of `<n>` by 1.
LDAP.number.of.ldapgroups	Required. Number of user groups in the Operational Reference Stores for which you want to synchronize users.
LDAP.groupname.for.ldap.search<n>	Required. Name of a user group in the LDAP server. Define the `LDAP.groupname.for.ldap.search<n>` property for each user group. The value of `<n>` for the first user group is 0. For each additional user group, increment the value of `<n>` by 1.
LDAP.group.attribute_name.for.userlist<n>	Required. Name of an attribute for a user group in an LDAP server that is associated with a user in an Operational Reference Store. Define the `LDAP.group.attribute_name.for.userlist<n>` property for each attribute. The value of `<n>` for the first attribute is 0. For each additional attribute, increment the value of `<n>` by 1.
LDAP.MDM.ORS.group.databaseId<n>	Required. ID of the Operational Reference Store that has a user group associated with a user in the LDAP server. Define the `LDAP.MDM.ORS.databaseId<n>` property for each Operational Reference Store. The value of `<n>` for the first Operational Reference Store is 0. For each additional Operational Reference Store, increment the value of `<n>` by 1.
LDAP.MDM.groupname<n>	Required. Name of a user group in the Operational Reference Store that corresponds to a user group in the LDAP server. Define the `LDAP.MDM.groupname<n>` property for each user group. The value of `<n>` for the first user group is 0. For each additional user group, increment the value of `<n>` by 1.

Security Provider Registration Properties

Set the security provider properties to automate the registration of security providers.

The following table describes the properties that you need to configure to automate the registration of security providers:

Property	Description
MDM.security_provider.login_module.template	Required. Name of the template that has the settings for the login module of the security provider. Use one of the following security provider login templates: - MicrosoftActiveDirectory-template - OpenLDAP-template - Kerberos-template
MDM.security_provider.login_module.name	Required. Name of the login module.
MDM.security_provider.login_module.description	Optional. Description of the login module.
MDM.security_provider.login_module.enabled	Required. Specifies whether the login module is enabled or disabled. You can configure the following values: - yes. Enables the login module. - no. Disables the login module. Default is `no`.
MDM.security_provider.login_module.position	Required. Position of login module with respect to the existing login module. You can configure the following values: - top. Indicates that the login module is the first login module. - bottom. Indicates that the login module is the last login module. Default is `top`.
MDM.security_provider.login_module.no_of_properties	Required. Total number of login modules.
MDM.security_provider.login_module.properties_name<n>	Required. Name of the login module. Define the `MDM.security_provider.login_module.properties_name<n>` property for each login module. The value of `<n>` for the first login module is 0. For each additional login module, increment the value of `<n>` by 1.
MDM.security_provider.login_module.properties_value<n>	Required. Value of the login module. Define the `MDM.security_provider.login_module.properties_value<n>` property for each login module. The value of `<n>` for the first login module is 0. For each additional login module, increment the value of `<n>` by 1. If any value has single slash ('\'), replace it with double slash ('\\').

Informatica Data Director Export and Import Properties

Set the Informatica Data Director application properties to automate the export or import of the Informatica Data Director application.

The following table describes the properties that you need to configure to automate the export or import of the Informatica Data Director application:

Property	Description
MDM.master_database.type	Required. Type of database that you use. Based on the database that you use, set to one of the following values: - oracle - db2 - sqlserver
MDM.master_database.server	Required. Name of the machine that hosts the MDM Hub Master Database.
MDM.master_database.portnumber	Required. Port number of the MDM Hub Master Database.
MDM.master_database.servicename	Applicable to Oracle only. Required. Name of the Oracle service if the selected Oracle connection type is SERVICE.
MDM.master_database.dbname	Applicable to IBM DB2 and Microsoft SQL Server. Required. Name of the database instance.
MDM.master_database.username	Required. User name to access the MDM Hub Master Database.
MDM.master_database.password	Required. Password to access the MDM Hub Master Database.
MDM.temp_directory_name	Required. Name of the temporary directory.
MDM.delete_temp_directory	Optional. Specifies whether you want to delete or retain files and directories in the temporary directory. You might want to retain files and directories in the temporary directory for troubleshooting issues. You can configure the following values: - no. Retains files and directories in the temporary directory. - yes. Deletes files and directories in the temporary directory. Default is `yes`.

Sample Automation Properties File

The following sample `automation.properties` file contains configuration for automation tools to be run in a JBoss application server environment:

```
## Application server type and version. Application server type can be jboss or weblogic
or websphere.
appserver.type=jboss
appserver.version=7.2

## WebLogic credentials for type and version
#appserver.type=weblogic
#appserver.version=10.3.6

## WebSphere credentials for type and version
#appserver.type=websphere
#appserver.version=8.5

## JBoss credentials for JBoss EAP 6.1 or JBoss 7.2
jboss.hostname=10.2.63.248
jboss.remote_port=4447

## WebLogic credentials
weblogic.hostname=10.21.41.74
weblogic.port=7001
weblogic.login=weblogic
```

```
weblogic.password=webl0gic

## WebSphere credentials
websphere.hostname=10.20.112.200
websphere.rmi_port=2817

## MDM administrative user credentials
MDMAdminUsername=admin

#MDMAdminPassword=admin
#        or
MDMAdminEncryptedPassword=A75FCFBCB375F229

## List of new users that you want to create

MDM.number.of.new.users=5

MDM.new.user.firstname0=Bill
MDM.new.user.middlename0=Henry
MDM.new.user.lastname0=Gates
MDM.new.user.username0=bgates
MDM.new.user.password0=
MDM.new.user.isExternalAuthentication0=Y

MDM.new.user.firstname1=Sohaib
MDM.new.user.middlename1=
MDM.new.user.lastname1=Abbasi
MDM.new.user.username1=sabbasi
MDM.new.user.password1=randomPassword1
MDM.new.user.isExternalAuthentication1=N
MDM.new.user.defaultDatabaseId1=orcl.informatica.com-MDM_SAMPLE

MDM.new.user.firstname2=Larry
MDM.new.user.middlename2=Joseph
MDM.new.user.lastname2=Ellison
MDM.new.user.username2=lellison
MDM.new.user.password2=
MDM.new.user.isExternalAuthentication2=Y
MDM.new.user.defaultDatabaseId2=orcl.informatica.com-MDM_SAMPLE
MDM.new.user.isAdministrator2=Y

MDM.new.user.firstname3=Warren
MDM.new.user.middlename3=Edward
MDM.new.user.lastname3=Buffett
MDM.new.user.username3=wbuffett
MDM.new.user.password3=randomPassword3
MDM.new.user.isExternalAuthentication3=N
MDM.new.user.isAdministrator3=Y

MDM.new.user.firstname4=Larry
MDM.new.user.middlename4=
MDM.new.user.lastname4=Page
MDM.new.user.username4=lpage
MDM.new.user.password4=
MDM.new.user.isExternalAuthentication4=Y

## List of relationships that you want to create between new users and the Operational
Reference Store (ORS)

MDM.number.of.user_ors_relationships=3

MDM.user_ors_rel.username0=sabbasi
MDM.user_ors_rel.databaseIds0=orcl.informatica.com-MDM_SAMPLE, orcl-CMX_ORS,
orcl.informatica.com-RETAIL

MDM.user_ors_rel.username1=wbuffett
MDM.user_ors_rel.databaseIds1=orcl.informatica.com-MDM_SAMPLE

MDM.user_ors_rel.username2=lpage
MDM.user_ors_rel.databaseIds2=orcl-CMX_ORS, orcl.informatica.com-MDM_SAMPLE
```

```
## List of new user-role relationships that you want to create

MDM.number.of.user_roles_relationships=3

MDM.user_roles_rel.username0=sabbasi
MDM.user_roles_rel.databaseId0=orcl.informatica.com-MDM_SAMPLE
MDM.user_roles_rel.roles0=Manager

MDM.user_roles_rel.username1=wbuffett
MDM.user_roles_rel.databaseId1=orcl.informatica.com-MDM_SAMPLE
MDM.user_roles_rel.roles1=Data Steward,Manager, Super User

MDM.user_roles_rel.username2=lpage
MDM.user_roles_rel.databaseId2=orcl-CMX_ORS
MDM.user_roles_rel.roles2=Data Steward, Manager

## List of users that you want to delete

MDM.number.of.delete.users=20

MDM.delete.user.username0=bgates
MDM.delete.user.username1=sabbasi
MDM.delete.user.username2=lellison
MDM.delete.user.username3=wbuffett
MDM.delete.user.username4=lpage

MDM.delete.user.username5=dkorablev
MDM.delete.user.username6=dmoore
MDM.delete.user.username7=dtoporov
MDM.delete.user.username8=echoi
MDM.delete.user.username9=jwu
MDM.delete.user.username10=mnaveed
MDM.delete.user.username11=rhoward
MDM.delete.user.username12=rkarel
MDM.delete.user.username13=rmatusof
MDM.delete.user.username14=rnaidu
MDM.delete.user.username15=rshankar
MDM.delete.user.username16=shoskin
MDM.delete.user.username17=smenon
MDM.delete.user.username18=xhe
MDM.delete.user.username19=zgombosi

## Settings for login module in a security provider

MDM.security_provider.login_module.template=MicrosoftActiveDirectory-template

MDM.security_provider.login_module.name=SB1 AD Login Module
MDM.security_provider.login_module.description=
MDM.security_provider.login_module.enabled=Yes

## Position of a login module. Set the value to top or bottom. Set to top to position
the login module as the first login module.
## Set to bottom to position the login module after all the other login modules.
MDM.security_provider.login_module.position=top

MDM.security_provider.login_module.no_of_properties=4

MDM.security_provider.login_module.properties_name0=java.naming.factory.initial
MDM.security_provider.login_module.properties_value0=com.sun.jndi.ldap.LdapCtxFactory

MDM.security_provider.login_module.properties_name1=java.naming.provider.url
MDM.security_provider.login_module.properties_value1=ldap://localhost:389/

MDM.security_provider.login_module.properties_name2=uidAttributeID
MDM.security_provider.login_module.properties_value2=sAMAccountName

## In case any value has single slash ('\'), replace it with double slashes ('\\').
MDM.security_provider.login_module.properties_name3=username.prefix
MDM.security_provider.login_module.properties_value3=SB1A\\

## Properties for IDD import and deployment
```

```
#MDM.master_database.type=oracle
#MDM.master_database.server=localhost
#MDM.master_database.portnumber=1521
#MDM.master_database.servicename=orcl.informatica.com
#MDM.master_database.username=cmx_system
#MDM.master_database.password=!!cmx!!

#MDM.master_database.type=db2
#MDM.master_database.server=mdmauto04.informatica.com
#MDM.master_database.portnumber=50000
#MDM.master_database.dbname=DEVUT
#MDM.master_database.username=cmx_system
#MDM.master_database.password=Password1

MDM.master_database.type=sqlserver
MDM.master_database.server=mdmauto01.informatica.com
MDM.master_database.portnumber=1433
MDM.master_database.dbname=cmx_system
MDM.master_database.username=cmx_system
MDM.master_database.password=!!cmx!!

## Temporary directory in which the MDM Hub can create temporary directories and files
that need to be processed
MDM.temp_directory_name=temp

## Deletes or retains files and directories in the temporary directory. You might want
to retain files and directories in the temporary directory for troubleshooting issues.
## Set to 'no' to retain files and directories in the temporary directory.Set to 'yes'
to delete files and directories in the temporary directory.
MDM.delete_temp_directory=yes

## Properties for LDAP connection
LDAP.Server=ldap://localhost:389
LDAP.Username=
LDAP.Password=

LDAP.SearchBase=dc=example,dc=com
LDAP.attribute_name.for.user.firstname=cn
LDAP.attribute_name.for.user.middlename=
LDAP.attribute_name.for.user.lastname=sn

LDAP.number.of.ldaproles=6

LDAP.rolename.for.ldap.search0=cn=MDM_Sample_DataSteward_role
LDAP.role.attribute_name.for.userlist0=member
LDAP.MDM.ORS.databaseId0=orcl.informatica.com-MDM_SAMPLE
LDAP.MDM.rolename0=Data Steward

LDAP.rolename.for.ldap.search1=cn=MDM_Sample_readonly_role
LDAP.role.attribute_name.for.userlist1=member
LDAP.MDM.ORS.databaseId1=orcl.informatica.com-MDM_SAMPLE
LDAP.MDM.rolename1=Manager

LDAP.rolename.for.ldap.search2=cn=cmx_ors_readonly_role
LDAP.role.attribute_name.for.userlist2=member
LDAP.MDM.ORS.databaseId2=orcl-CMX_ORS
LDAP.MDM.rolename2=readonly_role

LDAP.rolename.for.ldap.search3=cn=cmx_ors_datasteward_role
LDAP.role.attribute_name.for.userlist3=member
LDAP.MDM.ORS.databaseId3=orcl-CMX_ORS
LDAP.MDM.rolename3=role1

LDAP.rolename.for.ldap.search4=cn=retail_solution_readonly_role
LDAP.role.attribute_name.for.userlist4=member
LDAP.MDM.ORS.databaseId4=orcl.informatica.com-RETAIL
LDAP.MDM.rolename4=readonly

LDAP.rolename.for.ldap.search5=cn=retail_solution_datasteward_role
LDAP.role.attribute_name.for.userlist5=member
```

```
LDAP.MDM.ORS.databaseId5=orcl.informatica.com-RETAIL
LDAP.MDM.rolename5=datasteward

LDAP.number.of.ldapgroups=3

LDAP.groupname.for.ldap.search0=cn=mdm_sample_management
LDAP.group.attribute_name.for.userlist0=member
LDAP.MDM.ORS.group.databaseId0=orcl.informatica.com-MDM_SAMPLE
LDAP.MDM.groupname0=management

LDAP.groupname.for.ldap.search1=cn=mdm_sample_dev
LDAP.group.attribute_name.for.userlist1=member
LDAP.MDM.ORS.group.databaseId1=orcl.informatica.com-MDM_SAMPLE
LDAP.MDM.groupname1=dev

LDAP.groupname.for.ldap.search2=cn=mdm_sample_qa
LDAP.group.attribute_name.for.userlist2=member
LDAP.MDM.ORS.group.databaseId2=orcl.informatica.com-MDM_SAMPLE
LDAP.MDM.groupname2=qa
```

Automation .zip File Content

The automation .zip file, `MDMAutomation.zip`, contains the following files:

File Name	Description
AcquireReleaseLock.cmd AcquireReleaseLock.sh	Acquires and releases locks on the repository tables.
AddLoginModule.cmd AddLoginModule.sh	Adds the login module that is associated with an authentication provider to the MDM Hub.
AppserverContext.cmd AppserverContext.sh	Verifies the connection to the application server. Also, verifies whether the automation tools can access the MDM Hub installation to automate configuration tasks.
AssignRolesToUser.cmd AssignRolesToUser.s	Assigns roles to users that are registered in an Operational Reference Store.
AssignUsersToDatabases.cmd AssignUsersToDatabases.sh	Grants users access to an Operational Reference Store.
automation.properties	Automation properties configuration file.
com.ibm.ws.ejb.thinclient_8.5.0.jar	If the MDM Hub is deployed in the WebSphere application server, the JAR file is required to connect to WebSphere.
com.ibm.ws.orb_8.5.0	If the MDM Hub is deployed in the WebSphere application server, the JAR file is required to connect to WebSphere.
commons-lang-2.3.jar	Provides methods for the manipulation of core Java classes that the standard Java libraries fail to provide.
CreateUsers.cmd CreateUsers.sh	Creates and registers users that need access to the MDM Hub in the MDM Hub Master Database.

File Name	Description
db2jcc.jar	If the MDM Hub is deployed in the JBoss application server, the JAR file is required to connect to JBoss.
DeleteUsers.cmd DeleteUsers.sh	Deletes users in the MDM Hub Master Database.
GenerateDeployORSSpecificSchema.cmd GenerateDeployORSSpecificSchema.sh	Generates and deploys ORS-specific JMS schemas and Services Integration Framework APIs.
IddDeployment.cmd IddDeployment.sh	Deploys an Informatica Data Director application configuration file and compressed file.
IddGetApp.cmd IddGetApp.sh	Exports the Informatica Data Director application to a ZIP file.
IddImportToExistingApp.cmd IddImportToExistingApp.sh	Imports and deploys Informatica Data Director to an existing application.
jboss-client.jar	If the MDM Hub is deployed in the JBoss application server, the JAR file is required to connect to JBoss.
LdapConnection.cmd LdapConnection.sh	Verifies the LDAP server connection and searches for an entity in the LDAP server.
LdapGroupSynchronization.cmd LdapGroupSynchronization.sh	Synchronizes users in an LDAP server with user groups in multiple Operational Reference Stores in the MDM Hub.
LdapUserSynchronization.cmd LdapUserSynchronization.sh	Synchronizes users from the LDAP server roles to the MDM Hub roles.
log4j-1.2.16.jar	Java-based logging utility for classes that are required for the automation tools to run.
MDMAutomation.jar	Contains the classes that are required to run the automation tools.
ojdbc6.jar	If the Hub Store is in the Oracle database server, the JAR file is required to connect to Oracle.
sqljdbc4.jar	If the Hub Store is in Microsoft SQL Server, the JAR file is required to connect to Microsoft SQL Server.
wlthint3client.jar	If the MDM Hub is deployed in the WebLogic server, the JAR file is required to connect to WebLogic.

C H A P T E R 4

Encrypting and Decrypting Data in CSV Files

This chapter includes the following topics:

Encrypting and Decrypting Data in CSV Files Overview

You can encrypt or decrypt columns in CSV files. Use the encryption and decryption utilities that the Resource Kit includes.

You can specify columns that you need to encrypt or decrypt. Use the `opencsv-2.3.jar` file in the data encryption implementation for CSV files.

Encrypting Data in CSV Files

You can encrypt data in the columns of a CSV file.

1. Change to the following directory:

   On UNIX. `<infamdm_install_dir>/resourcekit/samples/DataEncryption`

   On Windows. `<infamdm_install_dir>\resourcekit\samples\DataEncryption`

2. Run the following command:

   On UNIX. `run.sh <encrypt> <input CSV file name> <output CSV file name> <column number>`

   On Windows. `run.bat <encrypt> <input CSV file name> <output CSV file name> <column number>`

   Column number starts at `0`.

Decrypting Data in CSV Files

You can decrypt data in the columns of a CSV file.

1. Change to the following directory:

   On UNIX. `<infamdm_install_dir>`/resourcekit/samples/DataEncryption

   On Windows. `<infamdm_install_dir>`\resourcekit\samples\DataEncryption

2. Run the following command:

   On UNIX. `run.sh <decrypt> <input CSV file name> <output CSV file name> <column number>`

   On Windows. `run.bat <decrypt> <input CSV file name> <output CSV file name> <column number>`

   Column number starts at `0`.

CHAPTER 5

Creating and Deleting Many User Roles for the MDM Hub

This chapter includes the following topics:

Creating and Deleting Many User Roles for the MDM Hub Overview

Use the role creation tool and role deletion tool to quickly create or delete up to 200 roles with the same resource privileges as an existing source role. If you do not use the role creation tool or role deletion tool, the MDM Hub requires you to manually create and delete Security Access Manager roles through the MDM Hub console. The role creation tool and role deletion tool avoids the time-consuming process of manually creating and deleting each role and manually assigning resource privileges to each role.

Unzipping the Role Creation Tool and Role Deletion Tool

Before you can use the role creation tool and the role deletion tool, you must unzip the files to an empty directory. Contact Informatica Global Customer Support to get the zip file.

1. Unzip the file `MDM_Role.zip` to an empty directory.

    The file `MDM_Role.zip` contains the following files:

    - CopyRole.cmd
    - CopyRole.sh
    - DeleteRole.cmd

- DeleteRole.sh
- ojdbc7.jar
- role.properties
- RoleManagement.jar

2. Ensure the java PATH variable for your environment is Java version 1.6.0.30 or higher.

Creating Roles

To create roles, you must create a source role, edit the `roles.properties` file, and then create the roles.

Step 1. Create a Source Role

You must create a source role. The roles that you create with the role creation tool have the same resource privileges as the source role.

1. In the MDM Hub console, create a Security Access Manager role. This is the source role.
2. Assign the most common resource privileges to the source role.

   The role creation tool creates roles with the same resource privileges as the source role. Assign the most common resource privileges to reduce the time spent manually modifying the privileges of the roles you create.

3. Close the MDM Hub console.
4. Stop the application server.

Step 2. Edit the roles.properties File

Before you run the role creation tool, you must configure the `roles.properties` file for your environment. The `role.properties` files contains sample properties to help you configure the file.

1. Edit the properties to provide the credentials for your database.
   - For Oracle environments, enter the following properties:
     - database.type=oracle
     - database.hostname
     - database.portnumber
     - database.servicename
     - database.username
     - database.password
   - For Microsoft SQL Server environments, enter the following properties:
     - database.type=sqlserver
     - database.hostname
     - database.portnumber
     - database.dbname

- database.username

- database.password

- For IBM DB2 environments, enter the following properties:

- database.type=db2

- database.hostname

- database.portnumber

- database.dbname

- database.username

- database.password

2. Edit the following property to provide the name of the source role:

- MDM.existing.role.name

3. Edit the following property to provide the number of roles you want to create:

- MDM.number.of.new.roles

Note: You can create a maximum of 200 roles.

4. For each role that you want to create, edit the following properties for each role to provide the name and description of each role:

- MDM.new.role.name<#>

- MDM.new.role.externalname<#>

- MDM.new.role.description<#>

is a number between 0 and (MDM.number.of.new.roles)-1.

Step 3. Create the Roles

To create the roles that you specified in the `roles.properties` file, run the role creation tool.

1. Run the roles creation tool:

- On Windows: Run CopyRole.cmd.

- On UNIX: Run CopyRole.sh.

Security Access Manager roles are created in the Operational Reference Store.

2. Start the application server.

3. Verify that the role creation tool created the roles that you specified in the `roles.properties` file. In the MDM Hub console, go to **Security Access Manager** > **Roles**.

4. If you want any of the new roles to have different resource privileges than the source role, change the resource privileges for these roles.

Deleting Roles

To delete roles, edit the `roles.properties` file and then delete the roles.

Step 1. Edit the roles.properties File

Before you run the role tool to delete roles, you must configure the `roles.properties` file for your environment.

1. Edit the properties to provide the credentials for your database.

   - For Oracle environments, enter the following properties:
     - database.type=oracle
     - database.hostname
     - database.portnumber
     - database.servicename
     - database.username
     - database.password

   - For Microsoft SQL Server environments, enter the following properties:
     - database.type=sqlserver
     - database.hostname
     - database.portnumber
     - database.dbname
     - database.username
     - database.password

   - For IBM DB2 environments, enter the following properties:
     - database.type=db2
     - database.hostname
     - database.portnumber
     - database.dbname
     - database.username
     - database.password

2. Edit the following property to provide the number of roles you want to create:

   - MDM.number.of.delete.roles

   Note: You can delete a maximum of 200 roles.

3. For each role that you want to delete, edit the following property for each role to specify the name of each role:

   - MDM.delete.role.name<#>

   # is a number between 0 and (MDM.number.of.delete.roles)-1.

Step 2. Delete the Roles

To delete the roles that you specified in the `roles.properties` file, run the role deletion tool.

1. Run the role deletion tool:

   - On Windows: Run DeleteRole.cmd.
   - On UNIX: Run DeleteRole.sh.

   Security Access Manager roles are deleted in the Operational Reference Store.

2. Start the application server.

3. Verify that the role deletion tool deleted the roles that you specified in the `roles.properties` file. In the MDM Hub console, go to **Security Access Manager > Roles**.

CHAPTER 6

Using the Password Encryption Tool

This chapter includes the following topics:

Overview

The Password Encryption tool is a command-line utility that is used to encrypt your secured database passwords.

Note: See the sample folders for more information about the additional samples and utilities included in the Resource Kit.

System Requirements

You need to make sure `Siperian-common.jar` is installed under the `Utilities` directory.

In addition, you must have Java installed and have the jar file to be able to run this utility.

Running the Password Encryption Tool

In order to successfully change the schema password, you must change it in several places. The first area in which you must change the schema password is in the data sources defined in the application server. This password is not encrypted as the application server protects it. Both `username` and `password` are stored in the `cmxserver.properties` file, and the password must be entered in encrypted form.

The parameters are stored in `cmxserver.properties` as:

- [databaseId].username=username

- [databaseId].password=encryptedPassword

In addition to the data sources on the application server, Informatica requires the password to be encrypted and stored in various tables.

Encrypting a New Password

You encrypt a database schema password from the `Utilities` folder in the Resource Kit.

The Utilities folder is in the following directory:

```
<MDM Hub installation directory>/hub/resourcekit
```

To encrypt a database schema password, from the Utilities folder, run one of the following commands:

- Windows systems: `java -classpath siperian-common.jar;commons-validator-1.4.0.jar com.siperian.common.security.Blowfish [key_type] <Password>`

- UNIX systems: `java -classpath siperian-common.jar:commons-validator-1.4.0.jar com.siperian.common.security.Blowfish [key_type] <Password>`

where `key_type` is the Blowfish key.

The terminal window displays the following message:

```
Plaintext Password: <Password>
Encrypted Password: <Encrypted Password>
```

For example, if `admin` is the password on a Windows system, use the following command:

```
java -classpath siperian-common.jar;commons-validator-1.4.0.jar
com.siperian.common.security.Blowfish [key_type] admin
```

The terminal window displays the following message:

```
Plaintext Password: admin
Encrypted Password: A75FCFBCB375F229
```

Updating the ORS Database Password

Execute the following commands to update the passwords for your ORS databases:

To update your ORS database password:

```
UPDATE C_REPOS_DB_RELEASE SET DB_PASSWORD = '';
COMMIT;
```

Updating the System Database Password

Execute the following commands to update the passwords for your System databases:

To update your CMX_SYSTEM database password:

```
UPDATE C_REPOS_DATABASE SET PASSWORD = '' WHERE USER_NAME = ''
```

C H A P T E R   7

MDM Support Tools

This chapter includes the following topics:

MDM Support Tools Overview

The MDM Support tools are a collection of tools that you can access from the Hub Console. Use the tools to gather configuration information, track user configurations, replicate issues, run system health checks, and simulate matches. The MDM Support tools were designed by Informatica Global Customer Support, and Informatica recommends only MDM Hub administrators use the tools.

The MDM Support tools contain the following tools:

Configuration Support Manager (CSM) Tool

Use the Configuration Support Manager (CSM) tool to generate a CSM report. The report contains configuration information from the Hub Server, Process Server, and any other server in the MDM Hub environment. The CSM report helps to troubleshoot MDM Hub issues.

User Migration Tool

Use the User Migration tool to create or update multiple MDM Hub user accounts. You can also migrate user accounts and role assignments for user accounts from one MDM Hub environment to another.

Match Analysis Tool

The Match Analysis tool assesses issues related to tokenization in the MDM Hub. The tool also provides a health check for the MDM Hub environment.

Match Simulator Tool

The Match Simulator tool tests undermatching and overmatching scenarios in the MDM Hub. The tool reduces the manual effort involved in troubleshooting matching issues.

To access the MDM Support tools from the Hub Console, click **Help** > **MDM Support Tools**.

Note: If you use WebLogic, provide the WebLogic administrator user name and password.

Configuration Support Manager (CSM) Tool

Use the Configuration Support Manager (CSM) tool to generate a report that contains configuration information from the Hub Server, Process Server, and any other server in the MDM Hub environment. The report, which is in a XML format, helps to troubleshoot issues in the MDM Hub.

The following image shows the CSM tool:
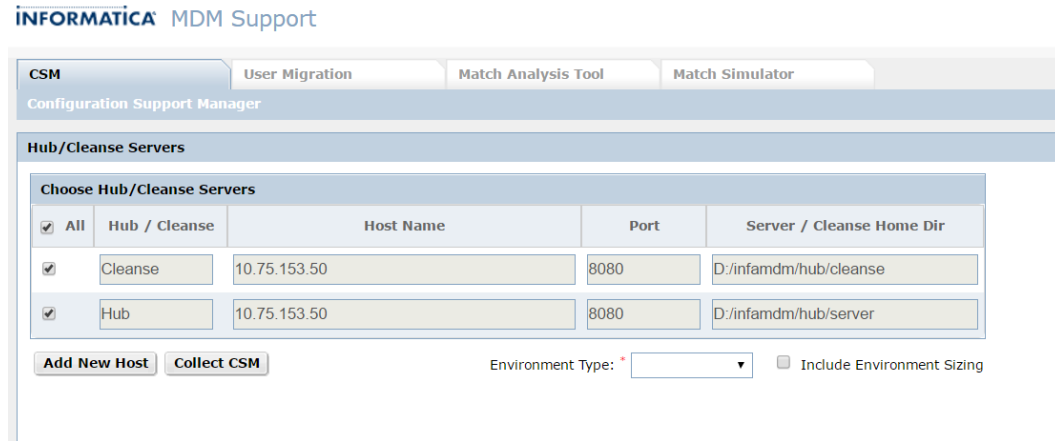
When you open the CSM tool, it shows the following details for the Hub Server and Process Server (Cleanse Server):

Host Name

> The host name or IP address of the MDM Hub instance.

Port

> The port number of the application server or the MDM Hub instance. Must be entered manually for each Hub Server and Process Server.

Home Directory

> The location of the Hub Server or the Process Server.

Note: If the details for the Hub Server and the Process Server do not appear, click **Add New Host** to add the host name, port, and home directory manually.

Generating a CSM Report

Use the Configuration Support Manager (CSM) tool to generate a CSM report, which can be used to help troubleshoot MDM Hub issues. You can view the report in a text editor.

1. Confirm that the port numbers for the Hub Server and the Process Server are correct.

2. Select the environment type for which you generate a report.

3. If you want to capture the sizing parameters for the environment, select **Include Environment Sizing**.

4. Click **Collect CSM**.

   The CSM tool generates an XML report for each server.

5. To download the report locally, click **Download File**.

6. Optionally, click **Upload File** to upload the CSM report to Informatica Global Customer Support.

User Migration Tool

Use the User Migration tool to create or update multiple MDM Hub user accounts. You can also migrate user accounts and role assignments for user accounts from one MDM Hub environment to another. Use a spreadsheet editor in conjunction with the User Migration tool to reduce the manual effort involved in the creation and migration of many user accounts.

The following image shows the User Migration tool:
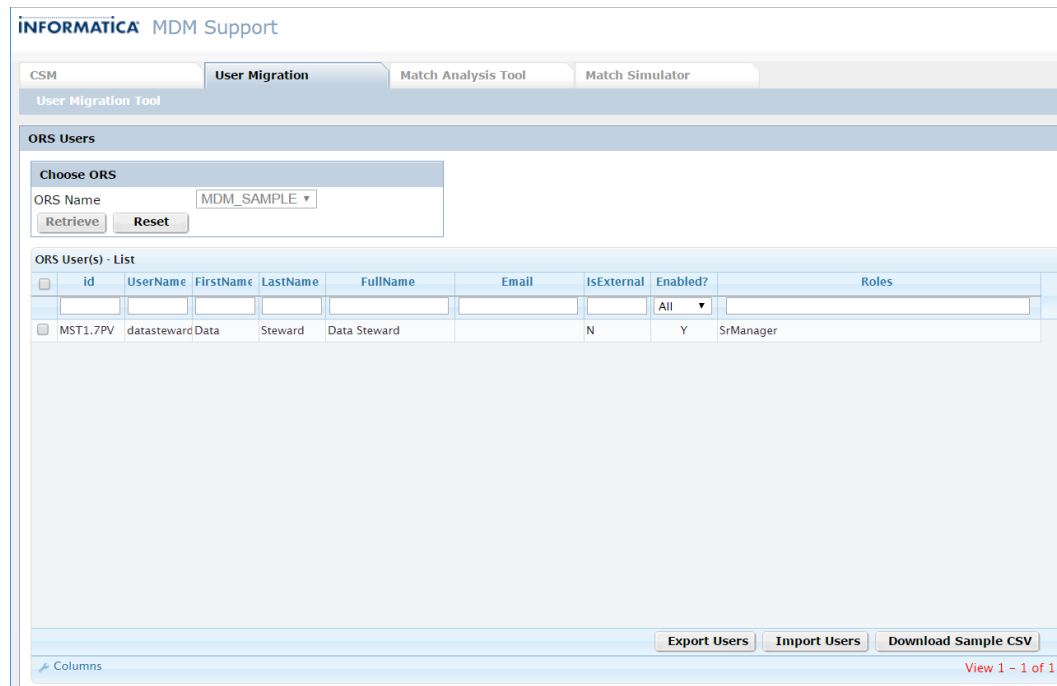
Exporting Users

Use the User Migration tool to export user account details in a CSV file. You can open and update the CSV file with a spreadsheet editor.

1. To retrieve user accounts from an Operational Reference Store (ORS), in the **ORS Name** list, select an ORS and then click **Retrieve**.

    The User Migration tool displays a list of the MDM Hub users in the selected ORS.

2. In the list of ORS users, select the users that you want to export.

3. Click **Export Users**.

    The **Export Roles** dialog box appears.

4. If you want to include user-to-role assignments in the exported user information, click **Yes**. If you only want to export user information, click **No**.

    The **Export Users - Result** dialog box appears.

5. To download the exported users CSV file, click the download link.

Importing Users

Before you import users into the MDM Hub, you can download details of exported users or sample user accounts in a CSV file. To download sample user accounts, click **Download Sample CSV**.

1. To retrieve user accounts from an Operational Reference Store (ORS), in the **ORS Name** list, select an ORS and then click **Retrieve**.

   The User Migration tool displays a list of the MDM Hub users in the selected ORS.

2. Click **Import Users**.

   The **Import Users** dialog box appears.

3. Browse to the file that contains the user accounts you want to import, and then click **Upload**.

   The **Import Users** dialog box displays additional options.

4. Select the password policy for the imported users.

   - Set a default password for all new users.

   - Set the last name for each user as the password for all new users.

5. If you create users, select the default database for the imported users.

6. If you update any existing users, select the default database for existing users.

7. Click **Import**.

   The User Migration tool displays a list of the imported users in the selected ORS.

Match Analysis Tool

Use the Match Analysis tool to assess issues related to tokenization in the MDM Hub. The Match Analysis tool provides an overview of all tokenization and match parameters across the MDM Hub, including environment variables, database-specific parameters, and Hub Server properties. The overview helps to reduce the manual effort involved in checking match configuration.

The following image shows the Match Analysis tool:
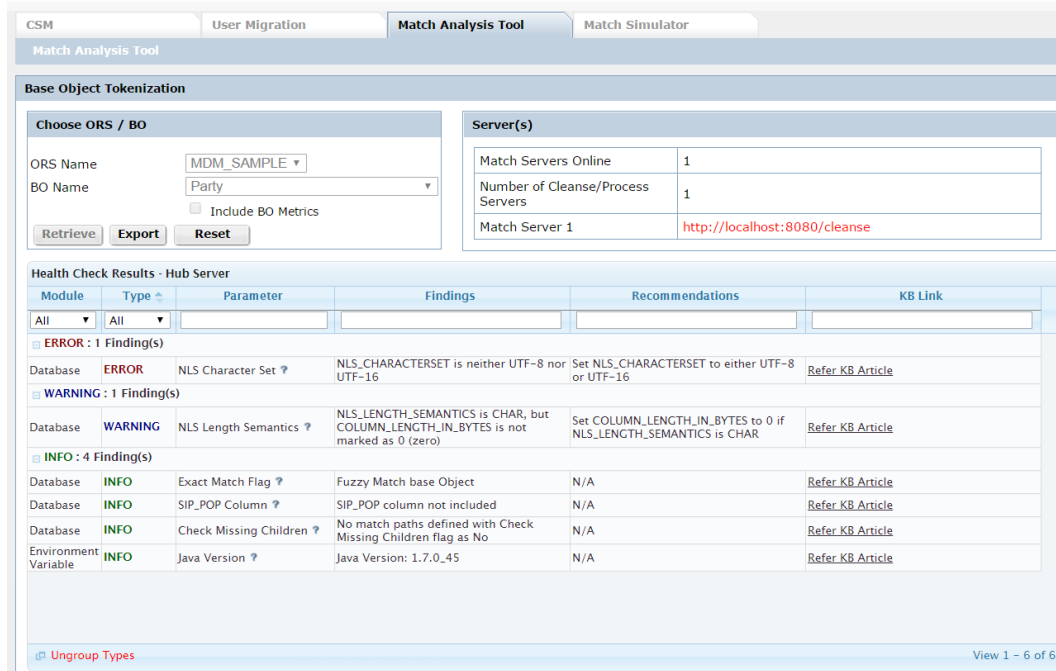
Retrieving Health Check Results

To run a tokenization health check on an Operational Reference Store (ORS), perform the following steps in the Match Analysis tool:

1. Select an ORS.
2. Aelect a base object, and then click **Retrieve**.

   Note: To collect additional parameters specific to the selected base object, select **Include BO Metrics**. Selecting this option causes the Match Analysis tool to run for a longer time because multiple queries run in the ORS schema.

   The Match Analysis tool displays health check results and Informatica recommendations for all online servers.

3. Optionally, to download the health check results as a CSV file, click **Export**.

Appendix A - Hub Server Parameters

The following table describes the Hub Server parameters that the Match Analysis tool validates:

Sl.No	Parameter	Rule for reference	Findings	Recommendations
1	Exact Match Flag	C_REPOS_TABLE.EXACT_MATCH_ OBJ_IND = 0	Fuzzy Match Base Object	N/A
2	Exact Match Flag	C_REPOS_TABLE.EXACT_MATCH_ OBJ_IND = 1	Exact Match Base Object	N/A

Sl.No	Parameter	Rule for reference	Findings	Recommendations
3	Exclude From Match flag		Exclude from Match flag not enabled	N/A
4	Exclude From Match flag	Count of BaseObject Records.exclude_from_match = 1	Exclude from Match flag enabled for the BaseObject. %,d records(flagged as 1) to be excluded for tokenization	Review the records with exclude_from_match =1 status to confirm.
5	Exclude From Match flag	Count of BaseObject Records.exclude_from_match = 1	Exclude from Match flag enabled for the Base Object. No record(flagged as 1) to be excluded for tokenization	N/A
6	Dirty Indicator	Count of BaseObject Records which are the records in <BO_NAME>_DRTY table	%,d records(flagged with dirty indicator as 1) to be tokenized	Execute "Tokenization" jo to tokenize records.
7	Dirty Indicator	Count of BaseObject Records which are the records not in <BO_NAME>_DRTY table	No records (flagged as dirty indicator as 1) available to be tokenized	N/A
8	Tokens in <BO>_STRP table	Count of <BO>_STRP records	%s table is empty. No tokens available %s = <BO>_STRP table	Execute "Tokenization" jo to tokenize records.
9	Tokens in <BO>_STRP table	Count of <BO>_STRP records	%,d tokens available in %s table %,d = Count %s = <BO>_STRP table	You might re-execute tokenization job if additio tokens must be created.
10	Hub State Indicator	C_REPOS_TABLE.match_pending_ind = 1 and BaseObject Records.hub_state_ind not in (0,1) and dirty indicator as 1	Match Pending records flag is enabled on the Base Object. %,d soft deleted records(hub state indicator as -1) not be tokenized	To tokenize such records either update match pend indicator flag or hub stat indicator flag.
11	Hub State Indicator	C_REPOS_TABLE.match_pending_ind = 1 and "No" Base Object Records.hub_state_ind not in (0,1) and dirty indicator as 1	Match Pending records flag is enabled on the Base Object. No soft deleted records(hub state indicator as -1) will be tokenized	N/A
12	Hub State Indicator	C_REPOS_TABLE.match_pending_ind = 0 and BaseObject Records.hub_state_ind in (0,1) and dirty indicator as 1	Match Pending records flag is disabled on the Base Object. %,d pending/soft deleted records (hub state indicator as 0 or -1) not to be tokenized	To tokenize such records either update match pend indicator flag or hub stat indicator flag.
13	Hub State Indicator	C_REPOS_TABLE.match_pending_ind = 0 and "No" BaseObject Records.hub_state_ind in (0,1) and dirty indicator as 1	Match Pending records flag is disabled on the Base Object. No pending/soft deleted records (hub state indicator as 0 or -1) will be tokenized	N/A

Sl.No	Parameter	Rule for reference	Findings	Recommendations
14	Consolidation Indicator	Count of BaseObject Records.Consolidation Ind = 9 and Dirty Ind = 1	%,d records(flagged with consolidation indicator as 9) are marked on-hold and will not be tokenized	To tokenize such records update the consolidation indicator.
15	Consolidation Indicator	Count of BaseObject Records.Consolidation Ind = 9 and Dirty Ind = 1	No records (flagged with consolidation indicator as 9) are marked on-hold	N/A
16	NLS Length Semantics	NLS_LENGTH_SEMANTICS = CHAR and C_REPOS_DB_RELEASE.column_length_in_bytes_ind = 0	NLS_LENGTH_SEMANTICS is CHAR and COLUMN_LENGTH_IN_BYTES is 0	N/A
17	NLS Length Semantics	NLS_LENGTH_SEMANTICS = CHAR and C_REPOS_DB_RELEASE.column_length_in_bytes_ind <> 0	NLS_LENGTH_SEMANTICS is CHAR, but COLUMN_LENGTH_IN_BYTES is not marked as 0 (zero)	Set COLUMN_LENGTH_IN_BY to 0 if NLS_LENGTH_SEMANTIC CHAR
18	NLS Length Semantics	NLS_LENGTH_SEMANTICS = BYTE and C_REPOS_DB_RELEASE.column_length_in_bytes_ind = 1	NLS_LENGTH_SEMANTICS is BYTE and COLUMN_LENGTH_IN_BYTES is 1	N/A
19	NLS Length Semantics	NLS_LENGTH_SEMANTICS = BYTE and C_REPOS_DB_RELEASE.column_length_in_bytes_ind <> 1	NLS_LENGTH_SEMANTICS is BYTE but COLUMN_LENGTH_IN_BYTES is not marked as 1	Set COLUMN_LENGTH_IN_BY to 1 if NLS_LENGTH_SEMANTIC BYTE
20	NLS Length Semantics	NLS_LENGTH_SEMANTICS not in (BYTE, CHAR)	NLS_LENGTH_SEMANTICS is neither BYTE not CHAR	Set NLS_LENGTH_SEMANTIC to either CHAR or BYTE
21	NLS Character Set	NLS_CHARECTERSET in UTF-8, UTF-16	NLS_CHARACTERSET is %s %s = UTF-8 or UTF-16	N/A
22	NLS Character Set	NLS_CHARECTERSET not in UTF-8, UTF-16	NLS_CHARACTERSET is neither UTF-8 nor UTF-16	Set NLS_CHARACTERSET either UTF-8 or UTF-16)
23	SIP_POP Column		SIP_POP column not included	N/A
24	SIP_POP Column		SIP_POP column included	SIP_POP column value in BaseObject must match a valid population file name from C_REPOS_SSA_POPULAT table.
25	Fuzzy Match Key		No fuzzy match key column is defined in the base object	Define a fuzzy match key column to participate in t tokenization.

Sl.No	Parameter	Rule for reference	Findings	Recommendations
26	Fuzzy Match Key		Physical columns not configured for fuzzy match key	Configure one or more physical columns for the fuzzy match key.
27	Records with NULL Fuzzy Key Columns		Fuzzy match key column(s) : %s [%s] No NULL values on any of the fuzzy match key columns - %s - comma separated key columns - %s - fuzzy match key table	N/A
28	Records with NULL Fuzzy Key Columns		Fuzzy match key column(s) : %s [%s] %,d records have NULL values on fuzzy match key columns - %s - comma separated key columns - %s - fuzzy match key table	NULL values on fuzzy ma key columns will generate NULL tokens. Try to keep NOT NULL values on such columns.
29	Check Missing Children	No match path defined	Match paths not defined	N/A
30	Check Missing Children	No match path defined with check missing children as No	No match paths defined with Check Missing Children flag as No	N/A
31	Check Missing Children	Match path defined with check missing children as No	Match paths (%s) defined in base object have Check Missing Children flag as No	If this flag is No, parent records will not be tokeni when any child/grandchil record is missing. And it affect the search results well. Set it based on the business requirements .
32	Java Version	Java_Version	Java Version: %s	N/A

Appendix B - Process Server Parameters

The following table describes the Process Server parameters that the Match Analysis tool validates:

Sl.No	Parameter	Rule for reference	Findings	Recommen
1	SSAPR variable	SSAPR environment variable is NULL	SSAPR environment variable is NULL	Set SSAPR variable as \hub\\clear
2	SSAPR variable	SSAPR environment variable is not NULL	SSAPR variable is %s %s - SSAPR variable value	N/A
3	Match folder	Match folder exists under SSAPR location	SSAPR match folder location (%s) validated %s - <SSAPR>/match	N/A

Sl.No	Parameter	Rule for reference	Findings	Recommen
4	Match folder	Match folder does not exist under SSAPR location	SSAPR match folder location (%s) does not exist %s - <SSAPR>/match	Match folde be present SSAPR loca
5	SSAPR Path	SSAPR environment variable not contains the pattern \\cleanse\\resources	SSAPR variable (%s) is not pointing to <INFA_HOME>\\hub\\cleanse\\resources folder	Set SSAPR variable as \hub\\clear
6	SSAPR Path	SSAPR environment variable contains the pattern \\cleanse\\resources	SSAPR variable (%s) is pointing to <INFA_HOME>\\hub\\cleanse\\resources folder	N/A
7	SSAPR Path	SSAPR environment variable contains the pattern \\cleanse\\resources	SSAPR variable location (%s) does not exist	SSAPR vari expected to
8	Population Files	C_REPOS_SSA_POPULATION.POPULATION_NAME with ENABLED_IND = 1	No population is enabled in the database	Enable at le population C_REPOS_S table for Fu object.
9	Population Files	Population files are not there in the server	No population files are available in the Process Server	Import the p to <SSAPR> for all enab
10	Population Files		No population file is enabled in the database	Enable at le population C_REPOS_S table .
11	Population Files		All population files are valid and enabled. Population files - %s %s - List of valid population files	N/A
12	Population Files		Enabled population files - %s Disabled population files - %s	Enable the population C_REPOS_S table
13	Population Files		No population file exists in the Process Server location (%s)which are enabled in the database %s - <SSAPR>/match	Import the p to <SSAPR> for all enab
14	Population Files		Configured population files - %s Missing population files - %s	N/A
15	Base Object's Population File(s)		No population is enabled in the database	Enable the configured in C_REPOS_S table

Sl.No	Parameter	Rule for reference	Findings	Recommen
16	Base Object's Population File(s)		Population file selected in the BaseObject is not enabled in the database	Enable the configured in C_REPOS_S table
17	Base Object's Population File(s)		No population file exists in the Process Server location (%s) which are referenced in the BaseObject %s - <SSAPR>/match	Import the to <SSAPR> for all Base referenced
18	Base Object's Population File(s)		Population file that is referenced in the BaseObject, does not exist in the Process Server location (%s) %s - <SSAPR>/match	Import the to <SSAPR> for all enab
19	Base Object's Population File(s)		Population Files enabled - %s %s - List of populations configured in the BaseObject	N/A
20	Base Object's Population File(s)		Configured population files - %s Missing population files - %s	N/A
21	Java Version	Java_Version	Java Version: %s	N/A
22	Properties file	cmxcleanse.properties available	cmxcleanse.properties available in %s %s - file location	N/A
23	Server Encoding flag	cmx.server.match.exact_match_fuzzy_bo_api is not present	cmx.server.match.server_encoding is not present in the cmxcleanse.properties	Server Enco to be prese to different non-Unicod
24	Server Encoding flag	cmx.server.match.exact_match_fuzzy_bo_api is blank	Server Encoding flag is blank	Set Server cmxcleanse 0 or 1
25	Server Encoding flag	cmx.server.match.exact_match_fuzzy_bo_api is 0 or 1	Server Encoding flag - %s %s - 0 or 1	N/A
26	Server Encoding flag	cmx.server.match.exact_match_fuzzy_bo_api is neither 0 or nor 1	Server Encoding flag (%s) is invalid %s - 0 or 1	Set Server cmxcleanse 0 or 1
27	Exact Match Fuzzy BO API flag	cmx.server.match.exact_match_fuzzy_bo_api is not present	cmx.server.match.exact_match_fuzzy_bo_api is not present in the cmxcleanse.properties	If you are u Extended s SearchMat combinatio fuzzy colun flag is requ

Sl.No	Parameter	Rule for reference	Findings	Recommen...
28	Exact Match Fuzzy BO API flag	cmx.server.match.exact_match_fuzzy_bo_api is blank	Exact Match Fuzzy BO API flag is blank	Set Exact M API flag in cmxcleanse 0 or 1
29	Exact Match Fuzzy BO API flag	cmx.server.match.exact_match_fuzzy_bo_api is 0 or 1	Exact Match Fuzzy BO API flag - %s %s - 0 or 1	N/A
30	Exact Match Fuzzy BO API flag	cmx.server.match.exact_match_fuzzy_bo_api is neither 0 or nor 1	Exact Match Fuzzy BO API flag (%s) is invalid %s - 0 or 1	Set Exact M API flag in cmxcleanse 0 or 1
31	LD_LIBRARY_ PATH variable	LD_LIBRARY_PATH environment variable is NULL	LD_LIBRARY_PATH environment variable is NULL	Set LD_LIBI environmer <INFA_HOM \cleanse\\l
32	LD_LIBRARY_ PATH variable	LD_LIBRARY_PATH environment variable is not NULL	LD_LIBRARY_PATH variable is %s %s - LD_LIBRARY_PATH variable value	N/A

Match Simulator Tool

Use the Match Simulator tool to test match rule sets already configured in the MDM Hub. Because of the complexity of the matching process in the MDM Hub, it can take a long time to troubleshoot match issues. The Match Simulator tool reduces the manual effort involved in troubleshooting matching issues.

The following image shows the Match Simulator tool:

Simulating a Match

Use the Match Simulator tool to test match rules.

1. Select an ORS.

2. Select a base object.

3. Select a predefined set of match rules.

   Based on the rule set and base object you selected, multiple fields appear.

4. Select a field by which to search for a record. For example, you can search by row ID of a record.

5. In the **Search Data** column, enter a value in a field by which to search for a record in the source data. For example, to search by row ID of a record, enter a value in the **ROW ID OBJECT** field.

6. In the **File Data** column, enter a value in the field that corresponds to the field you used in the **Search Data** column.
   For example, if you searched by row ID of a record in the **Search Data** column, enter a value in the **ROW ID OBJECT** field.

7. Click **Fetch**.

   The Match Simulator tool returns the records you searched for.

8. Click **Match Data**.

   The Match Simulator tool runs the match rules of the selected match rule set on the returned records.

You can test the match rules in the Match Simulator tool and compare match scores. Depending on the type of business data and how the data is used, you can decide which match rules are most appropriate for the data.

CHAPTER 8

Command Line Batch Execution Resource Kit

This chapter includes the following topics:

Command Line Batch Execution Resource Kit Overview

The Command Line Batch Execution Resource Kit is a Java class with the main method that accepts command line arguments to run common batch jobs. As of MDM Hub version 9.6.1, automating job execution includes interfacing with Services Integration Framework (SIF) APIs. The Command Line Batch Execution Resource Kit wraps the most commonly used batch APIs and exposes the APIs as command line commands.

You can use the command line commands to perform the following tasks:

- Create shell scripts to run series of job steps synchronously.
- Allow job schedulers to run scripts synchronously so that the MDM Hub jobs run at scheduled times.
- Allow PowerCenter workflow execution of the MDM Hub batch jobs.

Batch Execution Command Lines

You can expose the SIF APIs in Enterprise Java Beans (EJB) mode as command lines for running batch jobs through the `com.informatica.mdm.tools.MDMExecuteBatch` Java class.

The following table lists the MDM Hub SIF APIs in EJB mode as command lines:

ExecuteBatch API	Command Line
ExecuteBatchStage	`-username <user name> -password <encrypted password> -action stage -tablename <stage table name>`
ExecuteBatchLoad	`-username <user name> -password <encrypted password> -action load -tablename <stage table name> [-forceload <true|false>]`
ExecuteBatchStageandLoad	`-username <user name> -password <encrypted password> -action stageload -tablename <stage table name> [-forceload <true|false>]`
ExecuteBatchAutoMatchandMerge	`-username <user name> -password <encrypted password> -action automatchmerge -tablename <BO table name> [-matchset <match set name>]`
ExecuteBatchMatch	`-username <user name> -password <encrypted password> -action match -tablename <BO table name> [-matchset <match set name>]`
ExecuteBatchAutoMerge	`-username <user name> -password <encrypted password> -action automerge -tablename <BO table name>`
ExecuteBatchGroup	`-username <user name> -password <encrypted password> -action execbatchgroup -batchgroupname <batch group name> [-resume <true|false>]`
ExecuteBatchTokenize	`-username <user name> -password <encrypted password> -action tokenize -tablename <BO table name> [-regenerate <true|false>]`
ExecuteBatchExternalMatch	`-username <user name> -password <encrypted password> -action externalmatch -tablename <BO table name> [-matchset <match set name>]`
ExecuteBatchRecalculateBVT	`-username <user name> -password <encrypted password> -action recalculatebvt -tablename <BO table name> -rowidobject <single rowid object value>`
ExecuteBatchRecalculateBO	`-username <user name> -password <encrypted password> -action recalculatebo -tablename <BO table name> [-rowidobjecttable <temp table with rowid objects>]`
ExecuteBatchRevalidate	`-username <user name> -password <encrypted password> -action revalidate -tablename <BO table name> [-recalculatebvt <true|false> -cmdirtyonly <true|false>]`
ExecuteBatchUnmerge	`-username <user name> -password <encrypted password> -action unmerge -tablename <BO table name> -sourcetable <temp table with rowid xrefs> [-treeunmerge <true|false>]`

ExecuteBatch API	Command Line
ExecuteBatchDelete	-username <user name> -password <encrypted password> -action delete -tablename <BO table name> -sourcetable <temp table with rowid xrefs> [-recalculatebvt <true|false> -cascadedelete <true|false> -purgehistory <true|false> -overridehistory <true|false>]
ExecuteBatchKeyMatch	-username <user name> -password <encrypted password> -action keymatch -tablename <BO table name>
ExecuteBatchPromote	-username <user name> -password <encrypted password> -action promote -tablename <BO table name> [-xreflisttobepromoted <table with rowid xref list to be promoted> -allowcommitind <true|false>]
ExecuteBatchSynchronize	-username <user name> -password <encrypted password> -action synchronize -tablename <BO table name>
ExecuteBatchValidateFKRelationships	-username <user name> -password <encrypted password> -action validatefkrelationships -tablename <BO table name>
ExecuteBatchResetMatchTable	-username <user name> -password <encrypted password> -action resetmatchtable -tablename <BO table name>

For more information about the ExecuteBatch command, see the *Multidomain MDM Services Integration Framework Guide*.

The ExecuteBatch command can also include the following command line arguments:

- -mdmconnectionproperties <path and name of SiperianConnection.properties file>. For example, C:\Users\cgoon\Documents\Sip_Tools\mdm_exec_batch_process\scripts \SiperianConnection.properties.

- -mdmprefreturncode <the preferred return code>, where the preferred return code can be JOB_RUN_STATUS or JOB_RUN_RETURN_CODE.

Note: If you do not use the -mdmconnectionproperties option, the command loads the siperianconnection.properties file from the root of the com.informatica.mdm.tools.MDMExecuteBatch class that is part of the MDMExecuteBatch.jar file.

Command Line Batch Execution Resource Kit Contents

The Resource Kit contains the `com.informatica.mdm.tools.MDMExecuteBatch` Java class. The script files available in the `MDMExecuteBatch_resourcekit.zip` file helps you to simplify the execution of the Java class.

The following table lists the files that the `MDMExecuteBatch_resourcekit.zip` file contains:

File Name	Description
`lib/MDMExecuteBatch.jar`	Core of the Resource Kit that contains the `com.informatica.mdm.tools.MDMExecuteBatch` Java class.
`scripts/SiperianConnection.properties`	SIF connection configuration file.
`scripts/mdm_exec_batch_proc.sh`	UNIX bash shell script that simplifies the execution of the MDMExecuteBatch class and redirects logs output to a log file for traceability. **Note:** If you use WebSphere, add the following parameter to the `mdm_exec_batch_proc.sh` or `mdm_exec_batch_proc.bat` script: `-Dcom.ibm.CORBA.UseSchemaIDR=false`
`scripts/mdm_exec_batch_proc_env.sh`	UNIX bash shell script to set the environment variables for `PATH`, `CLASSPATH`, the MDM Hub user name and password, the location of the `SiperianConnection.properties` file, and directory locations used by `mdm_exec_batch_proc` and `get_encr_pwd` scripts. Option for preferred return code, `JOB_RUN_STATUS` or `JOB_RUN_RETURN_CODE`.
`scripts/get_encr_pwd.sh`	UNIX bash shell script to interface the `siperiancommon.jar` to get encryption password strings.
`scripts/sample_job_steps_script.sh`	A sample script to run a series of jobs.
`scripts/mdm_exec_batch_proc.cmd`	Windows script that simplifies the execution of the MDMExecuteBatch class and redirects logs output to a log file for traceability.
`scripts/mdm_exec_batch_proc_env.cmd`	Windows script to set the environment variables for `PATH`, `CLASSPATH`, the MDM Hub user name and password, the location of the `SiperianConnection.properties` file, and directory locations used by `mdm_exec_batch_proc` and `get_encr_pwd` scripts. Option for preferred return code, `JOB_RUN_STATUS` or `JOB_RUN_RETURN_CODE`.
`scripts/get_encr_pwd.cmd`	Windows script to interface the `siperiancommon.jar` to get encryption password strings.
`scripts/sample_job_steps_script.cmd`	A sample script to run a series of jobs.

Deploying the Command Line Batch Execution Resource Kit

The deployment of the Resource Kit has library JAR file dependencies and requires the configuration of environment information in the resource script files.

Dependencies

The Command Line Batch Execution Resource Kit requires the MDM Hub and application server JAR file dependencies to run the ExecuteBatch commands.

The Command Line Batch Execution Resource Kit requires the following library JAR file dependencies:

- MDM Hub JAR file libraries that are consistent with the MDM Hub version. You can copy the MDM Hub JAR files from the `<MDM Hub installation directory>/hub/server/lib`.

  The following list includes the MDM Hub library JAR files:

  - `siperian-api.jar`

  - `siperian-common.jar`

  - `log4j-1.2.16.jar`. Based on the MDM Hub version, the version number on the `log4j` JAR might be different in the MDM Hub installation directory. Use the JAR file with the highest version number.

  - `siperian-server.jar`. Required, if the application server is WebSphere.

  - `MDMExecuteBatch.jar`

  - `axis-1.3.jar`

  - `commons-logging-1.1.1.jar`

  - `castor-1.1.1-xml.jar`

  - `commons-pool-1.3.jar`

  - `commons-httpclient-2.0.jar`

  - `com.ibm.ws.cjb.thinclient_8.5.0.jar`

- The application server client JAR file libraries that are consistent with the application server version and supported by the MDM Hub version.

  The following table lists the application server library JAR files:

Application Server	JAR File Name	Notes
JBoss	`jboss-client.jar`	In a standard installation, you can find the specified library JAR file in the following directory: `<JBoss Installation Directory>/bin/client`
JBoss	`picketbox-<version>-redhat-<version>.jar`	In a standard installation, you can find the specified library JAR file in the following directory: `<JBoss Installation Directory>/modules/system/layers/base/org/picketbox/main`

Application Server	JAR File Name	Notes
WebLogic	`wlthint3client.jar`	In a standard installation, you can find the specified library JAR file in the following directory: `<WebLogic Installation Directory>/server/lib`
WebSphere	`com.ibm.ws.ejb.thinclient_<WAS version>.jar`	In a standard installation, you can find the specified library JAR file in the following directory: `<WebSphere Installation Directory>/appserver/runtime`
WebSphere	`com.ibm.ws.orb_<WAS version>.jar`	If you use Oracle Java Runtime Environment, you might require the ORB JAR file. In a standard installation, you can find the specified library JAR file in the following directory: `<WebSphere Installation Directory>/appserver/runtime`

Note: Ensure that the versions of the library JAR files match with the MDM Hub versions and application server versions. Otherwise, errors such as class not found or method not found occur.

MDM Hub User name and Encrypted Password

You can use the MDM Hub user name to run jobs in MDM Hub and you can get the encrypted password using `get_encr_pwd` script.

You must register the MDM Hub user name that you have used to run jobs in the MDM Hub and must have access to the Operational Reference Store (ORS). The MDM Hub user name requires create and update rights to most configured MDM Hub objects, because you use the MDM Hub user name to run jobs. The admin user enables the MDM Hub user name as service user. If the service user password does not match the admin user password, the admin user sets the service user password to expired or changed.

The MDMExecuteBatch class accepts encrypted passwords.

For example, the following sample command encrypts the clear text password `batch_runner_09`:

`./get_encr_pwd.sh batch_runner_09`

The script returns the following values:

`Plaintext Password: batch_runner_09`

`Encrypted Password: 37CA15328E2BFB58FD0CF5E97498D186`

Installing the Command Line Batch Execution Resource Kit

The Resource Kit contains samples and utilities that help users to set up and use the MDM Hub.

1. Create a installation directory where you want to install the Resource Kit.
2. Copy the `MDMExecuteBatch_resourcekit.zip` file into the installation directory.
3. Unzip the `MDMExecuteBatch_resourcekit.zip` file.

   The installation directory creates the following directories:

   - `scripts`. Contains script files.

- `lib`. Contains the `MDMExecuteBatch.jar` library.

4. For UNIX, change the current working directory to `scripts` directory and assign the execute privileges for `*.sh` script files using `chmod` command. For example, `chmod 774 *.sh`.

5. Create a `log` directory within the installation directory. For example, `logs`.

   The `logs` directory might be available in other directories within the same server.

6. Copy the dependent JAR files into the `lib` directory.

   The JAR files might be available in other directories within the same server.

Configuring the Connection Properties File

The `SiperianConnection.properties` file contains entries for user name and password. Comment the user name and password, because you do not use the user name and password in the `SiperianConnection.properties` file.

1. Open the `SiperianConnection.properties` file and configure the connection properties.

2. Search for `siperian-client.orsId`, and uncomment it.

3. To set the value for ORS ID, select **MDM Hub Console** > **Configuration** > **Database**, and then select the **Database entry**.

   The ORS ID appears as the database ID.

4. Search for `siperian-client.protocol=ejb`, and uncomment it.

5. Find the section for the MDM Hub application server environment and perform the following tasks:

   a. Uncomment the `java.naming.provider.url` entry and change the URL for your environment to include the host name and RMI port of the application server.

   b. Uncomment the other entries for the application server with appropriate values relating to EJB.

   c. For WebLogic, when you use MDM Hub version 10.0 or later, verify that the following property within the WebLogic section is uncommented:

      `java.naming.factory.url.pkgs=weblogic.jndi.factories`.

   d. For WebSphere, when you use MDM Hub version 10.0 or later, verify that the following property within the WebSphere section is uncommented:

      `java.naming.factory.url.pkgs=ibm`.

6. Ensure that all the other irrelevant properties are commented.

7. Save and verify the changes.

Configuring the Script Files

To set up the script files, you must update the runtime environment variables.

For Windows, use the `mdm_exec_batch_proc_env.cmd` script file to drive the main script file `mdm_exec_batch_proc.cmd`. For UNIX, use the `mdm_exec_batch_proc_env.sh` script file to drive the main script file `mdm_exec_batch_proc.sh`.

The following table lists the runtime environment variables that the script files use:

Environment Variable	Description	Comments and Notes
MDM_SCRIPTS_HOME	Specifies the location of the Resource Kit installation directory.	Adjust to directory of the installation.
MDM_SCRIPTS_DIR	Specifies the location of the scripts directory.	Defaults to "${MDM_SCRIPTS_HOME}/scripts", the subdirectory of the installation directory.
MDM_CONNECT_PROPS_DIR	Specifies the location of the SiperianConnection.properties file in the scripts directory.	Defaults to "${MDM_SCRIPTS_HOME}/scripts", in the scripts directory.
MDM_ENV_SCRIPT	Specifies the location and name of the mdm_exec_batch_proc_env.sh file for UNIX and mdm_exec_batch_proc_env.cmd file for Windows.	
MDM_LOGFILE_DIR	The log file directory.	
MDM_LOGFILE_RETN_DAYS	Specifies the number of days to retain the log files, before you delete them.	You must delete the log files that are older than the specified number of days. To disable log file deletion, set to 0.
MDM_EXECUTE_BATCH_CLASS	The MDMExecuteBatch Java class.	Set the MDMExecuteBatch Java class to com.informatica.mdm.tools.MDMExecuteBatch.
PATH	PATH contains the Java bin directory.	Place where you can find the Java bin directory.
CLASSPATH	Must point to the location of the MDMExecuteBatch.jar and dependent JAR files.	If dependent JAR files are in other directories, you must include them in the CLASSPATH. Dependent JAR files include the following files: - siperianapi.jar - siperian-common.jar - log4j.jar - application server client JAR
MDM_USERNAME	Specifies the registered MDM Hub user name.	Assign the MDM_USERNAME to the ORS with read and write privileges for batch data execution.
MDM_PASSWORD	Specifies the MDM Hub encrypted password.	You can get the encrypted password using the get_encr_pwd script.

Environment Variable	Description	Comments and Notes
MDM_PREFERRED_RETCODE	The preferred MDM Hub job execution return code, JOB_RUN_STATUS or JOB_RUN_RETURN_CODE . If the value or environment variable is missing or mis-spelled, the default return code is JOB_RUN_STATUS.	In MDM Hub version 9.7.1 HotFix 1 or later, both JOB_RUN_RETURN_CODE and JOB_RUN_STATUS contain the same values as returned by ExecuteBatch APIs. In earlier versions of MDM Hub 9.7.1, the JOB_RUN_STATUS and JOB_RUN_RETURN_CODE were inconsistent, and the JOB_RUN_RETURN_CODE is the preferred value to use. The environment variable returns one of the following return code values: - 0 indicates the successful completion of MDM Hub job with no warnings. - 1 indicates the completion of MDM Hub job with warnings. Generates the following warning messages: - Completed with rejected records. - No action. - Records failed to load. - Greater than 1 indicates complete job failure.
MDM_CONNECTION_PROPERTIES	Specifies the environment variable used to pass the –mdmconnectionproperties <values> into MDMExecuteBatch class.	Specifies the path and location of the SiperianConnection.properties file.

Note: Ensure that you review and change the following environment variables: MDM_SCRIPTS_HOME, MDM_USERNAME, MDM_PASSWORD, MDM_CONNECT_PROPS_DIR, PATH, CLASSPATH, and MDM_PREFERRED_RETCODE.

Executing Batch Commands

You must set up the mdm_exec_batch_proc script to run batch jobs. The argument or parameter -action tells the MDMExecuteBatch class which API to run.

Examples

You can run batch jobs in the following ways:

1. Run a batch group job using the default user name and password set in the mdm_exec_batch_proc_env script:

   ```
   ./mdm_exec_batch_proc.sh –action execbatchgroup –batchgroupname "bg stg ims"
   ```

2. Run an Auto Match and Merge job using a configured matchset (not the default) on the C_BO_PARTY base object table. Use the user name and password set in the command line:

   ```
   ./mdm_exec_batch_proc.sh –action automatchmerge -tablename c_bo_party –matchset "match
   set –special" –username admin –password 9EDE347834D
   ```

3. Run a full token job on the `C_BO_PARTY` base object table and use the default user name and password set in the command line:

```
./mdm_exec_batch_proc.sh -action tokenize -tablename c_bo_party -regenerate true
```

Rules on Enter Command Line Arguments

You can specify the Command Line Arguments at the command prompt to run a command or script.

Consider the following rules for command line arguments:

- You must enter the arguments as a parameter followed by a value, in a pair.
  For example, `-rowidobjecttable tmp_bvt_rowid_objects`.

- If you do not include the optional arguments that are true or false in the command line, you must consider the optional arguments as false.

- The automatchmerge, match, and externalmatch accepts the optional argument of `-matchset`. If you do not enter matchset as an optional argument, use the default matchset configured on the base object table.

- If the parameter values contain spaces, enclose the parameter values in double quotes.
  For example, `-matchset "match set -ims dataload"`.

- The Batch Group Name and Match Set are case sensitive.

Return Codes

You can review the return code from a job that you run from the command line and you can use the return code to troubleshoot a failed job.

The return code of 0 is successful, and all other return codes are failures. The log files record the return code and failures. The log files on the Hub and the Cleanse Server might contain more details about the failed jobs.

Log Files

You can use the log files to track the errors that occur during the execution of a script.

The following sample describes the status of execution for `mdm_exec_batch_proc` script:

```
*
* ENTERED mdm_exec_batch_proc script - Tue 11/26/2013 14:46:54.33
*****************************************************
*
[Tue 11/26/2013 14:46:54.34] Removing log files older than 10 day(s) from directory
C:\Users\cgoon\Documents\Sip_Tools\mdm_exec_batch_process\logs
ERROR: No files found with the specified search criteria.
[Tue 11/26/2013 14:46:54.34] Completed removal of old log files
[Tue 11/26/2013 14:46:54.37] Executing Command line java
com.informatica.mdm.tools.MDMExecuteBatch -username batch_process -password ******** -
action
execbatchgroup -batchgroupname "bg stg ims" -resume true -mdmconnectionproperties
"C:\Users\cgoon\Documents\Sip_Tools\mdm_exec_batch_process\scripts
\SiperianConnection.properties"
[2013-11-26 02:46:54,534] Entered com.informatica.mdm.tools.MDMExecuteBatch
[2013-11-26 02:46:54,534] Loading SIF Connection Properties from
C:\Users\cgoon\Documents\Sip_Tools\mdm_exec_batch_process\scripts
\SiperianConnection.properties
[2013-11-26 02:46:55,049] Connecting to MDM Hub Server RMI port using URL:
```

```
remote://njw175137:4447
[2013-11-26 02:46:55,049] Testing connection using AuthenticateResponse
[2013-11-26 02:46:55,189] Connection tested successfully
[2013-11-26 02:46:55,205] Executing Batchgroup BATCH_GROUP.bg stg ims
[2013-11-26 02:46:55,205] Run in resume mode: true
[2013-11-26 02:46:55,205] MDM Hub server URL: remote://njw175137:4447
[2013-11-26 02:46:55,205] ORS ID: cgoon3-OTSK_PROD
[2013-11-26 02:46:55,205] Username: batch_process
[2013-11-26 02:46:55,205] Waiting for completion...
[2013-11-26 02:47:08,827] Completed excution of batchgroup: BATCH_GROUP.bg stg ims
[2013-11-26 02:47:08,827] Batchgroup Execution Returned Message: Completed successfully
[2013-11-26 02:47:08,827] Retrieving BATCH_GROUP.bg stg ims status
[2013-11-26 02:47:08,874] Batchgroup BATCH_GROUP.bg stg ims started on [2013-11-26
02:46:55,205]
ended on [2013-11-26 02:47:08,812]
[2013-11-26 02:47:08,874] Batchgroup Status BATCH_GROUP.bg stg ims Returned Message:
Completed
successfully
[2013-11-26 02:47:08,874] Batchgroup Status BATCH_GROUP.bg stg ims Return Code: 0
[2013-11-26 02:47:08,874] Completed with Return Code: 0
[2013-11-26 02:47:08,874] Exit with Return Code: 0
[Tue 11/26/2013 14:47:08.92] Returned from com.informatica.mdm.tools.MDMExecuteBatch
[Tue 11/26/2013 14:47:08.92] com.informatica.mdm.tools.MDMExecuteBatch completed
successfully,
exit with return code = 0
*
* ENTERED mdm_exec_batch_proc script - Tue 11/26/2013 14:47:08.93
*****************************************************
*
[Tue 11/26/2013 14:47:08.95] Removing log files older than 10 day(s) from directory
C:\Users\cgoon\Documents\Sip_Tools\mdm_exec_batch_process\logs
ERROR: No files found with the specified search criteria.
[Tue 11/26/2013 14:47:08.95] Completed removal of old log files
[Tue 11/26/2013 14:47:08.99] Executing Command line java
com.informatica.mdm.tools.MDMExecuteBatch -username batch_process -password ******** -
action
automatchmerge -tablename C_BO_PROD_MSTR -mdmconnectionproperties
"C:\Users\cgoon\Documents\Sip_Tools\mdm_exec_batch_process\scripts
\SiperianConnection.properties"
[2013-11-26 02:47:09,139] Entered com.informatica.mdm.tools.MDMExecuteBatch
[2013-11-26 02:47:09,139] Loading SIF Connection Properties from
C:\Users\cgoon\Documents\Sip_Tools\mdm_exec_batch_process\scripts
\SiperianConnection.properties
[2013-11-26 02:47:09,607] Connecting to MDM Hub Server RMI port using URL:
remote://njw175137:4447
[2013-11-26 02:47:09,607] Testing connection using AuthenticateResponse
[2013-11-26 02:47:09,732] Connection tested successfully
[2013-11-26 02:47:09,732] Executing Auto Match and Merge
[2013-11-26 02:47:09,732] Base object table: C_BO_PROD_MSTR
[2013-11-26 02:47:09,732] Using Default Match Set
[2013-11-26 02:47:09,732] MDM Hub server URL: remote://njw175137:4447
[2013-11-26 02:47:09,732] ORS ID: cgoon3-OTSK_PROD
[2013-11-26 02:47:09,732] Username: batch_process
[2013-11-26 02:47:09,732] Waiting for completion...
[2013-11-26 02:47:10,262] Completed auto match and merge on base object table:
C_BO_PROD_MSTR
[2013-11-26 02:47:10,262] Returned Message: Batch SIF Call EXECUTEBATCHAUTOMATCHANDMERGE
was
processed successfully for input parameters.tableName:C_BO_PROD_MSTR matchSetName:null
[2013-11-26 02:47:10,262] Completed with Return Code: 0
[2013-11-26 02:47:10,262] Exit with Return Code: 0
[Tue 11/26/2013 14:47:10.27] Returned from com.informatica.mdm.tools.MDMExecuteBatch
[Tue 11/26/2013 14:47:10.27] com.informatica.mdm.tools.MDMExecuteBatch completed
successfully,
exit with return code = 0
```

Sample Script File

The `sample_job_step_script` shows the execution of the MDM Hub job steps. On failure, the job stream aborts and passes the return code to the caller.

The following script shows the bash version:

```bash
#!/bin/bash

MDM_SCRIPTS_DIR="/apps/mdm_exec_batch_process/scripts"

# Save user's current working directory
SAVE_DIR=`pwd`

# directory change to script directory
cd "$MDM_SCRIPTS_DIR"

RETURN_CODE=0

# Execute the step. Check return code. If not zero, restore directory
# and exit passing the return code

./mdm_exec_batch_proc.sh -action stage -tablename C_STG_IMS_PROD_MSTR
RETURN_CODE=$?
if [ $RETURN_CODE != 0 ]; then
    cd "$SAVE_DIR"
    exit $RETURN_CODE
fi

./mdm_exec_batch_proc.sh -action load -tablename C_STG_IMS_PROD_MSTR
RETURN_CODE=$?
if [ $RETURN_CODE != 0 ]; then
    cd "$SAVE_DIR"
    exit $RETURN_CODE
fi

./mdm_exec_batch_proc.sh -action stage -tablename C_STG_CMN_PROD_MSTR
RETURN_CODE=$?
if [ $RETURN_CODE != 0 ]; then
    cd "$SAVE_DIR"
    exit $RETURN_CODE
fi

./mdm_exec_batch_proc.sh -action load -tablename C_STG_CMN_PROD_MSTR
RETURN_CODE=$?
if [ $RETURN_CODE != 0 ]; then
  cd "$SAVE_DIR"
  exit $RETURN_CODE
fi

./mdm_exec_batch_proc.sh -action execbatchgroup -batchgroupname "bg stg ims" -
resume true
RETURN_CODE=$?
if [ $RETURN_CODE != 0 ]; then
  cd "$SAVE_DIR"
  exit $RETURN_CODE
fi

./mdm_exec_batch_proc.sh -action automatchmerge -tablename C_BO_PROD_MSTR
RETURN_CODE=$?
if [ $RETURN_CODE != 0 ]; then
  cd "$SAVE_DIR"
  exit $RETURN_CODE
fi

# Do a final tokenize
./mdm_exec_batch_proc.sh -action tokenize -tablename C_BO_PROD_MSTR
RETURN_CODE=$?
  if [ $RETURN_CODE != 0 ]; then
```

```
    cd "$SAVE_DIR"
exit $RETURN_CODE
fi

# successful completion exit
# All step executed successfully, restore user's directory, exit with return code
cd "$SAVE_DIR"
exit $RETURN_CODE
```

CHAPTER 9

Reporting Tools

This chapter includes the following topic:

-

Reporting Tools Overview

The Resource Kit includes data mart tools, which you can use to populate reports with master data.

Use the data mart tools to configure the data mart database connection and report parameters. Then you can populate the data mart with the report data.

Configure the Data Mart Database Connection

Before you can generate reports or populate charts, you must configure the data mart database connection.

1. Open a command prompt.
2. Navigate to the data mart directory.
    - On Windows, navigate to `<infamdm installation directory>\resourcekit\data-mart`
    - On UNIX, navigate to `<infamdm installation directory>/resourcekit/data-mart`
3. Run the following command:
    ```
    java -jar populate_datamart.jar config
    ```
4. Type C to configure the database connection.
5. Answer the prompts described in the following table:

Prompt	Description
Connection Name	Enter a unique name for the connection. If the name exists, it will be overwritten.
Type of Connection	Enter the type of connection to the data mart. Currently only DB is supported.
Database vendor	Enter the database to connect with, such as Oracle or IBM DB2.
User	Enter the database user.

Prompt	Description
Password	Enter the database password.
Token	Reserved for future use
Host Name	Enter the database host name.
Port	Enter the database port.
Database Name	Enter the database name/SID.

Configure the Report Parameters

Before you can use generate reports, you must configure the report parameters.

1. Open a command prompt.
2. Navigate to the data mart directory.
   - On Windows, navigate to `<infamdm installation directory>\resourcekit\data-mart`
   - On UNIX, navigate to `<infamdm installation directory>/resourcekit/data-mart`
3. Run the following command:

   ```
   java -jar populate_datamart.jar config
   ```
4. Type R to configure the report parameters.
5. Answer the prompts described in the following table:

Prompt	Description
Report Name	Unique name for the report. In case the name exists it will be overwritten. You must specify one of the report names that is defined in the file `infamdm installation directory>\resourcekit\data-mart\config\report-class-mapping.properties`
Report Configuration ID	Report configuration ID for the report as it appears in the C_REPOS_RPT_CONFIG table.
Mart Connection Name	Connection name for connecting to the data-mart. Specify the Operational Reference Store name that you use for reporting.
Query Connection Name	Connection name for the database to be queried. Specify the Operational Reference Store name that you use for reporting.

Populating the Data Mart with Report Data

To populate the data mart with report data, run a java command to populate the data mart for all available reports, or for specific report.

1. Open a command prompt.
2. Run a java command to populate the data mart.

- To populate the data mart with data for all available reports, run the following command:

```
java -jar populate_datamart.jar
```

- To populate the data mart with data for a specific report, run the following command:

```
java -jar populate_datamart.jar exec <report name>
```

The C_REPOS_RPT_DETAIL table is populated with report data.

CHAPTER 10

Database Performance Testing Utility

This chapter includes the following topics:

Database Performance Testing Utility Overview

Informatica products, such as the MDM Hub and Informatica PIM, have a high dependance on database for data storage. Consequently, the performance of the database affects the overall performance of the MDM Hub and Informatica PIM. To test the database performance, you can run the database performance testing utility that is in the Resource Kit.

The database performance testing utility is in the following directory:

On UNIX. `<Resource Kit installation directory>/utilities`

On Windows. `<Resource Kit installation directory>\utilities`

To check the input/output performance of the database, run the database performance testing utility. The database performance testing utility does not use the MDM Hub or Informatica PIM functionalities. The utility connects to the database by using JDBC. To assess the performance of the database input/output, the utility performs a load test that is independent of the MDM Hub and Informatica PIM.

The database performance testing utility performs a standard set of operations. The test is run with a known set of data. To determine the performance level of the database input/output, compare the test results against that of an Informatica benchmark environment. To compare the performance of your database environment with that of the Informatica benchmark environment, ensure that the conditions of the test environment are the same as that of the Informatica benchmark environment.

Database Performance Test

Informatica recommends that you load 20 to 100 million records to the database for the database performance test. Run the database performance testing utility to perform the operations to test the performance of the database.

The database performance testing utility performs the following operations:

1. Creates a table.

   Creates a table with 25 columns. The data type of two of the columns is date. For a column of primary keys that contains IDs, the data type is integer. The data type of the other 22 columns is varchar. Also, few varchar columns have indexes.

2. Creates and loads records.

   Creates and loads records to the database based on the value that you provide in the command line argument.

3. Updates records.

   Updates one-fifth of total records or 200,000 records, whichever is lower on indexed and non-indexed columns. The update is based on the WHERE clause on the primary key column. The updates are performed by using 10 parallel java threads.

4. Selects and deletes records.

   Selects and deletes one-fifth of the total records or 200,000 records. The deletes are performed by using 10 parallel java threads.

5. Creates a table by using the `CREATE TABLE AS SELECT` statement, and then drops the first table.

6. Drops the first table.

7. Drops the new table that was created by the `CREATE TABLE AS SELECT` statement.

8. Monitors the time taken for each operation.

Database Performance Testing Tasks

To test the performance of the database, perform the following tasks:

1. Prepare for the database performance test.

2. Test the database performance.

3. Test network latency.

4. Interpret database performance test results.

Step 1. Prepare for the Database Performance Test

Before you test the database performance and compare the results with that of the Informatica benchmark environment, prepare the database environment.

1. Install and configure the database that you use or want to use for the MDM Hub or Informatica PIM.

   You can use Oracle, IBM DB2, and Microsoft SQL Server.

2. Ensure that you have the privileges for the following database operations:

- Create tables
- Create indexes
- Drop tables
- Update tables
- Select
- Delete

3. Ensure that the database has 5 GB to 25 GB of space.

   To help load up to 100 million records, you require 5 GB to 25 GB of space.

4. Set the PATH environment variable to point to the Java 7 installation directory.

   The database performance testing utility is a Java based utility that requires Java 7.

5. Stop the application servers on which the MDM Hub runs.

6. To ensure that all applications are stopped, restart the database server.

   All the MDM Hub processes and Informatica PIM processes are stopped.

Step 2. Test the Database Performance

Ensure that you run the database performance test in the schema of the Operational Reference Store (ORS). Before you use the database performance testing utility, extract the `TestIO.zip` file to an empty directory.

1. Extract the `TestIO.zip` file.

   The following table describes the files contained in the `.zip` file:

File Name	Description
mdmutil.jar	Utility JAR to test the database performance
ojdbc6.jar	Oracle JDBC driver
sqljdbc4.jar	Microsoft SQL Server JDBC driver
db2jcc.jar	IBM DB2 JDBC driver
TestIO.properties	Sample properties file that contains the properties to be configured for testing the database performance

2. Open a command prompt.

3. To test the database performance, run the database performance testing utility.

    •   To perform a quick run of the database performance testing utility with some basic information, use the commands in the following table:

Database Type	Command
Oracle	On Windows. `java -cp mdmutil.jar;ojdbc6.jar com.infa.mdm.util.TestElapsedTime Oracle <host name> <port> <service name> <user name> <password> <number of records to process>` On UNIX. `java -cp mdmutil.jar:ojdbc6.jar com.infa.mdm.util.TestElapsedTime Oracle <host name> <port> <service name> <user name> <password> <number of records to process>`
IBM DB2	On Windows. `java -cp mdmutil.jar;db2jcc.jar com.infa.mdm.util.TestElapsedTime DB2 <host name> <port> <database name> <user name> <password> <number of records to process>` On UNIX. `java -cp mdmutil.jar:db2jcc.jar com.infa.mdm.util.TestElapsedTime DB2 <host name> <port> <database name> <user name> <password> <number of records to process>`
Microsoft SQL Server	On Windows. `java -cp mdmutil.jar;sqljdbc4.jar com.infa.mdm.util.TestElapsedTime SqlServer <host name> <port> <database name> <user name> <password> <number of records to process>` On UNIX. `java -cp mdmutil.jar:sqljdbc4.jar com.infa.mdm.util.TestElapsedTime SqlServer <host name> <port> <database name> <user name> <password> <number of records to process>`

    •   To run the database performance testing utility multiple times with different properties, configure multiple properties files, and use the commands in the following table:

Database Type	Command
Oracle	On Windows. `java -cp mdmutil.jar;ojdbc6.jar com.infa.mdm.util.TestElapsedTime -f <properties file name>` On UNIX. `java -cp mdmutil.jar:ojdbc6.jar com.infa.mdm.util.TestElapsedTime -f <properties file name>`
IBM DB2	On Windows. `java -cp mdmutil.jar;db2jcc.jar com.infa.mdm.util.TestElapsedTime -f <properties file name>` On UNIX. `java -cp mdmutil.jar:db2jcc.jar com.infa.mdm.util.TestElapsedTime -f <properties file name>`
Microsoft SQL Server	On Windows. `java -cp mdmutil.jar;sqljdbc4.jar com.infa.mdm.util.TestElapsedTime -f <properties file name>` On UNIX. `java -cp mdmutil.jar:sqljdbc4.jar com.infa.mdm.util.TestElapsedTime -f <properties file name>`

- To run the database performance testing utility multiple times with the same set of properties, configure the properties file, and include in `mdmutil.jar` before you run the commands in the following table:

Database Type	Command
Oracle	**On Windows.** `java -cp mdmutil.jar;ojdbc6.jar com.infa.mdm.util.TestElapsedTime` **On UNIX.** `java -cp mdmutil.jar:ojdbc6.jar com.infa.mdm.util.TestElapsedTime`
IBM DB2	**On Windows.** `java -cp mdmutil.jar;db2jcc.jar com.infa.mdm.util.TestElapsedTime` **On UNIX.** `java -cp mdmutil.jar:db2jcc.jar com.infa.mdm.util.TestElapsedTime`
Microsoft SQL Server	**On Windows.** `java -cp mdmutil.jar;sqljdbc4.jar com.infa.mdm.util.TestElapsedTime` **On UNIX.** `java -cp mdmutil.jar:sqljdbc4.jar com.infa.mdm.util.TestElapsedTime`

The results appear in the command window.

Step 3. Test Network Latency

Verify the network latency between the application server machine and the database machine that might affect database performance. To check the network latency, after you run the database performance testing utility on the database machine, run it from the application server machine.

After the database performance tests complete on the database machine and on the application server machine, compare the two test results. You need to compare the `Average transactions/second for all operations` value in the database performance test results from the database machine and from the application server machine. If the difference in value is higher than 10 percent , the network latency is considered very high. High network latency affects the performance of the MDM Hub. Investigate the cause of the high network latency.

Step 4. Interpret Database Performance Test Results

After you run the database performance testing utility, interpret the database performance test results. To interpret the database performance test results, compare the test results with the Informatica benchmarks.

Compare the average transaction time for each operation in your database environment with that of the benchmark database environment. Use the difference in performance between your database and the benchmark database environments to get an idea of how fast or slow your database is compared to the benchmark database. The difference in performance indicates the effect that the database performance has on the overall MDM Hub performance because the MDM Hub uses the database for storage.

Benchmark System Specifications

To be able to compare the database performance in your environment with that of the Informatica benchmark environment, you need to know the system specifications of the Informatica benchmark environment.

You need to know the system specification of the following environments:

- Database environment
- Application server environment

System Specification of the Benchmark Database Environment

To be able to compare the database performance in your environment with that of the Informatica benchmark environment, you need to know the system specifications of the Informatica benchmark database environment.

The following table provides the system specifications of the benchmark database environment:

Component	Specification
Processor	2 * Intel Xeon Processor E5-2630 (2.3 GHz)
CPU Core/Thread	12/24
RAM	64 GB (8 x 8 GB, 800 MHz)
Hard drive	C Drive. 5 X Samsung 840 Pro 480GB SSD with RAID 5, Intel RAID Controller; Total space 1.9 TB D Drive. 16 X Intel 520 Series 240GB SSDSC2CW240A3 SSD with RAID0, Areca ARC-1882 RAID Controller; Total space 3.7TB
Network adapter	Intel Ethernet Converged Network Adapter X540-T2 10G
Operating system	Windows Server 2008 R2 Enterprise Service Pack 1 Version 6.1.7601
Database drive	D drive
Operating system and database management system installation drive	C drive
Database version	- Oracle Database 11.2.0.3.0 - IBM DB2 Version 10.1 Fix Pack 4 - Microsoft SQL Server 2012 - 11.0.2100.60
Degree of parallelism	12

System Specification of the Benchmark Application Server Environment

To be able to compare the database performance of your environment with that of the Informatica benchmark environment, you need to know the system specifications of the Informatica benchmark application server environment.

The following table provides the system specifications of the benchmark application server environment:

Component	Specification
Processor	2 * Intel Xeon Processor E5-2430 (2.2 GHz)
CPU Core/Thread	12/24
RAM	64 GB (4 x `16GB, 1333 MHz)
Hard drive	1*1TB HDD non-RAID
Network adapter	Broadcom NetXtreme Gigabit Ethernet, Broadcom BCM57810 NetXtreme II 10 GigE
Operating system	Windows Server 2008 R2 Enterprise Service Pack 1 Version 6.1.7601

Database Configuration

To run the database performance test, you need to prepare the database environment to be similar to the Informatica benchmark environment. You can compare the database performance test results with the benchmark environment only if the configuration of the two database environments are similar.

Oracle Configuration Parameters

To run the database performance test, prepare the Oracle database environment to be similar to the Informatica benchmark environment. Configure Oracle initialization parameters in the `INIT.ORA` file. You can compare the database performance test results with the benchmark environment only if the configuration of the two database environments are similar.

The following table describes the parameters to configure in the `INIT.ORA` file:

Parameter Name	Description
AUDIT_SYS_OPERATIONS	Enables or disables the auditing of operations issued by the SYS user. The Informatica benchmark environment was set to `FALSE` to disable the audit of operations. Default is `FALSE`.
AUDIT_TRAIL	Enables or disables database auditing. The Informatica benchmark environment was set to `DB` to enable auditing and direct audit records to the database audit trail. Default is `NONE`.
COMPATIBLE	Allows you to use a new version of Oracle, while guaranteeing backward compatibility with an earlier version. The Informatica benchmark environment was set to `11.2.0.0.0`. Default is `10.0.0`.

Parameter Name	Description
CONTROL_FILES	Specifies names of control files. The Informatica benchmark environment was set to `D:\ORCL\CONTROL01.CTL, D:\ORCL\CONTROL02.CTL`.
CPU_COUNT	Number of CPUs available to the Oracle instance. Set automatically by Oracle. The Informatica benchmark environment had 24 CPUs.
CURSOR_SHARING	Specifies the kind of SQL statements that can share the same cursors. The Informatica benchmark environment was set to `EXACT` to only allow identical statements to share the same cursor. Default is `EXACT`.
DB_BLOCK_CHECKING	Controls whether or not block checking is performed for database blocks. The Informatica benchmark environment was set to `OFF`. Default is `OFF`.
DB_BLOCK_SIZE	Specifies the size of database blocks in bytes. The Informatica benchmark environment was set to `8192`. Default is `8192`.
DB_FILE_MULTIBLOCK_READ_COUNT	Specifies the maximum number of blocks to read in one input/output operation. The Informatica benchmark environment was set to `128`.
DB_FILES	Specifies the maximum number of database files that can be opened for the database. The Informatica benchmark environment was set to `200`. Default is `200`.
DB_ULTRA_SAFE	Sets the default values for other parameters that control protection levels. The Informatica benchmark environment was set to `OFF`. Default is `OFF`.
DB_WRITER_PROCESSES	Specifies the number of background database writer processes to start. The Informatica benchmark environment was set to `3`. Default is `1` or `<CPU Count>/8`, whichever is greater.
DBWR_IO_SLAVES	Specifies the number of input/output server processes used by the database writer process. The Informatica benchmark environment was set to `0`. Default is `0`.
DISK_ASYNCH_IO	Controls whether input/output to data files, control files, and log files is asynchronous. The Informatica benchmark environment was set to `TRUE`. Default is `TRUE`.
DISPATCHERS	Configures dispatcher processes. The Informatica benchmark environment was set to `(PROTOCOL=TCP) (SERVICE=orclXDB)`. Default is `(PROTOCOL=TCP)`.
FAST_START_PARALLEL_ROLLBACK	Specifies the degree of parallelism to use to recover terminated transactions. The Informatica benchmark environment was set to `LOW`. Default is `LOW`.
FILESYSTEMIO_OPTIONS	Specifies input/output operations for the file system files. The Informatica benchmark environment was set to `SETALL`.
GLOBAL_NAMES	Specifies whether a database link must have the same name as the database to which it connects. The Informatica benchmark environment was set to `FALSE`. Default is `FALSE`.

Parameter Name	Description
LOG_BUFFER	Specifies the redo circular buffer size in bytes. The Informatica benchmark environment was set to `53460992`. Default is `512000`.
LOG_CHECKPOINT_INTERVAL	Specifies the frequency of the redo log file blocks checkpoint interval. The Informatica benchmark environment was set to `0`. Default is `0`.
LOG_CHECKPOINT_TIMEOUT	Specifies the maximum time interval between checkpoints in seconds. The Informatica benchmark environment was set to `1800`. Default is `1800`.
MEMORY_MAX_TARGET	Specifies the maximum size for the memory target initialization parameter. The Informatica benchmark environment was set to `0`. Default is `0`.
MEMORY_TARGET	Specifies the target size of Oracle SGA and PGA memory. The Informatica benchmark environment was set to `0`. Default is `0`.
OPEN_CURSORS	Specifies the maximum number of open cursors in a session. The Informatica benchmark environment was set to `1000`. Default is `50`.
OPTIMIZER_DYNAMIC_SAMPLING	Controls the level of dynamic sampling that the optimizer performs. The Informatica benchmark environment was set to `2`. Default is `2`.
OPTIMIZER_FEATURES_ENABLE	Enables a series of optimizer features based on an Oracle release number. The Informatica benchmark environment was set to `11.2.0.3`. Default is `11.2.0.3`.
PARALLEL_MAX_SERVERS	Specifies the maximum number of parallel query servers for an instance. The Informatica benchmark environment was set to `960`.
PARALLEL_MIN_SERVERS	Specifies the minimum number of parallel query servers for the instance. The Informatica benchmark environment was set to `0`. Default is `0`.
PGA_AGGREGATE_TARGET	Specifies the target aggregate PGA memory available to the instance. The Informatica benchmark environment was set to `10737418240`. Default is 10 MB or 20% of the size of the SGA, whichever is greater.
PROCESSES	Specifies the maximum number of operating system user processes that can connect to Oracle. The Informatica benchmark environment was set to `1000`. Default is `100`.
RECYCLEBIN	Controls whether the dropped tables go into the recycle bin or not. The Informatica benchmark environment was set to `OFF`. Default is `ON`.
REMOTE_DEPENDENCIES_MODE	Specifies whether to run dependencies upon remote PL/SQL stored procedures based on time stamp or signature. The Informatica benchmark environment was set to `TIMESTAMP`. Default is `TIMESTAMP`.
RESOURCE_MANAGER_PLAN	Specifies the name of the top-level plan that the resource manager must load for an instance.
SESSION_CACHED_CURSORS	Specifies the number of cursors to cache in a session. The Informatica benchmark environment was set to `500`. Default is `50`.

Parameter Name	Description
SESSIONS	Specifies the maximum number of user and system sessions that can be created. The Informatica benchmark environment was set to `1536`. Default is a derived value equal to `(1.1*PROCESSES)+5`.
SGA_TARGET	Specifies the target size of SGA. The Informatica benchmark environment was set to `32212254720`. Default is `0`.
STATISTICS_LEVEL	Specifies the statistics collection level for the database and operating system. The Informatica benchmark environment was set to `ALL`. Default is `TYPICAL`.
TIMED_OS_STATISTICS	Specifies the internal operating system statistic gathering interval in seconds. The Informatica benchmark environment was set to `60`. Default is `5`.
TIMED_STATISTICS	Specifies whether or not to collect statistics related to time. The Informatica benchmark environment was set to `TRUE`. Default is `TRUE`.
TRANSACTIONS	Specifies the maximum number of concurrent transactions. The Informatica benchmark environment was set to `500`. Default is a derived value equal to `(1.1*SESSIONS)`.
TRANSACTIONS_PER_ROLLBACK_SEGMENT	Specifies the number of concurrent transactions that each rollback segment can handle. The Informatica benchmark environment was set to `1`. Default is `5`.
UNDO_MANAGEMENT	Specifies the undo space management mode that the system must use. The Informatica benchmark environment was set to `AUTO`. Default is `AUTO`.
UNDO_RETENTION	Specifies the low threshold value of undo retention . The Informatica benchmark environment was set to `900`. Default is `900`.
WORKAREA_SIZE_POLICY	Controls the mode in which work areas are sized. The Informatica benchmark environment was set to `AUTO`. Default is `AUTO`.

IBM DB2 Configuration Parameters

To run the database performance test, prepare the IBM DB2 database environment to be similar to the Informatica benchmark environment. You can compare the database performance test results with the benchmark environment if the configuration of the two database environments are similar.

The following table describes the parameters to configure in the `INIT.ORA` file:

IBM DB2 Registry Variables

The following table describes the IBM DB2 registry parameters that were configured in the benchmark environment:

Registry Variable	Description
DB2INSTOWNER	Created in the DB2 profile registry when the instance is created, and is set to the name of the machine that owns the instance. The Informatica benchmark environment was set to `TORPERF4`. Default is `NULL`.
DB2CODEPAGE	Specifies the code page of the data. DB2 derives the code page information from the operating system. The Informatica benchmark environment was set to `1208`.
DB2_RESTORE_GRANT_ADMIN_AUTHORITIES	Grants SECADM, DBADM, DATAACCESS, and ACCESSCTRL authorities when you restore to a new or existing database. The Informatica benchmark environment was set to `ON`. Default is `OFF`.
DB2_GRP_LOOKUP	Enables access token support. The Informatica benchmark environment was set to `LOCAL`.
DB2COMM	Configures the communication managers to start when the database manager is started. The Informatica benchmark environment was set to `TCPIP`. Default is `NULL`.
DB2INSTPROF	Specifies the location of the instance directory on Windows operating systems. The Informatica benchmark environment was set to `C:\IBM \PROGRAMDATA\\IBM\DB2\DB2SERVICE`.
DB2PORTRANGE	Specifies the TCP/IP port range used by FCM so that any additional database partitions created on another machine has the same port range. The Informatica benchmark environment was set to `60000:60003`.
DB2_DEFERRED_PREPARE_SEMANTICS	Specifies whether or not to allow dynamic statements that contain untyped parameter markers to use deferred prepare semantics in CLI and JDBC applications. The Informatica benchmark environment was set to `YES`. Default is `NO`.
DB2_SKIPINSERTED	Specifies whether or not to allow statements that use cursor stability or read stability isolation levels to skip uncommitted inserted rows. The Informatica benchmark environment was set to `YES`. Default is `NO`.
DB2_SKIPDELETED	Specifies whether to allow statements that use cursor stability or read stability isolation levels to skip deleted keys during index access and deleted rows during table access. The Informatica benchmark environment was set to `YES`. Default is `NO`.
DB2_EVALUNCOMMITTED	Specifies whether to allow, where possible, table or index access scans to avoid row locking until a data record satisfies predicate evaluation. The Informatica benchmark environment was set to `YES`. Default is `NO`.

Registry Variable	Description
DB2_SELECTIVITY	Controls where the SELECTIVITY clause can be used in search conditions in SQL statements. The Informatica benchmark environment was set to `ALL`. Default is `NO`.
DB2NTNOCACHE	Specifies whether or not the IBM DB2 opens database files with a NOCACHE option. The Informatica benchmark environment was set to `ON`. Default is `OFF`.
DB2_INLIST_TO_NLJN	Configures the optimizer to prefer or not prefer nested loop joins. The Informatica benchmark environment was set to `NO`. Default is `NO`.
DB2_ANTIJOIN	Configures the optimizer to transform subqueries into anti-joins. The Informatica benchmark environment was set to `YES`. Default is `NO`.
DB2_REDUCED_OPTIMIZATION	Configures reduced optimization features or rigid use of optimization features at the specified optimization level. The Informatica benchmark environment was set to `REDUCE_LOCKING`. Default is `NO`.
DB2_EXTENDED_OPTIMIZATION	Configures whether or not the query optimizer uses optimization extensions to improve query performance. The Informatica benchmark environment was set to `ON,ENHANCED_MULTIPLE_DISTINCT,IXOR,SNHD`. Default is `OFF`.
DB2_HASH_JOIN	Configures hash join as a possible join method when compiling an access plan. The Informatica benchmark environment was set to `YES`. Default is `YES`.

Database Manager Configuration Parameters

The following table describes the IBM DB2 database manager configuration parameters that require optimization and their recommended settings:

Configuration Parameter	Description
AGENT_STACK_SZ	Determines the amount of memory that DB2 allocates for each agent thread stack. The Informatica benchmark environment was set to `256`. Default value varies for the different operating systems.
AGENTPRI	Control the priority given to the database manager instance processes and threads that run on the machine. The Informatica benchmark environment was set to `SYSTEM`. Default is `SYSTEM`.
ALT_DIAGPATH	Specifies the fully qualified alternate path for DB2 diagnostic information to use when the primary diagnostic data path, diagpath, is unavailable. The Informatica benchmark environment was set to `NULL`. Default is `NULL`.
ALTERNATE_AUTH_ENC	Specifies the alternate encryption algorithm to encrypt the user IDs and passwords submitted to a DB2 database server for authentication. The Informatica benchmark environment was set to `NOT_SPECIFIED`. Default is `NOT_SPECIFIED`.
ASLHEAPSZ	Specifies the communication buffer between the local application and its associated agent that is allocated as shared memory by each database manager agent that starts. The Informatica benchmark environment was set to `15`. Default is `15`.

Configuration Parameter	Description
AUDIT_BUF_SZ	Specifies the size of the buffers used when you audit the DB2 instance. The Informatica benchmark environment was set to `0`. Default is `0`.
AUTHENTICATION	Specifies and determines how and where user authentication occurs. The Informatica benchmark environment was set to `SERVER`. Default is `SERVER`.
CATALOG_NOAUTH	Specifies whether or not users can catalog and uncatalog databases and nodes, or DCS and ODBC directories, without SYSADM authority. The Informatica benchmark environment was set to `NO`. Default is `NO` when the database server has local and remote clients.
CLNT_KRB_PLUGIN	Specifies the default Kerberos plug-in library name to use for client-side authentication and local authorization. The Informatica benchmark environment was set to `IBMkrb5`. Default is `IBMkrb5`.
CLNT_PW_PLUGIN	Specifies the name of the userid-password plug-in library to use for client-side authentication and local authorization. The Informatica benchmark environment was set to `NULL`. Default is `NULL`.
CLUSTER_MGR	Specifies the cluster manager to which the database manager must communicate incremental cluster configuration changes. The Informatica benchmark environment was not set to use the parameter. This parameter does not have a default value.
COMM_BANDWIDTH	Specifies the bandwidth between database partition servers to help the query optimizer determine access paths. The Informatica benchmark environment was set to `1.000000e+002`. Default is `-1`.
CONN_ELAPSE	Specifies the time in seconds within which a TCP/IP connection must be established between two database partition servers. The Informatica benchmark environment was set to `10`. Default is `10`.
CPUSPEED	Specifies the CPU speed of the database machines. The Informatica benchmark environment was set to `1.731929e-007`. Default is `-1`.
DFT_ACCOUNT_STR	Specifies the default suffix of accounting identifiers. The Informatica benchmark environment was set to `NULL`. Default is `NULL`.
DFTDBPATH	Specifies the default file path for creating databases under the database manager. The Informatica benchmark environment was set to `C:`. Default on UNIX is the home directory of the instance owner, and on Windows it is the drive on which DB2 is installed.
DFT_DEGREE	Configures the default for the DEGREE bind option. The Informatica benchmark environment was set to `ANY`. Default is `ANY`.
DFT_MONSWITCHES	Sets a number of database system monitor switches. The Informatica benchmark environment was set to `ON`. Default is `OFF`.
DIAGLEVEL	Specifies the type of diagnostic errors to record in the db2diag log file. The Informatica benchmark environment was set to `4`. Default is `3`.
DIAGPATH	Specifies the fully qualified primary path for DB2 diagnostic information. The Informatica benchmark environment was set to `D:\DB2\DIAG\`. Default is `NULL`.
DIAGSIZE	Controls the maximum size of the diagnostic log and administration notification log files. The Informatica benchmark environment was set to `0`. Default is `0`.

Configuration Parameter	Description
DIR_CACHE	Determines whether the database, node, and DCS directory files are cached in memory. The Informatica benchmark environment was set to `YES`. Default is `YES`.
DISCOVER	Determines the type of discovery requests that the client can make. The Informatica benchmark environment was set to `SEARCH`. Default is `SEARCH`.
DISCOVER_INST	Specifies whether the database instance is detectable by DB2 discovery. The Informatica benchmark environment was set to `ENABLE`. Default is `ENABLE`.
FCM_NUM_BUFFERS	Specifies the number of 4KB buffers to use for internal communications. The Informatica benchmark environment was set to `AUTOMATIC(4096)`. Default is `AUTOMATIC(<n>)`. `<n>` depends on the database server client type and partitioning.
FCM_NUM_CHANNELS	Specifies the number of FCM channels for each database partition. The Informatica benchmark environment was set to `AUTOMATIC(2048)`. Default is `AUTOMATIC(<n>)`. `<n>` depends on the database server client type and partitioning.
FCM_PARALLELISM	Specifies the degree of parallelism to use for communication between members within a DB2 instance. The Informatica benchmark environment was set to `1`. Default is `1`.
FED_NOAUTH	Determines whether federated authentication is bypassed at the instance. The Informatica benchmark environment was set to `NO`. Default is `NO`.
FEDERATED	Specifies whether or not to support applications that submit distributed requests for data managed by data sources. The Informatica benchmark environment was set to `NO`. Default is `NO`.
FEDERATED_ASYNC	Specifies the maximum number of asynchrony table queues in the access plan that the federated server supports. The Informatica benchmark environment was set to `0`. Default is `0`.
FENCED_POOL	Specifies the number of threads to cache in each db2fmp process for threaded db2fmp processes, or the number of processes to cache for nonthreaded db2fmp processes. The Informatica benchmark environment was set to `AUTOMATIC(MAX_COORDAGENTS)`. Default is `AUTOMATIC(MAX_COORDAGENTS)`.
GROUP_PLUGIN	Specifies the name of the group plug-in library. The Informatica benchmark environment was set to `NULL`. Default is `NULL`.
HEALTH_MON	Specifies whether you want to monitor an instance, its associated databases, and database objects based on various health indicators. The Informatica benchmark environment was set to `OFF`. Default is `ON`.
INDEXREC	Specifies when the indexes that are rebuilt are not valid, and whether any index build log records are redone during rollforward or high availability disaster recovery log replay. The Informatica benchmark environment was set to `RESTART`. Default is `RESTART`.
INSTANCE_MEMORY	Specifies the maximum memory allocation for a database partition if you use DB2 database products with memory usage restrictions or if you set it to a specific value. Otherwise, a value is calculated for the instance memory when the database partition is activated. The Informatica benchmark environment was set to `13107200`. Default is `0`.
INTRA_PARALLEL	Configures whether or not the database manager can use intra-partition parallelism. The Informatica benchmark environment was set to `YES`. Default is `NO`.

Configuration Parameter	Description
JAVA_HEAP_SZ	Specifies the maximum heap size to use for the Java interpreter. The Informatica benchmark environment was set to 0. Default for HP-UX is 4096 and for other operating systems, it is 2048.
JDK_PATH	Specifies the directory under which the Software Developer's Kit for Java is installed. The Informatica benchmark environment was set to C:\IBM\SQLLIB\java\jd. Default is NULL.
KEEPFENCED	Specifies whether or not a fenced mode process is kept after a fenced mode routine call is complete. The Informatica benchmark environment was set to YES. Default is 0.
LOCAL_GSSPLUGIN	Specifies the name of the default GSS API plug-in library to use for instance level local authorization when the value of the AUTHENTICATION parameter is not the default value. The Informatica benchmark environment was set to NULL. Default is NULL.
MAX_CONNECTIONS	Specifies the maximum number of client connections that are allowed for each database partition. The Informatica benchmark environment was set to AUTOMATIC(MAX_COORDAGENTS). Default is AUTOMATIC(MAX_COORDAGENTS).
MAX_CONNRETRIES	Specifies the maximum number of attempts to establish a TCP/IP connection between two database partition servers. The Informatica benchmark environment was set to 5. Default is 5.
MAX_COORDAGENTS	Specifies the maximum number of coordinating agents. The Informatica benchmark environment was set to AUTOMATIC(200). Default is AUTOMATIC(200).
MAX_QUERYDEGREE	Specifies the maximum degree of intrapartition parallelism to use for SQL statements that run on the database manager instance. The Informatica benchmark environment was set to ANY. Default is ANY.
MAX_TIME_DIFF	Specifies the maximum time difference, in minutes, to allow between the database partition servers listed in the node configuration file. The Informatica benchmark environment was set to 60. Default is 60.
MON_HEAP_SZ	Allocates the amount of the memory, in pages, for database system monitor data. The Informatica benchmark environment was set to AUTOMATIC(66). Default is AUTOMATIC.
NOTIFYLEVEL	Specifies the type of administration notification messages that are written to the administration notification log. The Informatica benchmark environment was set to 3. Default is 3.
NUM_INITAGENTS	Specifies the initial number of idle agents that can be created in the agent pool when the db2start command is run. The Informatica benchmark environment was set to 15. Default is 0.
NUM_INITFENCED	Specifies the initial number of nonthreaded, idle db2fmp processes that can be created in the db2fmp pool when the database manager starts. The Informatica benchmark environment was set to 0. Default is 0.
NUM_POOLAGENTS	Sets the maximum size of the idle agent pool. The Informatica benchmark environment was set to 40. Default is 100.
NUMDB	Specifies the number of local databases that can be concurrently active, or the maximum number of different database aliases that can be cataloged on a DB2 Connect server. The Informatica benchmark environment was set to 8. Default is 8.

Configuration Parameter	Description
RESYNC_INTERVAL	Specifies the time interval in seconds at which a transaction manager (TM), resource manager (RM) or sync point manager (SPM) should try to recover outstanding indoubt transactions that are found in the TM, the RM, or the SPM. The Informatica benchmark environment was set to 180. Default is 180.
RQRIOBLK	Sets the communication buffer size between remote applications and their database agents on the database server. The Informatica benchmark environment was set to 32767. Default is 256.
SHEAPTHRES	Configures the sort heap threshold for sorts. The Informatica benchmark environment was set to 0. Default is 0.
SPM_LOG_FILE_SZ	Sets the SPM log file size in 4 KB pages. The Informatica benchmark environment was set to 256. Default is 256.
SPM_LOG_PATH	Specifies the directory in which the SPM logs are written. The Informatica benchmark environment was set to NULL. Default is NULL.
SPM_MAX_RESYNC	Sets the number of agents that can simultaneously perform resync operations. The Informatica benchmark environment was set to 20. Default is 20.
SPM_NAME	Specifies the SPM instance name. The Informatica benchmark environment was set to TORPERF4. Default is derived from the TCP/IP host name.
SRVCON_AUTH	Specifies user authentication procedure to handle incoming connections at the server. The Informatica benchmark environment was set to NOT_SPECIFIED. Default is NOT_SPECIFIED.
SRVCON_GSSPLUGIN_LIST	Specifies the GSS API plug-in libraries that are supported by the database server. The Informatica benchmark environment was set to NULL. Default is NULL.
SRVCON_PW_PLUGIN	Specifies the name of the default userid-password plug-in library to use for server-side authentication. The Informatica benchmark environment was set to NULL. Default is NULL.
SRV_PLUGIN_MODE	Specifies whether plug-ins are to run in fenced mode or unfenced mode. The Informatica benchmark environment was set to UNFENCED. Default is UNFENCED.
SSL_CIPHERSPECS	Specifies the cipher suites that the server must allow for incoming connection requests when using SSL protocol. The Informatica benchmark environment was set to NULL. Default is NULL.
SSL_CLNT_KEYDB	Specifies the fully qualified file path of the key file to use for SSL connection on the client-side. The Informatica benchmark environment was set to NULL. Default is NULL.
SSL_CLNT_STASH	Specifies the fully qualified file path of the stash file to use for SSL connections at the client-side. The Informatica benchmark environment was set to NULL. Default is NULL.
SSL_SVR_KEYDB	Specifies a fully qualified file path of the key file to use for SSL setup at server-side. The Informatica benchmark environment was set to NULL. Default is NULL.
SSL_SVR_LABEL	Specifies a label of the personal certificate of the server in the key database. The Informatica benchmark environment was set to NULL. Default is NULL.

Configuration Parameter	Description
SSL_SVR_STASH	Specifies a fully qualified file path of the stash file to use for SSL setup at server-side. The Informatica benchmark environment was set to NULL. Default is NULL.
START_STOP_TIME	Specifies the time, in minutes, within which all database partition servers must respond to a START DBM or a STOP DBM command. The Informatica benchmark environment was set to 10. Default is 10.
SSL_SVCENAME	Specifies the port name that a database server uses to wait for communications from remote client nodes using SSL protocol. The Informatica benchmark environment was set to NULL. Default is NULL.
SSL_VERSIONS	Specifies SSL and TLS versions that the server supports for incoming connection requests. The Informatica benchmark environment was set to NULL. Default is NULL.
SVCENAME	Specifies the name of the TCP/IP port that a database server can use to wait for communications from remote client nodes. The Informatica benchmark environment was set to NULL. Default is NULL.
SYSADM_GROUP	Defines the group name with SYSADM authority for the database manager instance. The Informatica benchmark environment was set to DB2ADMNS. Default is NULL.
SYSCTRL_GROUP	Defines the group name with system control (SYSCTRL) authority. The Informatica benchmark environment was set to NULL. Default is NULL.
SYSMAINT_GROUP	Defines the group name with system maintenance (SYSMAINT) authority. The Informatica benchmark environment was set to NULL. Default is NULL.
SYSMON_GROUP	Defines the group name with system monitor (SYSMON) authority. The Informatica benchmark environment was set to NULL. Default is NULL.
TM_DATABASE	Specifies the name of the TM database for each DB2 instance. The Informatica benchmark environment was set to 1ST_CONN. Default is 1ST_CONN.
TP_MON_NAME	Specifies the name of the transaction processing (TP) monitor product being used. The Informatica benchmark environment was set to 1ST_CONN. This parameter does not have a default value.
TRUST_ALLCLNTS	Used with the TRUST_CLNAUTH parameter to specify where users are validated to the database environment. The Informatica benchmark environment was set to YES. Default is YES.
TRUST_CLNTAUTH	Specifies whether a trusted client is authenticated at the server or the client when the client provides a user ID and password for a connection. The Informatica benchmark environment was set to CLIENT. Default is CLIENT.
UTIL_IMPACT_LIM	Allows the database administrator to limit the performance degradation of a throttled utility on the workload. The Informatica benchmark environment was set to CLIENT. Default is CLIENT.

Database Configuration Parameters

The following table describes the IBM DB2 database configuration parameters that require optimization and specifies their recommended settings:

Configuration Parameter	Description
ALT_COLLATE	Specifies the collating sequence to use for Unicode tables in a non-Unicode database. The Informatica benchmark environment was set to `NULL`. Default is `NULL`.
APP_CTL_HEAP_SZ	Configures the application control heap size. The Informatica benchmark environment was set to `0`. The default value depends on the database server type.
APPGROUP_MEM_SZ	Configures the maximum size of application group memory. The Informatica benchmark environment was set to `0`. The default value depends on the database server type.
APPL_MEMORY	Controls the maximum amount of application memory that is allocated by DB2 database agents to service application requests. The Informatica benchmark environment was set to `AUTOMATIC`. Default is `AUTOMATIC`.
APPLHEAPSZ	Specifies the total application memory that is available for the entire application. The Informatica benchmark environment was set to `AUTOMATIC`. Default is `AUTOMATIC`.
ARCHRETRYDELAY	Specifies the number of seconds to wait after an archive attempt fails before a retry to archive the log file. The Informatica benchmark environment was set to `0`. Default is `20`.
AUTO_DEL_REC_OBJ	Specifies whether database log files, backup images, and load copy images should be deleted when the associated recovery history file entry is cleaned up. The Informatica benchmark environment was set to `OFF`. Default is `OFF`.
AUTO_MAINT	Parent parameter of all the other automatic maintenance database configuration parameters (auto_db_backup, auto_tbl_maint, auto_runstats, auto_stats_prof, auto_stmt_stats, auto_prof_upd, and auto_reorg). The Informatica benchmark environment was set to `OFF`. Default is `ON`.
AUTO_DB_BACKUP	Enables or disables automatic backup operations for a database. The Informatica benchmark environment was set to `OFF`. Default is `OFF`.
AUTO_TBL_MAINT	Enables or disables table maintenance. The Informatica benchmark environment was set to `ON`. Default is `ON`.
AUTO_RUNSTATS	Enables or disables automatic table runstats operations for a database. The Informatica benchmark environment was set to `ON`. Default is `ON`.
AUTO_STATS_PROF	Configures statistical profile generation. The Informatica benchmark environment was set to `OFF`. Default is `OFF`.
AUTO_STMT_STATS	Enables or disables the collection of real-time statistics. The Informatica benchmark environment was set to `ON`. Default is `ON`.
AUTO_PROF_UPD	Specifies whether or not the runstats profile is to be updated with recommendations. The Informatica benchmark environment was set to `OFF`. Default is `OFF`.
AUTO_REORG	Enables or disables automatic table and index reorganization for a database. The Informatica benchmark environment was set to `OFF`. Default is `OFF`.

Configuration Parameter	Description
AUTO_REVAL	Controls the revalidation and invalidation semantics. The Informatica benchmark environment was set to `DEFERRED_FORCE`. Default is `DEFERRED`.
AUTORESTART	Specifies whether the database manager can, in the event of an abnormal database termination, automatically call the restart database utility when an application connects to a database. The Informatica benchmark environment was set to `ON`. Default is `ON`.
AVG_APPLS	Allows the query optimizer to estimate the buffer pool space that is available at run time for the access plan chosen. The Informatica benchmark environment was set to `AUTOMATIC`. Default is `AUTOMATIC`.
BLK_LOG_DSK_FUL	Prevents disk full errors from being generated when DB2 cannot create a new log file in the active log path. The Informatica benchmark environment was set to `NO`. Default is `NO`.
BLOCKNONLOGGED	Specifies whether the database manager allows tables to have the NOT LOGGED or NOT LOGGED INITIALLY attributes activated. The Informatica benchmark environment was set to `NO`. Default is `NO`.
CATALOGCACHE_SZ	Configures the maximum memory that the catalog cache can use from the shared memory of the database. The Informatica benchmark environment was set to `25000`. Default is `-1`.
CHNGPGS_THRESH	Specifies the percentage level of changed pages at which the asynchronous page cleaners start, if they are not currently active. The Informatica benchmark environment was set to `80`. Default is `60`.
CONNECT_PROC	Specifies a two-part connect procedure name that runs every time an application connects to the database. The Informatica benchmark environment was set to `NULL`. Default is `NULL`.
CUR_COMMIT	Controls the behavior of cursor stability scans. The Informatica benchmark environment was set to `ON`. Default is `ON`.
DATABASE_MEMORY	Specifies the size of the database memory set. The Informatica benchmark environment was set to `AUTOMATIC`. Default is `AUTOMATIC`.
DBHEAP	Limits the maximum amount of memory allocated for the database heap. The Informatica benchmark environment was set to `AUTOMATIC`. Default is `AUTOMATIC`.
DB_MEM_THRESH	Specifies the maximum percentage of committed, but currently unused, database shared memory that the database manager allows before the release of committed pages of memory back to the operating system. The Informatica benchmark environment was set to `10`. Default is `10`.
DEC_TO_CHAR_FMT	Controls the result of the CHAR scalar function and the CAST specification to convert decimal to character values. The Informatica benchmark environment was set to `NEW`. Default is `NEW`.
DECFLT_ROUNDING	Sets the rounding mode for decimal floating point, DECFLOAT. The Informatica benchmark environment was set to `ROUND_HALF_UP`. Default is `ROUND_HALF_EVEN`.
DFT_DEGREE	Specifies the default value for the CURRENT DEGREE special register and the DEGREE bind option. The Informatica benchmark environment was set to `ANY`. Default is `1`.

Configuration Parameter	Description
DFT_EXTENT_SZ	Sets the default extent size of table spaces. The Informatica benchmark environment was set to 32. Default is 32.
DFT_LOADREC_SES	Specifies the default number of sessions that can be used during a table load recovery. The Informatica benchmark environment was set to 1. Default is 0.
DFT_MTTB_TYPES	Specifies the default value for the CURRENT MAINTAINED TABLE TYPES FOR OPTIMIZATION special register. The Informatica benchmark environment was set to SYSTEM. Default is SYSTEM.
DFT_PREFETCH_SZ	Sets the default prefetch size of table spaces. The Informatica benchmark environment was set to AUTOMATIC. Default is AUTOMATIC.
DFT_QUERYOPT	Sets the default query optimization class used when neither the SET CURRENT QUERY OPTIMIZATION statement nor the QUERYOPT option on the bind command are used. The Informatica benchmark environment was set to 5. Default is 5.
DFT_REFRESH_AGE	This parameter represents the maximum time duration since a REFRESH TABLE statement has been processed on a specific REFRESH DEFERRED materialized query table. After this time limit is exceeded, the materialized query table is not used to satisfy queries until the materialized query table is refreshed. The Informatica benchmark environment was set to 0. Default is 0.
DFT_SQLMATHWARN	Sets the default value that determines the handling of arithmetic errors and retrieval conversion errors during SQL statement compilation. The Informatica benchmark environment was set to NO. Default is NO.
DISCOVER_DB	Prevents information about a database from being returned to a client when a discovery request is received at the server. The Informatica benchmark environment was set to ENABLE. Default is ENABLE.
DLCHKTIME	Defines the frequency at which the database manager checks for deadlocks among all the applications connected to a database. The Informatica benchmark environment was set to 10000. Default is 10000.
DYN_QUERY_MGMT	Determines whether Query Patroller captures information about submitted queries. The Informatica benchmark environment was set to 0. Default is DISABLE.
ENABLE_XMLCHAR	Determines whether XMLPARSE operations can be performed on non-BIT DATA CHAR, or CHAR-type, expressions in an SQL statement. The Informatica benchmark environment was set to YES. Default is YES.
FAILARCHPATH	Specifies a path to which DB2 tries to archive log files if the log files cannot be archived to either the primary or the secondary archive destinations because of a media problem that affects the destinations. The Informatica benchmark environment was set to NULL. Default is NULL.
HADR_DB_ROLE	Specifies the current role of a database, whether the database is online or offline. The Informatica benchmark environment was set to STANDARD. This parameter does not have a default value.
HADR_LOCAL_HOST	Specifies the local host for high availability disaster recovery (HADR) TCP communication. The Informatica benchmark environment was set to NULL. Default is NULL.

Configuration Parameter	Description
HADR_LOCAL_SVC	Specifies the TCP service name or port number for which the local HADR process accepts connections. The Informatica benchmark environment was set to NULL. Default is NULL.
HADR_PEER_WINDOW	When set to a non-zero time value, an HADR primary-standby database pair continues to behave as though still in peer state, for the configured amount of time, if the primary database loses connection with the standby database. The Informatica benchmark environment was set to 0. Default is 0.
HADR_REMOTE_HOST	Specifies the TCP/IP host name or IP address of the remote HADR database server. The Informatica benchmark environment was set to NULL. Default is NULL.
HADR_REMOTE_INST	Specifies the instance name of the remote server. The Informatica benchmark environment was set to NULL. Default is NULL.
HADR_REMOTE_SVC	Specifies the TCP service name or port number that are used by the remote HADR database server. The Informatica benchmark environment was set to NULL. Default is NULL.
HADR_SYNCMODE	Specifies the synchronization mode, which determines how primary log writes are synchronized with the standby when the systems are in peer state. The Informatica benchmark environment was set to NEARSYNC. Default is NEARSYNC.
HADR_TIMEOUT	Specifies the time for which the HADR process waits before it considers a communication attempt as failed. The Informatica benchmark environment was set to 120. Default is 120.
INDEXREC	Indicates when the database manager attempts to rebuild indexes that are not valid, and whether any index build is redone during rollforward or HADR log replay on the standby database. The Informatica benchmark environment was set to RESTART. Default is RESTART.
INDEXSORT	Specifies whether data must be sorted before it is passed to the index manager. The Informatica benchmark environment was set to YES. Default is YES.
LOCKLIST	Allocates the amount of storage to the lock list of a database. The Informatica benchmark environment was set to AUTOMATIC. Default is AUTOMATIC.
LOCKTIMEOUT	Specifies the number of seconds that an application waits to obtain a lock, to avoid global deadlocks for applications. The Informatica benchmark environment was set to -1. Default is -1.
LOGARCHMETH1	Specifies the media type of the primary destination for archived logs. The Informatica benchmark environment was set to OFF. Default is OFF.
LOGARCHMETH2	Specifies the media type of the secondary destination for archived logs. The Informatica benchmark environment was set to OFF. Default is OFF.
LOGARCHOPT1	Specifies the options field for the primary destination for archived logs. The Informatica benchmark environment was set to NULL. Default is NULL.
LOGARCHOPT2	Specifies the options field for the secondary destination for archived logs. The Informatica benchmark environment was set to NULL. Default is NULL.

Configuration Parameter	Description
LOGBUFSZ	Configures the amount of the database heap to use as a buffer for log records before writing the records to disk. The Informatica benchmark environment was set to 4096. Default is 256.
LOGFILSIZ	Defines the size of each primary and secondary log file. The Informatica benchmark environment was set to 256000. Default is 1000.
LOGINDEXBUILD	Specifies whether index creation, recreation, or reorganization operations are logged so that indexes can be reconstructed during DB2 rollforward operations or HADR log replay procedures. The Informatica benchmark environment was set to OFF. Default is OFF.
LOGPRIMARY	Configures the number of primary log files to be pre-allocated. The Informatica benchmark environment was set to 100. Default is 3.
LOGRETAIN	Sets the LOGRETAIN value. The Informatica benchmark environment was set to OFF. Default is OFF.
LOGSECOND	Configures the number of secondary log files that IBM DB2 can create and use for recovery log files. The Informatica benchmark environment was set to 100. Default is 2.
MAX_LOG	Specifies the limit to the percentage of log space that a transaction can consume. The Informatica benchmark environment was set to 0. Default is 0.
MAXAPPLS	Specifies the maximum number of concurrent applications that can be connected to a database. The Informatica benchmark environment was set to AUTOMATIC. Default is AUTOMATIC.
MAXFILOP	Specifies the maximum number of file handles to open for each database. The Informatica benchmark environment was set to 65535. The default value depends on the operating system.
MAXLOCKS	Configures the percentage of the lock list that one application can use. The Informatica benchmark environment was set to AUTOMATIC. Default is AUTOMATIC.
MINCOMMIT	Allows the delay of the writing of log records to disk, until a minimum number of commits are performed. The Informatica benchmark environment was set to 1. Default is 1.
MIRRORLOGPATH	Specifies a string of up to 242 bytes for the fully qualified mirror path, not a relative path. The Informatica benchmark environment was set to NULL. Default is NULL.
MON_ACT_METRICS	Controls the collection of activity metrics on the entire database and affects activities submitted by connections associated with any DB2 workload definitions. The Informatica benchmark environment was set to BASE. Default is BASE.
MON_DEADLOCK	Controls the generation of deadlock events at the database level for the lock event monitor. The Informatica benchmark environment was set to WITHOUT_HIST. Default is WITHOUT_HIST.
MON_LOCKTIMEOUT	Controls the generation of lock timeout events at the database level for the lock event monitor and affects all DB2 workload definitions. The Informatica benchmark environment was set to NONE. Default is NONE.

Configuration Parameter	Description
MON_LOCKWAIT	Controls the generation of lock wait events at the database level for the lock event monitor. The Informatica benchmark environment was set to `NONE`. Default is `NONE`.
MON_LW_THRESH	Controls the amount of time spent in lock wait before an event for mon_lockwait is generated. The Informatica benchmark environment was set to `5000000`. Default is `5000000`.
MON_LCK_MSG_LVL	Controls the logging of messages to the administration notification log when lock timeout, deadlock, and lock escalation events occur. The Informatica benchmark environment was set to `1`. Default is `1`.
MON_OBJ_METRICS	Controls the collection of data object metrics on the database. The Informatica benchmark environment was set to `BASE`. Default is `BASE`.
MON_PKGLIST_SZ	Controls the maximum number of entries that can appear in the package listing for each unit of work that the unit of work event monitor captures. The Informatica benchmark environment was set to `32`. Default is `32`.
MON_REQ_METRICS	Controls the collection of request metrics on the database and affects requests that run in DB2 service classes. The Informatica benchmark environment was set to `BASE`. Default is `BASE`.
MON_UOW_DATA	Controls the generation of unit of work events at the database level for the unit of work event monitor and affects units of work on the data server. The Informatica benchmark environment was set to `NONE`. Default is `NONE`.
NEWLOGPATH	Specifies a string of up to 242 bytes to change the location of the log files. The Informatica benchmark environment was set to `NULL`. Default is `NULL`.
NUM_DB_BACKUPS	Specifies the number of full database backups to retain for a database. The Informatica benchmark environment was set to `12`. Default is `12`.
NUM_FREQVALUES	Specifies the number of frequent values that will be collected if you specify the WITH DISTRIBUTION option on the RUNSTATS command. The Informatica benchmark environment was set to `10`. Default is `10`.
NUM_IOCLEANERS	Specifies the number of asynchronous page cleaners for a database. The Informatica benchmark environment was set to `AUTOMATIC`. Default is `AUTOMATIC`.
NUM_IOSERVERS	Specifies the number of input/output servers for a database that can be in progress for prefetching and utilities. The Informatica benchmark environment was set to `AUTOMATIC`. Default is `AUTOMATIC`.
NUM_LOG_SPAN	Specifies whether there is a limit to how many log files one transaction can span and what that limit is. The Informatica benchmark environment was set to `0`. Default is `0`.
NUM_QUANTILES	Controls the number of quantiles that will be collected if you specify the WITH DISTRIBUTION option on the RUNSTATS command. The Informatica benchmark environment was set to `20`. Default is `20`.
NUMARCHRETRY	Specifies the number of attempts that DB2 must make to archive a log file to the primary or the secondary archive directory before trying to archive log files to the failover directory. The Informatica benchmark environment was set to `5`. Default is `5`.

Configuration Parameter	Description
OVERFLOWLOGPATH	Specifies a location for DB2 databases to find log files that are needed for a rollforward operation, in addition to storing active log files retrieved from the archive. The Informatica benchmark environment was set to NULL. Default is NULL.
PCKCACHESZ	Configures the package cache size, which is allocated out of the database shared memory. The Informatica benchmark environment was set to 128000. Default is AUTOMATIC.
REC_HIS_RETENTN	Specifies the number of days that historical information on backups are retained. The Informatica benchmark environment was set to 366. Default is 366.
SECTION_ACTUALS	Enables measurement of section actuals. The Informatica benchmark environment was set to NONE. Default is NONE.
SELF_TUNING_MEM	Specifies whether the memory tuner dynamically distributes the available memory resources between memory consumers that are enabled for self-tuning. The Informatica benchmark environment was set to ON. In single-database partition environments, default is ON. In multi-database partition environments, default is OFF.
SEQDETECT	Controls whether the database manager is allowed to detect sequential page reading during input/output activity. The Informatica benchmark environment was set to YES. Default is YES.
SHEAPTHRES_SHR	Configures the limit on the total amount of database shared memory that the sort memory consumers can use at a time. Set the SHEAPTHRES_SHR parameter to AUTOMATIC if the SORTHEAP parameter is set to AUTOMATIC. The Informatica benchmark environment was set to AUTOMATIC. Default is AUTOMATIC.
SMTP_SERVER	Identifies a simple mail transfer protocol (SMTP) server that transmits email sent by the UTL_MAIL built-in module. The Informatica benchmark environment was set to NULL. Default is NULL.
SOFTMAX	Determines the frequency of soft check points and the recovery range that help in the crash recovery process. The Informatica benchmark environment was set to 500. Default is 100.
SORTHEAP	Configures the sort heap size. The Informatica benchmark environment was set to AUTOMATIC. Default is AUTOMATIC.
SQL_CCFLAGS	Contains a list of conditional compilation values for use in conditional compilation of selected SQL statements. The Informatica benchmark environment was set to NULL. Default is NULL.
STAT_HEAP_SZ	Indicates the maximum heap size to use in collecting statistics using the RUNSTATS command. The Informatica benchmark environment was set to AUTOMATIC. Default is AUTOMATIC.
STMTHEAP	Configures the limit of the statement heap, which is used during the compilation of an SQL statement. The Informatica benchmark environment was set to AUTOMATIC. Default is AUTOMATIC.
STMT_CONC	Sets the default statement concentrator behavior. The Informatica benchmark environment was set to OFF. Default is OFF.

Configuration Parameter	Description
TRACKMOD	Specifies whether the database manager tracks database modifications so that the backup utility detects the subsets of the database pages that must be examined by an incremental backup, and potentially included in the backup image. The Informatica benchmark environment was set to NO. Default is NO.
TSM_MGMTCLASS	Determines how the Tivoli Storage Manager (TSM) server manages the backup versions of the objects that are backed up. The Informatica benchmark environment was set to NULL. Default is NULL.
TSM_NODENAME	Sets the value used to override the default setting for the node name associated with the TSM product. The Informatica benchmark environment was set to NULL. Default is NULL.
TSM_OWNER	Sets the value used to override the default setting for the owner associated with the TSM product. The Informatica benchmark environment was set to NULL. Default is NULL.
TSM_PASSWORD	Sets the value used to override the default setting for the password associated with the TSM product. The Informatica benchmark environment was set to NULL. Default is NULL.
USEREXIT	Sets the USEREXIT value. The Informatica benchmark environment was set to OFF. Default is OFF.
UTIL_HEAP_SZ	Configures the maximum amount of memory that the BACKUP, RESTORE, and LOAD utilities can use simultaneously. The Informatica benchmark environment was set to 50000. Default is 5000.
VENDOROPT	Specifies additional parameters that DB2 might need to use to communicate with storage systems during backup, restore, or load copy operations. The Informatica benchmark environment was set to NULL. Default is NULL.
WLM_COLLECT_INT	Specifies a collect and reset interval, in minutes, for workload management statistics. The Informatica benchmark environment was set to BASE. Default is 0.

Microsoft SQL Server Configuration Parameters

To run the database performance test, prepare the Microsoft SQL Server database environment to be similar to the Informatica benchmark environment. You can compare the database performance test results with the benchmark environment only if the configuration of the two database environments are similar.

The Informatica benchmark environment uses the following Microsoft SQL Server database properties configuration:

Property	Description
AUTO_UPDATE_STATISTICS_ASYNC	Specifies whether or not to enforce statistics update in asynchronous mode. The Informatica benchmark environment was set to ON. Default is OFF.
PARAMETERIZATION	Specifies whether or not all SQL statements in the database must be parameterized. The Informatica benchmark environment was set to FORCED. Default is SIMPLE.
READ_COMMITTED_SNAPSHOT	Specifies whether or not to allow other sessions to see data that is not yet a committed transaction. The Informatica benchmark environment was set to ON. Default is OFF.

Database Performance Test Properties

Before you run the database performance testing utility, configure the database performance test properties in the TestIO.properties file.

The following table describes the database performance test properties that you can configure in the TestIO.properties file:

Property	Description
jdbcUrl	JDBC URL to connect to the database. If you specify the JDBC URL, do not specify the following database connection properties: - database_type - hostname - port - servicename - databasename
database_type	Type of database. Specify one of the following values: - oracle. Specify if the database type is Oracle. - SqlServer. Specify if the database type is Microsoft SQL Server. - DB2. Specify if the database type is IBM DB2.
hostname	Name of the machine that hosts the database.
port	Port number on which the database is listening.

Property	Description
servicename	Oracle only. Name of the Oracle Service. If the Oracle connection type is SID, or if it is a Oracle RAC environment, use the `jdbcUrl` property instead.
databasename	Microsoft SQL Server and IBM DB2 only. For Microsoft SQL Server, specify the name of the Operational Reference Store. For IBM DB2, specify the name of the database instance in which the Operational Reference Store is present.
username	Name of the Operational Reference Store user.
password	Database password.
no_of_records	Number of records to be processed. Default is `1000`.
output_result_filename	Name of the file in which the database performance test results must be saved when the database performance testing utility is run. If you specify only the file name, the database performance testing utility creates the file in the directory from where you run the utility. If you specify the file name with a relative or complete path, the database performance testing utility creates the file in the specified directory. By default, the database performance test results appear in the command window.
INFORMATICA_TESTIO_MAX_UPDATE_DELETE_ROWS	Maximum number of rows to update or delete when the database performance testing utility runs. Default is `200000`.
INFORMATICA_TESTIO_MAX_THREADS	Maximum number of Java threads to use for the DML operations of the database performance test. Default is `10`.
INFORMATICA_TESTIO_COMMIT_RECORDS	Number of rows to process before committing a DML operation. Default is `500`.

Database Performance Test Properties File

The database performance test properties file, `TestIO.properties`, contains the properties to configure the database performance test. Use the `TestIO.properties` file to configure the properties applicable to the MDM Hub environment.

The `TestIO.properties` file is in the `TestIO.zip` file, which is in the following directory:

On UNIX. `<Resource Kit installation directory>/utilities`

On Windows. `<Resource Kit installation directory>\utilities`

Sample Database Performance Test Properties File

The following sample `TestIO.properties` file contains configuration for testing the database performance:

```
##################################################################
#### Properties for Oracle Database
```

```
database_type=oracle
hostname=localhost
port=1521
servicename=orcl.informatica.com
username=mdm_sample2
password=!!cmx!!

## if jdbcUrl is provided, above hostname, port and servicename will not be used to
calculate jdbcUrl
#jdbcUrl=jdbc:oracle:thin:@//localhost:1521/orcl.informatica.com

####################################################################
#### Properties for sqlserver Database
#database_type=SqlServer
#hostname=psv28mdmqa1
#port=1433
#databasename=cmx_ors
#username=cmx_ors
#password=INFAdba1

## if jdbcUrl is provided, above hostname, port, databasename, username and password
will not be used to calculate jdbcUrl
#jdbcUrl=jdbc:sqlserver://
psv28mdmqa1:1433;databaseName=cmx_ors;user=cmx_ors;password=INFAdba1

####################################################################
#### Properties for DB2 Database
#database_type=DB2
#hostname=psraxmdmqa1
#port=60000
#databasename=MDM10
#username=cmx_ors
#password=INFAdba1

## if jdbcUrl is provided, above hostname, port and databasename will not be used to
calculate jdbcUrl
#jdbcUrl=jdbc:db2://psraxmdmqa1:60000/MDM10



####################################################################

#### properties unrelated to database connection
## no of records to insert
no_of_records=1000

## name of the file in which all the results will go from this utility
output_result_filename=c:/temp/TestIO_result.log



####################################################################

INFORMATICA_TESTIO_MAX_UPDATE_DELETE_ROWS=200000
INFORMATICA_TESTIO_MAX_THREADS=10
INFORMATICA_TESTIO_COMMIT_RECORDS=500
```

Database Performance Test Result

After you run the database performance testing utility, the test results appear in the command line. To assess the performance level of your database environment, compare the test results with the benchmark. The test results are saved to an output file if you configure the requirement in the `TestIO.properties` file.

The test results consist of the following parts:

1. Log information
2. Summary of operations run in parallel.

The log information indicates the operations that are run. The summary provides the total time, average time, and the average transactions in a second for each individual operation and for all operations as a whole.

Sample Database Performance Test Result

You run the database testing utility on 60 million records. The DML operations of the utility runs on 10 parallel java threads.

The following sample shows the summary of the DML operations when the database testing utility is run on 60 million records:

```
07-15-2015 06:56:46:895 : ************************** Summary **************************
07-15-2015 06:56:46:896 : All DML operations ran in multiple threads with thread count =
10
07-15-2015 06:56:46:897 : All the timings are in hour:min:second:millisecond
07-15-2015 06:56:46:897 : Total distinct database interactions: 9
07-15-2015 06:56:46:898 : 0- operation type: CREATE, count:1
07-15-2015 06:56:46:899 : 1- operation type: INSERT, count:60000001
07-15-2015 06:56:46:901 : 2- operation type: UPDATE, count:200000
07-15-2015 06:56:46:903 : 3- operation type: UPDATE_INDEX, count:200000
07-15-2015 06:56:46:906 : 4- operation type: SELECT, count:200000
07-15-2015 06:56:46:908 : 5- operation type: DELETE, count:200000
07-15-2015 06:56:46:910 : 6- operation type: CTAS, count:1
07-15-2015 06:56:46:912 : 7- operation type: DROP, count:1
07-15-2015 06:56:46:915 : 8- operation type: DROP, count:1
07-15-2015 06:56:46:932 : Total time for the test: 7:31:45:791.0
07-15-2015 06:56:46:933 : Number of operations: 60800005
07-15-2015 06:56:46:937 : Average time for all operations: 0:0:0:0.4458188942583146
07-15-2015 06:56:46:939 : Average transactions/second for all operations: 2243
07-15-2015 06:56:46:941 :
07-15-2015 06:56:46:944 : Number of create operations: 1
07-15-2015 06:56:46:946 : Total time for create operations: 0:0:0:307.0
07-15-2015 06:56:46:948 : Average time for all create operations: 0:0:0:307.0
07-15-2015 06:56:46:951 : Average transactions/second for all create operations: 3
07-15-2015 06:56:46:953 :
07-15-2015 06:56:46:955 : Number of create table as select operations: 1
07-15-2015 06:56:46:958 : Total time for create table as select operations: 0:31:29:121.0
07-15-2015 06:56:46:960 : Average time for all create table as select operations:
0:31:29:121.0
07-15-2015 06:56:46:962 : Average transactions/second for all create table as select
operations: 0
07-15-2015 06:56:46:964 :
07-15-2015 06:56:46:966 : Number of drop operations: 2
07-15-2015 06:56:46:968 : Total time for drop operations: 0:0:1:71.0
07-15-2015 06:56:46:971 : Average time for all drop operations: 0:0:0:535.5
07-15-2015 06:56:46:973 : Average transactions/second for all drop operations: 1
07-15-2015 06:56:46:975 :
07-15-2015 06:56:46:977 : Number of insert operations: 60000001
07-15-2015 06:56:46:980 : Total time for insert operations: 6:51:31:743.0
07-15-2015 06:56:46:984 : Average time for all insert operations:
0:0:0:0.4115290431411826
07-15-2015 06:56:46:986 : Average transactions/second for all insert operations: 2429
07-15-2015 06:56:46:988 : Total bytes of data inserted: 1158196632
07-15-2015 06:56:46:991 : Average bytes of data inserted/second (bytes/second): 46906
07-15-2015 06:56:46:993 :
```

```
07-15-2015 06:56:46:995 : Number of update operations in non-indexed table: 200000
07-15-2015 06:56:46:997 : Total time for update operations in non-indexed table:
0:1:41:826.0
07-15-2015 06:56:47:000 : Average time for all update operations in non-indexed table:
0:0:0:0.50913
07-15-2015 06:56:47:002 : Average transactions/second for all update operations in non-
indexed table: 1964
07-15-2015 06:56:47:004 :
07-15-2015 06:56:47:006 : Number of update operations in indexed table: 200000
07-15-2015 06:56:47:009 : Total time for update operations in indexed table: 0:2:25:359.0
07-15-2015 06:56:47:011 : Average time for all update operations in indexed table:
0:0:0:0.726795
07-15-2015 06:56:47:013 : Average transactions/second for all update operations in
indexed table: 1375
07-15-2015 06:56:47:017 :
07-15-2015 06:56:47:019 : Number of select operations: 200000
07-15-2015 06:56:47:022 : Total time for select operations: 0:1:19:136.0
07-15-2015 06:56:47:024 : Average time for all select operations: 0:0:0:0.39568
07-15-2015 06:56:47:025 : Average transactions/second for all select operations: 2527
07-15-2015 06:56:47:028 :
07-15-2015 06:56:47:031 : Number of delete operations: 200000
07-15-2015 06:56:47:033 : Total time for delete operations: 0:3:17:228.0
07-15-2015 06:56:47:035 : Average time for all delete operations: 0:0:0:0.98614
07-15-2015 06:56:47:038 : Average transactions/second for all delete operations: 1014
07-15-2015 06:56:47:040 : ***************************************************************
```

Benchmarks for Tests Run On the Database Machine

To test the database performance, you can run the database performance testing utility from the database machine. Compare the results of the database performance test against the Informatica benchmarks for performance tests run on the database machine.

Benchmark for Oracle

Compare the results of the Oracle database performance test against the following Informatica benchmark for performance tests run on the database machine:

```
07-22-2015 11:44:20:619 : *********** TestIO Utility version 1.4 *********************
07-22-2015 11:44:20:619 : Number of java threads    : 10
07-22-2015 11:44:20:728 : Database Type     : Oracle
07-22-2015 11:44:20:728 : Host Name         : localhost
07-22-2015 11:44:20:728 : Port              : 1521
07-22-2015 11:44:20:728 : ServiceName       : pttdb
07-22-2015 11:44:20:728 : User Name         : cmx_ors
07-22-2015 11:44:20:728 : Password          : *********
07-22-2015 11:44:20:728 : JDBC Url generated : jdbc:oracle:thin:@//localhost:1521/pttdb
07-22-2015 11:44:20:728 : Number of records: 60000000
07-22-2015 11:44:20:728 : ***************************************************************
07-22-2015 11:44:20:728 : before 10 JDBC connections ....
07-22-2015 11:44:21:165 : after 10 JDBC connrections ....
07-22-2015 11:44:21:165 : JDBC driver version is: 11.2.0.2.0
07-22-2015 11:44:21:165 : Temp Table name - c_repos_test_420
07-22-2015 11:44:21:165 : DML operations are going to be run in multiple threads with
thread count = 10
07-22-2015 11:44:21:165 : Start create table and indexes
07-22-2015 11:44:21:211 : CREATE TABLE c_repos_test_420 ( id int NOT NULL, create_date
date, last_update_date date, column1 varchar(255), column2 varchar(255), column3
varchar(255), column4 varchar(255), column5 varchar(255), column6 varchar(255), column7
varchar(255), column8 varchar(255), column9 varchar(255), column10 varchar(255),
column11 varchar(255), column12 varchar(255), column13 varchar(255), column14
varchar(255), column15 varchar(255), column16 varchar(255), column17 varchar(255),
column18 varchar(255), column19 varchar(255), column20 varchar(255), column21
```

```
varchar(255), column22 varchar(255), PRIMARY KEY (id))
07-22-2015 11:44:21:227 : CREATE INDEX c_repos_test_420_index1 on
c_repos_test_420(column1)
07-22-2015 11:44:21:227 : CREATE INDEX c_repos_test_420_index2 on
c_repos_test_420(column2, column3, column4)
07-22-2015 11:44:21:227 : Done create table and indexes
07-22-2015 11:44:21:227 : Inserting rows in threads begin....
07-22-2015 11:44:21:227 : Start insert rows through thread number 0
07-22-2015 11:44:21:227 : Start insert rows through thread number 1
07-22-2015 11:44:21:227 : Start insert rows through thread number 2
07-22-2015 11:44:21:227 : Start insert rows through thread number 3
07-22-2015 11:44:21:227 : Start insert rows through thread number 4
07-22-2015 11:44:21:227 : Start insert rows through thread number 5
07-22-2015 11:44:21:227 : Start insert rows through thread number 6
07-22-2015 11:44:21:227 : Start insert rows through thread number 7
07-22-2015 11:44:21:227 : Start insert rows through thread number 8
07-22-2015 11:44:21:227 : Start insert rows through thread number 9
07-22-2015 12:40:14:781 : Done insert rows through thread number 4
07-22-2015 12:40:16:185 : Done insert rows through thread number 7
07-22-2015 12:40:27:822 : Done insert rows through thread number 1
07-22-2015 12:40:29:195 : Done insert rows through thread number 3
07-22-2015 12:40:34:234 : Done insert rows through thread number 5
07-22-2015 12:40:34:234 : Done insert rows through thread number 9
07-22-2015 12:40:35:341 : Done insert rows through thread number 6
07-22-2015 12:40:35:669 : Done insert rows through thread number 2
07-22-2015 12:40:38:025 : Done insert rows through thread number 8
07-22-2015 12:41:07:087 : Done insert rows through thread number 0
07-22-2015 12:41:07:087 : Inserting rows in threads end....
07-22-2015 12:41:07:087 : Updating rows in threads begin....
07-22-2015 12:41:07:087 : Start update rows for non-indexed columns through thread
number 0
07-22-2015 12:41:07:087 : Start update rows for non-indexed columns through thread
number 1
07-22-2015 12:41:07:087 : Start update rows for non-indexed columns through thread
number 2
07-22-2015 12:41:07:087 : Start update rows for non-indexed columns through thread
number 3
07-22-2015 12:41:07:087 : Start update rows for non-indexed columns through thread
number 4
07-22-2015 12:41:07:087 : Start update rows for non-indexed columns through thread
number 5
07-22-2015 12:41:07:087 : Start update rows for non-indexed columns through thread
number 6
07-22-2015 12:41:07:087 : Start update rows for non-indexed columns through thread
number 7
07-22-2015 12:41:07:087 : Start update rows for non-indexed columns through thread
number 8
07-22-2015 12:41:07:087 : Start update rows for non-indexed columns through thread
number 9
07-22-2015 12:41:21:580 : Done update rows through thread number 4
07-22-2015 12:41:21:580 : Done update rows through thread number 7
07-22-2015 12:41:21:580 : Done update rows through thread number 6
07-22-2015 12:41:21:611 : Done update rows through thread number 0
07-22-2015 12:41:21:611 : Done update rows through thread number 5
07-22-2015 12:41:21:627 : Done update rows through thread number 2
07-22-2015 12:41:21:642 : Done update rows through thread number 1
07-22-2015 12:41:21:642 : Done update rows through thread number 3
07-22-2015 12:41:21:642 : Done update rows through thread number 9
07-22-2015 12:41:21:658 : Done update rows through thread number 8
07-22-2015 12:41:21:658 : Updating rows in threads end....
07-22-2015 12:41:21:658 : Updating rows in threads begin....
07-22-2015 12:41:21:673 : Start update rows for indexed columns through thread number 0
07-22-2015 12:41:21:673 : Start update rows for indexed columns through thread number 1
07-22-2015 12:41:21:673 : Start update rows for indexed columns through thread number 2
07-22-2015 12:41:21:673 : Start update rows for indexed columns through thread number 3
07-22-2015 12:41:21:673 : Start update rows for indexed columns through thread number 4
07-22-2015 12:41:21:673 : Start update rows for indexed columns through thread number 5
07-22-2015 12:41:21:673 : Start update rows for indexed columns through thread number 6
07-22-2015 12:41:21:673 : Start update rows for indexed columns through thread number 7
07-22-2015 12:41:21:673 : Start update rows for indexed columns through thread number 8
07-22-2015 12:41:21:673 : Start update rows for indexed columns through thread number 9
```

```
07-22-2015 12:41:38:724 : Done update rows through thread number 3
07-22-2015 12:41:38:771 : Done update rows through thread number 5
07-22-2015 12:41:38:787 : Done update rows through thread number 8
07-22-2015 12:41:38:787 : Done update rows through thread number 1
07-22-2015 12:41:38:802 : Done update rows through thread number 2
07-22-2015 12:41:38:802 : Done update rows through thread number 4
07-22-2015 12:41:38:818 : Done update rows through thread number 7
07-22-2015 12:41:38:818 : Done update rows through thread number 6
07-22-2015 12:41:38:818 : Done update rows through thread number 9
07-22-2015 12:41:38:834 : Done update rows through thread number 0
07-22-2015 12:41:38:834 : Updating rows in threads end....
07-22-2015 12:41:38:834 : Selecting rows in threads begin....
07-22-2015 12:41:38:834 : Start select rows through thread number 0
07-22-2015 12:41:38:834 : Start select rows through thread number 1
07-22-2015 12:41:38:834 : Start select rows through thread number 2
07-22-2015 12:41:38:834 : Start select rows through thread number 3
07-22-2015 12:41:38:834 : Start select rows through thread number 4
07-22-2015 12:41:38:834 : Start select rows through thread number 5
07-22-2015 12:41:38:834 : Start select rows through thread number 6
07-22-2015 12:41:38:834 : Start select rows through thread number 7
07-22-2015 12:41:38:834 : Start select rows through thread number 8
07-22-2015 12:41:38:834 : Start select rows through thread number 9
07-22-2015 12:41:50:034 : Done select rows through thread number 9
07-22-2015 12:41:50:081 : Done select rows through thread number 2
07-22-2015 12:41:50:097 : Done select rows through thread number 6
07-22-2015 12:41:50:097 : Done select rows through thread number 5
07-22-2015 12:41:50:097 : Done select rows through thread number 4
07-22-2015 12:41:50:112 : Done select rows through thread number 3
07-22-2015 12:41:50:128 : Done select rows through thread number 8
07-22-2015 12:41:50:128 : Done select rows through thread number 7
07-22-2015 12:41:50:128 : Done select rows through thread number 0
07-22-2015 12:41:50:144 : Done select rows through thread number 1
07-22-2015 12:41:50:144 : Selecting rows in threads end....
07-22-2015 12:41:50:144 : Deleting rows in threads begin....
07-22-2015 12:41:50:144 : Start delete rows through thread number 0
07-22-2015 12:41:50:144 : Start delete rows through thread number 1
07-22-2015 12:41:50:144 : Start delete rows through thread number 2
07-22-2015 12:41:50:144 : Start delete rows through thread number 3
07-22-2015 12:41:50:144 : Start delete rows through thread number 4
07-22-2015 12:41:50:144 : Start delete rows through thread number 5
07-22-2015 12:41:50:144 : Start delete rows through thread number 6
07-22-2015 12:41:50:144 : Start delete rows through thread number 7
07-22-2015 12:41:50:144 : Start delete rows through thread number 8
07-22-2015 12:41:50:144 : Start delete rows through thread number 9
07-22-2015 12:42:11:469 : Done delete rows through thread number 0
07-22-2015 12:42:11:484 : Done delete rows through thread number 2
07-22-2015 12:42:11:500 : Done delete rows through thread number 4
07-22-2015 12:42:11:500 : Done delete rows through thread number 1
07-22-2015 12:42:11:500 : Done delete rows through thread number 9
07-22-2015 12:42:11:500 : Done delete rows through thread number 7
07-22-2015 12:42:11:516 : Done delete rows through thread number 6
07-22-2015 12:42:11:547 : Done delete rows through thread number 3
07-22-2015 12:42:11:578 : Done delete rows through thread number 8
07-22-2015 12:42:11:609 : Done delete rows through thread number 5
07-22-2015 12:42:11:609 : Deleting rows in threads end....
07-22-2015 12:42:11:609 : Temp Table2 name - c_repos_test_5694
07-22-2015 12:42:11:609 : Start create table as select and indexes
07-22-2015 12:42:11:609 : CREATE TABLE c_repos_test_5694 as select * from
c_repos_test_420
07-22-2015 12:44:11:948 : ALTER TABLE c_repos_test_5694 ADD CONSTRAINT
c_repos_test_5694_id UNIQUE (id)
07-22-2015 12:46:17:232 : CREATE INDEX c_repos_test_5694_index1 on
c_repos_test_5694(column1)
07-22-2015 12:48:00:176 : CREATE INDEX c_repos_test_5694_index2 on
c_repos_test_5694(column2, column3, column4)
07-22-2015 12:50:14:586 : Done create table as select and indexes
07-22-2015 12:50:14:586 : Start drop table c_repos_test_420
07-22-2015 12:50:15:662 : Done drop table c_repos_test_420
07-22-2015 12:50:15:662 : Start drop table c_repos_test_5694
07-22-2015 12:50:15:912 : Done drop table c_repos_test_5694
07-22-2015 12:50:15:912 : ************************* Summary *************************
```

```
07-22-2015 12:50:15:912 : All DML operations ran in multiple threads with thread count =
10
07-22-2015 12:50:15:912 : All the timings are in hour:min:second:millisecond
07-22-2015 12:50:15:928 : Total distinct database interactions: 9
07-22-2015 12:50:15:928 : 0- operation type: CREATE, count:1
07-22-2015 12:50:15:928 : 1- operation type: INSERT, count:60000001
07-22-2015 12:50:15:928 : 2- operation type: UPDATE, count:200000
07-22-2015 12:50:15:928 : 3- operation type: UPDATE_INDEX, count:200000
07-22-2015 12:50:15:928 : 4- operation type: SELECT, count:200000
07-22-2015 12:50:15:928 : 5- operation type: DELETE, count:200000
07-22-2015 12:50:15:928 : 6- operation type: CTAS, count:1
07-22-2015 12:50:15:928 : 7- operation type: DROP, count:1
07-22-2015 12:50:15:928 : 8- operation type: DROP, count:1
07-22-2015 12:50:15:928 : Total time for the test: 1:5:54:747.0
07-22-2015 12:50:15:928 : Number of operations: 60800005
07-22-2015 12:50:15:928 : Average time for all operations: 0:0:0:0.06504517557194428
07-22-2015 12:50:15:928 : Average transactions/second for all operations: 15373
07-22-2015 12:50:15:928 :
07-22-2015 12:50:15:928 : Number of create operations: 1
07-22-2015 12:50:15:928 : Total time for create operations: 0:0:0:62.0
07-22-2015 12:50:15:928 : Average time for all create operations: 0:0:0:62.0
07-22-2015 12:50:15:928 : Average transactions/second for all create operations: 16
07-22-2015 12:50:15:928 :
07-22-2015 12:50:15:928 : Number of create table as select operations: 1
07-22-2015 12:50:15:928 : Total time for create table as select operations: 0:8:2:977.0
07-22-2015 12:50:15:928 : Average time for all create table as select operations:
0:8:2:977.0
07-22-2015 12:50:15:928 : Average transactions/second for all create table as select
operations: 0
07-22-2015 12:50:15:928 :
07-22-2015 12:50:15:928 : Number of drop operations: 2
07-22-2015 12:50:15:928 : Total time for drop operations: 0:0:1:326.0
07-22-2015 12:50:15:928 : Average time for all drop operations: 0:0:0:663.0
07-22-2015 12:50:15:928 : Average transactions/second for all drop operations: 1
07-22-2015 12:50:15:928 :
07-22-2015 12:50:15:928 : Number of insert operations: 60000001
07-22-2015 12:50:15:928 : Total time for insert operations: 0:56:45:860.0
07-22-2015 12:50:15:928 : Average time for all insert operations:
0:0:0:0.05676433238726113
07-22-2015 12:50:15:928 : Average transactions/second for all insert operations: 17616
07-22-2015 12:50:15:928 : Total bytes of data inserted: 1158196632
07-22-2015 12:50:15:928 : Average bytes of data inserted/second (bytes/second): 340059
07-22-2015 12:50:15:928 :
07-22-2015 12:50:15:928 : Number of update operations in non-indexed table: 200000
07-22-2015 12:50:15:928 : Total time for update operations in non-indexed table:
0:0:14:571.0
07-22-2015 12:50:15:928 : Average time for all update operations in non-indexed table:
0:0:0:0.072855
07-22-2015 12:50:15:928 : Average transactions/second for all update operations in non-
indexed table: 13725
07-22-2015 12:50:15:928 :
07-22-2015 12:50:15:928 : Number of update operations in indexed table: 200000
07-22-2015 12:50:15:928 : Total time for update operations in indexed table: 0:0:17:176.0
07-22-2015 12:50:15:928 : Average time for all update operations in indexed table:
0:0:0:0.08588
07-22-2015 12:50:15:928 : Average transactions/second for all update operations in
indexed table: 11644
07-22-2015 12:50:15:928 :
07-22-2015 12:50:15:928 : Number of select operations: 200000
07-22-2015 12:50:15:928 : Total time for select operations: 0:0:11:310.0
07-22-2015 12:50:15:928 : Average time for all select operations: 0:0:0:0.05655
07-22-2015 12:50:15:928 : Average transactions/second for all select operations: 17683
07-22-2015 12:50:15:928 :
07-22-2015 12:50:15:928 : Number of delete operations: 200000
07-22-2015 12:50:15:928 : Total time for delete operations: 0:0:21:465.0
07-22-2015 12:50:15:928 : Average time for all delete operations: 0:0:0:0.107325
07-22-2015 12:50:15:928 : Average transactions/second for all delete operations: 9317
07-22-2015 12:50:15:928 : ************************************************************
```

Benchmark for IBM DB2

Compare the results of the IBM DB2 database performance test against the following Informatica benchmark for performance tests run on the database machine:

```
07-20-2015 16:32:02:000 : *********** TestIO Utility version 1.4 *********************
07-20-2015 16:32:02:016 : Number of java threads    : 10
07-20-2015 16:32:02:172 : Database Type    : DB2
07-20-2015 16:32:02:172 : Host Name        : localhost
07-20-2015 16:32:02:172 : Port             : 50000
07-20-2015 16:32:02:172 : Database Name    : DB2
07-20-2015 16:32:02:172 : User Name        : cmx_ors
07-20-2015 16:32:02:172 : Password         : **********
07-20-2015 16:32:02:172 : JDBC Url generated : jdbc:db2://localhost:50000/DB2
07-20-2015 16:32:02:172 : Number of records: 60000000
07-20-2015 16:32:02:172 : **************************************************************
07-20-2015 16:32:02:172 : before 10 JDBC connections ....
07-20-2015 16:32:02:640 : after 10 JDBC connrections ....
07-20-2015 16:32:02:640 : JDBC driver version is: 3.64.82
07-20-2015 16:32:02:640 : Temp Table name - c_repos_test_9741
07-20-2015 16:32:02:640 : DML operations are going to be run in multiple threads with
thread count = 10
07-20-2015 16:32:02:640 : Start create table and indexes
07-20-2015 16:32:02:655 : CREATE TABLE c_repos_test_9741 ( id int NOT NULL, create_date
date, last_update_date date, column1 varchar(255), column2 varchar(255), column3
varchar(255), column4 varchar(255), column5 varchar(255), column6 varchar(255), column7
varchar(255), column8 varchar(255), column9 varchar(255), column10 varchar(255),
column11 varchar(255), column12 varchar(255), column13 varchar(255), column14
varchar(255), column15 varchar(255), column16 varchar(255), column17 varchar(255),
column18 varchar(255), column19 varchar(255), column20 varchar(255), column21
varchar(255), column22 varchar(255), PRIMARY KEY (id))
07-20-2015 16:32:02:671 : CREATE INDEX c_repos_test_9741_index1 on
c_repos_test_9741(column1) cluster
07-20-2015 16:32:02:702 : CREATE INDEX c_repos_test_9741_index2 on
c_repos_test_9741(column2, column3, column4)
07-20-2015 16:32:02:702 : Done create table and indexes
07-20-2015 16:32:02:702 : Inserting rows in threads begin....
07-20-2015 16:32:02:702 : Start insert rows through thread number 0
07-20-2015 16:32:02:702 : Start insert rows through thread number 1
07-20-2015 16:32:02:702 : Start insert rows through thread number 2
07-20-2015 16:32:02:702 : Start insert rows through thread number 3
07-20-2015 16:32:02:702 : Start insert rows through thread number 4
07-20-2015 16:32:02:702 : Start insert rows through thread number 5
07-20-2015 16:32:02:702 : Start insert rows through thread number 6
07-20-2015 16:32:02:702 : Start insert rows through thread number 7
07-20-2015 16:32:02:702 : Start insert rows through thread number 8
07-20-2015 16:32:02:702 : Start insert rows through thread number 9
07-20-2015 17:55:37:034 : Done insert rows through thread number 0
07-20-2015 17:56:49:590 : Done insert rows through thread number 1
07-20-2015 17:56:55:783 : Done insert rows through thread number 9
07-20-2015 17:57:06:922 : Done insert rows through thread number 7
07-20-2015 17:58:52:784 : Done insert rows through thread number 4
07-20-2015 17:58:56:871 : Done insert rows through thread number 5
07-20-2015 17:59:11:800 : Done insert rows through thread number 6
07-20-2015 17:59:13:157 : Done insert rows through thread number 2
07-20-2015 17:59:18:290 : Done insert rows through thread number 8
07-20-2015 17:59:32:267 : Done insert rows through thread number 3
07-20-2015 17:59:32:267 : Inserting rows in threads end....
07-20-2015 17:59:32:267 : Updating rows in threads begin....
07-20-2015 17:59:32:267 : Start update rows for non-indexed columns through thread
number 1
07-20-2015 17:59:32:267 : Start update rows for non-indexed columns through thread
number 0
07-20-2015 17:59:32:267 : Start update rows for non-indexed columns through thread
number 2
07-20-2015 17:59:32:267 : Start update rows for non-indexed columns through thread
number 3
07-20-2015 17:59:32:267 : Start update rows for non-indexed columns through thread
number 4
07-20-2015 17:59:32:267 : Start update rows for non-indexed columns through thread
number 5
```

```
07-20-2015 17:59:32:283 : Start update rows for non-indexed columns through thread
number 6
07-20-2015 17:59:32:283 : Start update rows for non-indexed columns through thread
number 7
07-20-2015 17:59:32:283 : Start update rows for non-indexed columns through thread
number 8
07-20-2015 17:59:32:283 : Start update rows for non-indexed columns through thread
number 9
07-20-2015 17:59:48:070 : Done update rows through thread number 0
07-20-2015 17:59:48:210 : Done update rows through thread number 9
07-20-2015 17:59:48:242 : Done update rows through thread number 1
07-20-2015 17:59:48:351 : Done update rows through thread number 7
07-20-2015 17:59:48:538 : Done update rows through thread number 2
07-20-2015 17:59:48:538 : Done update rows through thread number 5
07-20-2015 17:59:48:585 : Done update rows through thread number 4
07-20-2015 17:59:48:585 : Done update rows through thread number 8
07-20-2015 17:59:48:600 : Done update rows through thread number 6
07-20-2015 17:59:48:616 : Done update rows through thread number 3
07-20-2015 17:59:48:616 : Updating rows in threads end....
07-20-2015 17:59:48:616 : Updating rows in threads begin....
07-20-2015 17:59:48:616 : Start update rows for indexed columns through thread number 0
07-20-2015 17:59:48:616 : Start update rows for indexed columns through thread number 1
07-20-2015 17:59:48:616 : Start update rows for indexed columns through thread number 2
07-20-2015 17:59:48:616 : Start update rows for indexed columns through thread number 3
07-20-2015 17:59:48:616 : Start update rows for indexed columns through thread number 4
07-20-2015 17:59:48:616 : Start update rows for indexed columns through thread number 5
07-20-2015 17:59:48:616 : Start update rows for indexed columns through thread number 6
07-20-2015 17:59:48:616 : Start update rows for indexed columns through thread number 7
07-20-2015 17:59:48:616 : Start update rows for indexed columns through thread number 8
07-20-2015 17:59:48:616 : Start update rows for indexed columns through thread number 9
07-20-2015 18:00:05:199 : Done update rows through thread number 0
07-20-2015 18:00:05:355 : Done update rows through thread number 9
07-20-2015 18:00:05:370 : Done update rows through thread number 1
07-20-2015 18:00:05:433 : Done update rows through thread number 7
07-20-2015 18:00:05:558 : Done update rows through thread number 4
07-20-2015 18:00:05:558 : Done update rows through thread number 5
07-20-2015 18:00:05:573 : Done update rows through thread number 8
07-20-2015 18:00:05:636 : Done update rows through thread number 6
07-20-2015 18:00:05:651 : Done update rows through thread number 2
07-20-2015 18:00:05:667 : Done update rows through thread number 3
07-20-2015 18:00:05:667 : Updating rows in threads end....
07-20-2015 18:00:05:667 : Selecting rows in threads begin....
07-20-2015 18:00:05:667 : Start select rows through thread number 0
07-20-2015 18:00:05:667 : Start select rows through thread number 1
07-20-2015 18:00:05:667 : Start select rows through thread number 2
07-20-2015 18:00:05:667 : Start select rows through thread number 3
07-20-2015 18:00:05:667 : Start select rows through thread number 4
07-20-2015 18:00:05:667 : Start select rows through thread number 5
07-20-2015 18:00:05:667 : Start select rows through thread number 6
07-20-2015 18:00:05:667 : Start select rows through thread number 7
07-20-2015 18:00:05:667 : Start select rows through thread number 8
07-20-2015 18:00:05:667 : Start select rows through thread number 9
07-20-2015 18:01:13:418 : Done select rows through thread number 1
07-20-2015 18:01:17:692 : Done select rows through thread number 6
07-20-2015 18:01:18:878 : Done select rows through thread number 9
07-20-2015 18:01:18:893 : Done select rows through thread number 4
07-20-2015 18:01:19:751 : Done select rows through thread number 3
07-20-2015 18:01:20:141 : Done select rows through thread number 7
07-20-2015 18:01:20:173 : Done select rows through thread number 8
07-20-2015 18:01:20:219 : Done select rows through thread number 5
07-20-2015 18:01:20:703 : Done select rows through thread number 0
07-20-2015 18:01:20:765 : Done select rows through thread number 2
07-20-2015 18:01:20:765 : Selecting rows in threads end....
07-20-2015 18:01:20:765 : Deleting rows in threads begin....
07-20-2015 18:01:20:765 : Start delete rows through thread number 0
07-20-2015 18:01:20:765 : Start delete rows through thread number 1
07-20-2015 18:01:20:765 : Start delete rows through thread number 2
07-20-2015 18:01:20:765 : Start delete rows through thread number 3
07-20-2015 18:01:20:765 : Start delete rows through thread number 4
07-20-2015 18:01:20:765 : Start delete rows through thread number 5
07-20-2015 18:01:20:765 : Start delete rows through thread number 6
```

```
07-20-2015 18:01:20:765 : Start delete rows through thread number 7
07-20-2015 18:01:20:765 : Start delete rows through thread number 8
07-20-2015 18:01:20:765 : Start delete rows through thread number 9
07-20-2015 18:01:37:177 : Done delete rows through thread number 1
07-20-2015 18:01:37:192 : Done delete rows through thread number 9
07-20-2015 18:01:37:192 : Done delete rows through thread number 0
07-20-2015 18:01:37:301 : Done delete rows through thread number 4
07-20-2015 18:01:37:301 : Done delete rows through thread number 7
07-20-2015 18:01:37:364 : Done delete rows through thread number 8
07-20-2015 18:01:37:364 : Done delete rows through thread number 6
07-20-2015 18:01:37:379 : Done delete rows through thread number 5
07-20-2015 18:01:37:379 : Done delete rows through thread number 2
07-20-2015 18:01:37:442 : Done delete rows through thread number 3
07-20-2015 18:01:37:442 : Deleting rows in threads end....
07-20-2015 18:01:37:442 : Temp Table2 name - c_repos_test_8259
07-20-2015 18:01:37:442 : Start create table as select and indexes
07-20-2015 18:01:37:442 : CREATE TABLE c_repos_test_8259 as (select * from
c_repos_test_9741) definition only
07-20-2015 18:01:37:442 : INSERT INTO c_repos_test_8259 select * from c_repos_test_9741
07-20-2015 18:12:01:240 : ALTER TABLE c_repos_test_8259 ADD CONSTRAINT
c_repos_test_8259_id UNIQUE (id)
07-20-2015 18:12:36:028 : CREATE INDEX c_repos_test_8259_index1 on
c_repos_test_8259(column1) cluster
07-20-2015 18:13:23:889 : CREATE INDEX c_repos_test_8259_index2 on
c_repos_test_8259(column2, column3, column4)
07-20-2015 18:14:49:705 : Done create table as select and indexes
07-20-2015 18:14:49:705 : Start drop table c_repos_test_9741
07-20-2015 18:14:55:336 : Done drop table c_repos_test_9741
07-20-2015 18:14:55:336 : Start drop table c_repos_test_8259
07-20-2015 18:14:55:399 : Done drop table c_repos_test_8259
07-20-2015 18:14:55:399 : ************************* Summary *************************
07-20-2015 18:14:55:399 : All DML operations ran in multiple threads with thread count =
10
07-20-2015 18:14:55:399 : All the timings are in hour:min:second:millisecond
07-20-2015 18:14:55:399 : Total distinct database interactions: 9
07-20-2015 18:14:55:399 : 0- operation type: CREATE, count:1
07-20-2015 18:14:55:399 : 1- operation type: INSERT, count:60000001
07-20-2015 18:14:55:399 : 2- operation type: UPDATE, count:200000
07-20-2015 18:14:55:399 : 3- operation type: UPDATE_INDEX, count:200000
07-20-2015 18:14:55:399 : 4- operation type: SELECT, count:200000
07-20-2015 18:14:55:399 : 5- operation type: DELETE, count:200000
07-20-2015 18:14:55:399 : 6- operation type: CTAS, count:1
07-20-2015 18:14:55:399 : 7- operation type: DROP, count:1
07-20-2015 18:14:55:399 : 8- operation type: DROP, count:1
07-20-2015 18:14:55:399 : Total time for the test: 1:42:52:759.0
07-20-2015 18:14:55:399 : Number of operations: 60800005
07-20-2015 18:14:55:399 : Average time for all operations: 0:0:0:0.10152563309822096
07-20-2015 18:14:55:399 : Average transactions/second for all operations: 9849
07-20-2015 18:14:55:399 :
07-20-2015 18:14:55:399 : Number of create operations: 1
07-20-2015 18:14:55:399 : Total time for create operations: 0:0:0:62.0
07-20-2015 18:14:55:399 : Average time for all create operations: 0:0:0:62.0
07-20-2015 18:14:55:399 : Average transactions/second for all create operations: 16
07-20-2015 18:14:55:399 :
07-20-2015 18:14:55:399 : Number of create table as select operations: 1
07-20-2015 18:14:55:399 : Total time for create table as select operations: 0:13:12:263.0
07-20-2015 18:14:55:399 : Average time for all create table as select operations:
0:13:12:263.0
07-20-2015 18:14:55:399 : Average transactions/second for all create table as select
operations: 0
07-20-2015 18:14:55:399 :
07-20-2015 18:14:55:399 : Number of drop operations: 2
07-20-2015 18:14:55:399 : Total time for drop operations: 0:0:5:694.0
07-20-2015 18:14:55:399 : Average time for all drop operations: 0:0:2:847.0
07-20-2015 18:14:55:399 : Average transactions/second for all drop operations: 0
07-20-2015 18:14:55:399 :
07-20-2015 18:14:55:399 : Number of insert operations: 60000001
07-20-2015 18:14:55:399 : Total time for insert operations: 1:27:29:565.0
07-20-2015 18:14:55:399 : Average time for all insert operations:
0:0:0:0.08749274854178753
07-20-2015 18:14:55:399 : Average transactions/second for all insert operations: 11429
```

```
07-20-2015 18:14:55:399 : Total bytes of data inserted: 1158196632
07-20-2015 18:14:55:399 : Average bytes of data inserted/second (bytes/second): 220627
07-20-2015 18:14:55:399 :
07-20-2015 18:14:55:399 : Number of update operations in non-indexed table: 200000
07-20-2015 18:14:55:399 : Total time for update operations in non-indexed table:
0:0:16:349.0
07-20-2015 18:14:55:399 : Average time for all update operations in non-indexed table:
0:0:0:0.081745
07-20-2015 18:14:55:399 : Average transactions/second for all update operations in non-
indexed table: 12233
07-20-2015 18:14:55:399 :
07-20-2015 18:14:55:399 : Number of update operations in indexed table: 200000
07-20-2015 18:14:55:399 : Total time for update operations in indexed table: 0:0:17:51.0
07-20-2015 18:14:55:399 : Average time for all update operations in indexed table:
0:0:0:0.085255
07-20-2015 18:14:55:399 : Average transactions/second for all update operations in
indexed table: 11729
07-20-2015 18:14:55:399 :
07-20-2015 18:14:55:399 : Number of select operations: 200000
07-20-2015 18:14:55:399 : Total time for select operations: 0:1:15:98.0
07-20-2015 18:14:55:399 : Average time for all select operations: 0:0:0:0.37549
07-20-2015 18:14:55:399 : Average transactions/second for all select operations: 2663
07-20-2015 18:14:55:399 :
07-20-2015 18:14:55:399 : Number of delete operations: 200000
07-20-2015 18:14:55:399 : Total time for delete operations: 0:0:16:677.0
07-20-2015 18:14:55:399 : Average time for all delete operations: 0:0:0:0.083385
07-20-2015 18:14:55:399 : Average transactions/second for all delete operations: 11992
07-20-2015 18:14:55:399 : ****************************************************************
```

Benchmark for Microsoft SQL Server

Compare the results of the Microsoft SQL Server database performance test against the following Informatica benchmark for performance tests run on the database machine:

```
07-20-2015 09:09:12:823 : *********** TestIO Utility version 1.4 *********************
07-20-2015 09:09:12:823 : Number of java threads    : 10
07-20-2015 09:09:12:947 : Database Type    : SqlServer
07-20-2015 09:09:12:947 : Host Name        : localhost
07-20-2015 09:09:12:947 : Port             : 1433
07-20-2015 09:09:12:947 : Database Name    : cmx_ors
07-20-2015 09:09:12:947 : User Name        : cmx_ors
07-20-2015 09:09:12:947 : Password         : **********
07-20-2015 09:09:12:947 : JDBC Url generated : jdbc:sqlserver://localhost:
1433;databaseName=cmx_ors;user=cmx_ors;password=!!cmx!!
07-20-2015 09:09:12:947 : Number of records: 60000000
07-20-2015 09:09:12:947 : ************************************************************
07-20-2015 09:09:12:947 : before 10 JDBC connections ....
07-20-2015 09:09:13:400 : after 10 JDBC conrnections ....
07-20-2015 09:09:13:415 : JDBC driver version is: 4.0.2206.100
07-20-2015 09:09:13:415 : Temp Table name - c_repos_test_841
07-20-2015 09:09:13:415 : DML operations are going to be run in multiple threads with
thread count = 10
07-20-2015 09:09:13:415 : Start create table and indexes
07-20-2015 09:09:13:415 : CREATE TABLE c_repos_test_841 ( id int NOT NULL, create_date
date, last_update_date date, column1 varchar(255), column2 varchar(255), column3
varchar(255), column4 varchar(255), column5 varchar(255), column6 varchar(255), column7
varchar(255), column8 varchar(255), column9 varchar(255), column10 varchar(255),
column11 varchar(255), column12 varchar(255), column13 varchar(255), column14
varchar(255), column15 varchar(255), column16 varchar(255), column17 varchar(255),
column18 varchar(255), column19 varchar(255), column20 varchar(255), column21
varchar(255), column22 varchar(255), CONSTRAINT [PK_c_repos_test_841] PRIMARY KEY
CLUSTERED (id))
07-20-2015 09:09:13:431 : CREATE INDEX c_repos_test_841_index1 on
c_repos_test_841(column1)
07-20-2015 09:09:13:431 : CREATE INDEX c_repos_test_841_index2 on
c_repos_test_841(column2, column3, column4)
07-20-2015 09:09:13:431 : Done create table and indexes
07-20-2015 09:09:13:431 : Inserting rows in threads begin....
07-20-2015 09:09:13:431 : Start insert rows through thread number 0
```

```
07-20-2015 09:09:13:431 : Start insert rows through thread number 1
07-20-2015 09:09:13:431 : Start insert rows through thread number 2
07-20-2015 09:09:13:431 : Start insert rows through thread number 3
07-20-2015 09:09:13:431 : Start insert rows through thread number 4
07-20-2015 09:09:13:431 : Start insert rows through thread number 5
07-20-2015 09:09:13:431 : Start insert rows through thread number 6
07-20-2015 09:09:13:431 : Start insert rows through thread number 7
07-20-2015 09:09:13:431 : Start insert rows through thread number 8
07-20-2015 09:09:13:431 : Start insert rows through thread number 9
07-20-2015 09:59:04:050 : Done insert rows through thread number 9
07-20-2015 09:59:22:130 : Done insert rows through thread number 3
07-20-2015 09:59:26:420 : Done insert rows through thread number 7
07-20-2015 09:59:43:284 : Done insert rows through thread number 5
07-20-2015 10:00:00:226 : Done insert rows through thread number 1
07-20-2015 10:00:07:963 : Done insert rows through thread number 6
07-20-2015 10:00:09:196 : Done insert rows through thread number 4
07-20-2015 10:00:32:892 : Done insert rows through thread number 8
07-20-2015 10:00:39:428 : Done insert rows through thread number 2
07-20-2015 10:01:45:978 : Done insert rows through thread number 0
07-20-2015 10:01:45:978 : Inserting rows in threads end....
07-20-2015 10:01:45:978 : Updating rows in threads begin....
07-20-2015 10:01:45:978 : Start update rows for non-indexed columns through thread
number 0
07-20-2015 10:01:45:978 : Start update rows for non-indexed columns through thread
number 1
07-20-2015 10:01:45:978 : Start update rows for non-indexed columns through thread
number 2
07-20-2015 10:01:45:978 : Start update rows for non-indexed columns through thread
number 3
07-20-2015 10:01:45:978 : Start update rows for non-indexed columns through thread
number 4
07-20-2015 10:01:45:978 : Start update rows for non-indexed columns through thread
number 5
07-20-2015 10:01:45:978 : Start update rows for non-indexed columns through thread
number 6
07-20-2015 10:01:45:978 : Start update rows for non-indexed columns through thread
number 7
07-20-2015 10:01:45:978 : Start update rows for non-indexed columns through thread
number 8
07-20-2015 10:01:45:978 : Start update rows for non-indexed columns through thread
number 9
07-20-2015 10:01:57:132 : Done update rows through thread number 3
07-20-2015 10:01:57:195 : Done update rows through thread number 6
07-20-2015 10:01:57:195 : Done update rows through thread number 1
07-20-2015 10:01:57:210 : Done update rows through thread number 7
07-20-2015 10:01:57:226 : Done update rows through thread number 5
07-20-2015 10:01:57:241 : Done update rows through thread number 2
07-20-2015 10:01:57:257 : Done update rows through thread number 8
07-20-2015 10:01:57:257 : Done update rows through thread number 9
07-20-2015 10:01:57:351 : Done update rows through thread number 4
07-20-2015 10:01:57:444 : Done update rows through thread number 0
07-20-2015 10:01:57:444 : Updating rows in threads end....
07-20-2015 10:01:57:444 : Updating rows in threads begin....
07-20-2015 10:01:57:444 : Start update rows for indexed columns through thread number 0
07-20-2015 10:01:57:444 : Start update rows for indexed columns through thread number 1
07-20-2015 10:01:57:444 : Start update rows for indexed columns through thread number 2
07-20-2015 10:01:57:444 : Start update rows for indexed columns through thread number 3
07-20-2015 10:01:57:444 : Start update rows for indexed columns through thread number 4
07-20-2015 10:01:57:444 : Start update rows for indexed columns through thread number 5
07-20-2015 10:01:57:444 : Start update rows for indexed columns through thread number 6
07-20-2015 10:01:57:444 : Start update rows for indexed columns through thread number 7
07-20-2015 10:01:57:444 : Start update rows for indexed columns through thread number 8
07-20-2015 10:01:57:444 : Start update rows for indexed columns through thread number 9
07-20-2015 10:02:14:027 : Done update rows through thread number 3
07-20-2015 10:02:14:183 : Done update rows through thread number 5
07-20-2015 10:02:14:199 : Done update rows through thread number 9
07-20-2015 10:02:14:199 : Done update rows through thread number 1
07-20-2015 10:02:14:230 : Done update rows through thread number 6
07-20-2015 10:02:14:230 : Done update rows through thread number 4
07-20-2015 10:02:14:245 : Done update rows through thread number 2
07-20-2015 10:02:14:261 : Done update rows through thread number 8
```

```
07-20-2015 10:02:14:261 : Done update rows through thread number 7
07-20-2015 10:02:14:292 : Done update rows through thread number 0
07-20-2015 10:02:14:292 : Updating rows in threads end....
07-20-2015 10:02:14:292 : Selecting rows in threads begin....
07-20-2015 10:02:14:292 : Start select rows through thread number 0
07-20-2015 10:02:14:292 : Start select rows through thread number 1
07-20-2015 10:02:14:292 : Start select rows through thread number 2
07-20-2015 10:02:14:292 : Start select rows through thread number 3
07-20-2015 10:02:14:292 : Start select rows through thread number 4
07-20-2015 10:02:14:292 : Start select rows through thread number 5
07-20-2015 10:02:14:292 : Start select rows through thread number 6
07-20-2015 10:02:14:292 : Start select rows through thread number 7
07-20-2015 10:02:14:292 : Start select rows through thread number 8
07-20-2015 10:02:14:292 : Start select rows through thread number 9
07-20-2015 10:02:25:009 : Done select rows through thread number 3
07-20-2015 10:02:25:025 : Done select rows through thread number 1
07-20-2015 10:02:25:072 : Done select rows through thread number 7
07-20-2015 10:02:25:072 : Done select rows through thread number 9
07-20-2015 10:02:25:165 : Done select rows through thread number 6
07-20-2015 10:02:25:181 : Done select rows through thread number 0
07-20-2015 10:02:25:197 : Done select rows through thread number 2
07-20-2015 10:02:25:228 : Done select rows through thread number 4
07-20-2015 10:02:25:259 : Done select rows through thread number 8
07-20-2015 10:02:26:679 : Done select rows through thread number 5
07-20-2015 10:02:26:679 : Selecting rows in threads end....
07-20-2015 10:02:26:679 : Deleting rows in threads begin....
07-20-2015 10:02:26:679 : Start delete rows through thread number 0
07-20-2015 10:02:26:679 : Start delete rows through thread number 1
07-20-2015 10:02:26:679 : Start delete rows through thread number 2
07-20-2015 10:02:26:679 : Start delete rows through thread number 3
07-20-2015 10:02:26:679 : Start delete rows through thread number 4
07-20-2015 10:02:26:679 : Start delete rows through thread number 5
07-20-2015 10:02:26:679 : Start delete rows through thread number 6
07-20-2015 10:02:26:679 : Start delete rows through thread number 7
07-20-2015 10:02:26:679 : Start delete rows through thread number 8
07-20-2015 10:02:26:679 : Start delete rows through thread number 9
07-20-2015 10:02:50:281 : Done delete rows through thread number 3
07-20-2015 10:02:50:359 : Done delete rows through thread number 1
07-20-2015 10:02:50:359 : Done delete rows through thread number 9
07-20-2015 10:02:50:359 : Done delete rows through thread number 6
07-20-2015 10:02:50:375 : Done delete rows through thread number 5
07-20-2015 10:02:50:391 : Done delete rows through thread number 4
07-20-2015 10:02:50:391 : Done delete rows through thread number 2
07-20-2015 10:02:50:406 : Done delete rows through thread number 7
07-20-2015 10:02:50:406 : Done delete rows through thread number 0
07-20-2015 10:02:50:422 : Done delete rows through thread number 8
07-20-2015 10:02:50:422 : Deleting rows in threads end....
07-20-2015 10:02:50:422 : Temp Table2 name - c_repos_test_5923
07-20-2015 10:02:50:422 : Start create table as select and indexes
07-20-2015 10:02:50:422 : SELECT * INTO c_repos_test_5923 from c_repos_test_841
07-20-2015 10:06:01:195 : ALTER TABLE c_repos_test_5923 ADD CONSTRAINT
c_repos_test_5923_id UNIQUE (id)
07-20-2015 10:06:15:827 : CREATE INDEX c_repos_test_5923_index1 on
c_repos_test_5923(column1)
07-20-2015 10:06:37:917 : CREATE INDEX c_repos_test_5923_index2 on
c_repos_test_5923(column2, column3, column4)
07-20-2015 10:07:01:988 : Done create table as select and indexes
07-20-2015 10:07:01:988 : Start drop table c_repos_test_841
07-20-2015 10:07:02:066 : Done drop table c_repos_test_841
07-20-2015 10:07:02:066 : Start drop table c_repos_test_5923
07-20-2015 10:07:02:097 : Done drop table c_repos_test_5923
07-20-2015 10:07:02:097 : *************************** Summary ***************************
07-20-2015 10:07:02:097 : All DML operations ran in multiple threads with thread count =
10
07-20-2015 10:07:02:097 : All the timings are in hour:min:second:millisecond
07-20-2015 10:07:02:097 : Total distinct database interactions: 9
07-20-2015 10:07:02:097 : 0- operation type: CREATE, count:1
07-20-2015 10:07:02:097 : 1- operation type: INSERT, count:60000001
07-20-2015 10:07:02:097 : 2- operation type: UPDATE, count:200000
07-20-2015 10:07:02:097 : 3- operation type: UPDATE_INDEX, count:200000
07-20-2015 10:07:02:097 : 4- operation type: SELECT, count:200000
```

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07-20-2015 10:07:02:097 : 5- operation type: DELETE, count:200000
07-20-2015 10:07:02:097 : 6- operation type: CTAS, count:1
07-20-2015 10:07:02:097 : 7- operation type: DROP, count:1
07-20-2015 10:07:02:097 : 8- operation type: DROP, count:1
07-20-2015 10:07:02:097 : Total time for the test: 0:57:48:682.0
07-20-2015 10:07:02:097 : Number of operations: 60800005
07-20-2015 10:07:02:097 : Average time for all operations: 0:0:0:0.05705068609780542
07-20-2015 10:07:02:097 : Average transactions/second for all operations: 17528
07-20-2015 10:07:02:097 :
07-20-2015 10:07:02:097 : Number of create operations: 1
07-20-2015 10:07:02:097 : Total time for create operations: 0:0:0:16.0
07-20-2015 10:07:02:097 : Average time for all create operations: 0:0:0:16.0
07-20-2015 10:07:02:097 : Average transactions/second for all create operations: 62
07-20-2015 10:07:02:097 :
07-20-2015 10:07:02:097 : Number of create table as select operations: 1
07-20-2015 10:07:02:097 : Total time for create table as select operations: 0:4:11:566.0
07-20-2015 10:07:02:097 : Average time for all create table as select operations:
0:4:11:566.0
07-20-2015 10:07:02:097 : Average transactions/second for all create table as select
operations: 0
07-20-2015 10:07:02:097 :
07-20-2015 10:07:02:097 : Number of drop operations: 2
07-20-2015 10:07:02:097 : Total time for drop operations: 0:0:0:109.0
07-20-2015 10:07:02:097 : Average time for all drop operations: 0:0:0:54.5
07-20-2015 10:07:02:097 : Average transactions/second for all drop operations: 18
07-20-2015 10:07:02:097 :
07-20-2015 10:07:02:097 : Number of insert operations: 60000001
07-20-2015 10:07:02:097 : Total time for insert operations: 0:52:32:547.0
07-20-2015 10:07:02:097 : Average time for all insert operations:
0:0:0:0.05254244912429251
07-20-2015 10:07:02:097 : Average transactions/second for all insert operations: 19032
07-20-2015 10:07:02:097 : Total bytes of data inserted: 1158196632
07-20-2015 10:07:02:097 : Average bytes of data inserted/second (bytes/second): 367384
07-20-2015 10:07:02:097 :
07-20-2015 10:07:02:097 : Number of update operations in non-indexed table: 200000
07-20-2015 10:07:02:097 : Total time for update operations in non-indexed table:
0:0:11:466.0
07-20-2015 10:07:02:097 : Average time for all update operations in non-indexed table:
0:0:0:0.05733
07-20-2015 10:07:02:097 : Average transactions/second for all update operations in non-
indexed table: 17442
07-20-2015 10:07:02:097 :
07-20-2015 10:07:02:097 : Number of update operations in indexed table: 200000
07-20-2015 10:07:02:097 : Total time for update operations in indexed table: 0:0:16:848.0
07-20-2015 10:07:02:097 : Average time for all update operations in indexed table:
0:0:0:0.08424
07-20-2015 10:07:02:097 : Average transactions/second for all update operations in
indexed table: 11870
07-20-2015 10:07:02:097 :
07-20-2015 10:07:02:097 : Number of select operations: 200000
07-20-2015 10:07:02:097 : Total time for select operations: 0:0:12:387.0
07-20-2015 10:07:02:097 : Average time for all select operations: 0:0:0:0.061935
07-20-2015 10:07:02:097 : Average transactions/second for all select operations: 16145
07-20-2015 10:07:02:097 :
07-20-2015 10:07:02:097 : Number of delete operations: 200000
07-20-2015 10:07:02:097 : Total time for delete operations: 0:0:23:743.0
07-20-2015 10:07:02:097 : Average time for all delete operations: 0:0:0:0.118715
07-20-2015 10:07:02:097 : Average transactions/second for all delete operations: 8423
07-20-2015 10:07:02:097 : ************************************************************
```

Benchmarks for Tests Run From the Application Server Machine

To check the network latency, you can run the database performance testing utility from the application server machine. Compare the results of the database performance test against the Informatica benchmarks for performance tests run from the application server machine.

Benchmark for Oracle

Compare the results of the Oracle database performance test against the following Informatica benchmark for performance tests run from the application server machine:

```
07-22-2015 13:14:35:857 : *********** TestIO Utility version 1.4 *********************
07-22-2015 13:14:35:873 : Number of java threads    : 10
07-22-2015 13:14:36:356 : Database Type     : Oracle
07-22-2015 13:14:36:356 : Host Name         : torperf4
07-22-2015 13:14:36:356 : Port              : 1521
07-22-2015 13:14:36:356 : ServiceName       : pttdb
07-22-2015 13:14:36:356 : User Name         : cmx_ors
07-22-2015 13:14:36:356 : Password          : **********
07-22-2015 13:14:36:356 : JDBC Url generated : jdbc:oracle:thin:@//torperf4:1521/pttdb
07-22-2015 13:14:36:356 : Number of records: 60000000
07-22-2015 13:14:36:356 : ************************************************************
07-22-2015 13:14:36:356 : before 10 JDBC connections ....
07-22-2015 13:14:37:277 : after 10 JDBC conrrections ....
07-22-2015 13:14:37:277 : JDBC driver version is: 11.2.0.2.0
07-22-2015 13:14:37:277 : Temp Table name - c_repos_test_2076
07-22-2015 13:14:37:277 : DML operations are going to be run in multiple threads with
thread count = 10
07-22-2015 13:14:37:277 : Start create table and indexes
07-22-2015 13:14:37:370 : CREATE TABLE c_repos_test_2076 ( id int NOT NULL, create_date
date, last_update_date date, column1 varchar(255), column2 varchar(255), column3
varchar(255), column4 varchar(255), column5 varchar(255), column6 varchar(255), column7
varchar(255), column8 varchar(255), column9 varchar(255), column10 varchar(255),
column11 varchar(255), column12 varchar(255), column13 varchar(255), column14
varchar(255), column15 varchar(255), column16 varchar(255), column17 varchar(255),
column18 varchar(255), column19 varchar(255), column20 varchar(255), column21
varchar(255), column22 varchar(255), PRIMARY KEY (id))
07-22-2015 13:14:37:386 : CREATE INDEX c_repos_test_2076_index1 on
c_repos_test_2076(column1)
07-22-2015 13:14:37:386 : CREATE INDEX c_repos_test_2076_index2 on
c_repos_test_2076(column2, column3, column4)
07-22-2015 13:14:37:386 : Done create table and indexes
07-22-2015 13:14:37:386 : Inserting rows in threads begin....
07-22-2015 13:14:37:386 : Start insert rows through thread number 0
07-22-2015 13:14:37:386 : Start insert rows through thread number 1
07-22-2015 13:14:37:386 : Start insert rows through thread number 2
07-22-2015 13:14:37:386 : Start insert rows through thread number 3
07-22-2015 13:14:37:402 : Start insert rows through thread number 4
07-22-2015 13:14:37:402 : Start insert rows through thread number 5
07-22-2015 13:14:37:402 : Start insert rows through thread number 6
07-22-2015 13:14:37:402 : Start insert rows through thread number 7
07-22-2015 13:14:37:402 : Start insert rows through thread number 8
07-22-2015 13:14:37:402 : Start insert rows through thread number 9
07-22-2015 14:11:50:094 : Done insert rows through thread number 7
07-22-2015 14:11:56:225 : Done insert rows through thread number 8
07-22-2015 14:12:00:265 : Done insert rows through thread number 2
07-22-2015 14:12:04:883 : Done insert rows through thread number 1
07-22-2015 14:12:11:154 : Done insert rows through thread number 4
07-22-2015 14:12:12:137 : Done insert rows through thread number 6
07-22-2015 14:12:19:516 : Done insert rows through thread number 5
07-22-2015 14:12:23:041 : Done insert rows through thread number 3
07-22-2015 14:12:37:596 : Done insert rows through thread number 9
07-22-2015 14:12:58:952 : Done insert rows through thread number 0
07-22-2015 14:12:58:952 : Inserting rows in threads end....
```

```
07-22-2015 14:12:58:952 : Updating rows in threads begin....
07-22-2015 14:12:58:952 : Start update rows for non-indexed columns through thread
number 0
07-22-2015 14:12:58:952 : Start update rows for non-indexed columns through thread
number 1
07-22-2015 14:12:58:952 : Start update rows for non-indexed columns through thread
number 2
07-22-2015 14:12:58:952 : Start update rows for non-indexed columns through thread
number 3
07-22-2015 14:12:58:952 : Start update rows for non-indexed columns through thread
number 4
07-22-2015 14:12:58:952 : Start update rows for non-indexed columns through thread
number 5
07-22-2015 14:12:58:952 : Start update rows for non-indexed columns through thread
number 6
07-22-2015 14:12:58:952 : Start update rows for non-indexed columns through thread
number 7
07-22-2015 14:12:58:952 : Start update rows for non-indexed columns through thread
number 8
07-22-2015 14:12:58:952 : Start update rows for non-indexed columns through thread
number 9
07-22-2015 14:13:14:443 : Done update rows through thread number 1
07-22-2015 14:13:14:506 : Done update rows through thread number 6
07-22-2015 14:13:14:506 : Done update rows through thread number 8
07-22-2015 14:13:14:521 : Done update rows through thread number 7
07-22-2015 14:13:14:552 : Done update rows through thread number 9
07-22-2015 14:13:14:552 : Done update rows through thread number 2
07-22-2015 14:13:14:552 : Done update rows through thread number 4
07-22-2015 14:13:14:599 : Done update rows through thread number 0
07-22-2015 14:13:14:864 : Done update rows through thread number 3
07-22-2015 14:13:14:896 : Done update rows through thread number 5
07-22-2015 14:13:14:896 : Updating rows in threads end....
07-22-2015 14:13:14:896 : Updating rows in threads begin....
07-22-2015 14:13:14:896 : Start update rows for indexed columns through thread number 0
07-22-2015 14:13:14:896 : Start update rows for indexed columns through thread number 1
07-22-2015 14:13:14:896 : Start update rows for indexed columns through thread number 2
07-22-2015 14:13:14:896 : Start update rows for indexed columns through thread number 3
07-22-2015 14:13:14:896 : Start update rows for indexed columns through thread number 4
07-22-2015 14:13:14:896 : Start update rows for indexed columns through thread number 5
07-22-2015 14:13:14:896 : Start update rows for indexed columns through thread number 6
07-22-2015 14:13:14:896 : Start update rows for indexed columns through thread number 7
07-22-2015 14:13:14:896 : Start update rows for indexed columns through thread number 8
07-22-2015 14:13:14:896 : Start update rows for indexed columns through thread number 9
07-22-2015 14:13:32:758 : Done update rows through thread number 7
07-22-2015 14:13:32:789 : Done update rows through thread number 2
07-22-2015 14:13:32:867 : Done update rows through thread number 8
07-22-2015 14:13:32:867 : Done update rows through thread number 9
07-22-2015 14:13:32:883 : Done update rows through thread number 3
07-22-2015 14:13:32:898 : Done update rows through thread number 1
07-22-2015 14:13:32:914 : Done update rows through thread number 4
07-22-2015 14:13:32:961 : Done update rows through thread number 6
07-22-2015 14:13:32:976 : Done update rows through thread number 0
07-22-2015 14:13:33:039 : Done update rows through thread number 5
07-22-2015 14:13:33:039 : Updating rows in threads end....
07-22-2015 14:13:33:039 : Selecting rows in threads begin....
07-22-2015 14:13:33:039 : Start select rows through thread number 0
07-22-2015 14:13:33:039 : Start select rows through thread number 1
07-22-2015 14:13:33:039 : Start select rows through thread number 2
07-22-2015 14:13:33:039 : Start select rows through thread number 3
07-22-2015 14:13:33:039 : Start select rows through thread number 4
07-22-2015 14:13:33:039 : Start select rows through thread number 5
07-22-2015 14:13:33:039 : Start select rows through thread number 6
07-22-2015 14:13:33:039 : Start select rows through thread number 7
07-22-2015 14:13:33:039 : Start select rows through thread number 8
07-22-2015 14:13:33:039 : Start select rows through thread number 9
07-22-2015 14:13:45:940 : Done select rows through thread number 8
07-22-2015 14:13:45:940 : Done select rows through thread number 3
07-22-2015 14:13:45:971 : Done select rows through thread number 7
07-22-2015 14:13:46:002 : Done select rows through thread number 2
07-22-2015 14:13:46:033 : Done select rows through thread number 9
07-22-2015 14:13:46:065 : Done select rows through thread number 6
```

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07-22-2015 14:13:46:065 : Done select rows through thread number 4
07-22-2015 14:13:46:096 : Done select rows through thread number 0
07-22-2015 14:13:46:096 : Done select rows through thread number 1
07-22-2015 14:13:46:158 : Done select rows through thread number 5
07-22-2015 14:13:46:158 : Selecting rows in threads end....
07-22-2015 14:13:46:158 : Deleting rows in threads begin....
07-22-2015 14:13:46:158 : Start delete rows through thread number 0
07-22-2015 14:13:46:158 : Start delete rows through thread number 1
07-22-2015 14:13:46:158 : Start delete rows through thread number 2
07-22-2015 14:13:46:158 : Start delete rows through thread number 3
07-22-2015 14:13:46:158 : Start delete rows through thread number 4
07-22-2015 14:13:46:158 : Start delete rows through thread number 5
07-22-2015 14:13:46:158 : Start delete rows through thread number 6
07-22-2015 14:13:46:158 : Start delete rows through thread number 7
07-22-2015 14:13:46:158 : Start delete rows through thread number 8
07-22-2015 14:13:46:158 : Start delete rows through thread number 9
07-22-2015 14:14:06:813 : Done delete rows through thread number 9
07-22-2015 14:14:06:859 : Done delete rows through thread number 7
07-22-2015 14:14:06:875 : Done delete rows through thread number 2
07-22-2015 14:14:06:891 : Done delete rows through thread number 6
07-22-2015 14:14:06:906 : Done delete rows through thread number 8
07-22-2015 14:14:06:906 : Done delete rows through thread number 5
07-22-2015 14:14:06:937 : Done delete rows through thread number 1
07-22-2015 14:14:06:953 : Done delete rows through thread number 0
07-22-2015 14:14:06:969 : Done delete rows through thread number 3
07-22-2015 14:14:06:969 : Done delete rows through thread number 4
07-22-2015 14:14:06:969 : Deleting rows in threads end....
07-22-2015 14:14:06:969 : Temp Table2 name - c_repos_test_8590
07-22-2015 14:14:06:969 : Start create table as select and indexes
07-22-2015 14:14:06:969 : CREATE TABLE c_repos_test_8590 as select * from
c_repos_test_2076
07-22-2015 14:16:04:562 : ALTER TABLE c_repos_test_8590 ADD CONSTRAINT
c_repos_test_8590_id UNIQUE (id)
07-22-2015 14:18:04:042 : CREATE INDEX c_repos_test_8590_index1 on
c_repos_test_8590(column1)
07-22-2015 14:19:43:336 : CREATE INDEX c_repos_test_8590_index2 on
c_repos_test_8590(column2, column3, column4)
07-22-2015 14:21:50:087 : Done create table as select and indexes
07-22-2015 14:21:50:087 : Start drop table c_repos_test_2076
07-22-2015 14:21:51:194 : Done drop table c_repos_test_2076
07-22-2015 14:21:51:194 : Start drop table c_repos_test_8590
07-22-2015 14:21:51:459 : Done drop table c_repos_test_8590
07-22-2015 14:21:51:459 : ************************** Summary **************************
07-22-2015 14:21:51:459 : All DML operations ran in multiple threads with thread count =
10
07-22-2015 14:21:51:459 : All the timings are in hour:min:second:millisecond
07-22-2015 14:21:51:459 : Total distinct database interactions: 9
07-22-2015 14:21:51:459 : 0- operation type: CREATE, count:1
07-22-2015 14:21:51:459 : 1- operation type: INSERT, count:60000001
07-22-2015 14:21:51:459 : 2- operation type: UPDATE, count:200000
07-22-2015 14:21:51:459 : 3- operation type: UPDATE_INDEX, count:200000
07-22-2015 14:21:51:459 : 4- operation type: SELECT, count:200000
07-22-2015 14:21:51:459 : 5- operation type: DELETE, count:200000
07-22-2015 14:21:51:459 : 6- operation type: CTAS, count:1
07-22-2015 14:21:51:459 : 7- operation type: DROP, count:1
07-22-2015 14:21:51:459 : 8- operation type: DROP, count:1
07-22-2015 14:21:51:491 : Total time for the test: 1:7:14:182.0
07-22-2015 14:21:51:491 : Number of operations: 60800005
07-22-2015 14:21:51:491 : Average time for all operations: 0:0:0:0.06635167217502697
07-22-2015 14:21:51:491 : Average transactions/second for all operations: 15071
07-22-2015 14:21:51:491 :
07-22-2015 14:21:51:491 : Number of create operations: 1
07-22-2015 14:21:51:491 : Total time for create operations: 0:0:0:109.0
07-22-2015 14:21:51:491 : Average time for all create operations: 0:0:0:109.0
07-22-2015 14:21:51:491 : Average transactions/second for all create operations: 9
07-22-2015 14:21:51:491 :
07-22-2015 14:21:51:491 : Number of create table as select operations: 1
07-22-2015 14:21:51:491 : Total time for create table as select operations: 0:7:43:118.0
07-22-2015 14:21:51:491 : Average time for all create table as select operations:
0:7:43:118.0
07-22-2015 14:21:51:491 : Average transactions/second for all create table as select
```

```
operations: 0
07-22-2015 14:21:51:491 :
07-22-2015 14:21:51:491 : Number of drop operations: 2
07-22-2015 14:21:51:491 : Total time for drop operations: 0:0:1:372.0
07-22-2015 14:21:51:491 : Average time for all drop operations: 0:0:0:686.0
07-22-2015 14:21:51:491 : Average transactions/second for all drop operations: 1
07-22-2015 14:21:51:491 :
07-22-2015 14:21:51:491 : Number of insert operations: 60000001
07-22-2015 14:21:51:491 : Total time for insert operations: 0:58:21:566.0
07-22-2015 14:21:51:491 : Average time for all insert operations:
0:0:0:0.05835943236067613
07-22-2015 14:21:51:491 : Average transactions/second for all insert operations: 17135
07-22-2015 14:21:51:491 : Total bytes of data inserted: 1158196632
07-22-2015 14:21:51:491 : Average bytes of data inserted/second (bytes/second): 330765
07-22-2015 14:21:51:491 :
07-22-2015 14:21:51:491 : Number of update operations in non-indexed table: 200000
07-22-2015 14:21:51:491 : Total time for update operations in non-indexed table:
0:0:15:944.0
07-22-2015 14:21:51:491 : Average time for all update operations in non-indexed table:
0:0:0:0.07972
07-22-2015 14:21:51:491 : Average transactions/second for all update operations in non-
indexed table: 12543
07-22-2015 14:21:51:491 :
07-22-2015 14:21:51:491 : Number of update operations in indexed table: 200000
07-22-2015 14:21:51:491 : Total time for update operations in indexed table: 0:0:18:143.0
07-22-2015 14:21:51:491 : Average time for all update operations in indexed table:
0:0:0:0.090715
07-22-2015 14:21:51:491 : Average transactions/second for all update operations in
indexed table: 11023
07-22-2015 14:21:51:491 :
07-22-2015 14:21:51:491 : Number of select operations: 200000
07-22-2015 14:21:51:491 : Total time for select operations: 0:0:13:119.0
07-22-2015 14:21:51:491 : Average time for all select operations: 0:0:0:0.065595
07-22-2015 14:21:51:491 : Average transactions/second for all select operations: 15245
07-22-2015 14:21:51:491 :
07-22-2015 14:21:51:491 : Number of delete operations: 200000
07-22-2015 14:21:51:491 : Total time for delete operations: 0:0:20:811.0
07-22-2015 14:21:51:491 : Average time for all delete operations: 0:0:0:0.104055
07-22-2015 14:21:51:491 : Average transactions/second for all delete operations: 9610
07-22-2015 14:21:51:491 : *************************************************************
```

Benchmark for IBM DB2

Compare the results of the IBM DB2 database performance test against the following Informatica benchmark for performance tests run from the application server machine:

```
07-20-2015 16:32:02:000 : *********** TestIO Utility version 1.4 *********************
07-20-2015 16:32:02:016 : Number of java threads    : 10
07-20-2015 16:32:02:172 : Database Type    : DB2
07-20-2015 16:32:02:172 : Host Name        : localhost
07-20-2015 16:32:02:172 : Port             : 50000
07-20-2015 16:32:02:172 : Database Name    : DB2
07-20-2015 16:32:02:172 : User Name        : cmx_ors
07-20-2015 16:32:02:172 : Password         : **********
07-20-2015 16:32:02:172 : JDBC Url generated : jdbc:db2://localhost:50000/DB2
07-20-2015 16:32:02:172 : Number of records: 60000000
07-20-2015 16:32:02:172 : *************************************************************
07-20-2015 16:32:02:172 : before 10 JDBC connections ....
07-20-2015 16:32:02:640 : after 10 JDBC connrections ....
07-20-2015 16:32:02:640 : JDBC driver version is: 3.64.82
07-20-2015 16:32:02:640 : Temp Table name - c_repos_test_9741
07-20-2015 16:32:02:640 : DML operations are going to be run in multiple threads with
thread count = 10
07-20-2015 16:32:02:640 : Start create table and indexes
07-20-2015 16:32:02:655 : CREATE TABLE c_repos_test_9741 ( id int NOT NULL, create_date
date, last_update_date date, column1 varchar(255), column2 varchar(255), column3
varchar(255), column4 varchar(255), column5 varchar(255), column6 varchar(255), column7
varchar(255), column8 varchar(255), column9 varchar(255), column10 varchar(255),
column11 varchar(255), column12 varchar(255), column13 varchar(255), column14
```

```
varchar(255), column15 varchar(255), column16 varchar(255), column17 varchar(255),
column18 varchar(255), column19 varchar(255), column20 varchar(255), column21
varchar(255), column22 varchar(255), PRIMARY KEY (id))
07-20-2015 16:32:02:671 : CREATE INDEX c_repos_test_9741_index1 on
c_repos_test_9741(column1) cluster
07-20-2015 16:32:02:702 : CREATE INDEX c_repos_test_9741_index2 on
c_repos_test_9741(column2, column3, column4)
07-20-2015 16:32:02:702 : Done create table and indexes
07-20-2015 16:32:02:702 : Inserting rows in threads begin....
07-20-2015 16:32:02:702 : Start insert rows through thread number 0
07-20-2015 16:32:02:702 : Start insert rows through thread number 1
07-20-2015 16:32:02:702 : Start insert rows through thread number 2
07-20-2015 16:32:02:702 : Start insert rows through thread number 3
07-20-2015 16:32:02:702 : Start insert rows through thread number 4
07-20-2015 16:32:02:702 : Start insert rows through thread number 5
07-20-2015 16:32:02:702 : Start insert rows through thread number 6
07-20-2015 16:32:02:702 : Start insert rows through thread number 7
07-20-2015 16:32:02:702 : Start insert rows through thread number 8
07-20-2015 16:32:02:702 : Start insert rows through thread number 9
07-20-2015 17:55:37:034 : Done insert rows through thread number 0
07-20-2015 17:56:49:590 : Done insert rows through thread number 1
07-20-2015 17:56:55:783 : Done insert rows through thread number 9
07-20-2015 17:57:06:922 : Done insert rows through thread number 7
07-20-2015 17:58:52:784 : Done insert rows through thread number 4
07-20-2015 17:58:56:871 : Done insert rows through thread number 5
07-20-2015 17:59:11:800 : Done insert rows through thread number 6
07-20-2015 17:59:13:157 : Done insert rows through thread number 2
07-20-2015 17:59:18:290 : Done insert rows through thread number 8
07-20-2015 17:59:32:267 : Done insert rows through thread number 3
07-20-2015 17:59:32:267 : Inserting rows in threads end....
07-20-2015 17:59:32:267 : Updating rows in threads begin....
07-20-2015 17:59:32:267 : Start update rows for non-indexed columns through thread
number 1
07-20-2015 17:59:32:267 : Start update rows for non-indexed columns through thread
number 0
07-20-2015 17:59:32:267 : Start update rows for non-indexed columns through thread
number 2
07-20-2015 17:59:32:267 : Start update rows for non-indexed columns through thread
number 3
07-20-2015 17:59:32:267 : Start update rows for non-indexed columns through thread
number 4
07-20-2015 17:59:32:267 : Start update rows for non-indexed columns through thread
number 5
07-20-2015 17:59:32:283 : Start update rows for non-indexed columns through thread
number 6
07-20-2015 17:59:32:283 : Start update rows for non-indexed columns through thread
number 7
07-20-2015 17:59:32:283 : Start update rows for non-indexed columns through thread
number 8
07-20-2015 17:59:32:283 : Start update rows for non-indexed columns through thread
number 9
07-20-2015 17:59:48:070 : Done update rows through thread number 0
07-20-2015 17:59:48:210 : Done update rows through thread number 9
07-20-2015 17:59:48:242 : Done update rows through thread number 1
07-20-2015 17:59:48:351 : Done update rows through thread number 7
07-20-2015 17:59:48:538 : Done update rows through thread number 2
07-20-2015 17:59:48:538 : Done update rows through thread number 5
07-20-2015 17:59:48:585 : Done update rows through thread number 4
07-20-2015 17:59:48:585 : Done update rows through thread number 8
07-20-2015 17:59:48:600 : Done update rows through thread number 6
07-20-2015 17:59:48:616 : Done update rows through thread number 3
07-20-2015 17:59:48:616 : Updating rows in threads end....
07-20-2015 17:59:48:616 : Updating rows in threads begin....
07-20-2015 17:59:48:616 : Start update rows for indexed columns through thread number 0
07-20-2015 17:59:48:616 : Start update rows for indexed columns through thread number 1
07-20-2015 17:59:48:616 : Start update rows for indexed columns through thread number 2
07-20-2015 17:59:48:616 : Start update rows for indexed columns through thread number 3
07-20-2015 17:59:48:616 : Start update rows for indexed columns through thread number 4
07-20-2015 17:59:48:616 : Start update rows for indexed columns through thread number 5
07-20-2015 17:59:48:616 : Start update rows for indexed columns through thread number 6
07-20-2015 17:59:48:616 : Start update rows for indexed columns through thread number 7
```

```
07-20-2015 17:59:48:616 : Start update rows for indexed columns through thread number 8
07-20-2015 17:59:48:616 : Start update rows for indexed columns through thread number 9
07-20-2015 18:00:05:199 : Done update rows through thread number 0
07-20-2015 18:00:05:355 : Done update rows through thread number 9
07-20-2015 18:00:05:370 : Done update rows through thread number 1
07-20-2015 18:00:05:433 : Done update rows through thread number 7
07-20-2015 18:00:05:558 : Done update rows through thread number 4
07-20-2015 18:00:05:558 : Done update rows through thread number 5
07-20-2015 18:00:05:573 : Done update rows through thread number 8
07-20-2015 18:00:05:636 : Done update rows through thread number 6
07-20-2015 18:00:05:651 : Done update rows through thread number 2
07-20-2015 18:00:05:667 : Done update rows through thread number 3
07-20-2015 18:00:05:667 : Updating rows in threads end....
07-20-2015 18:00:05:667 : Selecting rows in threads begin....
07-20-2015 18:00:05:667 : Start select rows through thread number 0
07-20-2015 18:00:05:667 : Start select rows through thread number 1
07-20-2015 18:00:05:667 : Start select rows through thread number 2
07-20-2015 18:00:05:667 : Start select rows through thread number 3
07-20-2015 18:00:05:667 : Start select rows through thread number 4
07-20-2015 18:00:05:667 : Start select rows through thread number 5
07-20-2015 18:00:05:667 : Start select rows through thread number 6
07-20-2015 18:00:05:667 : Start select rows through thread number 7
07-20-2015 18:00:05:667 : Start select rows through thread number 8
07-20-2015 18:00:05:667 : Start select rows through thread number 9
07-20-2015 18:01:13:418 : Done select rows through thread number 1
07-20-2015 18:01:17:692 : Done select rows through thread number 6
07-20-2015 18:01:18:878 : Done select rows through thread number 9
07-20-2015 18:01:18:893 : Done select rows through thread number 4
07-20-2015 18:01:19:751 : Done select rows through thread number 3
07-20-2015 18:01:20:141 : Done select rows through thread number 7
07-20-2015 18:01:20:173 : Done select rows through thread number 8
07-20-2015 18:01:20:219 : Done select rows through thread number 5
07-20-2015 18:01:20:703 : Done select rows through thread number 0
07-20-2015 18:01:20:765 : Done select rows through thread number 2
07-20-2015 18:01:20:765 : Selecting rows in threads end....
07-20-2015 18:01:20:765 : Deleting rows in threads begin....
07-20-2015 18:01:20:765 : Start delete rows through thread number 0
07-20-2015 18:01:20:765 : Start delete rows through thread number 1
07-20-2015 18:01:20:765 : Start delete rows through thread number 2
07-20-2015 18:01:20:765 : Start delete rows through thread number 3
07-20-2015 18:01:20:765 : Start delete rows through thread number 4
07-20-2015 18:01:20:765 : Start delete rows through thread number 5
07-20-2015 18:01:20:765 : Start delete rows through thread number 6
07-20-2015 18:01:20:765 : Start delete rows through thread number 7
07-20-2015 18:01:20:765 : Start delete rows through thread number 8
07-20-2015 18:01:20:765 : Start delete rows through thread number 9
07-20-2015 18:01:37:177 : Done delete rows through thread number 1
07-20-2015 18:01:37:192 : Done delete rows through thread number 9
07-20-2015 18:01:37:192 : Done delete rows through thread number 0
07-20-2015 18:01:37:301 : Done delete rows through thread number 4
07-20-2015 18:01:37:301 : Done delete rows through thread number 7
07-20-2015 18:01:37:364 : Done delete rows through thread number 8
07-20-2015 18:01:37:364 : Done delete rows through thread number 6
07-20-2015 18:01:37:379 : Done delete rows through thread number 5
07-20-2015 18:01:37:379 : Done delete rows through thread number 2
07-20-2015 18:01:37:442 : Done delete rows through thread number 3
07-20-2015 18:01:37:442 : Deleting rows in threads end....
07-20-2015 18:01:37:442 : Temp Table2 name - c_repos_test_8259
07-20-2015 18:01:37:442 : Start create table as select and indexes
07-20-2015 18:01:37:442 : CREATE TABLE c_repos_test_8259 as (select * from
c_repos_test_9741) definition only
07-20-2015 18:01:37:442 : INSERT INTO c_repos_test_8259 select * from c_repos_test_9741
07-20-2015 18:12:01:240 : ALTER TABLE c_repos_test_8259 ADD CONSTRAINT
c_repos_test_8259_id UNIQUE (id)
07-20-2015 18:12:36:028 : CREATE INDEX c_repos_test_8259_index1 on
c_repos_test_8259(column1) cluster
07-20-2015 18:13:23:889 : CREATE INDEX c_repos_test_8259_index2 on
c_repos_test_8259(column2, column3, column4)
07-20-2015 18:14:49:705 : Done create table as select and indexes
07-20-2015 18:14:49:705 : Start drop table c_repos_test_9741
07-20-2015 18:14:55:336 : Done drop table c_repos_test_9741
```

```
07-20-2015 18:14:55:336 : Start drop table c_repos_test_8259
07-20-2015 18:14:55:399 : Done drop table c_repos_test_8259
07-20-2015 18:14:55:399 : ************************** Summary **************************
07-20-2015 18:14:55:399 : All DML operations ran in multiple threads with thread count =
10
07-20-2015 18:14:55:399 : All the timings are in hour:min:second:millisecond
07-20-2015 18:14:55:399 : Total distinct database interactions: 9
07-20-2015 18:14:55:399 : 0- operation type: CREATE, count:1
07-20-2015 18:14:55:399 : 1- operation type: INSERT, count:60000001
07-20-2015 18:14:55:399 : 2- operation type: UPDATE, count:200000
07-20-2015 18:14:55:399 : 3- operation type: UPDATE_INDEX, count:200000
07-20-2015 18:14:55:399 : 4- operation type: SELECT, count:200000
07-20-2015 18:14:55:399 : 5- operation type: DELETE, count:200000
07-20-2015 18:14:55:399 : 6- operation type: CTAS, count:1
07-20-2015 18:14:55:399 : 7- operation type: DROP, count:1
07-20-2015 18:14:55:399 : 8- operation type: DROP, count:1
07-20-2015 18:14:55:399 : Total time for the test: 1:42:52:759.0
07-20-2015 18:14:55:399 : Number of operations: 60800005
07-20-2015 18:14:55:399 : Average time for all operations: 0:0:0:0.10152563309822096
07-20-2015 18:14:55:399 : Average transactions/second for all operations: 9849
07-20-2015 18:14:55:399 :
07-20-2015 18:14:55:399 : Number of create operations: 1
07-20-2015 18:14:55:399 : Total time for create operations: 0:0:0:62.0
07-20-2015 18:14:55:399 : Average time for all create operations: 0:0:0:62.0
07-20-2015 18:14:55:399 : Average transactions/second for all create operations: 16
07-20-2015 18:14:55:399 :
07-20-2015 18:14:55:399 : Number of create table as select operations: 1
07-20-2015 18:14:55:399 : Total time for create table as select operations: 0:13:12:263.0
07-20-2015 18:14:55:399 : Average time for all create table as select operations:
0:13:12:263.0
07-20-2015 18:14:55:399 : Average transactions/second for all create table as select
operations: 0
07-20-2015 18:14:55:399 :
07-20-2015 18:14:55:399 : Number of drop operations: 2
07-20-2015 18:14:55:399 : Total time for drop operations: 0:0:5:694.0
07-20-2015 18:14:55:399 : Average time for all drop operations: 0:0:2:847.0
07-20-2015 18:14:55:399 : Average transactions/second for all drop operations: 0
07-20-2015 18:14:55:399 :
07-20-2015 18:14:55:399 : Number of insert operations: 60000001
07-20-2015 18:14:55:399 : Total time for insert operations: 1:27:29:565.0
07-20-2015 18:14:55:399 : Average time for all insert operations:
0:0:0:0.08749274854178753
07-20-2015 18:14:55:399 : Average transactions/second for all insert operations: 11429
07-20-2015 18:14:55:399 : Total bytes of data inserted: 1158196632
07-20-2015 18:14:55:399 : Average bytes of data inserted/second (bytes/second): 220627
07-20-2015 18:14:55:399 :
07-20-2015 18:14:55:399 : Number of update operations in non-indexed table: 200000
07-20-2015 18:14:55:399 : Total time for update operations in non-indexed table:
0:0:16:349.0
07-20-2015 18:14:55:399 : Average time for all update operations in non-indexed table:
0:0:0:0.081745
07-20-2015 18:14:55:399 : Average transactions/second for all update operations in non-
indexed table: 12233
07-20-2015 18:14:55:399 :
07-20-2015 18:14:55:399 : Number of update operations in indexed table: 200000
07-20-2015 18:14:55:399 : Total time for update operations in indexed table: 0:0:17:51.0
07-20-2015 18:14:55:399 : Average time for all update operations in indexed table:
0:0:0:0.085255
07-20-2015 18:14:55:399 : Average transactions/second for all update operations in
indexed table: 11729
07-20-2015 18:14:55:399 :
07-20-2015 18:14:55:399 : Number of select operations: 200000
07-20-2015 18:14:55:399 : Total time for select operations: 0:1:15:98.0
07-20-2015 18:14:55:399 : Average time for all select operations: 0:0:0:0.37549
07-20-2015 18:14:55:399 : Average transactions/second for all select operations: 2663
07-20-2015 18:14:55:399 :
07-20-2015 18:14:55:399 : Number of delete operations: 200000
07-20-2015 18:14:55:399 : Total time for delete operations: 0:0:16:677.0
07-20-2015 18:14:55:399 : Average time for all delete operations: 0:0:0:0.083385
07-20-2015 18:14:55:399 : Average transactions/second for all delete operations: 11992
07-20-2015 18:14:55:399 : ************************************************************
```

Benchmark for Microsoft SQL Server

Compare the results of the Microsoft SQL Server database performance test against the following Informatica benchmark for performance tests run from the application server machine:

```
07-20-2015 10:32:57:524 : *********** TestIO Utility version 1.4 ********************
07-20-2015 10:32:57:555 : Number of java threads    : 10
07-20-2015 10:32:58:148 : Database Type    : SqlServer
07-20-2015 10:32:58:148 : Host Name        : torperf4
07-20-2015 10:32:58:164 : Port             : 1433
07-20-2015 10:32:58:164 : Database Name    : cmx_ors
07-20-2015 10:32:58:164 : User Name        : cmx_ors
07-20-2015 10:32:58:164 : Password         : **********
07-20-2015 10:32:58:164 : JDBC Url generated : jdbc:sqlserver://
torperf4:1433;databaseName=cmx_ors;user=cmx_ors;password=!!cmx!!
07-20-2015 10:32:58:164 : Number of records: 60000000
07-20-2015 10:32:58:164 : **************************************************************
07-20-2015 10:32:58:164 : before 10 JDBC connections ....
07-20-2015 10:32:59:396 : after 10 JDBC connrections ....
07-20-2015 10:32:59:412 : JDBC driver version is: 4.0.2206.100
07-20-2015 10:32:59:412 : Temp Table name - c_repos_test_1148
07-20-2015 10:32:59:412 : DML operations are going to be run in multiple threads with
thread count = 10
07-20-2015 10:32:59:412 : Start create table and indexes
07-20-2015 10:32:59:412 : CREATE TABLE c_repos_test_1148 ( id int NOT NULL, create_date
date, last_update_date date, column1 varchar(255), column2 varchar(255), column3
varchar(255), column4 varchar(255), column5 varchar(255), column6 varchar(255), column7
varchar(255), column8 varchar(255), column9 varchar(255), column10 varchar(255),
column11 varchar(255), column12 varchar(255), column13 varchar(255), column14
varchar(255), column15 varchar(255), column16 varchar(255), column17 varchar(255),
column18 varchar(255), column19 varchar(255), column20 varchar(255), column21
varchar(255), column22 varchar(255), CONSTRAINT [PK_c_repos_test_1148] PRIMARY KEY
CLUSTERED (id))
07-20-2015 10:32:59:427 : CREATE INDEX c_repos_test_1148_index1 on
c_repos_test_1148(column1)
07-20-2015 10:32:59:427 : CREATE INDEX c_repos_test_1148_index2 on
c_repos_test_1148(column2, column3, column4)
07-20-2015 10:32:59:427 : Done create table and indexes
07-20-2015 10:32:59:427 : Inserting rows in threads begin....
07-20-2015 10:32:59:443 : Start insert rows through thread number 0
07-20-2015 10:32:59:443 : Start insert rows through thread number 1
07-20-2015 10:32:59:443 : Start insert rows through thread number 2
07-20-2015 10:32:59:443 : Start insert rows through thread number 3
07-20-2015 10:32:59:443 : Start insert rows through thread number 4
07-20-2015 10:32:59:443 : Start insert rows through thread number 5
07-20-2015 10:32:59:443 : Start insert rows through thread number 6
07-20-2015 10:32:59:443 : Start insert rows through thread number 7
07-20-2015 10:32:59:443 : Start insert rows through thread number 8
07-20-2015 10:32:59:443 : Start insert rows through thread number 9
07-20-2015 11:30:55:815 : Done insert rows through thread number 6
07-20-2015 11:31:14:364 : Done insert rows through thread number 9
07-20-2015 11:31:41:882 : Done insert rows through thread number 7
07-20-2015 11:31:52:849 : Done insert rows through thread number 8
07-20-2015 11:31:57:654 : Done insert rows through thread number 0
07-20-2015 11:32:03:800 : Done insert rows through thread number 2
07-20-2015 11:32:08:730 : Done insert rows through thread number 3
07-20-2015 11:32:41:115 : Done insert rows through thread number 4
07-20-2015 11:32:51:833 : Done insert rows through thread number 5
07-20-2015 11:33:15:514 : Done insert rows through thread number 1
07-20-2015 11:33:15:514 : Inserting rows in threads end....
07-20-2015 11:33:15:514 : Updating rows in threads begin....
07-20-2015 11:33:15:514 : Start update rows for non-indexed columns through thread
number 0
07-20-2015 11:33:15:514 : Start update rows for non-indexed columns through thread
number 1
07-20-2015 11:33:15:514 : Start update rows for non-indexed columns through thread
number 2
07-20-2015 11:33:15:514 : Start update rows for non-indexed columns through thread
number 3
07-20-2015 11:33:15:514 : Start update rows for non-indexed columns through thread
number 4
```

```
07-20-2015 11:33:15:514 : Start update rows for non-indexed columns through thread
number 5
07-20-2015 11:33:15:514 : Start update rows for non-indexed columns through thread
number 6
07-20-2015 11:33:15:514 : Start update rows for non-indexed columns through thread
number 7
07-20-2015 11:33:15:514 : Start update rows for non-indexed columns through thread
number 8
07-20-2015 11:33:15:514 : Start update rows for non-indexed columns through thread
number 9
07-20-2015 11:33:26:683 : Done update rows through thread number 6
07-20-2015 11:33:26:714 : Done update rows through thread number 0
07-20-2015 11:33:26:746 : Done update rows through thread number 1
07-20-2015 11:33:26:792 : Done update rows through thread number 7
07-20-2015 11:33:26:808 : Done update rows through thread number 4
07-20-2015 11:33:26:995 : Done update rows through thread number 5
07-20-2015 11:33:27:073 : Done update rows through thread number 2
07-20-2015 11:33:27:104 : Done update rows through thread number 9
07-20-2015 11:33:27:120 : Done update rows through thread number 8
07-20-2015 11:33:27:136 : Done update rows through thread number 3
07-20-2015 11:33:27:136 : Updating rows in threads end....
07-20-2015 11:33:27:136 : Updating rows in threads begin....
07-20-2015 11:33:27:136 : Start update rows for indexed columns through thread number 0
07-20-2015 11:33:27:136 : Start update rows for indexed columns through thread number 1
07-20-2015 11:33:27:136 : Start update rows for indexed columns through thread number 2
07-20-2015 11:33:27:136 : Start update rows for indexed columns through thread number 3
07-20-2015 11:33:27:136 : Start update rows for indexed columns through thread number 4
07-20-2015 11:33:27:136 : Start update rows for indexed columns through thread number 5
07-20-2015 11:33:27:136 : Start update rows for indexed columns through thread number 6
07-20-2015 11:33:27:136 : Start update rows for indexed columns through thread number 7
07-20-2015 11:33:27:136 : Start update rows for indexed columns through thread number 8
07-20-2015 11:33:27:136 : Start update rows for indexed columns through thread number 9
07-20-2015 11:33:45:044 : Done update rows through thread number 9
07-20-2015 11:33:45:138 : Done update rows through thread number 6
07-20-2015 11:33:45:216 : Done update rows through thread number 2
07-20-2015 11:33:45:216 : Done update rows through thread number 0
07-20-2015 11:33:45:216 : Done update rows through thread number 3
07-20-2015 11:33:45:263 : Done update rows through thread number 7
07-20-2015 11:33:45:310 : Done update rows through thread number 4
07-20-2015 11:33:45:341 : Done update rows through thread number 8
07-20-2015 11:33:45:356 : Done update rows through thread number 5
07-20-2015 11:33:45:481 : Done update rows through thread number 1
07-20-2015 11:33:45:481 : Updating rows in threads end....
07-20-2015 11:33:45:481 : Selecting rows in threads begin....
07-20-2015 11:33:45:481 : Start select rows through thread number 0
07-20-2015 11:33:45:481 : Start select rows through thread number 1
07-20-2015 11:33:45:481 : Start select rows through thread number 2
07-20-2015 11:33:45:481 : Start select rows through thread number 3
07-20-2015 11:33:45:481 : Start select rows through thread number 4
07-20-2015 11:33:45:481 : Start select rows through thread number 5
07-20-2015 11:33:45:481 : Start select rows through thread number 6
07-20-2015 11:33:45:481 : Start select rows through thread number 7
07-20-2015 11:33:45:481 : Start select rows through thread number 8
07-20-2015 11:33:45:481 : Start select rows through thread number 9
07-20-2015 11:33:57:431 : Done select rows through thread number 5
07-20-2015 11:33:57:696 : Done select rows through thread number 6
07-20-2015 11:33:57:712 : Done select rows through thread number 0
07-20-2015 11:33:57:743 : Done select rows through thread number 2
07-20-2015 11:33:57:758 : Done select rows through thread number 8
07-20-2015 11:33:57:774 : Done select rows through thread number 9
07-20-2015 11:33:57:774 : Done select rows through thread number 4
07-20-2015 11:33:57:852 : Done select rows through thread number 7
07-20-2015 11:33:57:899 : Done select rows through thread number 1
07-20-2015 11:33:57:930 : Done select rows through thread number 3
07-20-2015 11:33:57:930 : Selecting rows in threads end....
07-20-2015 11:33:57:930 : Deleting rows in threads begin....
07-20-2015 11:33:57:930 : Start delete rows through thread number 0
07-20-2015 11:33:57:930 : Start delete rows through thread number 1
07-20-2015 11:33:57:930 : Start delete rows through thread number 2
07-20-2015 11:33:57:930 : Start delete rows through thread number 3
07-20-2015 11:33:57:930 : Start delete rows through thread number 4
```

```
07-20-2015 11:33:57:930 : Start delete rows through thread number 5
07-20-2015 11:33:57:930 : Start delete rows through thread number 6
07-20-2015 11:33:57:930 : Start delete rows through thread number 7
07-20-2015 11:33:57:930 : Start delete rows through thread number 8
07-20-2015 11:33:57:930 : Start delete rows through thread number 9
07-20-2015 11:34:09:412 : Done delete rows through thread number 0
07-20-2015 11:34:09:412 : Done delete rows through thread number 1
07-20-2015 11:34:09:474 : Done delete rows through thread number 7
07-20-2015 11:34:09:646 : Done delete rows through thread number 6
07-20-2015 11:34:09:708 : Done delete rows through thread number 9
07-20-2015 11:34:09:724 : Done delete rows through thread number 4
07-20-2015 11:34:09:817 : Done delete rows through thread number 2
07-20-2015 11:34:09:848 : Done delete rows through thread number 8
07-20-2015 11:34:10:379 : Done delete rows through thread number 5
07-20-2015 11:34:11:268 : Done delete rows through thread number 3
07-20-2015 11:34:11:268 : Deleting rows in threads end....
07-20-2015 11:34:11:268 : Temp Table2 name - c_repos_test_9279
07-20-2015 11:34:11:268 : Start create table as select and indexes
07-20-2015 11:34:11:268 : SELECT * INTO c_repos_test_9279 from c_repos_test_1148
07-20-2015 11:37:14:958 : ALTER TABLE c_repos_test_9279 ADD CONSTRAINT
c_repos_test_9279_id UNIQUE (id)
07-20-2015 11:37:28:733 : CREATE INDEX c_repos_test_9279_index1 on
c_repos_test_9279(column1)
07-20-2015 11:37:50:807 : CREATE INDEX c_repos_test_9279_index2 on
c_repos_test_9279(column2, column3, column4)
07-20-2015 11:38:15:034 : Done create table as select and indexes
07-20-2015 11:38:15:034 : Start drop table c_repos_test_1148
07-20-2015 11:38:15:143 : Done drop table c_repos_test_1148
07-20-2015 11:38:15:143 : Start drop table c_repos_test_9279
07-20-2015 11:38:15:159 : Done drop table c_repos_test_9279
07-20-2015 11:38:15:159 : ************************* Summary *************************
07-20-2015 11:38:15:159 : All DML operations ran in multiple threads with thread count =
10
07-20-2015 11:38:15:159 : All the timings are in hour:min:second:millisecond
07-20-2015 11:38:15:159 : Total distinct database interactions: 9
07-20-2015 11:38:15:159 : 0- operation type: CREATE, count:1
07-20-2015 11:38:15:159 : 1- operation type: INSERT, count:60000001
07-20-2015 11:38:15:159 : 2- operation type: UPDATE, count:200000
07-20-2015 11:38:15:159 : 3- operation type: UPDATE_INDEX, count:200000
07-20-2015 11:38:15:159 : 4- operation type: SELECT, count:200000
07-20-2015 11:38:15:159 : 5- operation type: DELETE, count:200000
07-20-2015 11:38:15:159 : 6- operation type: CTAS, count:1
07-20-2015 11:38:15:159 : 7- operation type: DROP, count:1
07-20-2015 11:38:15:159 : 8- operation type: DROP, count:1
07-20-2015 11:38:15:159 : Total time for the test: 1:5:15:747.0
07-20-2015 11:38:15:159 : Number of operations: 60800005
07-20-2015 11:38:15:159 : Average time for all operations: 0:0:0:0.06440372825627234
07-20-2015 11:38:15:159 : Average transactions/second for all operations: 15527
07-20-2015 11:38:15:159 :
07-20-2015 11:38:15:159 : Number of create operations: 1
07-20-2015 11:38:15:159 : Total time for create operations: 0:0:0:15.0
07-20-2015 11:38:15:159 : Average time for all create operations: 0:0:0:15.0
07-20-2015 11:38:15:159 : Average transactions/second for all create operations: 66
07-20-2015 11:38:15:159 :
07-20-2015 11:38:15:159 : Number of create table as select operations: 1
07-20-2015 11:38:15:159 : Total time for create table as select operations: 0:4:3:766.0
07-20-2015 11:38:15:159 : Average time for all create table as select operations:
0:4:3:766.0
07-20-2015 11:38:15:159 : Average transactions/second for all create table as select
operations: 0
07-20-2015 11:38:15:159 :
07-20-2015 11:38:15:159 : Number of drop operations: 2
07-20-2015 11:38:15:159 : Total time for drop operations: 0:0:0:125.0
07-20-2015 11:38:15:159 : Average time for all drop operations: 0:0:0:62.5
07-20-2015 11:38:15:159 : Average transactions/second for all drop operations: 16
07-20-2015 11:38:15:159 :
07-20-2015 11:38:15:159 : Number of insert operations: 60000001
07-20-2015 11:38:15:159 : Total time for insert operations: 1:0:16:87.0
07-20-2015 11:38:15:159 : Average time for all insert operations:
0:0:0:0.06026811566219807
07-20-2015 11:38:15:159 : Average transactions/second for all insert operations: 16592
```

```
07-20-2015 11:38:15:159 : Total bytes of data inserted: 1158196632
07-20-2015 11:38:15:159 : Average bytes of data inserted/second (bytes/second): 320290
07-20-2015 11:38:15:159 :
07-20-2015 11:38:15:159 : Number of update operations in non-indexed table: 200000
07-20-2015 11:38:15:159 : Total time for update operations in non-indexed table:
0:0:11:622.0
07-20-2015 11:38:15:159 : Average time for all update operations in non-indexed table:
0:0:0:0.05811
07-20-2015 11:38:15:159 : Average transactions/second for all update operations in non-
indexed table: 17208
07-20-2015 11:38:15:159 :
07-20-2015 11:38:15:159 : Number of update operations in indexed table: 200000
07-20-2015 11:38:15:159 : Total time for update operations in indexed table: 0:0:18:345.0
07-20-2015 11:38:15:159 : Average time for all update operations in indexed table:
0:0:0:0.091725
07-20-2015 11:38:15:159 : Average transactions/second for all update operations in
indexed table: 10902
07-20-2015 11:38:15:159 :
07-20-2015 11:38:15:159 : Number of select operations: 200000
07-20-2015 11:38:15:159 : Total time for select operations: 0:0:12:449.0
07-20-2015 11:38:15:159 : Average time for all select operations: 0:0:0:0.062245
07-20-2015 11:38:15:159 : Average transactions/second for all select operations: 16065
07-20-2015 11:38:15:159 :
07-20-2015 11:38:15:159 : Number of delete operations: 200000
07-20-2015 11:38:15:159 : Total time for delete operations: 0:0:13:338.0
07-20-2015 11:38:15:159 : Average time for all delete operations: 0:0:0:0.06669
07-20-2015 11:38:15:159 : Average transactions/second for all delete operations: 14994
07-20-2015 11:38:15:159 : ************************************************************
```

Part IV: SDK Resources

This part contains the following chapter:

CHAPTER 11

Services Integration Framework (SIF) SDK

This chapter includes the following topics:

Services Integration Framework (SIF)

Use Services Integration Framework (SIF) to invoke the MDM Hub operations from external applications in real time. SIF uses service-oriented architecture that provides application functionality as services to other applications.

You can configure SIF for the MDM Hub to interface with the client programs. SIF serves as the middle tier in the client-server model. You can use the SIF access protocols to implement the request and response interactions.

Note: Only admin users can access private resources through the SIF requests.

The Services Integration Framework offers the following services and events:

Process Services

Process services are integration processes and people-to-system processes. For example, in a customer domain, the process services include activities such as verifying customers and approving customers.

Business Events

Business events are rule-driven events and actions that are based on business logic. For example, you might evaluate the impact of a new relationship.

Business Services

Business services act on base objects in the data model. For example, in a customer domain, you can create a Customer base object or retrieve a Customer base object.

Data Services

Data services act on records in the tables. You can insert a record, retrieve a record, or update a record.

Data Events

Data events are events that affect master data or source data. For example, a customer last name changes in a source record or an address changes in a master record.

The SIF requests can directly interact with each other. Data services can interact with data events, process services with data services, data services with business services, and data events with process services.

You can use external applications or the MDM Hub to generate the data events. Use the event-driven architecture (EDA) capabilities of the MDM Hub that include event capture, event processing, event filtering, and event generation to handle these events. The EDA components and external applications for query and data synchronization operations can use the services provided in the MDM Hub. You can use the existing infrastructure, such as an enterprise service bus (ESB) and enterprise application integration (EAI) technologies, such as TIBCO, webMethods, and message-oriented middleware with SIF.

SIF SDK

Use the SIF SDK to develop web services and Java applications that interact with the MDM Hub. The SIF SDK includes utilities to build and deploy SIF applications, a set of Java classes to create services, and sample codes to build web services. You can use the SIF SDK to create data objects, client services, business services, and GUI controls for creation and deployment of web-based and rich-client applications.

The SIF SDK is packaged with the MDM Hub Resource Kit installer. You can find the directory structures, libraries, online documentation for SIF, and build files in the following directory: `<Resource Kit Installation Directory>\hub\resourcekit\sdk\sifsdk`.

You can copy the SIF SDK to any client system on which you want to develop and run programs to interact with the MDM Hub. If you can run a Java virtual machine (JVM) on the client system, you can use the Java classes included in the SIF SDK. You can configure the SIF SDK to use any access protocol. If you cannot run a JVM, you must explicitly use web services, Java Message Service (JMS), or XML over HTTP.

You can use the SIF SDK for the following tasks:

- Automatic generation and deployment of data objects and data services for the web services-based interactions.

- Generation of a client .jar file that includes data objects. You can use the data objects in external applications.

- Creation and management of complex integration scenarios by combining data objects from different MDM Hub schemas.

Setting Up a Sample Eclipse Client

Use the sample `.project` file that is part of the SIF SDK to create a sample Eclipse client.

1. In the Eclipse IDE, import the sample `.project` file located in the `<Resource Kit Installation Directory>\hub\resourcekit\sdk\sifsdk` directory into your Eclipse workspace.

2. Identify the missing library JAR files that are specific to the application server and add them to the build class path. The sample `.project` file requires the library JAR files to set up the proper Java build path.

3. Customize the following files according to your environment:

    - `<Resource Kit Installation Directory>\hub\resourcekit\sdk\sifsdk\build.xml`

    - `<Resource Kit Installation Directory>\hub\resourcekit\sdk\sifsdk\my.properties`

    - `<Resource Kit Installation Directory>\hub\resourcekit\sdk\sifsdk\source\properties\log4j.xml`

    - `<Resource Kit Installation Directory>\hub\resourcekit\sdk\sifsdk\source\properties\siperian-client.properties`

Importing the Sample Project File

1. From the Eclipse IDE, click **File** > **Import**.

    The **Import** dialog box appears.

2. Select **Existing Projects into Workspace** and click **Next**.

    The **Import Projects** page appears.

3. Select **Select root directory**, and browse to the `.project` file located in the following directory:`<Resource Kit Installation Directory>\hub\resourcekit\sdk\sifsdk`

    The project name appears under **Projects**. The default project name is SIF-SDK-[ORS NAME].

4. Under **Projects**, select the project, and click **Finish**.

    The sample project appears in the package explorer.

Identifying the Missing Library JAR Files

After you import the sample `.project` file, verify whether all the required library JAR files for the project are added to the build class path. The library JAR files are specific to the application server.

1. In the Eclipse IDE, right-click the sample project, and select **Properties**.

    The **Properties** dialog box appears.

2. Click **Java Build Path**.

3. On the **Libraries** tab, identify the missing JAR files that are marked with a red cross mark.

Required JAR Files for JBoss

The following library JAR files are required to set up an Eclipse client for a JBoss application server.:

- `jboss-client.jar`

- `picketbox-4.0.16.Final-redhat-1.jar`

The name of the JAR files might vary according to the version of JBoss, so use the equivalent JAR files based on your environment. You can find the library JAR files in the following directory:`<Resource Kit Installation Directory>\hub\resourcekit\sdk\sifsdk\lib\jboss`

Required JAR Files for WebLogic

The `wlthint3client.jar` library JAR file is required to set up an Eclipse client for a WebLogic application server. The name of the JAR file might vary according to the version of WebLogic, so use the equivalent JAR file based on your environment.

You can find the library JAR file in the following directory:`<Resource Kit Installation Directory>\hub \resourcekit\sdk\sifsdk\lib\weblogic`

Required JAR Files for WebSphere

The following library JAR files are required to set up an Eclipse client for a WebSphere application server:

- `admin.jar`
- `jmxc.jar`
- `rsadapterspi.jar`
- `wasjmx.jar`
- `wasx.jar`

The name of the JAR files might vary according to the version of WebSphere, so use the equivalent JAR files based on your environment. You can find the library JAR files in the following directory:`<Resource Kit Installation Directory>\hub\resourcekit\sdk\sifsdk\lib\websphere`

Adding the Missing Library JAR Files

After you identify the missing library JAR files, add them to the build class path.

1. In the Eclipse IDE, right-click the sample project, and select **Properties**.
2. Click **Java Build Path**.
3. On the **Libraries** tab, perform one of the following tasks:
   - To add a JAR file that is inside your workspace, click **Add JARs**.
   - To add an external JAR file, click **Add External JARs**.

   The **JAR Selection** dialog box appears.
4. Browse to the location of the JAR file that you want to add, and select the JAR file.

   The JAR file is added to the build class path.
5. Similarly, add the other missing JAR files.

Customizing the Properties in the Library Files

The SIF SDK includes some library files that contain properties related to your development environment. You must customize the properties before you use the SIF SDK.

1. Open the following files in a text editor:
   - `<Resource Kit Installation Directory>\hub\resourcekit\sdk\sifsdk\build.xml`
   - `<Resource Kit Installation Directory>\hub\resourcekit\sdk\sifsdk\my.properties`
   - `<Resource Kit Installation Directory>\hub\resourcekit\sdk\sifsdk\source\properties \log4j.xml`
   - `<Resource Kit Installation Directory>\hub\resourcekit\sdk\sifsdk\source\properties \siperian-client.properties`

   Note: If you do not want to use the `build.xml` file, use the library JAR files located in the following directory to manually compile the code:`<Resource Kit Installation Directory>\hub\resourcekit \sdk\sifsdk\lib`
2. Customize the properties according to your development environment, and comment the properties that are not relevant to your development environment.

SiperianClient Library Classes

Use the SiperianClient library classes to build custom web services that interact with the MDM Hub. You can use the sample codes located in the following directory to build a custom web service: `<Resource Kit Installation Directory>\samples`.

Use the `process` method of the `com.siperian.sif.client.SiperianClient` class to implement the request and response interactions between the client program and the MDM Hub. The `process` method accepts any subclass of the `com.siperian.sif.message.SiperianRequest` class as an argument. If the `process` method successfully processes the request, it returns the `com.siperian.sif.message.SiperianResponse` object as the response. Otherwise, it returns the `com.siperian.sif.client.SiperianServerException` object.

The `com.siperian.sif.message.mrm` and `com.siperian.sif.message.hm` packages include the request and response objects to perform operations on the MDM Hub. The `com.siperian.sif.client` package manages the details of the client communication with the MDM Hub. You can use the access protocols, such as Enterprise JavaBeans (EJB), XML over HTTP, or SOAP, to communicate with the MDM Hub.

The `siperian-api.jar` file located in the following directories contains all the SiperianClient library classes:

- `<Resource Kit Installation Directory>\sdk\sifsdk\lib`
- `<MDM Hub Installation Directory>\hub\server\lib`

When you use the SiperianClient library classes, ensure you also have all the dependent files. The `siperian-api.jar` file is dependent on the following JAR files:

siperian-common.jar

  - `<Resource Kit Installation Directory>\sdk\sifsdk\lib`
  - `<MDM Hub Installation Directory>\hub\server\lib`

informatica-bpm-adapter.jar

  - `<Resource Kit Installation Directory>\sdk\sifsdk\lib`
  - `<MDM Hub Installation Directory>\hub\server\lib`

siperian-server-pkiutil.jar

  - `<Resource Kit Installation Directory>\sdk\sifsdk\lib`
  - `<MDM Hub Installation Directory>\hub\server\lib\pkiutils`

If you run an external SIF client, you might also require other JAR files in the following directory:

`<Resource Kit Installation Directory>\sdk\sifsdk\lib`

Request and Response Objects Overview

Every operation that you perform by using SIF requires a set of request and response objects. A request object includes methods that indicate the action that you want to perform on the MDM Hub, and a response object includes methods that return the result of that action.

A SIF class can represent a request object or a response object. A SIF class that represents a request object has a suffix of 'Request,' and a SIF class that represents a response object has a suffix of 'Response.' For example, the `PutRequest` class represents a request object, and the `PutResponse` class represents the response to the `PutRequest` object.

The request and response objects can have Java or XML representations. To represent request and response objects in Java, you must internally convert an XML representation to Java.

Use EJB protocol to invoke the SIF classes if you want multiple requests to participate in a single transaction.

Request Objects

A request object includes methods that indicate the action that you want to perform on the MDM Hub. A SIF class that represents a request object is a subclass of the `SiperianRequest` class and extends the `SiperianRequest` class.

For example, the following sample uses the `SearchQueryRequest` object:

```
SearchQueryRequest request = new SearchQueryRequest();
request.setRecordsToReturn(5); //Required
request.setSiperianObjectUID("PACKAGE.PARTY_ADDRESS_READ_PKG");//Required
request.setFilterCriteria("PARTY_FULL_NAME LIKE ?");
```

The request runs the `PARTY_ADDRESS_READ_PKG` package, uses the `PARTY_FULL_NAME LIKE` filter criteria, and returns no more than five records.

SiperianRequest Class

The `SiperianRequest` class is the base class for the all the SIF classes that represent request objects.

The `SiperianRequest` class includes methods that set the following information:
User Name and Password

User credentials to run the request. If the user does not have access permission to perform the operation, the SIF request fails.

ORS ID

ID of the ORS to which the request is directed. If you do not specify the ORS, the request is directed to the default ORS.

Interaction ID

Interaction ID to group multiple requests into a single interaction.

Asynchronous Options

Indicates whether to process the request asynchronously or synchronously. If the value of the `asynchronousOptions` parameter is null, SIF processes the request synchronously. If the value is not null, SIF processes the request synchronously or asynchronously according to the value that you set.

When you process a request asynchronously, SIF returns a dummy response with a message that the request is asynchronously processed. The actual response goes to the JMS queue that you specify. If you do not specify a queue, SIF discards the actual response.

The `SiperianRequest` class includes methods that get the following information:
Transaction Attribute Type

Specifies whether the request object can participate in the transactions. You can get any of the following transaction attribute types:

- NOT_SUPPORTED if the request cannot participate in the transactions.
- SUPPORTS if the request can participate in the transactions.

- REQUIRED if the request requires a transaction.
- REQUIRES_NEW if the request requires a new transaction.

Name of the Request

Name of the class of which the request object is an instance. For example, if x is an instance of the `AuditRequest` class, `x.getRequestName()` returns `AuditRequest` as the name of the request.

Response Objects

A response object represents the response to the corresponding request object and includes methods that return the result of the action that you perform on the MDM Hub. A SIF class that represents a response object is a subclass of the `SiperianResponse` class and extends the `SiperianResponse` class into it.

For example, the following sample uses the `GetOrsMetadataResponse` object:

```
GetOrsMetadataResponse getOrsMetadataResponse = (GetOrsMetadataResponse)
sifClient.process(getOrsMetadataRequest );
System.out.println("ORS Metadata (first line only): " +
getOrsMetadataResponse.getRepositoryXml().substring(0, 80));;
```

SiperianResponse Class

The `SiperianResponse` class is the base class for the all the SIF classes that represent response objects.

The `SiperianResponse` class includes methods that get the following information:

Interaction ID

Interaction ID for the request.

Message

Brief message that indicates the status of the request.

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