AUTHORIZED DOCUMENTATION

# Common Driver Administration Guide

Novell®
Identity Manager

**4.0**

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# About This Guide

This guide contains administration tasks that are common to all Identity Manager drivers. The guide is organized as follows:


- Chapter 1, “Starting, Stopping, or Restarting the Driver,” on page 11
- Chapter 2, “Activating the Driver,” on page 13
- Chapter 3, “Viewing Version Information,” on page 15
- Chapter 4, “Backing Up a Driver,” on page 21
- Chapter 5, “Monitoring Driver Health,” on page 23
- Chapter 6, “Viewing Driver Statistics,” on page 35
- Chapter 7, “Managing Associations between Drivers and Objects,” on page 39
- Chapter 8, “Inspecting a Driver’s Cache File,” on page 45
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- Chapter 10, “Configuring Java Environment Parameters,” on page 55
- Chapter 11, “Reassociating a Driver Set Object with a Server,” on page 59
- Chapter 12, “Using the DirXML Command Line Utility,” on page 61
- Chapter 13, “Synchronizing Objects,” on page 77
- Chapter 14, “Migrating and Resynchronizing Data,” on page 85
- Chapter 15, “Viewing Identity Manager Processes,” on page 87
- Chapter 16, “Editing Driver Configuration Files,” on page 93
- Chapter 17, “Troubleshooting the Driver,” on page 99
- Chapter 18, “When and How to Use Global Configuration Values,” on page 107
- Appendix A, “Driver Properties,” on page 111


### Audience

This guide is intended for administrators, consultants, and network engineers who require a high-level introduction to Identity Manager business solutions, technologies, and tools.

### Documentation Updates

For the most recent version of this document, see the Identity Manager Documentation Web site (http://www.novell.com/documentation/idm40/index.html).

### Additional Documentation

For additional Identity Manager documentation, see the Identity Manager Documentation Web site (http://www.novell.com/documentation/idm40/index.html)

For information about specific Identity Manager drivers, see the Identity Manager Drivers Web site (http://www.novell.com/documentation/idm40drivers/index.html).

# Starting, Stopping, or Restarting the Driver

1

The following sections describe how to start, stop, and restart a driver in Designer and iManager.


- Section 1.1, “Starting the Driver in Designer,” on page 11
- Section 1.2, “Starting the Driver in iManager,” on page 11
- Section 1.3, “Stopping the Driver in Designer,” on page 11
- Section 1.4, “Stopping the Driver in iManager,” on page 11
- Section 1.5, “Restarting the Driver in Designer,” on page 12
- Section 1.6, “Restarting the Driver in iManager,” on page 12


## 1.1 Starting the Driver in Designer

1. Open a project in the Modeler, then right-click the driver line.
2. Click *Live* > *Start Driver*.

## 1.2 Starting the Driver in iManager

1. In the *Roles and Tasks* view, click *Identity Manager* > *Identity Manager Overview*.
2. In the *Search in* field, specify the fully distinguished name of the container where you want to start searching and then click , or click  to browse for and select the container in the tree structure.
3. Click the upper right corner of the driver icon whose status you want to change, then click *Start driver*.

## 1.3 Stopping the Driver in Designer

1. Open a project in the Modeler, then right-click the driver line.
2. Click *Live* > *Stop Driver*.

## 1.4 Stopping the Driver in iManager

1. In the *Roles and Tasks* view, click *Identity Manager* > *Identity Manager Overview*.
2. In the *Search in* field, specify the fully distinguished name of the container where you want to start searching and then click , or click  to browse for and select the container in the tree structure.
3. Click the upper right corner of the driver icon whose status you want to change, then click *Stop driver*.

## 1.5 Restarting the Driver in Designer

1. Open a project in the Modeler, then right-click the driver line.
2. Click *Live* > *Restart Driver*.

## 1.6 Restarting the Driver in iManager

1. In the *Roles and Tasks* view, click *Identity Manager* > *Identity Manager Overview*.
2. In the *Search in* field, specify the fully distinguished name of the container where you want to start searching and then click , or click  to browse for and select the container in the tree structure.
3. Click the upper right corner of the driver icon, then click *Restart driver*.

# Activating the Driver

2

Novell Identity Manager, Integration Modules (drivers), and the Roles Based Provisioning Module must be activated within 90 days of installation, or they shut down. At any time during the 90 days, or afterward, you can choose to activate Identity Manager products.

To activate the driver, see "Activating Novell Identity Manager Products" in the *Identity Manager 4.0 Integrated Installation Guide*.

# Viewing Version Information

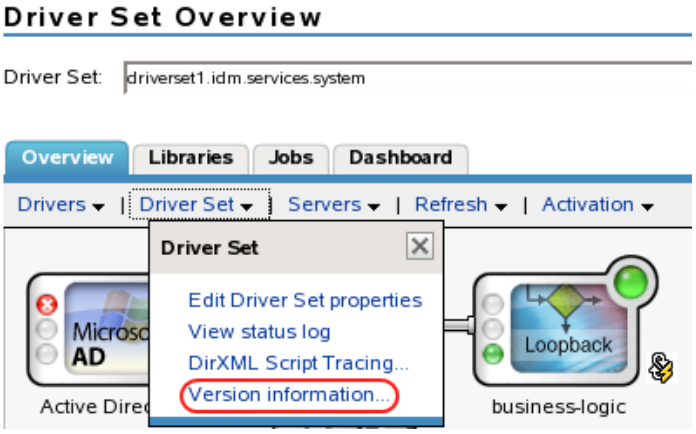
3

The Metadirectory engine, the driver shims, and the driver configuration files each contain a separate version number. The Version Discovery Tool in iManager helps you find the versions of the Metadirectory engine and the driver shims versions. The driver configuration files contain there own naming convention.


- Section 3.1, “Viewing a Hierarchical Display of Version Information,” on page 15
- Section 3.2, “Viewing the Version Information as a Text File,” on page 17
- Section 3.3, “Saving Version Information,” on page 19
- Section 3.4, “Driver Configuration Files Naming Convention,” on page 20

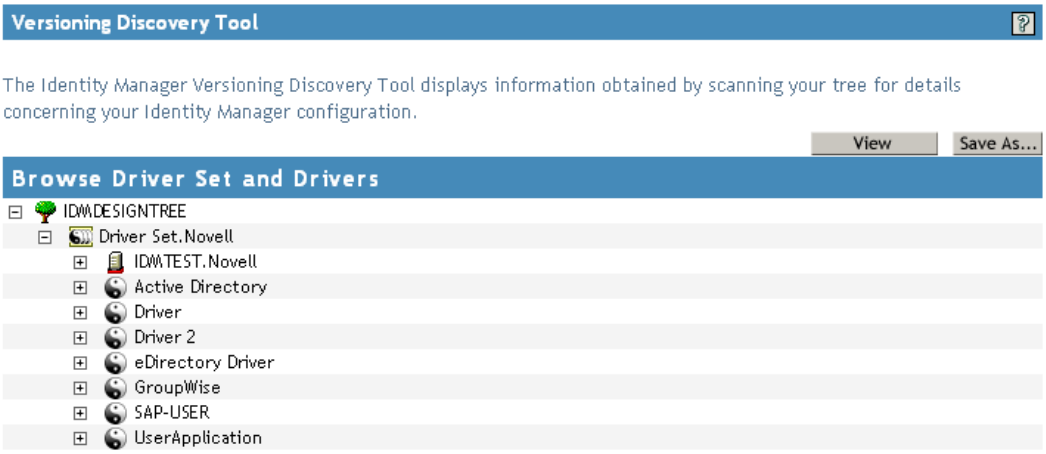

## 3.1 Viewing a Hierarchical Display of Version Information

1. In iManager, click *Identity Manager* > *Identity Manager Overview*, then click *Search* to find the driver sets in the Identity Vault.
2. Click the specific driver set in the list.
3. Click *Driver Set* > *Version information* in the Driver Set Overview page.




You can also select *Identity Manager Utilities* > *Versions Discovery*, browse to and select the driver set, then click *OK*.

4. View a top-level or unexpanded display of versioning information.

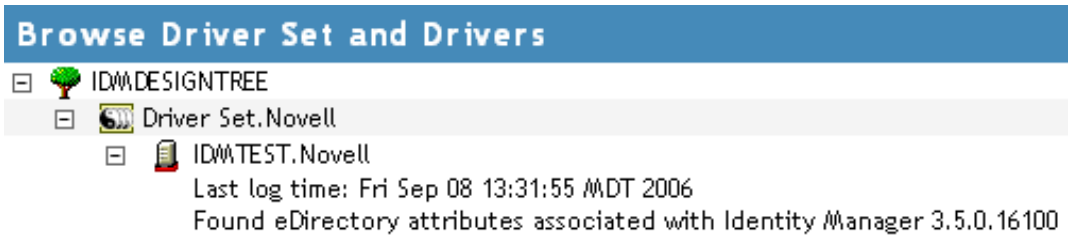



The unexpanded hierarchical view displays the following:

- The eDirectory tree that you are authenticated to
- The driver set that you selected
- Servers that are associated with the driver set

  If the driver set is associated with two or more servers, you can view Identity Manager information on each server.
- Drivers

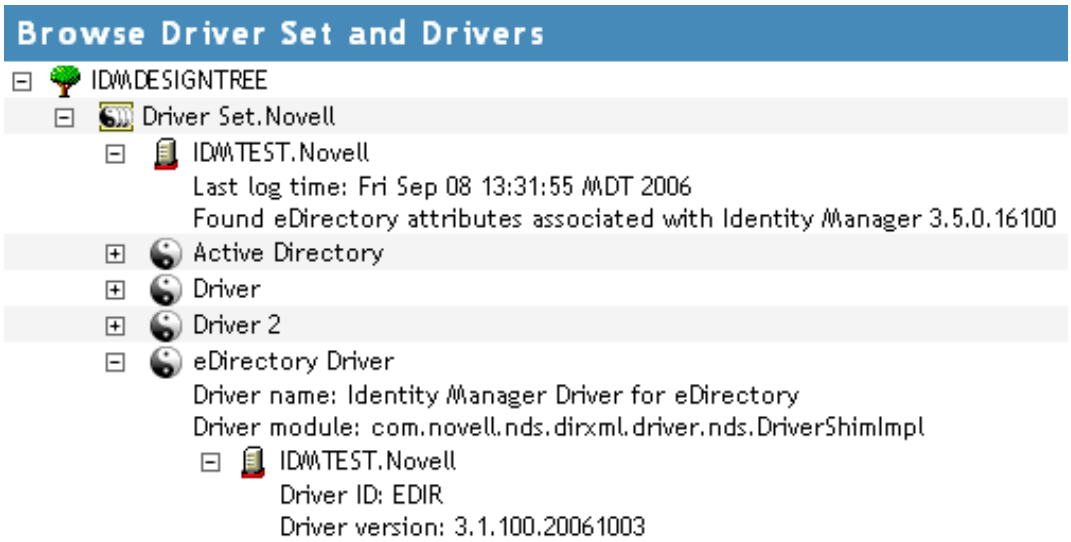
5 View version information related to servers by expanding the server icon.




The expanded view of a top-level server icon displays the following:

- Last log time
- Version of Identity Manager that is running on the server

6 View version information related to drivers by expanding the driver icon.




The expanded view of a top-level driver icon displays the following:

- The driver name
- The driver module (for example, com.novell.nds.dirxml.driver.nds.DriverShimImpl)

The expanded view of a server under a driver icon displays the following:

- The driver ID
- The version of the instance of the driver running on that server

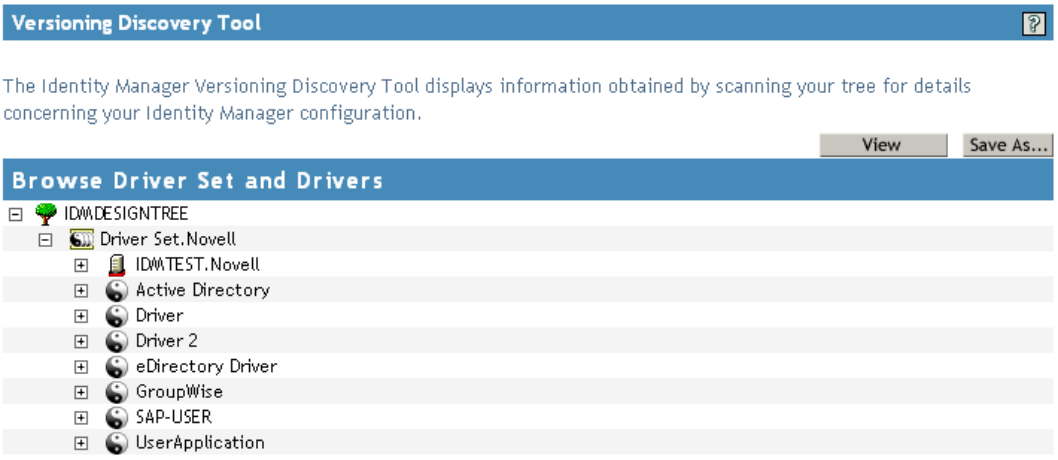
## 3.2 Viewing the Version Information as a Text File

Identity Manager publishes versioning information to a file. You can view this information in text format. The textual representation is the same information contained in the hierarchical view.

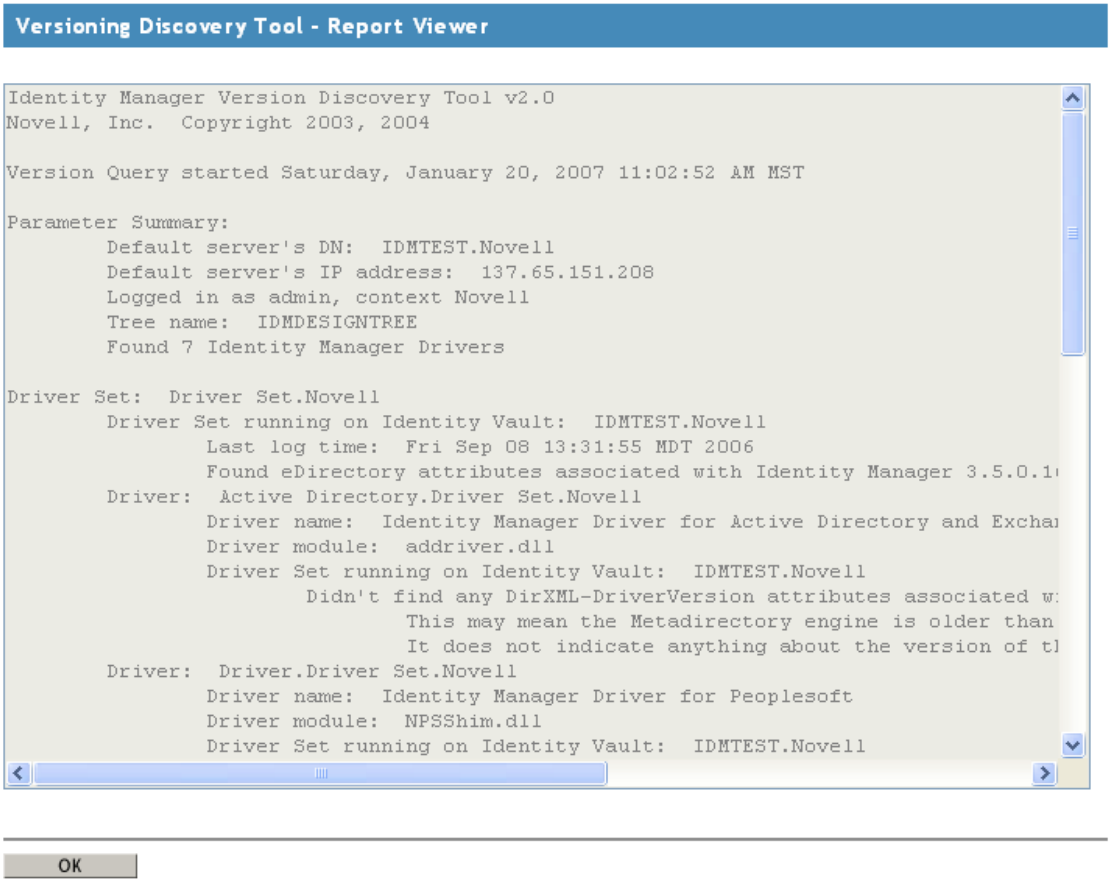
1. In iManager, click *Identity Manager* > *Identity Manager Overview*, then click *Search* to find the driver sets in the Identity Vault.
2. Click the specific driver set in the list.
3. Click *Driver Set* > *Version information* in the Driver Set Overview page.

You can also select *Identity Manager Utilities* > *Versioning Discovery*, then browse to and select the driver set, then click *Information*.

4 In the Versioning Discovery Tool dialog box, click *View*.



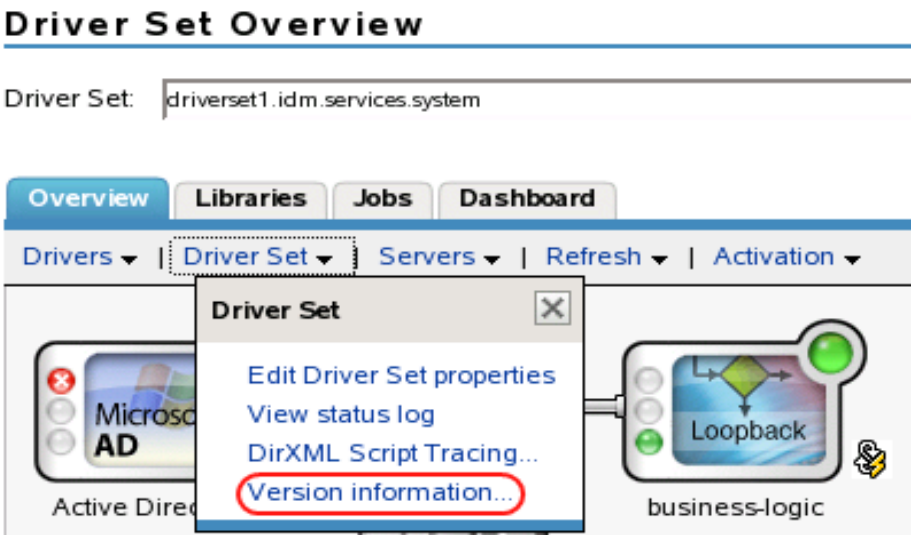

The information is displayed as a text file in the Report Viewer window.



## 3.3 Saving Version Information

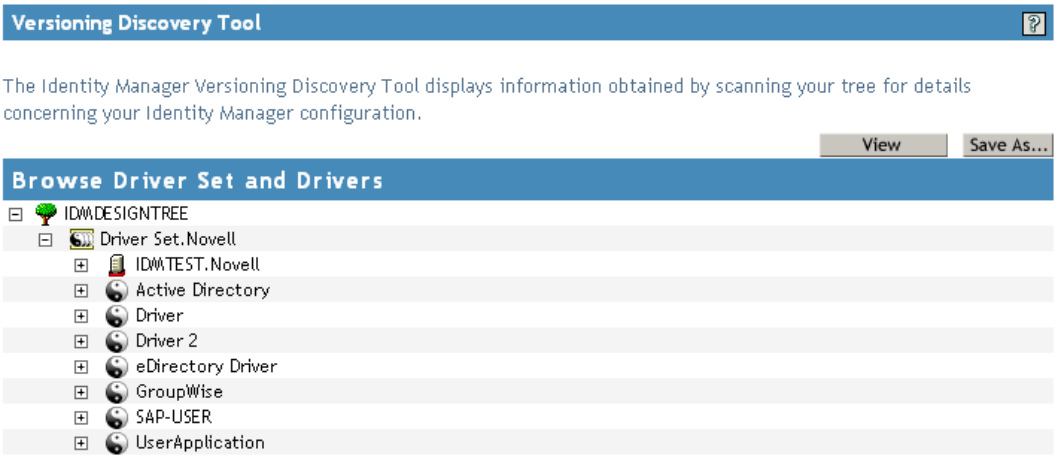
You can save version information to a text file on your local or network drive.

1. In iManager, click *Identity Manager* > *Identity Manager Overview*, then click *Search* to find the driver sets in the Identity Vault.
2. Click the specific driver set in the list.
3. Click *Driver Set* > *Version information* in the Driver Set Overview page.




You can also select *Identity Manager Utilities* > *Versioning Discovery*, browse to and select the driver set, then click *Information*.

4. In the Versioning Discovery Tool dialog box, click *Save As*.




5. In the File Download dialog box, click *Save*.
6. Navigate to the desired directory, type a filename, then click *Save*.

   Identity Manager saves the data to a text file.

## 3.4 Driver Configuration Files Naming Convention

The driver configuration file naming convention is:

```
<base name>[-<type>]-IDM<min. engine version>-V<config version>.xml
```

- **Base Name:** The name of the connected system or service the driver provides. For example, Active Directory or Delimited Text.
- **Type:** An additional descriptor for the driver configuration file. If there are multiple configuration files, the type distinguishes among the different files.
- **Minimum Engine Version:** Lists the minimum engine version that the driver can run against. The elements to date are:
  - IDM2_0_0
  - IDM2_0_1
  - IDM2_0_2
  - IDM3_0_0
  - IDM3_0_1
  - IDM3_5_0
  - IDM3_5_1
  - IDM3_6_0
- **Configuration Version:** Specifies the particular driver configuration file version. It is a number that is incriminated with each release of a new driver configuration file.
  - V1
  - V2
  - V11
  - V23

For example:

```
ActiveDirectory-IDM3_6_0-V4.xml
DelimitedText-CSVSample-IDM3_6_0-V2.xml
```

# Backing Up a Driver

# 4

After you have created a driver, it is important to create a backup of the driver. You can use Designer or iManager to create an XML file of the driver. The file contains all of the information entered into the driver during configuration. If the driver becomes corrupted, the exported file can be imported to restore the configuration information.

---

**IMPORTANT:** If the driver has been deleted, all of the associations on the objects are purged. When the XML file is imported again, new associations are created through the migration process.

---

Not all server-specific information stored on the driver is contained in the XML file. Make sure this information is documented through the Doc Gen process in Designer. See "Documenting Projects" in the *Designer 4.0 for Identity Manager 4.0 Administration Guide*.

You can also run the driver in factory mode, if you created the driver with packages.


- Section 4.1, "Exporting the Driver in Designer," on page 21
- Section 4.2, "Exporting the Driver in iManager," on page 21
- Section 4.3, "Running the Driver in Factory Mode," on page 22


## 4.1 Exporting the Driver in Designer

1. Open a project in Designer, then right-click the driver object.
2. Select *Export to Configuration File*.
3. Specify a unique name for the configuration file, browse to location where it should be saved, then click *Save*.
4. Click *OK* in the Export Configuration Results window.

## 4.2 Exporting the Driver in iManager

1. In iManager, click *Identity Manager* > *Identity Manager Overview*.
2. Browse to and select the driver set object, then click *Search*.
3. Click the driver icon.
4. Select *Export* in the Identity Manager Driver Overview page.
5. Browse to and select the driver object you want to export, then click *Next*.
6. Select *Export all policies, linked to the configuration or not* or select *Only export policies that are linked to the configuration*, depending upon the information you want to have stored in the XML file.
7. Click *Next*.
8. Click *Save As*, then click *Save*.
9. Browse and select a location to save the XML file, then click *Save*.
10. Click *Finish*.

## 4.3 Running the Driver in Factory Mode

You can run a driver in the default factory mode, if you created the driver with packages in Designer.

To run the driver in the factory mode:

1. In Designer, right-click on the driver and then click *Properties*.
2. Click *Packages*, then select *Run driver in Factory mode*.
3. Select how Package Manager handles the customizations to the driver:
   - **Strict:** Removes custom configuration.
   - **Relaxed:** Preserve custom configuration.

For more information, see "Running a Driver in Factory Mode" in the *Designer 4.0 for Identity Manager 4.0 Administration Guide*.

# Monitoring Driver Health

5

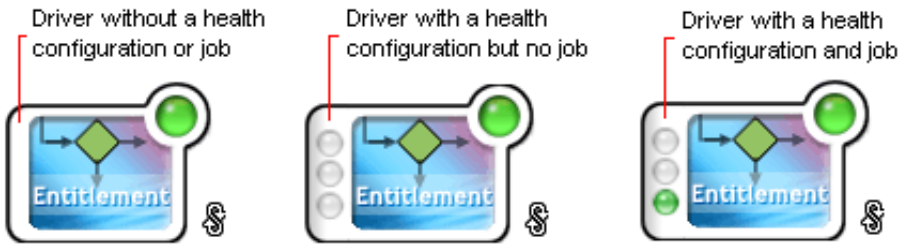
Driver health monitoring allows you to view a driver's current state of health as green, yellow, or red, and to define the actions to perform in response to each of these health states.

You create the conditions (criteria) that determine each of the health states, and you also define the actions you want performed whenever the driver's health state changes. For example, if the driver's health changes from a green state to a yellow state (based on the conditions you've established), you can perform such actions as restarting the driver, shutting down the driver, and sending an e-mail to the person designated to resolve issues with the driver.

You can also define custom states. Whenever the conditions for the custom state are met, the associated actions are performed regardless of the driver's current state of green, yellow, or red.

The driver's health state is not monitored unless both a health configuration and a health job exist and the health job is running. If the configuration and job exist and the job is running, the driver icon displays a semaphore (green, yellow, or red indicator). Otherwise, the semaphore is not displayed or is displayed without a colored indicator.

***Figure 5-1*** *Driver health indicator*




To turn on health monitoring for the driver, complete the steps provided in the following three sections:


- Section 5.1, "Creating a Driver Health Configuration," on page 23
- Section 5.2, "Creating a Driver Health Job," on page 25
- Section 5.3, "Modifying the Driver Health Job's Settings," on page 26


After you've created the driver's health configuration and health job, you can use the steps in the following sections to modify the conditions and actions associated with each health state and to create one or more custom states:


- Section 5.4, "Modifying the Conditions for a Health State," on page 27
- Section 5.5, "Modifying the Actions for a Health State," on page 30
- Section 5.6, "Creating a Custom State," on page 31

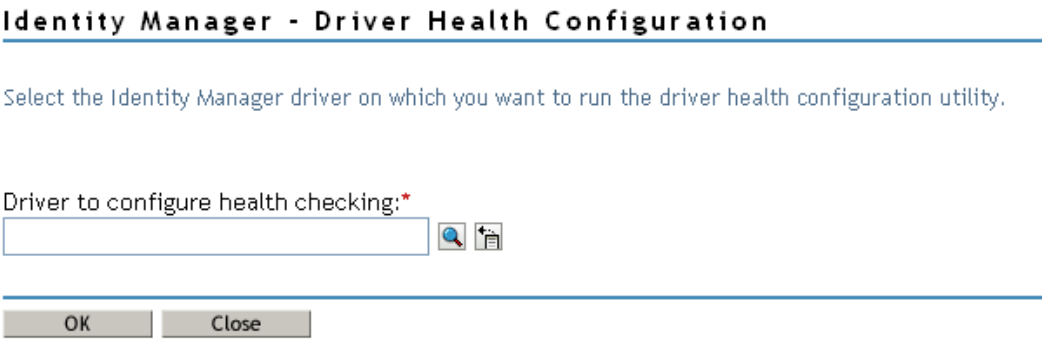

## 5.1 Creating a Driver Health Configuration

The health configuration for version 3.6 or newer drivers is automatically configured. Skip this section if your drivers are version 3.6 or newer.

If you have drivers that are older than version 3.6, you need to create the health configuration for each driver you want to monitor.

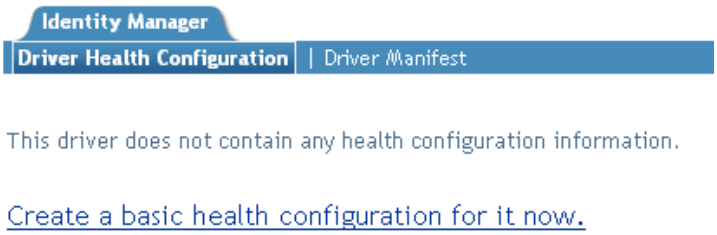
1 In iManager, click to display the Identity Manager Administration page.

2 In the Administration list, click *Driver Health Configuration*.




3 In the *Driver to configure health checking* field, select the driver for which you want to create the health configuration, then click *OK* to display the Driver Health Configuration page.

If the driver's health configuration does not yet exist, the Driver Health Configuration page displays a *Create a basic health configuration for it now* prompt.




4 Click *Create a basic health configuration for it now*.

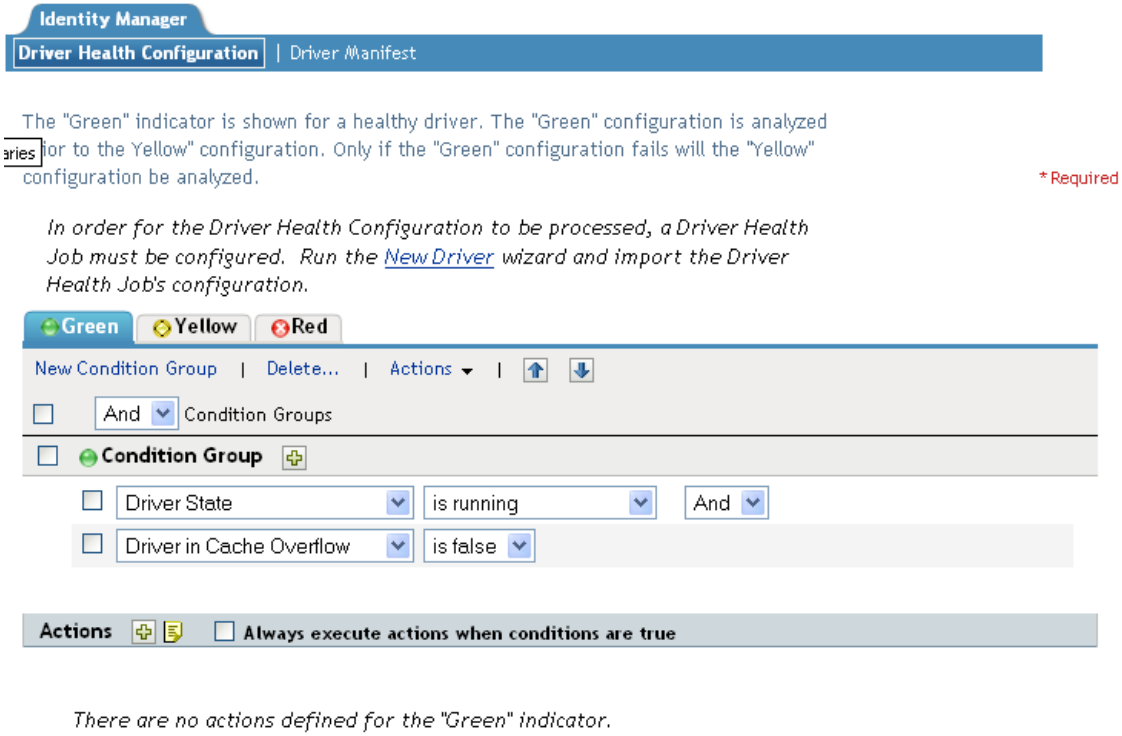
A basic health configuration is created and displayed. Sample conditions are created for the green and yellow states (not the red).

5 Continue with Section 5.2, "Creating a Driver Health Job," on page 25.

## 5.2 Creating a Driver Health Job

The health of a driver is evaluated during the periodic execution of a Driver Health job. The job evaluates the conditions for the health states and assigns the driver the appropriate state. The job also executes any actions associated with the assigned state.

If a Driver Health job does not exist, the Driver Health Configuration page displays a *Run the New Driver wizard and import the Driver Health Job's configuration* prompt, as shown in the following screenshot. If the page does not display this prompt, the Driver Health job already exists; you can skip to Section 5.4, "Modifying the Conditions for a Health State," on page 27.




To create a Driver Health job:

1. Open the Driver Health Configuration page for a driver you want to monitor.

   For help opening the Driver Health Configuration page, see Step 1 through Step 3 on page 24.

2. Click *New Driver*, then follow the prompts to import the configuration file for the Driver Health job. Refer to the following information for details:

   - **Where to place the driver:** Place the job in the same driver set as the driver. The correct driver set is selected by default.
   - **Import a configuration:** Import the configuration from the server. In the *Show* field, select Identity Manager 3.6.1 configurations, then select the Driver Health job in the *Configurations* field.
   - **Email server:** Select the e-mail server that you want used for any actions that initiate e-mail. If you have not defined additional e-mail servers, select the Default Notification Collection server.

- **Servers:** If the driver set is associated with only one server, that server is selected and cannot be changed. If the driver set is associated with multiple servers, select the server where you want to run the job.

After the job is created, you can adjust the job settings as desired. For example, you can modify how often the job runs, which drivers use the job, and how much data the job maintains to support transaction history. For instructions, continue with Section 5.3, "Modifying the Driver Health Job's Settings," on page 26.

## 5.3 Modifying the Driver Health Job's Settings

The Driver Health job evaluates the conditions for the health states and assigns the driver the appropriate state. The job also executes any actions associated with the assigned state.

As with all driver jobs, there are several Driver Health job settings that you can modify to optimize health monitoring performance for your environment, including settings for how often the job runs, which drivers use the job, and how much data the job maintains to support transaction history.

To modify the job settings:

1. Open the Driver Health Configuration page for a driver that uses the Driver Health job you want to modify.

   For help opening the Driver Health Configuration page, see Step 1 through Step 3 on page 24.
2. Click the Driver Health job.
3. Change the desired settings on the following tabs:
   - **Schedule:** The Driver Health job is a continuously running job, meaning that it does not stop unless a health state action shuts it down or it is shut down manually. The job must run continuously to be able to support transaction data collection for use in Transactions History conditions.

     If the job does stop, it is restarted based on the schedule. The default schedule checks every minute to see if the job is running. If the job is not running, it is started.
   - **Scope:** By default, the job applies to all drivers in the driver set. This means that you only need one Driver Health job per driver set. However, you can create multiple Driver Health jobs for different drivers within the same driver set. For example, you might have some drivers whose health you want updated more frequently than other drivers, in which case you would need at least two Driver Health jobs.
   - **Parameters:** You can change any of the following parameters:
     - **Login ID:** This defaults to the login ID that was used when creating the driver job. You should only change this if you want the driver to authenticate with different credentials.
     - **Login password:** This is the password required for the login ID that you supplied in the Login ID field.
     - **Subscriber Heartbeat:** Controls whether the Driver Health job does a heartbeat query on a driver's Subscriber channel before performing a health check on the driver.
     - **Polling interval:** Determines how often the job evaluates the conditions for the health states, assigns the driver the appropriate state, executes any actions associated with the assigned state, and stores the driver's transaction data. The default polling interval is one minute.

- **Polling interval units:** Specifies the time unit (minutes, hours, days, weeks) for the number specified in the *Polling interval* setting.
- **Duration sampling data is kept:** Specifies how long a driver's transaction data is kept. The default, two weeks, causes a transaction to be retained for two weeks before being deleted. A longer duration provides a greater time period that can be used in Transactions History conditions, but requires more memory. For example, to use a Transactions History condition that evaluates of the number of publisher reported events for the last 10 days, you need to keep transaction data for at least 10 days.
- **Duration units:** Specifies the time unit (minutes, hours, days, weeks) for the number specified in the *Duration transaction data is kept* setting.

4 Click *OK* to save your changes.

## 5.4 Modifying the Conditions for a Health State

You control the conditions that determine each health state. The green state is intended to represent a healthy driver, and a red state is intended to represent an unhealthy driver.

The conditions for the green state are evaluated first. If the driver fails to meet the green conditions, the yellow conditions are evaluated. If the driver fails to meet the yellow conditions, the driver is automatically assigned a red health state.

To modify the conditions for a state:

1 Open the Driver Health Configuration page for a driver whose conditions you want to modify.

For help opening the Driver Health Configuration page, see Step 1 through Step 3 on page 24.

2 Click the tab for the state (Green or Yellow) you want to modify.

The tab displays the current conditions for the health state. Conditions are organized into groups, and logical operators, either AND or OR, are used to combine each condition and each group. Consider the following example for the green state:

```
GROUP1
Condition1 and
Condition2
Or
GROUP2
Condition1 and
Condition2 and
Condition3
```

In the example, the driver is assigned a green state if either the GROUP1 conditions or the GROUP2 conditions evaluate as true. If neither group of conditions is true, then the conditions for the yellow state are evaluated.

The conditions that can be evaluated are:

- **Driver State:** Running, stopped, starting, not running, or shutting down. For example, one of the default conditions for the green health state is that the driver is running.
- **Driver in Cache Overflow:** The state of the cache used for holding driver transactions. If the driver is in cache overflow, all available cache has been used. For example, the default condition for the green health state is that the Driver in Cache Overflow condition is false and the default for the yellow health state is that the Driver in Cache Overflow condition is true.
- **Newest:** The age of the newest transaction in the cache.
- **Oldest:** The age of the oldest transaction in the cache.
- **Total Size:** The size of the cache.
- **Unprocessed Size:** The size of all unprocessed transactions in the cache.
- **Unprocessed Transactions:** The number of unprocessed transactions in the cache. You can specify all transactions types or specific transaction types (such as adds, removes, or renames).
- **Transactions History:** The number of transactions processed at various points in the Subscriber or Publisher channel over a given period of time. This condition uses multiple elements in the following format:

  *<transaction type> <transaction location and time period > <relational operator> <transaction number>*.

  - *<transaction type>*: Specifies the type of transaction being evaluated. This can be all transactions, adds, removes, renames, and so forth.
  - *<transaction location and time period>*: Specifies the place in the Subscriber or Publisher channel and the time period being evaluated. For example, you might evaluate the total number of transactions processed as Publisher reported events over the last 48 hours. By default, transaction history data is kept for two weeks, which means that you cannot specify a time period greater than two weeks unless you change the default Transaction Data Duration setting. This setting is specified on the Driver Health job. See Section 5.3, "Modifying the Driver Health Job's Settings," on page 26 for information about changing the setting.
  - *<relational operator>*: Specifies that the identified transactions must be equal to, not equal to, less than, less than or equal to, greater than, or greater than or equal to the <transaction number>.
  - *<transaction number>*: Specifies the number of transactions being used in the evaluation.

  The following provides an example of a Transactions History condition:

```
<number of adds> <as publisher commands> <over the last 10 minutes> <is
less than> <1000>
```

- **Available History:** The amount of transaction history data that is available for evaluation. The primary purpose for this condition is to ensure that a Transactions History condition does not cause the current state to fail because it does not have enough transaction history data collected for the time period being evaluated.

  For example, assume that you want to use the Transactions History condition to evaluate the number of adds as Publisher commands over the last 48 hours (the example shown in the Transactions History section above). However, you don't want the condition to fail if there is not yet 48 hours worth of data, which can be the case after the initial setup of the driver's health configuration or if the driver's server restarts (because transaction history data is kept in memory). Therefore, you create condition groups similar to the following:

  ```
  Group1
  Available History <is less than> <48 hours>

  or

  Group2
  Available History <is greater than or equal to> <48 hours> and
  Transactions History <number of adds> <as publisher commands> <over
  the last 48 hours> <is less than> <1000>
  ```

  The state evaluates to true if either condition group is true, meaning that a) there is less than 48 hours of data, or b) there is at least 48 hours of data and the number of adds as Publisher commands over the last 48 hours is less than 1000.

  The state evaluates to false if both conditions evaluate to false, meaning that a) there is at least 48 hours of data and b) the number of adds as publisher commands over the last 48 hours is greater than 1000.

**3** Modify the criteria as desired.

- To add a new group, click *New Group*.
- To add a condition, click the button next to the group heading.
- To reorder condition groups or individual conditions, select the check box next to the group or condition you want to move, then click the and buttons to move it up and down. You can also use the and buttons to move a condition from one group to another.
- To copy condition groups or individual conditions, select the check box next to the group or condition you want to copy, click *Edit* > *Copy selections to clipboard*, click the tab for the health state where you want to copy the group or condition, then click *Edit* > *Append items on clipboard*. For example, assume that you want to copy a condition from one condition group to another. You would select the condition, copy it to the clipboard, then append it. The condition is added as its own condition group; if desired, use the and buttons to move it into another condition group.
- To move condition groups or individual conditions, select the check box next to the group or condition you want to move, click *Edit* > *Cut selections to clipboard*, click the tab for the health state where you want to move the group or condition, then click *Edit* > *Append items on clipboard*. For example, assume that you want to move a condition group from the green health state to the yellow health state. You would select the condition group, cut it to the Clipboard, open the yellow health state, then append it.

4 Click *Apply* to save your changes.

5 If you want to change the actions associated with the conditions you've set, continue with Section 5.5, "Modifying the Actions for a Health State," on page 30.

## 5.5 Modifying the Actions for a Health State

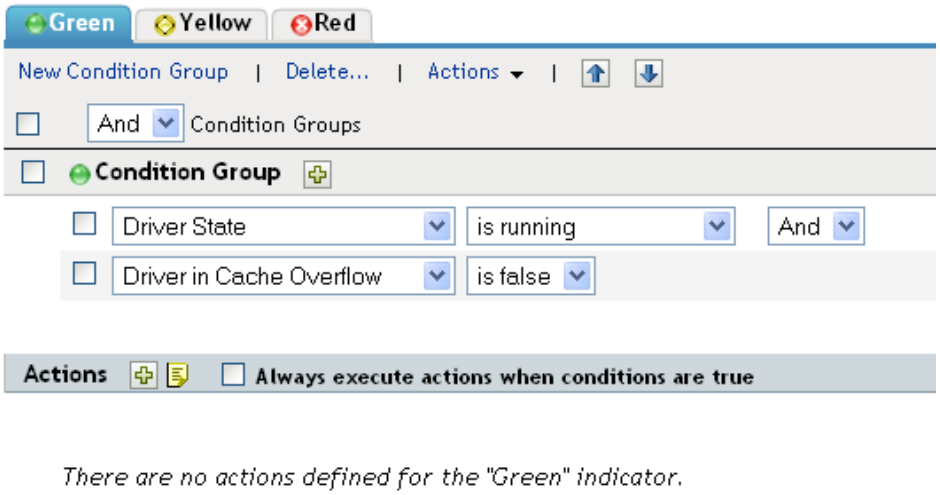
You can determine the actions that you want performed when the driver health state changes. For example, if the state changes from green to yellow, you can shut down or restart the driver, generate an event, or start a workflow. Or, if the state changes from yellow to green, any actions associated with the green state are performed.

A health state's actions are performed only once each time the conditions are met; as long as the state remains true, the actions are not repeated. If the state changes because its conditions are no longer met, the actions are performed again the next time the conditions are met.

1 Open the Driver Health Configuration page for a driver whose actions you want to modify.

For help opening the Driver Health Configuration page, see Step 1 through Step 3 on page 24.

2 Click the tab for the state whose actions you want to modify.




3 Click the button next to the Actions heading to add an action, then select the type of action you want:

- **Start Driver:** Starts the driver.
- **Stop Driver:** Stops the driver.
- **Restart Driver:** Stops and then starts the driver.
- **Clear Driver Cache:** Removes all transactions, including unprocessed transactions, from the cache.
- **Send Email:** Sends an e-mail to one or more recipients. The template you want to use in the e-mail message body must already exist. To include the driver name, server name, and current health state information in the e-mail, add the `$Driver$`, `$Server$`, and `$HealthState$` tokens to the e-mail template and then include the tokens in the message text. For example:

  ```
  The current health state of the $Driver$ driver running on $Server$ is
  $HealthState$.
  ```

- **Write Trace Message:** Outputs a message to the driver's log file.
- **Generate Event:** Generates an event that can be used by Novell Audit and Novell Sentinel
- **Execute ECMAScript:** Executes an existing ECMAScript. Use the or buttons to select the DirXML-Resource object that contains the ECMAScript.
- **Start Workflow:** Starts a provisioning workflow.
- **On Error:** If an action fails, instructs what to do with the remaining actions, the current health state, and the Driver Health job.
  - **Affect actions by:** You can continue to execute the remaining actions, stop execution of the remaining actions, or default to the current setting. The current setting applies only if you have multiple On Error actions and you set the Affect actions by option in one of the preceding On Error actions.
  - **Affect state by:** You can save the current state, reject the current state, or default to the current setting. Saving the state causes the state's conditions to continue to evaluate as true. Rejecting the state causes the state's conditions to evaluate as false. The current setting applies only if you have multiple On Error actions and you set the Affect state by option in one of the preceding On Error actions.
  - **Affect Driver Health Job by:** You can continue to run the job, abort and disable the job, or default to the current setting. Continuing to run the job causes the job to finish evaluating the conditions to determine the driver's health state and perform any actions associated with the state. Aborting and disabling the job stops the job's current activity and shuts down the job; the job does not run again until you enable it. The current setting applies only if you have multiple On Error actions and you set the Affect Driver Health Job by setting in one of the preceding On Error actions.

4. If you want the actions executed every time the conditions evaluate to true, click *Always execute actions when conditions are true*.

   By default, actions are performed only one time while a driver's health state remains the same; regardless of the number of times the conditions are evaluated, as long as the health state remains true, the actions are not repeated. For example, when the driver's health state changes from red to green, the green state's actions are executed. The next time the conditions are evaluated, if the health state is still green, the actions are not repeated.

   Selecting the *Always execute actions when conditions are true* setting causes the actions to be repeated each time the condition evaluates to true. For example, if the driver's health state repeatedly evaluates to green without changing to another state, the green state's actions are repeated after each evaluation.

5. Click *Apply* to save your changes.

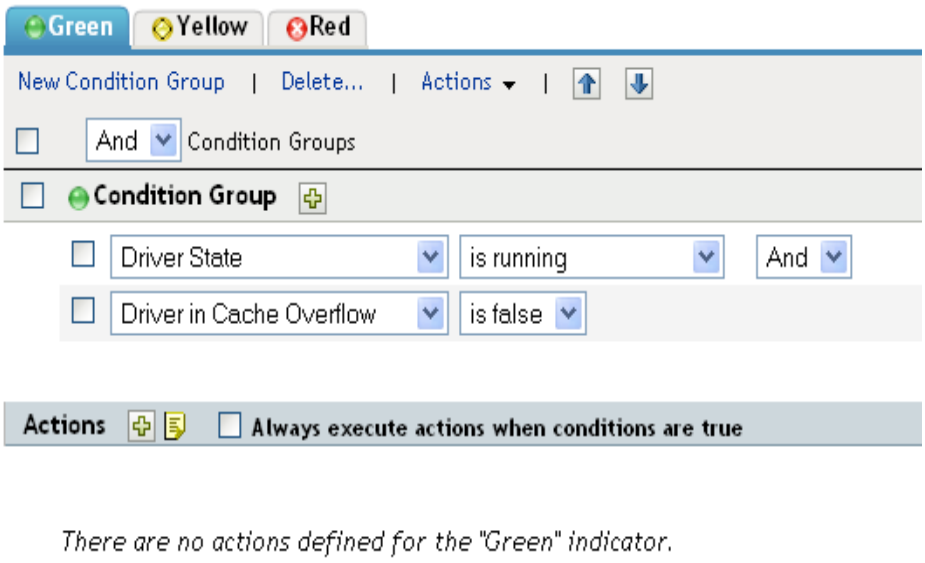
## 5.6 Creating a Custom State

You can create one or more custom states to perform actions independent of the driver's current health state (green, yellow, red). If a custom state's conditions are met, its actions are performed regardless of the current health state.

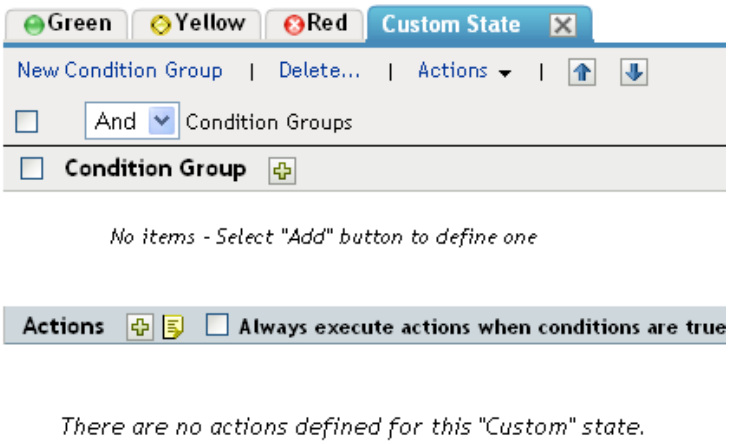
As with the green, yellow, and red health states, a custom state's actions are performed only once each time the conditions are met; as long as the state remains true, the actions are not repeated. If the state changes because its conditions are no longer met, the actions are performed again the next time the conditions are met.

1 Open the Driver Health Configuration page for a driver for which you want to create a custom state.

For help opening the Driver Health Configuration page, see Step 1 through Step 3 on page 24.




2 On any of the tabs, click *Actions*, then click *New Custom State*.




3 Follow the instructions in Section 5.4, "Modifying the Conditions for a Health State," on page 27 and Section 5.5, "Modifying the Actions for a Health State," on page 30 to define the custom state's conditions and actions.

## 5.7 Memory Requirements for Driver Health

The combination of interval, interval-units, duration, and duration-units define how much sampling data is maintained by the Driver Health Job. The values for these parameters directly affect how much memory the Driver Health Job requires to run.

The number of samples per driver per server is calculated as:

Number of samples = ((duration * duration units) / (polling interval * polling units)) + 1

For example, if

duration = 12 hours
polling interval = 1 minute

Number of samples = (12*60) / (1*1) + 1 = 721

If there are 4 drivers on 1 server, total number of samples = 4*1*721 = 2884.

Each sample stores data from 5 points in the publisher channel and 5 points in the subscriber channel.

### Publisher Channel Points:

publisher-commands
publisher-command-results
publisher-post-event-transformation
publisher-post-input-transformation
publisher-reported-events

### Subscriber Channel Points:

subscriber-commands
subscriber-command-results
subscriber-pre-output-transformation
subscriber-post-event-transformation
subscriber-reported-events

A sample contains a list of IDs and counts for each point. IDs correspond to operations such as query, status, instance, add-association, and so on.

Consider the following driver cache statistics:

```
<subscriber>
   <operations>
        <command-results>
            <status>12</status>
            <instance>12</instance>
        </command-results>
   </operations>
</subscriber>
```

For subscriber-command-results, the list has IDs 7,21 (for instance and status) and counts 12,12.

Each sample consumes ~700 bytes.

721 samples consume ~ 500 KB. This is the memory requirement per driver.

For 4 drivers, 2 MB is required for storing sampling data.

# Viewing Driver Statistics

6

You can use Novell iManager to view a variety of statistics for a single driver or for an entire driver set. This includes statistics such as the cache file size, the size of the unprocessed transactions in the cache file, the oldest and newest transactions, and the total number of unprocessed transactions by category (add, remove, modify, and so forth). The following sections provide instructions:

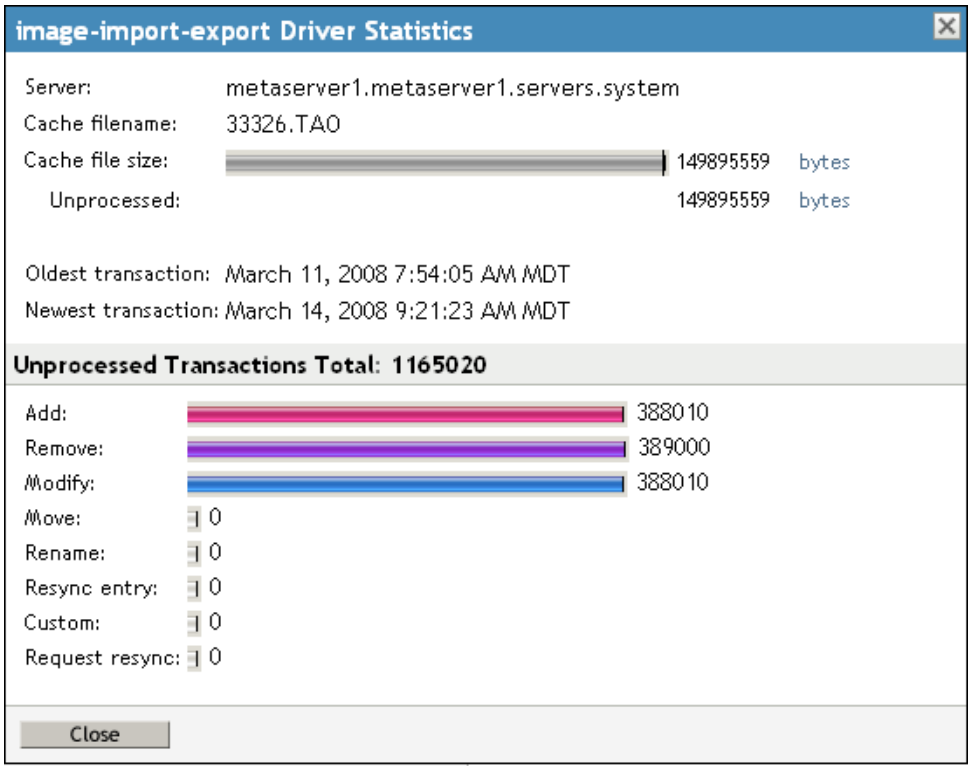

- Section 6.1, "Viewing Statistics for an Individual Driver," on page 35
- Section 6.2, "Viewing Statistics for a Driver Set," on page 36


## 6.1 Viewing Statistics for an Individual Driver

1. In iManager, click to display the Identity Manager Administration page.
2. In the *Administration* list, click *Identity Manager Overview* to display the Identity Manager Overview page.

   You use the Identity Manager Overview page to locate the driver set in which the driver resides.
3. In the *Search in* field, specify the fully distinguished name of the container where you want to start searching for the driver set, then click . Or click to browse for and select the container in the tree structure.

   iManager keeps a record of the objects you have previously selected, so you can also use the to select the container from a list of previously selected objects. Or, you can search from the root of the tree by simply clicking .
4. After the search completes and displays the driver sets, click the driver set in which the driver resides to display the Driver Set Overview page.
5. Locate the driver whose statistics you want to check, click the driver's *Status* icon (the green or red circle on the driver icon), then click *Statistics*.




**Server:** The name of the server running the driver.

**Cache Filename:** The name of the cache file.

**Cache File Size:** The total size of the cache file.

**Unprocessed:** The amount of cache file space being used for unprocessed transactions.

**Oldest Transaction:** The date and time of the oldest transaction in the cache.

**Newest Transaction:** The date and time of the newest transaction in the cache.

**Unprocessed Transactions Total:** The total number of unprocessed transactions in the cache. Individual transaction types (add, remove, modify, and so forth), with the number of unprocessed transactions for each type, are listed below the total.

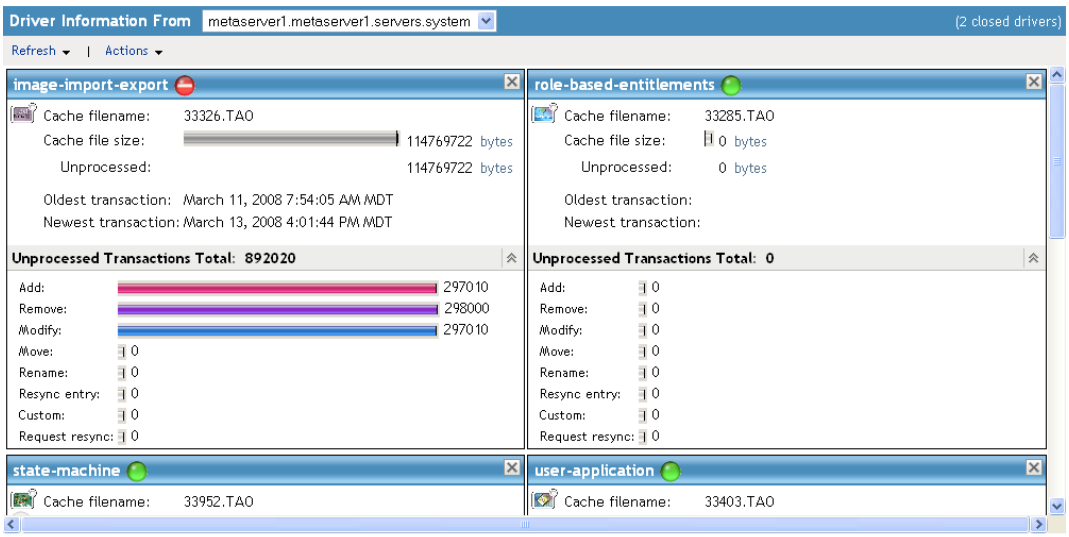
## 6.2 Viewing Statistics for a Driver Set

1. In iManager, click to display the Identity Manager Administration page.
2. In the *Administration* list, click *Driver Set Dashboard* to display the Driver Set Query page.

   You use the Driver Set Query page to specify the driver set for which you want to display statistics.
3. In the *Driver Set* field, specify the fully distinguished name of the driver set, then click *OK*. Or click to browse for and select the driver set in the tree structure, then click *OK*.

   iManager keeps a record of the objects you have previously selected, so you can also use the icon to select the container from a list of previously selected objects.

   A page is displayed that allows you to view the statistics for all of the drivers contained in the driver set.




- To refresh the statistics, click *Refresh*, then select *Refresh now* or select a refresh interval.
- To close the statistics for a driver, click the ☒ button in the upper right corner of the driver's statistics window.
- To open the statistics for all drivers, click *Actions* > *Show all drivers*.
- To collapse the list of unprocessed transactions for a driver, click the button located above the list. To collapse the list of unprocessed transactions for all drivers, click *Actions* > *Collapse all transactions*
- To expand the list of transactions, click the button. To expand the list of unprocessed transactions for all drivers, click *Actions* > *Expand all transactions*.
- To change the layout of the driver dashboard, click *Actions*, then select a column layout.

# Managing Associations between Drivers and Objects

# 7

Novell iManager provides two tools to enable you to view and manage the associations between drivers and objects (data).

The first tool is the Driver Inspector. The Driver Inspector displays all objects associated with a driver and lets you perform various actions on those associations, such as deleting an object or modifying its properties.

The second tool is the Object Inspector. The Object Inspector displays all connected systems associated with an object. For each association, you can perform various actions, including viewing the object's data flow between the Identity Vault and the connected system, configuring the connected system's driver or driver set, viewing the entitlements, and removing the association between the object and the connected system.

The following sections provide instructions for using the Driver Inspector and Object Inspector.

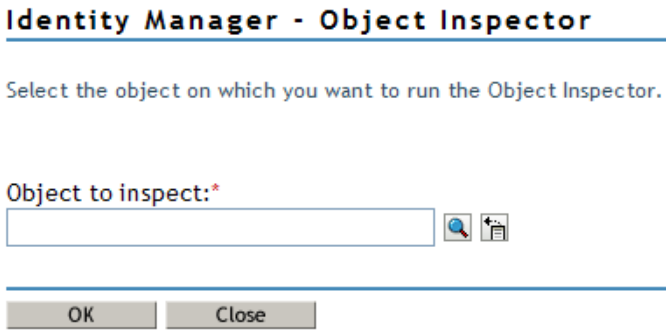

- Section 7.1, "Inspecting Objects," on page 39
- Section 7.2, "Inspecting Drivers," on page 41


## 7.1 Inspecting Objects

You can use the Object Inspector to view detailed information about how an object participates in Identity Manager relationships. These relationships include the connected systems that are associated with the object, how data flows between the Identity Vault and the connected systems, the attribute values that are currently stored in the Identity Vault and on the connected systems, the connected system driver configurations, and so forth.

1. In iManager, click to display the Identity Manager Administration page.
2. In the *Administration* list, click *Object Inspector* to display the Object Inspector page.

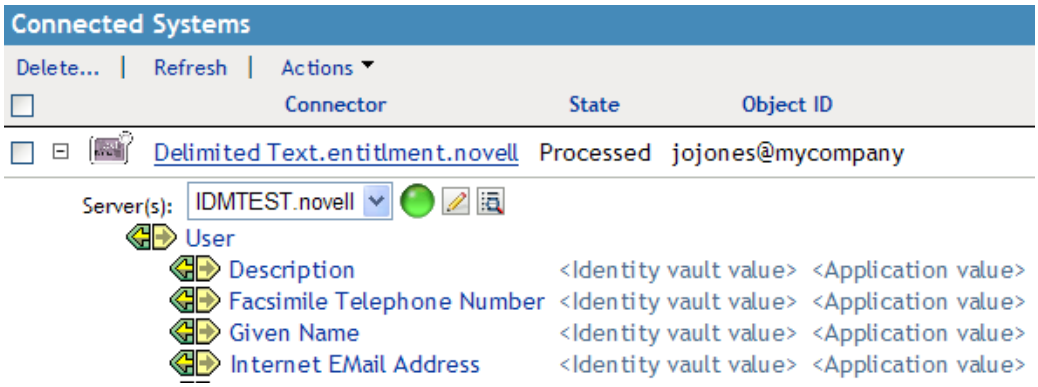
   This page allows you to select an object to inspect.




3. Specify the fully distinguished name of the object that you want to inspect, or click to select the desired object.

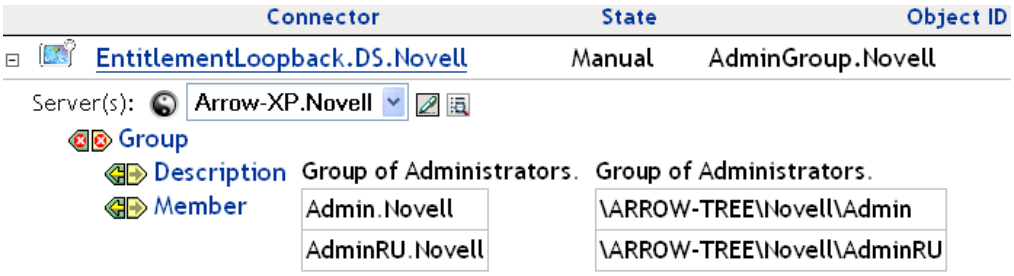
iManager keeps a record of the objects you have previously selected, so you can also use the icon to select from a list of previously selected objects.

4 After you've selected the object, click *OK* to display the Object Inspector page.




The Connected Systems section lists each of the connected systems with which the object is associated. You can perform any of the following actions:

- **Delete:** To delete an association with a connected system, select the check box to the left of the association and click *Delete*. To delete all associations, select the check box beneath the Delete column, then click *Delete*.
- **Refresh:** Select *Refresh* to re-read the connected system associations and refresh the table.
- **Actions:** Select a connected system by clicking the check box to the left of the association reference (you do not need to select any boxes for the *Add New Association* action item). Click *Actions*, then choose one of the following options:
  - **Run Overview on Driver:** Launches the overview page for the connected system's driver.
  - **Run Overview on Driver Set:** Launches the overview page for the connected system's driver set.
  - **Configure Driver:** Launches the properties page for the connected system's driver so that you can modify the driver's properties.
  - **Configure Driver Set:** Launches the properties page for the connected system's driver set so that you can modify the driver set's properties.
  - **Add New Association:** Prompts you for the parameters necessary to add new attribute values to the object's DirXML-Association attribute.
  - **Edit Selected Association:** Prompts you to edit the parameters of the connected system's DirXML-Association attribute values.
  - **View Entitlements:** Displays a list of the entitlements associated with the connected system. The list displays the current state of the entitlement (granted or revoked) as well as the source of the entitlement (for example, workflow or role-based).
- **Connector:** Lists the connected system's fully distinguished name that is associated with the object. Click the + icon next to the connected system to see how data flows through the connected system.




The Servers entry shows the servers that are associated with the driver set. Clicking the *Edit* icon to the right of the server brings up the server's properties page in a pop-up window. Clicking the *Query* icon queries the attribute values for all classes in the driver filter. The larger the filter, the longer the query takes. If the Inspector cannot communicate with the connected system, you see a message stating that the attribute cannot be queried from the application.

The driver filter's associated classes (such as Group) and their attributes (such as Description and Member) are listed under the Server entry. Click the class to see all of the values for the defined attributes in that class. You can also click an attribute to see its values, or you can click the entries to the right of the attributes to see just the Identity Vault value or the application value. If no value has been defined, the entry displays No Values. If the Inspector cannot communicate with the connected system, you see a message stating that the attribute cannot be queried from the application.

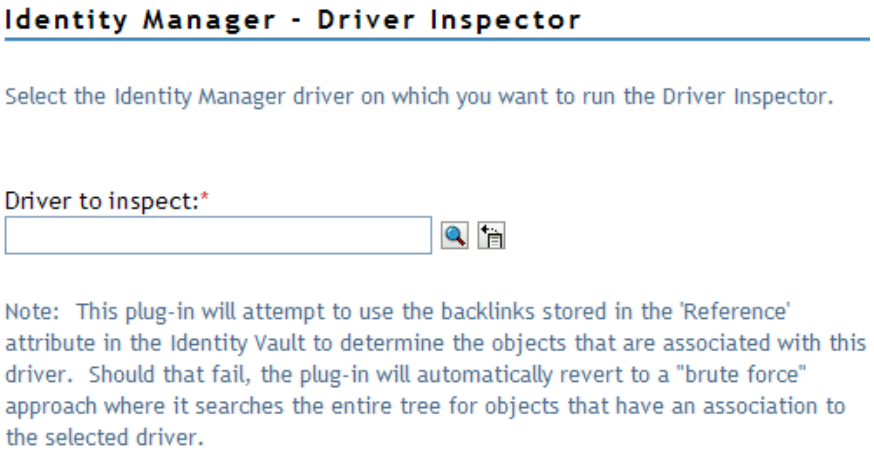
- **States:** The connected system's driver states are Enabled, Disabled, Processed, Pending, Manual, and Migrate.
- **Object ID:** The identification value of the associated object to the connected system. If the connected system driver has no identification, this column displays *None*.

## 7.2 Inspecting Drivers

You can use the Driver Inspector to view detailed information about the objects associated with a driver.

1. In iManager, click to display the Identity Manager Administration page.
2. In the *Administration* list, click *Driver Inspector* to display the Driver Inspector page.

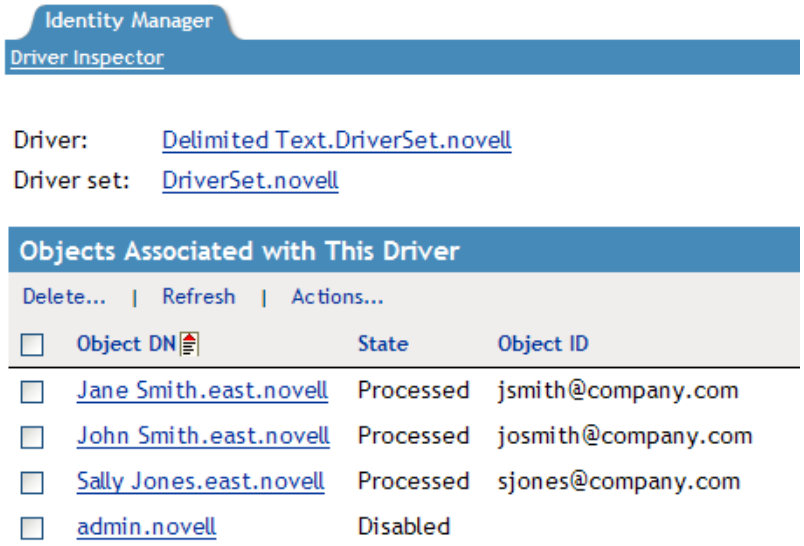
   This page allows you to select a driver to inspect.



3 Specify the fully distinguished name of the driver that you want to inspect, or click the icon to select the desired driver.

iManager keeps a record of the objects you have previously selected, so you can also use the icon to select from a list of previously selected objects.

4 After you've selected the driver to inspect, click *OK* to display the Driver Inspector page.




The page displays information about the objects associated with the selected driver. You can perform any of the following actions:

- **Driver:** Displays the name of the inspected driver. Click the driver name to display the Driver Overview page.
- **Driver Set:** Displays the name of the driver set in which the inspected driver resides. Click the driver set name to display the Driver Set Overview page.
- **Delete:** Removes the association between the driver and an object. Select the check box in front of the object you no longer want associated with the driver, click *Delete*, then click *OK* to confirm the deletion.
- **Refresh:** Select this option to re-read all of the objects associated with the driver and refresh the displayed information.
- **Show:** Select the number of associations to display per page. You can select a predefined number (25, 50, or 100) or specify another number of your choice. The default is 50 associations per page. If there are more associations than the number displayed, you can use the and buttons to display the next and previous pages of associations.
- **Actions:** Perform actions on the objects associated with the driver. Click *Actions*, then select one of the following options:
  - **Show All Associations:** Displays all objects associated with the driver.
  - **Filter for Disabled Associations:** Displays all objects associated with the driver that have a Disabled state.
  - **Filter for Manual Associations:** Displays all objects associated with the driver that have a Manual state.
  - **Filter for Migrate Associations:** Displays all objects associated with the driver that have a Migrate state.

    - **Filter for Pending Associations:** Displays all objects associated with the driver that have a Pending state.
    - **Filter for Processed Associations:** Displays all objects associated with the driver that have a Processed state.
    - **Filter for Undefined Associations:** Displays all objects associated with the driver that have an Undefined state.
    - **Association Summary:** Displays the state of all objects associated with the driver.
- **Object DN:** Displays the DN of the associated objects.
- **State:** Displays the association state of the object.
- **Object ID:** Displays the value of the association.

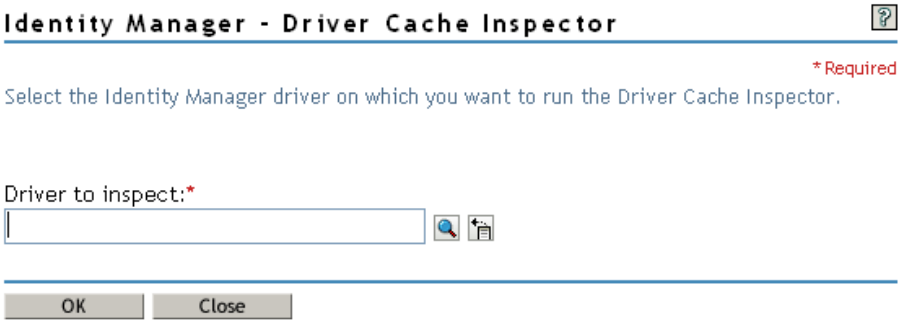
# Inspecting a Driver's Cache File

8

You can use iManager to view the transactions in a driver's cache file. The Driver Cache Inspector displays information about the cache file, including a list of the events to be processed by the driver.

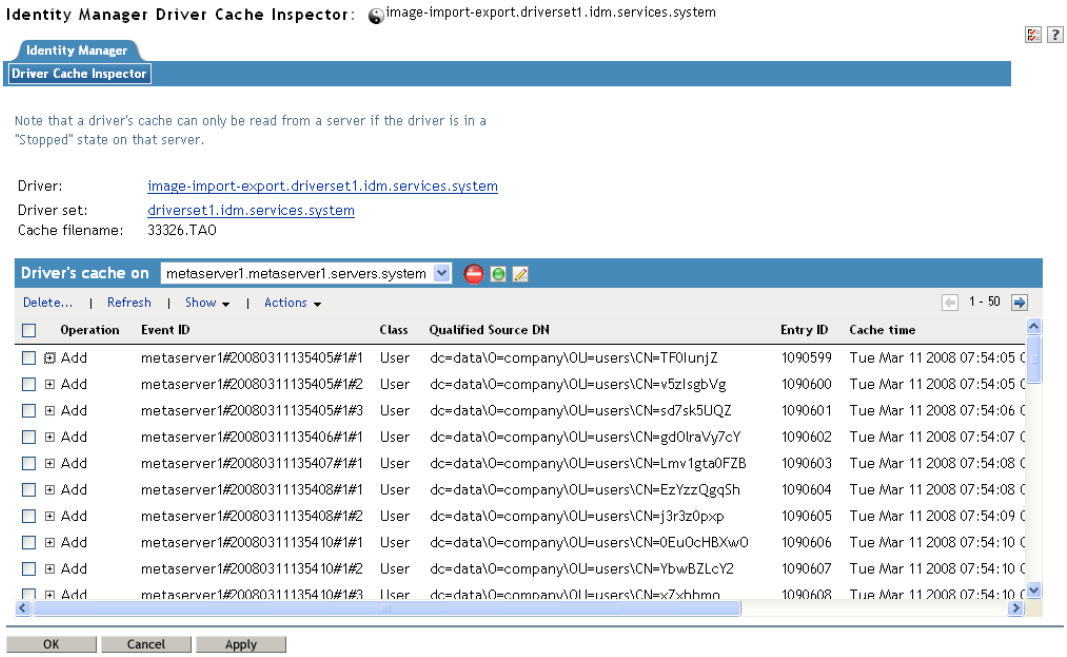
1 In iManager, click to display the Identity Manager Administration page.

2 In the *Administration* list, click *Driver Cache Inspector* to display the following page.




3 Specify the fully distinguished name of the driver whose cache you want to inspect, or click the button to select the desired driver, then click *OK* to display the Driver Cache Inspector page.

A driver's cache file can only be read when the driver not running. If the driver is stopped, the Driver Cache Inspector page displays the cache as shown in the screen shot below. If the driver is running, the page displays a `Driver not stopped, cache cannot be read` note in place of the cache entries. To stop the driver, click the button; the cache is then read and displayed.




- **Driver:** Lists the driver that is associated with the cache file. Click the link to display the Driver Overview page.

- **Driver Set:** Lists the driver set in which the driver resides. Click the link to display the Driver Set Overview page.
- **Driver's cache on:** Lists the server that contains this instance of the cache file. If the driver is running on multiple servers, you can select another server in the list to view the driver's cache file for that server.
- **Start/Stop Driver icons:** Displays the current state of the driver and allows you to start or stop the driver. The cache can only be read while the driver is stopped.
- **Edit icon:** Allows you to edit the properties of the currently selected server.
- **Delete:** Select entries in the cache, then click *Delete* to remove them from the cache file.
- **Refresh:** Select this option to re-read the cache file and refresh the displayed information.
- **Show:** Select the number of entries to display per page. You can select a predefined number (25, 50, or 100) or specify another number of your choice. The default is 50 entries per page. If there are more entries than the number displayed, you can use the ➡ and ⬅ buttons to display the next and previous pages.
- **Actions:** Allows you to perform actions on the entries in the cache file. Click *Actions* to expand the menu, then select one of the following options:
  - **Expand All:** Expands all of the entries displayed in the cache file.
  - **Collapse All:** Collapses all of the entries displayed in the cache file.
  - **Go To:** Allows you to access a specified entry in the cache file. Specify the entry number, then click *OK*.
  - **Cache Summary:** Summarizes all of the events stored in the cache file.

# Securely Storing Driver Passwords with Named Passwords

9

Identity Manager allows you to securely store multiple passwords for a driver. This functionality is referred to as Named Passwords. Each different password is accessed by a key, or name.

You can add Named Passwords to a driver set or to individual drivers. Named Passwords for a driver set are available to all drivers in the set. Named Passwords for an individual driver are available only to that driver.

To use a Named Password in a driver policy, you refer to it by the name of the password, instead of using the actual password, and the Metadirectory engine sends the password to the driver. The method described in this section for storing and retrieving Named Passwords can be used with any driver without making changes to the driver shim.

---

**NOTE:** The sample configurations provided for the Identity Manager Driver for Lotus Notes include an example of using Named Passwords in this way. The Notes driver shim has also been customized to support other ways of using Named Passwords, and examples of those methods are also included. For more information, see the section on Named Passwords in the *Identity Manager Driver Guide for Lotus Notes*.

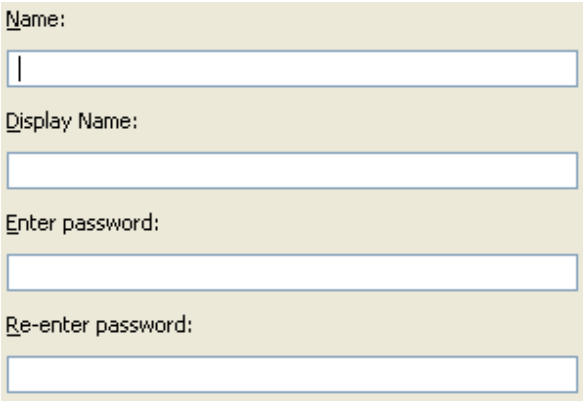
---

In this section:


- Section 9.1, “Using Designer to Configure Named Passwords,” on page 47
- Section 9.2, “Using iManager to Configure Named Passwords,” on page 48
- Section 9.3, “Using Named Passwords in Driver Policies,” on page 49
- Section 9.4, “Using the DirXML Command Line Utility to Configure Named Passwords,” on page 50


## 9.1 Using Designer to Configure Named Passwords

1. Select the driver, then right-click and select *Properties*.
2. Select *Named Password*, then click *New*.




3 Specify a name, display name, and a password, then click *OK* twice.

## 9.2 Using iManager to Configure Named Passwords

1 Locate the driver set or driver where you want to add a Named Password:

   1a Click to display the Identity Manager Administration page.

   1b In the *Administration* list, click *Identity Manager Overview*.

   1c If the driver set is not listed on the *Driver Sets* tab, use the *Search In* field to search for and display the driver set.

   1d Click the driver set to open the Driver Set Overview page.

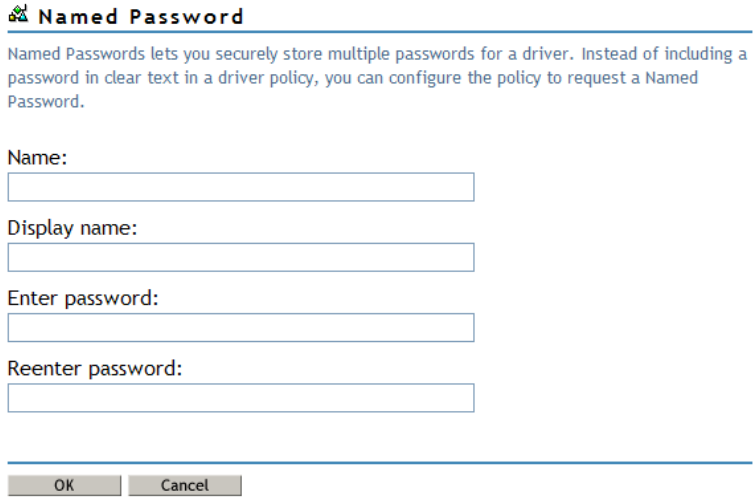
2 To add a Named Password to a driver set, click the Driver Set menu, then click Edit Driver Set properties.

   or

   To add a Named Password to a driver, click the upper right corner of the driver icon, then click *Edit properties*.

3 On the Identity Manager tab, click *Named Passwords*.

4 Click *Add* to display the following page.



5 Specify a name, display name and a password, then click *OK* twice.

6 A message is displayed, `Do you want to restart the driver to put your changes in effect?` Click *OK*.

# 9.3 Using Named Passwords in Driver Policies


- Section 9.3.1, "Using the Policy Builder," on page 49
- Section 9.3.2, "Using XSLT," on page 49


## 9.3.1 Using the Policy Builder

The Policy Builder allows you to make a call to a Named Password. Create a new rule and select Named Password as the condition, then set an action depending upon if the Named Password is available or not available.

1 In Designer, launch the Policy Builder, right-click, then click *New* > *Rule*.

2 Specify the name of the rule, then click *Next*.

3 Select the condition structure, then click *Next*.

4 Select *named password* for the *Condition*.

5 Browse to and select the Named Password that is stored on the driver.

   In this example, it is `user info`.

6 Select whether the operator is available or not available, then click *Next*.

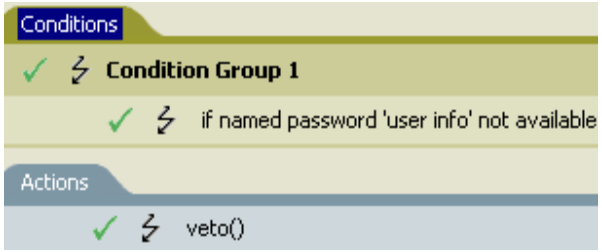
7 Select an action for the *Do* field.

   In this example, the action is *veto*.

8 Click *Finish*.

The example indicates that if the `user info` Named Password is not available, then the event is vetoed.

***Figure 9-1*** *A Policy Using Named Passwords*




## 9.3.2 Using XSLT

The following example shows how a Named Password can be referenced in a driver policy on the Subscriber channel in XSLT:

```
<xsl:value-of
select="query:getNamedPassword($srcQueryProcessor,'mynamedpassword')"
xmlns:query="http://www.novell.com/nxsl/java/
com.novell.nds.dirxml.driver.XdsQueryProcessor"/>
```

# 9.4 Using the DirXML Command Line Utility to Configure Named Passwords


- "Creating a Named Password in the DirXML Command Line Utility" on page 50
- "Removing a Named Password in the DirXML Command Line Utility" on page 52


## 9.4.1 Creating a Named Password in the DirXML Command Line Utility

1. Run the DirXML Command Line utility.

   For information, see Chapter 12, "Using the DirXML Command Line Utility," on page 61.

2. Specify your user name and password.

   The following list of options is displayed:

   ```
   DirXML commands

   1: Start driver
   2: Stop driver
   3: Driver operations...
   4: Driver set operations...
   5: Log events operations...
   6: Get DirXML version
   7: Job operations...
   99: Quit

   Enter choice:
   ```

3. Specify one of the following:

   - Option *3* for Driver Operations
   - Option *4* for Driver Set Operations

   **Option 3 for Driver Operations:** If you have specified *3*, a numbered list of drivers is displayed. Do the following:

   1. Specify the number for the driver you want to add a Named Password to.

      The following list of options is displayed:

      ```
      Select a driver operation for:
      driver_name

      1: Start driver
      2: Stop driver
      3: Get driver state
      4: Get driver start option
      5: Set driver start option
      6: Resync driver
      7: Migrate from application into DirXML
      8: Submit XDS command document to driver
      9: Submit XDS event document to driver
      10: Queue event for driver
      11: Check object password
      12: Initialize new driver object
      13: Passwords operations
      14: Cache operations
      99: Exit

      Enter choice:
      ```

2. Specify *13* for Password Operations.

   The following list of options is displayed.

```
Select a password operation

1: Set shim password
2: Reset shim password
3: Set Remote Loader password
4: Clear Remote Loader password
5: Set named password
6: Clear named password(s)
7: List named passwords
8: Get passwords state
99: Exit

Enter choice:
```

3. Specify *5* to set a new Named Password.

   Go to Step 4.

**Option 4 for Driver Set Operations:** If you have specified *4*, the following numbered list of driver set operations is displayed.

```
Select a driver set operation

1: Associate driver set with server
2: Disassociate driver set from server
3: Export Identity Manager server public key certificate
4: Regenerate Identity Manager server keypair
5: Passwords operations
6: Get default reciprocal attribute mappings
7: Regenerate all Identity Manager server keys
99: Exit

Enter choice:
```

Do the following:

1. Specify *5* for Password Operations.

   The following list of options is displayed.

```
Select a password operation

 1: Set named password
 2: Clear named password(s)
 3: List named passwords
99: Exit

Enter choice:
```

2. Specify 1 to set a new Named Password.

   Go to Step 4.

**4** At the following prompt, specify the name by which you want to refer to the Named Password:

```
Enter password name:
```

**5** At the following prompt, specify a description of the password:

```
Enter password description:
```

**6** At the following prompt, specify the actual password that you want to secure:

```
Enter password:
```

The characters you type for the password are not displayed.

7 At the following prompt, confirm the password by specifying it again:

```
Confirm password:
```

The password operations menu is displayed.

8 Specify the *99* option twice to exit the menu and quit the DirXML Command Line utility.

### 9.4.2 Removing a Named Password in the DirXML Command Line Utility

This option is useful if you no longer need Named Passwords you previously created.

1 Run the DirXML Command Line utility.

For information, see Chapter 12, "Using the DirXML Command Line Utility," on page 61.

2 Specify your user name and password.

The following list of options is displayed:

```
DirXML commands

1: Start driver
2: Stop driver
3: Driver operations...
4: Driver set operations...
5: Log events operations...
6: Get DirXML version
7: Job operations...
99: Quit

Enter choice:
```

3 Specify one of the following:

- Option *3* for Driver Operations
- Option *4* for Driver Set Operations

**Option 3 for Driver Operations:** If you have specified *3*, a numbered list of drivers is displayed. Do the following:

1. Enter the number for the driver you want to remove Named Passwords from.

   The following list of options is displayed:

   ```
   Select a driver operation for:
   driver_name

   1: Start driver
   2: Stop driver
   3: Get driver state
   4: Get driver start option
   5: Set driver start option
   6: Resync driver
   7: Migrate from application into DirXML
   8: Submit XDS command document to driver
   9: Submit XDS event document to driver
   10: Queue event for driver
   11: Check object password
   12: Initialize new driver object
   13: Passwords operations
   14: Cache operations
   99: Exit
   ```

```
Enter choice:
```

2. Specify *13* for Password Operations.

   The following list of options is displayed:

```
Select a password operation

1: Set shim password
2: Reset shim password
3: Set Remote Loader password
4: Clear Remote Loader password
5: Set named password
6: Clear named password(s)
7: List named passwords
8: Get passwords state
99: Exit

Enter choice:
```

3. (Optional) Specify *7* to see the list of existing Named Passwords.

   This helps you to make sure that you are removing the correct password.

4. Specify *6* to remove one or more Named Passwords.
5. Go to Step 4.

**Option 4 for Driver Set Operations:** If you have specified *4*, the following numbered list of driver set operations is displayed.

```
Select a driver set operation

1: Associate driver set with server
2: Disassociate driver set from server
3: Export Identity Manager server public key certificate
4: Regenerate Identity Manager server keypair
5: Passwords operations
6: Get default reciprocal attribute mappings
7: Regenerate all Identity Manager server keys
99: Exit

Enter choice:
```

Do the following:

1. Specify *5* for Password Operations.

   The following list of options is displayed.

```
Select a password operation

1: Set named password
2: Clear named password(s)
3: List named passwords
99: Exit

Enter choice:
```

2. (Optional) Specify *3* to see the list of existing Named Passwords.

   This helps you to make sure that you are removing the correct password.

3. Specify *2* to remove one or more Named Passwords.
4. Go to Step 4.

**4** At the following prompt, enter `No` to remove a single Named Password:

```
Do you want to clear all named passwords? (yes/no):
```

5 At the following prompt, enter the name of the Named Password you want to remove:

```
Enter password name:
```

The password operations menu is displayed.

6 (Optional) Specify the appropriate number to see the list of existing Named Passwords.

This step helps you to verify that you have removed the correct password.

7 Specify the *99* option twice to exit the menu and quit the DirXML Command Line utility.

# Configuring Java Environment Parameters

# 10

Rather than use command line options and configuration files to set the environment parameters for the Java virtual machine (JVM) associated with a driver set, you can use iManager or Designer.


- Section 10.1, "Using iManager to Configure the Java Environment Parameters," on page 55
- Section 10.2, "Using Designer to Configure the Java Environment Parameters," on page 56


## 10.1 Using iManager to Configure the Java Environment Parameters

1. Click to display the Identity Manager Administration page.
2. Open the properties for the driver set whose parameters you want to configure:
   - **2a** In the *Administration* list, click *Identity Manager Overview*.
   - **2b** If the driver set is not listed on the *Driver Sets* tab, use the *Search In* field to search for and display the driver set.
   - **2c** Click the driver set to open the Driver Set Overview page.
   - **2d** Click the *Driver Set* menu, then click *Edit Driver Set properties*.
3. Click *Misc* to display the property page that contains the Java environment parameters.
4. Modify the following settings as desired:

   **Classpath Additions:** Specify additional paths for the JVM to search for package (`.jar`) and class (`.class`) files. Using this parameter is the same as using the `java -classpath` command. When entering multiple class paths, separate them with a semicolon (;) for a Windows JVM and a colon (:) for a UNIX/Linux JVM.

   **JVM Options:** Specify additional options to use with the JVM. Refer to your JVM documentation for valid options.

   `DHOST_JVM_OPTIONS` is the corresponding environment variable. It specifies the arguments for JVM 1.2. For example:

   ```
   -Xnoagent -Xdebug -Xrunjdwp: transport=dt_socket,server=y, address=8000
   ```

   Each option string is separated by whitespace. If an option string contains whitespace, then it must be enclosed in double quotes.

   The driver set attribute option has precedence over the `DHOST_JVM_OPTIONS` environment variable. This environment variable is tacked on to the end of driver set attribute option.

   **Initial Heap Size:** Specify the initial (minimum) heap size available to the JVM. Increasing the initial heap size can improve startup time and throughput performance. Use a numeric value followed by G, M, or K. If no letter size is specified, the size defaults to bytes. Using this parameter is the same as using the `java -Xms` command.

   `DHOST_JVM_INITIAL_HEAP` is the corresponding environment variable. It specifies the initial JVM heap size in decimal number of bytes. It has precedence over the driver set attribute option.

Refer to your JVM documentation for information about the JVM's default initial heap size.

**Maximum Heap Size:** Specify the maximum heap size available to the JVM. Use a numeric value followed by G, M, or K. If no letter size is specified, the size defaults to bytes. Using this parameter is the same as using the `java -Xmx` command.

`DHOST_JVM_MAX_HEAP` is the corresponding environment variable. It specifies the maximum JVM heap size in decimal number of bytes. It has precedence over the driver set attribute option.

Refer to your JVM documentation for information about the JVM's default maximum heap size.

5 Click *OK* to save your changes.

## 10.2 Using Designer to Configure the Java Environment Parameters

1 Open your project in the Modeler.

2 Right-click the driver set icon , then click *Properties* > *Java*.

3 Modify the following settings as desired:

**Server:** If the driver set is associated with multiple Metadirectory servers, select the server whose JVM parameters you want to configure.

**Classpath Additions:** Specify additional paths for the JVM to search for package (`.jar`) and class (`.class`) files. Using this parameter is the same as using the `java -classpath` command. When entering multiple class paths, separate them with a semicolon (;) for a Windows JVM and a colon (:) for a UNIX/Linux JVM.

**JVM Options:** Specify additional options to use with the JVM. Refer to your JVM documentation for valid options.

`DHOST_JVM_OPTIONS` is the corresponding environment variable. It specifies the arguments for JVM 1.2. For example:

```
-Xnoagent -Xdebug -Xrunjdwp: transport=dt_socket,server=y, address=8000
```

Each option string is separated by whitespace. If an option string contains whitespace, then it must be enclosed in double quotes.

The driver set attribute option has precedence over the `DHOST_JVM_OPTIONS` environment variable. This environment variable is tacked on to the end of driver set attribute option.

**Initial Heap Size:** Specify the initial (minimum) heap size available to the JVM in bytes. Increasing the initial heap size can improve startup time and throughput performance. Using this parameter is the same as using the `java -Xms` command.

`DHOST_JVM_INITIAL_HEAP` is the corresponding environment variable. It specifies the initial JVM heap size in decimal number of bytes. It has precedence over the driver set attribute option.

Refer to your JVM documentation for information about the JVM's default initial heap size.

**Maximum Heap Size:** Specify the maximum heap size available to the JVM. Use a numeric value followed by G, M, or K. If no letter size is specified, the size defaults to bytes. Using this parameter is the same as using the `java -Xmx` command.

`DHOST_JVM_MAX_HEAP` is the corresponding environment variable. It specifies the maximum JVM heap size in decimal number of bytes. It has precedence over the driver set attribute option.

Refer to your JVM documentation for information about the JVM's default maximum heap size.

4 Click *OK* to save your changes.

5 To deploy the changes into your Identity Vault, right-click the driver set icon , click *Live* > *Deploy*, and follow the deployment prompts.

# Reassociating a Driver Set Object with a Server

# 11

A driver set object is associated with a server. If the association becomes invalid for some reason, it is indicated by one of the following:

- When upgrading eDirectory on your Identity Manager server, you get the error `UniqueSPIException error -783`.
- No server is listed in the *Servers* tab on the driver or driver set.
- A server is listed next to the driver in the Identity Manager Overview screen, but the name is garbled text.

To resolve this issue, you must disassociate the driver set object and the server, and then reassociate them:

1. In iManager, click to display the Identity Manager Administration page.
2. In the *Administration* list, click *Identity Manager Overview*.
3. In the *Search in* field, specify the fully distinguished name of the container where you want to start searching and then click , or click to browse for and select the container in the tree structure.
4. Click the driver set object that you want to reassociate with a server.
5. In the *Overview* tab, click *Servers*.
6. Click *Remove server*.
7. Click *Add server*.

Be aware that when you reassociate a driver set object with a server, all drivers are disabled, and all passwords are cleared.

# Using the DirXML Command Line Utility

# 12

The DirXML Command Line utility allows you to use a command line interface to manage the driver. The primary use of this utility is to allow you to create platform-specific scripts to manage the driver.

The utility and scripts are installed on all platforms during the Identity Manager installation. The utility is installed to the following locations:

- Windows: `\Novell\Nds\dxcmd.bat`
- UNIX/Linux: `/usr/bin/dxcmd`

There are two different methods for using the DirXML Command Line utility:


- Section 12.1, “Interactive Mode,” on page 61
- Section 12.2, “Command Line Mode,” on page 72


## 12.1 Interactive Mode

The interactive mode provides a text interface to control and use the DirXML Command Line utility.

1. At the console, enter `dxcmd`.
2. Enter the name of a user with sufficient rights to the Identity Manager objects, such as admin.novell.
3. Enter the user’s password.

```
DirXML commands

 1: Start driver
 2: Stop driver
 3: Driver operations...
 4: Driver set operations...
 5: Log events operations...
 6: Get DirXML version
 7: Job operations...
99: Quit

Enter choice:
```

4. Enter the number of the command you want to perform.

   Table 12-1 on page 62 contains the list of options and what functionality is available.
5. Enter 99 to quit the utility.

---

**NOTE:** If you are running eDirectory 8.8 on UNIX or Linux, you must specify the -host and -port parameters. For example, `dxcmd -host 10.0.0.1 -port 524`. If the parameters are not specified, a jclient error occurs.

```
novell.jclient.JCException: connect (to address) 111 UNKNOWN ERROR
```

By default, eDirectory 8.8 is not listening to localhost. The DirXML Command Line utility needs to resolve the server IP address or hostname and the port to be able to authenticate.

***Table 12-1*** *Interactive Mode Options*

| Option | Description |
|---|---|
| 1: *Start Driver* | Starts the driver. If there is more than one driver, each driver is listed with a number. Enter the number of the driver to start the driver. |
| 2: *Stop Driver* | Stops the driver. If there is more than one driver, each driver is listed with a number. Enter the number of the driver to stop the driver. |
| 3: *Driver operations* | Lists the operations available for the driver. If there is more than one driver, each driver is listed with a number. Enter the number of the driver to see the operations available. For a list of operations, see Table 12-2 on page 63. |
| 4: *Driver set operations* | Lists the operations available for the driver set. For a list of operations, see Table 12-3 on page 66. |
| 5: *Log events operations* | Lists the operations available for logging events through Novell Audit. For a description of these options, see Table 12-6 on page 69. |
| 6: *Get DirXML version* | Lists the version of the Identity Manager installed. |
| 7: *Job operations* | Manages jobs created for Identity Manager. |
| 99: *Quit* | Exits the DirXML Command Line utility. |

***Figure 12-1*** *Driver Options*

```
Select a driver operation for:
Active Directory.Driver Set.Novell.IDMDESIGNTREE.

 1: Start driver
 2: Stop driver
 3: Get driver state
 4: Get driver start option
 5: Set driver start option
 6: Resync driver
 7: Migrate from application into DirXML
 8: Submit XDS command document to driver
 9: Submit XDS event document to driver
10: Queue event for driver
11: Check object password
12: Initialize new driver object
13: Passwords operations
14: Cache operations
99: Exit

Enter choice:
```

***Table 12-2*** *Driver Options*

| Options | Description |
|---|---|
| 1: *Start driver* | Starts the driver. |
| 2: *Stop driver* | Stops the driver. |
| 3: *Get driver state* | Lists the state of the driver.<br>◆ 0 - Driver is stopped<br>◆ 1 - Driver is starting<br>◆ 2 - Driver is running<br>◆ 3 - Driver is stopping |
| 4: *Get driver start option* | Lists the current driver start option.<br>◆ 1 - Disabled<br>◆ 2 - Manual<br>◆ 3 - Auto |
| 5: *Set driver start option* | Changes the start option of the driver.<br>◆ 1 - Disabled<br>◆ 2 - Manual<br>◆ 3 - Auto<br>◆ 99 - Exit |
| 6: *Resync driver* | Forces a resynchronization the driver. It prompts for a time delay: *Do you want to specify a minimum time for resync? (yes/no).*<br>If you enter Yes, specify the date and time you want the resynchronization to occur: *Enter a date/time (format 9/27/05 3:27 PM)*.<br>If you enter No, the resynchronization occurs immediately. |
| 7: *Migrate from application into DirXML* | Processes an XML document that contains a query command: *Enter filename of XDS query document:*<br>Create the XML document that contains a query command by using the Novell `nds.dtd` (http://developer.novell.com/ndk/doc/dirxml/dirxmlbk/ref/ndsdtd/query.html).<br>Examples:<br>NetWare: `sys:\files\query.xml`<br>Windows: `c:\files\query.xml`<br>Linux: `/files/query.xml` |

| Options | Description |
| --- | --- |
| 8: *Submit XDS command document to driver* | Submits an XDS command document to the driver's Subscriber channel, bypassing the driver cache. The document is processed before anything that might be in the cache at the time of the submission. It also means that the submission fails if the driver is not running.<br><br>*Enter filename of XDS command document:*<br><br>Examples:<br><br>Windows: `c:\files\user.xml`<br><br>Linux: `/files/user.xml`<br><br>*Enter name of file for response:*<br><br>Examples:<br><br>Windows: `c:\files\user.log`<br><br>Linux: `/files/user.log` |
| *9: Submit XDS event document to driver* | Submits an XDS event document to the driver's Subscriber channel, bypassing the driver cache. The document is processed before anything that might be in the cache at the time of the submission. It also means that the submission fails if the driver is not running.<br><br>*Enter filename of XDS event document:*<br><br>Examples:<br><br>Windows: `c:\files\add.xml`<br><br>Linux: `/files/add.xml` |
| *10: Queue event for driver* | Submits a document to the driver's Subscriber channel by queuing the document in the driver cache. The document is processed after anything that might be in the cache at the time of the submission. The submission does not fail if the driver is not running.<br><br>*Enter filename of XDS event document:*<br><br>Examples:<br><br>Windows: `c:\files\add.xml`<br><br>Linux: `/files/add.xml` |
| 11: *Check object password* | Validates that an object's password in the connected system is associated with a driver. It matches the object's eDirectory password (Distribution Password, used with Universal Password).<br><br>*Enter user name*: |

| Options | Description |
|---|---|
| 12: *Initialize new driver object* | Performs an internal initialization of data on a new Driver object. This is only for testing purposes. |
| 13: *Password operations* | There are nine Password options. See Table 12-4 on page 67 for a description of these options. |
| 14: *Cache operations* | There are five Cache operations. See Table 12-5 on page 68 for a descriptions of these options. |
| 99: *Exit* | Exits the driver options. |

### Sample XDS Event Document

```
<nds dtdversion="1.1" ndsversion="8.6" xml:space="default">
  <input>
    <add class-name="User" src-dn="Doe John">
      <association>JDoe@novell.com</association>
      <add-attr attr-name="LastName">
        <value type="string">John</value>
      </add-attr>
      <add-attr attr-name="FirstName">
        <value type="string">Doe</value>
      </add-attr>
      <add-attr attr-name="Email">
        <value type="string">JDoe@novell.com</value>
      </add-attr>
    </add>
  </input>
</nds>
```

### Sample XDS Command Document

```
<nds dtdversion="3.5" ndsversion="8.x">
  <source>
    <product version="3.5.11.4223">DirXML</product>
    <contact>Novell, Inc.</contact>
  </source>
  <input>
    <add cached-time="20080519102858.809Z" class-name="User" eventid=
      "blr-krajiv-sles#20080519102858#1#1" qualified-srcdn=
      "O=n\OU=People\CN=JDoe" src-dn="\KRAJIV-LINUXTREE\n\People\JDoe"
      src-entry-id="32956" timestamp="1211192938#9">
      <add-attr attr-name="Internet EMail Address">
        <value timestamp="1211192938#8"
          type="string">JDoe@novell.com</value>
      </add-attr>
      <add-attr attr-name="Given Name">
        <value timestamp="1211192938#5" type="string">John</value>
      </add-attr>
      <add-attr attr-name="Surname">
        <value timestamp="1211192938#9" type="string">Doe</value>
      </add-attr>
    </add>
  </input>
</nds>
```

***Figure 12-2*** *Driver Set Operations*

```
Select a driver set operation

 1: Associate driver set with server
 2: Disassociate driver set from server
 3: Export Identity Manager server public key certificate
 4: Regenerate Identity Manager server keypair
 5: Passwords operations
 6: Get default reciprocal attribute mappings
 7: Regenerate all Identity Manager server keys
99: Exit

Enter choice:
```

***Table 12-3*** *Driver Set Operations*

| Operation | Description |
|---|---|
| *1: Associate driver set with server* | Adds a driver set to the server after which the driver set becomes active. |
| *2: Disassociate driver set from server* | Removes a driver set from the server after which the driver set becomes inactive. |
| *3: Export Identity Manager server public key certificate* | Exports the DirXML server's public key certificate which is used for encrypting data when setting passwords. |
| *4: Regenerate Identity Manager server keypair* | Makes the DirXML Engine regenerate the public key/private key pair which is used for encrypting data when setting passwords. |
| 5: Passwords operations | There are four password operations. For description of these operations, see the operations 5, 6, 7, and 99 in the Table 12-4 on page 67. |
| *6: Get default reciprocal attribute mappings* | Lists the default reciprocal attribute mappings. |
| *7: Regenerate all Identity Manager server keys* | Makes the DirXML Engine regenerate all server-specific encryption keys. |
| 99: *Exit* | Exits the current menu and takes you back to the DirXML commands. |

***Figure 12-3*** *Password Operations*

```
Select a password operation

 1: Set shim password
 2: Clear shim password
 3: Set Remote Loader password
 4: Clear Remote Loader password
 5: Set named password
 6: Clear named password(s)
 7: List named passwords
 8: Get passwords state
99: Exit

Enter choice:
```

***Table 12-4*** *Password Operations*

| Operation | Description |
|---|---|
| 1: *Set shim password* | Sets the application password. This is the password of the user account you are using to authenticate into the connected system with. |
| 2: *Clear shim password* | Clears the application password. |
| 3: *Set Remote Loader password* | The Remote Loader password is used to control access to the Remote Loader instance.<br><br>Enter the Remote Loader password, then confirm the password by typing it again. |
| 4: *Clear Remote Loader password* | Clears the Remote Loader password so no Remote Loader password is set on the Driver object. |
| 5: *Set named password* | Allows you to store a password or other pieces of security information on the driver. See Chapter 9, "Securely Storing Driver Passwords with Named Passwords," on page 47 for more information.<br><br>There are four prompts to fill in:<br><br>◆ *Enter password name:*<br>◆ *Enter password description:*<br>◆ *Enter password:*<br>◆ *Confirm password* |
| 6: *Clear named passwords* | Clears a specified Named Password or all Named Passwords that are stored on the driver object: *Do you want to clear all named passwords? (yes/no).*<br><br>If you enter Yes, all Named Passwords are cleared. If you enter No, you are prompted to specify the password name that you want to clear. |

| Operation | Description |
|---|---|
| 7: *List named passwords* | Lists all Named Passwords that are stored on the driver object. It lists the password name and the password description. |
| 8: *Get password state* | Lists if a password is set for:<br>◆ Driver Object password:<br>◆ Application password:<br>◆ Remote loader password:<br>The dxcmd utility allows you to set the Application password and the Remote Loader password. You cannot set the Driver Object password with this utility. It shows if the password has been set or not. |
| 99: *Exit* | Exits the current menu and takes you back to the Driver options. |

***Figure 12-4*** *Cache Operations*

```
Enter choice: 14


Select a cache operation

 1: Get driver cache limit
 2: Set driver cache limit
 3: View cached transactions
 4: Delete cached transactions
99: Exit

Enter choice:
```

***Table 12-5*** *Cache Operations*

| Operation | Description |
|---|---|
| 1: *Get driver cache limit* | Displays the current cache limit that is set for the driver. |
| 2: *Set driver cache limit* | Sets the driver cache limit in kilobytes. A value of 0 is unlimited. |
| 3: *View cached transactions* | A text file is created with the events that are stored in cache. You can select the number of transactions to view.<br>◆ *Enter option token* (default=0):<br>◆ *Enter maximum transactions records to return* (default=1):<br>◆ *Enter name of file for response:* |

| Operation | Description |
|---|---|
| 4: *Delete cached transactions* | Deletes the transactions stored in cache.<br>◆ *Enter position token* (default=0):<br>◆ *Enter event-id value of first transaction record* to delete (optional):<br>◆ *Enter number of transaction records to delete* (default=1): |
| 99: *Exit* | Exits the current menu and takes you back to the Driver options. |

***Figure 12-5*** *Log Event Operations*

```
Select a log events operation

 1: Set driver set log events
 2: Reset driver set log events
 3: Set driver log events
 4: Reset driver log events
99: Exit

Enter choice:
```

***Table 12-6*** *Log Events Operations*

| Operation | Description |
|---|---|
| 1: *Set driver set log events* | Allows you to log driver set events through Novell Audit. There are 49 items you can select to log. See Table 12-7 on page 70 for a list of these options.<br>Enter the number of the item you want to log. After the items are selected, enter 99 to accept the selections. |
| 2: *Reset driver set log events* | Resets all of the log event options. |
| 3: *Set driver log events* | Allows you to log driver events through Novell Audit. There are 49 items to select to log. See Table 12-7 on page 70 for a list of these options.<br>Enter the number of the item you want to log. After the items are selected, enter 99 to accept the selections. |
| 4: *Reset driver log events* | Resets all of the log event options. |
| 99: *Exit* | Exits the log events operations menu. |

*Table 12-7 Driver Set and Driver Log Events*

| Options |
| --- |
| 1: Status success |
| 2: Status retry |
| 3: Status warning |
| 4: Status error |
| 5: Status fatal |
| 6: Status other |
| 7: Query elements |
| 8: Add elements |
| 9: Remove elements |
| 10: Modify elements |
| 11: Rename elements |
| 12: Move elements |
| 13: Add-association elements |
| 14: Remove-association elements |
| 15: Query-schema elements |
| 16: Check-password elements |
| 17: Check-object-password elements |
| 18: Modify-password elements |
| 19: Sync elements |
| 20: Pre-transformed XDS document from shim |
| 21: Post input transformation XDS document |
| 22: Post output transformation XDS document |
| 23: Post event transformation XDS document |
| 24: Post placement transformation XDS document |
| 25: Post create transformation XDS document |
| 26: Post mapping transformation <inbound> XDS document |
| 27: Post mapping transformation <outbound> XDS document |
| 28: Post matching transformation XDS document |
| 29: Post command transformation XDS document |
| 30: Post-filtered XDS document <Publisher> |
| 31: User agent XDS command document |

| Options |
| --- |
| 32: Driver resync request |
| 33: Driver migrate from application |
| 34: Driver start |
| 35: Driver stop |
| 36: Password sync |
| 37: Password request |
| 38: Engine error |
| 39: Engine warning |
| 40: Add attribute |
| 41: Clear attribute |
| 42: Add value |
| 43: Remove value |
| 44: Merge entire |
| 45: Get named password |
| 46: Reset Attributes |
| 47: Add Value - Add Entry |
| 48: Set SSO Credential |
| 49: Clear SSO Credential |
| 50: Set SSO Passphrase |
| 51: User defined IDs |
| 99: Accept checked items |

***Table 12-8*** *Job Operations*

| Options | Description |
| --- | --- |
| 1: *Get available job definitions* | Allows you to select an existing job.<br>*Enter the driverset number or the driver number:*<br>*Do you want to filter the job definitions by containment?* Enter Yes or No<br>*Enter name of the file for response:*<br>Examples:<br>Windows: `c:\files\user.log`<br>Linux: `/files/user.log` |

| Options | Description |
|---|---|
| 2: *Operations on specific job object* | Allows you to perform operations for a specific job.<br>*Enter the job number:*<br>The following list of options is displayed:<br>*1: Send job update notification*<br>*2: Start job*<br>*3: Abort running job*<br>*4: Get job state*<br>*5: Check job configuration*<br>*6: Passwords operations*<br>*99: Exit* |

## 12.2 Command Line Mode

The command line mode allows you to use script or batch files. Table 12-9 on page 72 contains the different options that are available.

To use the command line options, decide which items you want to use and string them together.

Example: `dxcmd -user admin.headquarters -host 10.0.0.1 -password n0vell -start test.driverset.headquarters`

This example command starts the driver.

***Table 12-9*** *Command Line Options*

| Option | Description |
|---|---|
| **Configuration** | |
| -user *<user name>* | Specify the name of a user with administrative rights to the drivers you want to test. |
| -host *<name or IP address>* | Specify the IP address of the server where the driver is installed. |
| -password *<user password>* | Specify the password of the user specified above. |
| -port *<port number>* | Specify a port number, if the default port is not used. |
| -q *<quiet mode>* | Displays very little information when a command is executed. |
| -v *<verbose mode>* | Displays detailed information when a command is executed. |
| -s *<stdout>* | Writes the results of the dxcmd command to stdout. |
| -? *<show this message>* | Displays the help menu. |
| -help *<show this message>* | Displays the help menu. |
| -cert *<X.509 DER certificate filename>* | Certificate file used for encrypting passwords. |

| Option | Description |
|---|---|
| -version *<n.n[.n[.n]]>* | Changes engine version by force. |
| -nossl | Uses clear socket for LDAP. |
| -keystore *<keystore path and filename>* | Specifies the filename of the Java keystore that contains the trusted root certificate of the issuer of the certificate used by the remote interface shim. |
| -storepass *<keystore password>* | Specifies the password for the Java keystore specified by the keystore parameter. |
| -dnform *<slash\|qualified-slash\|dot\|qualified-dot\|ldap>* | Changes the dn form by force. |
| **Actions** | |
| -start *<driver dn>* | Starts the driver. |
| -stop *<driver dn>* | Stops the driver. |
| -getstate *<driver dn>* | Returns the value that indicates the state of the driver (0 - stopped, 2 - running, and so on). |
| -getdriverstats *<driver dn> <output filename>* | Shows the statistics of the driver. |
| -resetdriverstats *<driver dn>* | Resets the statistics of the driver. |
| -getstartoption *<driver dn>* | Shows the startup option of the driver. |
| -setstartoption *<driver dn> <disabled\|manual\|auto> <resync\|noresync>* | Sets how the driver starts if the server is rebooted. Sets whether the objects are to be resynchronized when the driver restarts. |
| -getcachelimit *<driver dn>* | Lists the cache limit set for the driver. |
| -setcachelimit *<driver dn> <0 or positive integer>* | Sets the cache limit for the driver. |
| -migrateapp *<driver dn> <filename>* | Processes an XML document that contains a query command.<br><br>Create the XML document that contains a query command by using the Novell `nds.dtd` (http://www.novell.com/documentation/idm35/index.html?page=/documentation/idm35/policy_dtd/data/dtdndsoverview.html#dtdndsoverview). |
| -setshimpassword *<driver dn> <password>* | Sets the application password. This is the password of the user account you are using to authenticate into the connected system with. |
| -clearshimpassword *<driver dn> <password>* | Clears the application password. |
| -setremoteloaderpassword *<driver dn> <password>* | Sets the Remote Loader password.<br><br>The Remote Loader password is used to control access to the Remote Loader instance. |
| <clearremoteloaderpassword *<driver dn>* | Clears the Remote Loader password. |

| Option | Description |
|---|---|
| -sendcommand *<driver dn>* *<input filename>* *<output filename>* | Submits a document to the driver's Subscriber channel, bypassing the driver cache. The document gets processed ahead of anything that might be in the cache at the time of the submission. It also means that the submission fails if the driver is not running.<br><br>Specify the XDS command document as the input file.<br><br>Examples:<br><br>NetWare: `sys:\files\user.xml`<br><br>Windows: `c:\files\user.xml`<br><br>Linux: `/files/user.log`<br><br>Specify the output filename to see the results.<br><br>Examples:<br><br>NetWare: `sys:\files\user.log`<br><br>Windows: `c:\files\user.log`<br><br>Linux: `/files/user.log` |
| -sendevent *<driver dn>* *<input filename>* | Submits a document to the driver's Subscriber channel, bypassing the driver cache. The document gets processed ahead of anything that might be in the cache at the time of the submission. It also means that the submission fails if the driver is not running. |
| -queueevent *<driver dn>* *<input filename>* | Submits a document to the driver's Subscriber channel by queuing the document in the driver cache. The document gets processed after anything that might be in the cache at the time of the submission. The submission won't fail if the driver isn't running. |
| -setlogevents *<dn>* *<integer ...>* | Sets Novell Audit log events on the driver. The integer is the option of the item to log. See Table 12-7 on page 70 for the list of the integers to enter. |
| -clearlogevents *<dn>* | Clears all Novell Audit log events that are set on the driver. |
| -setdriverset *<driver set dn>* | Associates a driver set with the server. |
| -cleardriverset | Clears the driver set association from the server. |
| -getversion | Shows the version of Identity Manager that is installed. |
| -initdriver object *<dn>* | Performs an internal initialization of data on a new Driver object. This is only for testing purposes. |

| Option | Description |
|---|---|
| -setnamedpassword *<driver dn>* *<name>* *<password>* *[description]* | Sets Named Passwords on the driver object. You specify the name, the password, and the description of the Named Password. |
| -clearnamedpassword *<driver dn>* *<name>* | Clears a specified Named Password. |
| -startjob *<job dn>* | Starts the specified job. |
| -abortjob *<job dn>* | Aborts the specified job. |
| -getjobrunningstate *<job dn>* | Returns the specified job's running state. |
| -getjobenabledstate *<job dn>* | Returns the specified job's enabled state. |
| -getjobnextruntime *<job dn>* | Returns the specified job's next run time. |
| -updatejob *<job dn>* | Updates the specified job. |
| -clearallnamedpaswords *<driver dn>* | Clears all Named Passwords set on a specific driver. |

If a command line is executed successfully, it returns a zero. If the command line returns anything other than zero, it is an error. For example 0 means success, and -641 means invalid operation. -641 is an eDirectory error code. Table 12-10 on page 75 contains other values for specific command line options.

***Table 12-10*** *Command Line Option Values*

| Command Line Option | Values |
|---|---|
| -getstate | 0- stopped<br>1- starting<br>2- running<br>3- shutting down<br>11- get schema<br>Anything else that is returned is an error.<br>The getstate option returns the state of the driver. It doesn't show the state.<br>You can access the return value by using '$?' in UNIX/Linux and '%errorlevel%' in Windows. The return value can be used in a batch or shell script. |
| -getstartoption | 0- disabled<br>1- manual<br>2- auto<br>Anything else that is returned is an error. |

| Command Line Option | Values |
| --- | --- |
| -getcachelimit | 0- unlimited<br>Anything else that is returned is an error. |
| -getjobrunningstate | 0- stopped<br>1- running<br>Anything else that is returned is an error. |
| -getjobenabledstate | 0- disabled<br>1- enabled<br>2- configuration error<br>Anything else that is returned is an error. |
| -getjobnextruntime | The return is the next scheduled time for the job in eDirectory time format (number of seconds since 00:00:00 Jan 1, 1970 UTC). |

# Synchronizing Objects

# 13

The following sections explain how data is synchronized between the Identity Vault and connected systems:


- Section 13.1, "What Is Synchronization?," on page 77
- Section 13.2, "When Is Synchronization Done?," on page 77
- Section 13.3, "How Does the Metadirectory Engine Decide Which Object to Synchronize?," on page 78
- Section 13.4, "How Does Synchronization Work?," on page 79


## 13.1 What Is Synchronization?

The actions commonly referred to as "synchronization" in Identity Manager refer to several different but related actions:

- Synchronization (or merging) of attribute values of an object in the Identity Vault with the corresponding attribute values of an associated object in a connected system.
- Migration of all Identity Vault objects and classes that are included in the filter on the Subscriber channel.
- Generation of the list of objects to submit to the driver's Subscriber channel for synchronization or migration in response to a user request (a manual synchronization).
- Generation of the list of objects to submit to the driver's Subscriber channel for synchronization or migration in response to enabling a formerly disabled driver, or in response to a cache error.

## 13.2 When Is Synchronization Done?

The Metadirectory engine performs object synchronization or merging in the following circumstances:

- A `<sync>` event element is submitted on the Subscriber or Publisher channel.
- A `<sync>` event element is submitted on the Subscriber channel in the following circumstances:
  - The state of the object's association value is set to "manual" or "migrate." (This causes an eDirectory event, which in turn causes the Identity Manager caching system to queue an object synchronization command in the affected driver's cache.)
  - An object synchronization command is read from the driver's cache.
- A `<sync>` event element is submitted on the Publisher channel in the following circumstances:
  - A driver submits a `<sync>` event element. No known driver currently does this.
  - The Metadirectory engine submits a `<sync>` event element for each object found as the result of a migrate-into-NDS query. These `<sync>` events are submitted by using the Subscriber thread, but are processed using the Publisher channel filter and policies.

- An `<add>` event (real or synthetic) is submitted on a channel and the channel Matching policy finds a matching object in the target system.
- An `<add>` event with an association is submitted on the Subscriber channel. This normally occurs only in exceptional cases, such as the bulk load of objects into eDirectory with DirXML-Associations attribute values.
- An `<add>` event is submitted on the Publisher channel and an object is found in eDirectory that already has the association value reported with the `<add>` event.

The Metadirectory engine generates synchronization requests for zero or more objects in the following cases:

- The user issues a manual driver synchronization request. This corresponds to the *Resync* button in the Driver Set property page in ConsoleOne, or to the *Synchronize* button on the iManager Identity Manager Driver Overview page.
- The Metadirectory engine encounters an error with the driver's cache and cannot recover from the cache error. The driver's cache is deleted and the engine generates object synchronization commands as detailed in Section 13.3, "How Does the Metadirectory Engine Decide Which Object to Synchronize?," on page 78.

## 13.3 How Does the Metadirectory Engine Decide Which Object to Synchronize?

The Metadirectory engine processes both manually initiated and automatically initiated synchronization requests in the same manner. The only difference in the processing of manually initiated versus automatically initiated driver synchronization requests is the starting filter time used to filter objects being considered for synchronization.

The starting filter time is used to filter objects that have modification or creation times that are older than the starting time specified in the synchronization request.

For automatically initiated driver synchronization, the starting filter time is obtained from the time stamps of cached eDirectory events. In particular, the starting filter time is the earliest time for the cached events that haven't yet been successfully processed by the driver's Subscriber channel.

For manually initiated driver synchronization, the default starting filter time is the earliest time in the eDirectory database. In Identity Manager 2 and Identity Manager 3, an explicit starting filter time can also be set. In DirXML 1.1a there is no facility to set the starting filter time value for synchronization when manually initiating driver synchronization.

The Metadirectory engine creates a list of objects to be synchronized on the Subscriber channel in the following manner:

1. It finds all objects that have an entry modification time stamp greater than or equal to the starting filter time.
2. It finds all objects that have an entry creation time stamp greater than or equal to the starting filter time.
3. It adds a `synchronize object` command to the driver cache for each unique object found that has an entry modification time stamp greater than or equal to the starting filter time.

## 13.4 How Does Synchronization Work?

After the Metadirectory engine determines that an object is to be synchronized, the following processes occur:

1. Each system (the Identity Vault and the connected system) is queried for all attribute values in the appropriate filters.
   - eDirectory is queried for all values in the Subscriber filter, and for values that are marked for synchronization in Identity Manager 2.x and Identity Manager 3.x.
   - The connected system is queried for all values in the Publisher filter, and for values that are marked for synchronization in Identity Manager 2.x and Identity Manager 3.x.
2. The returned attribute values are compared and modification lists are prepared for the Identity Vault and the connected system according to Table 13-1 on page 80, Table 13-2 on page 81, and Table 13-3 on page 83.

   In the tables the following pseudo-equations are used:
   - `Left = Right` indicates that the left side receives all values from the right side.
   - `Left = Right[1]` indicates that the left side receives one value from the right side. If there is more than one value, it is indeterminate.
   - `Left += Right` indicates that the left side adds the right side values to the left side's existing values.
   - `Left = Left + Right` indicates that the left sides receives the union of the values of the left and right sides.

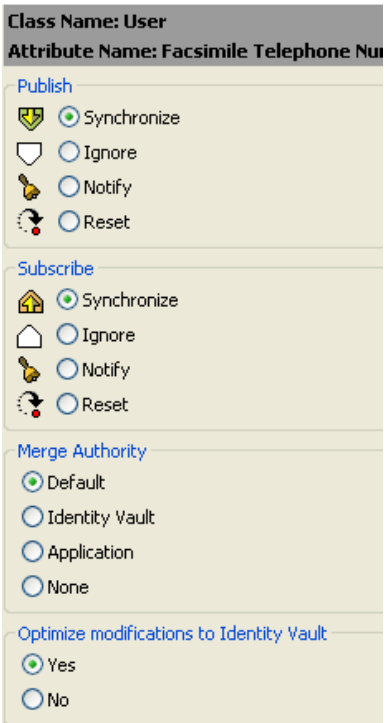
There are three different combinations of selected items in the filter, and each one creates a different output.


- Section 13.4.1, "Scenario One," on page 79
- Section 13.4.2, "Scenario Two," on page 81
- Section 13.4.3, "Scenario Three," on page 82


### 13.4.1 Scenario One

The attribute is set to *Synchronize* on the Publisher and Subscriber channels, and the merge authority is set to *Default*.

*Figure 13-1* *Scenario One*




The following table contains the values that the Metadirectory engine synchronizes when the attribute is sent through a filter that is set to the configuration for Scenario One. The table shows different outputs depending upon whether the attribute comes from the Identity Vault or the Application, if the attribute is single-valued or multi-valued, and if the attribute is empty or non-empty.

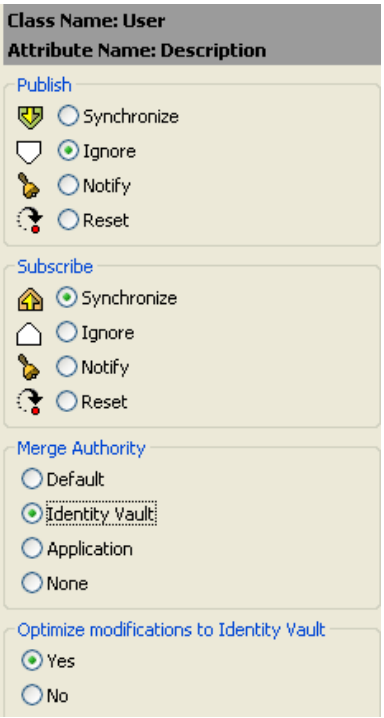
*Table 13-1* *Output of Scenario One*

| | **Identity Vault single-valued empty** | **Identity Vault single-valued non-empty** | **Identity Vault multi-valued empty** | **Identity Vault multi-valued non-empty** |
|---|---|---|---|---|
| **Application single-valued empty** | No change | App = Identity Vault | No change | App = Identity Vault[1] |
| **Application single-valued non-empty** | Identity Vault = App | App = Identity Vault | Identity Vault = App | Identity Vault + = App |
| **Application multi-valued empty** | No change | App = Identity Vault | No change | App = Identity Vault |
| **Application multi-valued non-empty** | Identity Vault = App[1] | App + = Identity Vault | Identity Vault = App | App = App + Identity Vault<br>Identity Vault = App + Identity Vault |

## 13.4.2 Scenario Two

The attribute is set to *Synchronize* only on the Subscriber channel, or it is set to *Synchronize* on both the Subscriber and Publisher channels. The merge authority is set to *Identity Vault*.

***Figure 13-2*** *Scenario Two*




The following table contains the values that the Metadirectory engine synchronizes when the attribute is sent through a filter that is set to the configuration for Scenario Two. The table shows different outputs depending upon whether the attribute comes from the Identity Vault or the Application, if the attribute is single-valued or multi-valued, and if the attribute is empty or non-empty.

***Table 13-2*** *Output of Scenario Two*

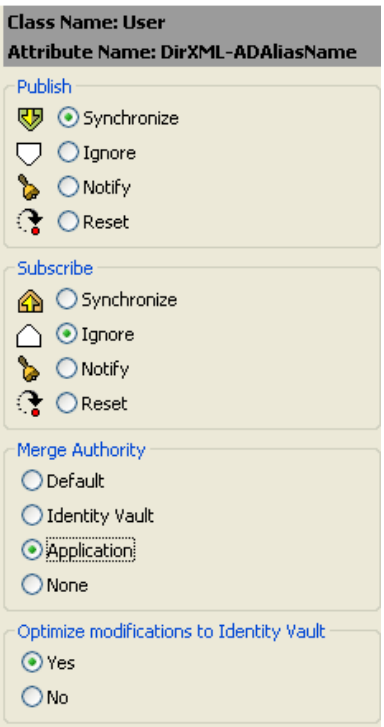
| | **Identity Vault single-valued empty** | **Identity Vault single-valued non-empty** | **Identity Vault multi-valued empty** | **Identity Vault multi-valued non-empty** |
|---|---|---|---|---|
| **Application single-valued empty** | No change | App = Identity Vault | No change | App = Identity Vault[1] |
| **Application single-valued empty** | App = empty | App = Identity Vault | Identity Vault = App | App = Identity Vault[1] |
| **Application multi-valued empty** | No change | App = Identity Vault | No change | App = Identity Vault |

| | Identity Vault single-valued empty | Identity Vault single-valued non-empty | Identity Vault multi-valued empty | Identity Vault multi-valued non-empty |
|---|---|---|---|---|
| **Application multi-valued non-empty** | App = empty | App = Identity Vault | App = empty | App = Identity Vault |

## 13.4.3 Scenario Three

The attribute is set to *Synchronize* on the Publisher channel or the merge authority is set to *Application*.

***Figure 13-3*** *Scenario Three*




The following table contains the values that the Metadirectory engine synchronizes when the attribute is sent through a filter that is set to the configuration for Scenario Three. The table shows different outputs depending upon whether the attribute comes from the Identity Vault or the Application, if the attribute is single-valued or multi-valued, and if the attribute is empty or non-empty.

*Table 13-3 Output of Scenario Three*

| | Identity Vault single-valued empty | Identity Vault single-valued non-empty | Identity Vault multi-valued empty | Identity Vault multi-valued non-empty |
|---|---|---|---|---|
| **Application single-valued empty** | No change | Identity Vault = empty | No change | Identity Vault = empty |
| **Application single-valued non-empty** | Identity Vault = App | Identity Vault = App | Identity Vault = App | Identity Vault = App |
| **Application multi-valued empty** | No change | Identity Vault = empty | No change | Identity Vault = empty |
| **Application multi-valued non-empty** | Identity Vault = App[1] | Identity Vault = App[1] | Identity Vault = App | Identity Vault = App |

# Migrating and Resynchronizing Data

# 14

Identity Manager synchronizes data when the data changes. If you want to synchronize all data immediately, you can choose from the following options:

- **Migrate Data from Identity Vault:** Allows you to select containers or objects you want to migrate from the Identity Vault to an application. When you migrate an object, the Identity Manager engine applies all of the Matching, Placement, and Create policies, as well as the Subscriber filter, to the object.
- **Migrate Data into Identity Vault:** Assumes that the remote application can be queried for entries that match the criteria in the Publisher filter.
- **Synchronize:** The Identity Manager engine looks in the Subscriber class filter and processes all objects for those classes. Associated objects are merged. Unassociated objects are processed as Add events.

To use one of the options explained above:

1. In iManager, in the *Roles and Tasks* view, click *Identity Manager* > *Identity Manager Overview*.
2. Browse to and select the driver set where the driver exists, then click *Search*.
3. Click the driver icon then click the *Migrate* tab.
4. Click the appropriate migration button.

For more information, see Chapter 13, “Synchronizing Objects,” on page 77.

# Viewing Identity Manager Processes

# 15

To view Identity Manage processing events, use DSTrace. You only use this during testing and troubleshooting Identity Manager. Running DSTrace while the drivers are in production increases the utilization on the Identity Manager server and can cause events to process very slowly.

To see Identity Manager processes in DSTrace, you add values to the driver set and the drivers. You can do this in Designer and iManager.


- Section 15.1, “Adding Trace Levels in Designer,” on page 87
- Section 15.2, “Adding Trace Levels in iManager,” on page 89
- Section 15.3, “Capturing Identity Manager Processes to a File,” on page 90


## 15.1 Adding Trace Levels in Designer

You can add trace levels to the driver set or to each driver.


- Section 15.1.1, “Driver,” on page 87
- Section 15.1.2, “Driver Set,” on page 88


### 15.1.1 Driver

1. In an open project in Designer, select the driver in the Outline view.
2. Right-click and select *Properties*, then click *8. Trace*.
3. Set the parameters for tracing., then click *OK*. See Table 15-1 for more information about the driver trace parameters.

   If you set the parameters on the driver only, only information for that driver appears in the DSTrace log.

***Table 15-1*** *Druver Trace Parameters*

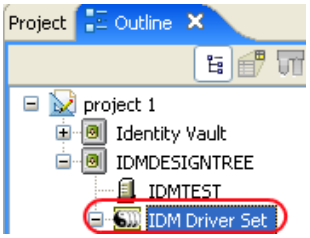
| Parameter | Description |
|---|---|
| Tace level | As the driver trace level increases, the amount of information displayed in DSTrace increases.<br><br>Trace level one shows errors, but not the cause of the errors. If you want to see password synchronization information, set the trace level to five.<br><br>If you select *Use setting from Driver Set*, the value is taken from the driver set. |
| Trace file | Specify a file name an location of where the Identity Manager information is written for the selected driver.<br><br>If you select *Use setting from Driver Set*, the value is taken from the driver set. |

| Parameter | Description |
|---|---|
| Trace file encoding | The trace file uses the system's default encoding. You can specify another encoding if desired. |
| Trace file size limit | Allows you to set a limit for the Java trace file. If you set the file size to unlimited, the file grows in size until there is no disk space left.<br><br>**NOTE:** The trace file is created in multiple files. Identity Manager automatically divides the maximum file size by ten and creates ten separate files. The combined size of these files equals the maximum trace file size.<br><br>If you select *Use setting from Driver Set*, the value is taken from the driver set. |
| Trace name | The driver trace messages are prepended with the value entered instead of the driver name. Use if the driver name is very long. |

## 15.1.2 Driver Set

Setting the trace level on the driver set creates very long traces that are hard to read. All events from all drivers are included in one trace file. If you are troubleshooting an issue, it is best to set the trace only on the driver you are troubleshooting.

1. In an open project in Designer, select the driver set in the *Outline* view.




2. Right-click and select *Properties*, then click *5. Trace*.
3. Set the parameters for tracing, then click *OK*. See Table 15-2 on page 88 for more information about the driver set trace parameters.

   If you set the trace level on the driver set, all drivers appear in the DSTrace logs.

***Table 15-2*** *Driver Set Trace Parameters*

| Parameter | Description |
|---|---|
| Driver trace level | As the driver trace level increases, the amount of information displayed in DSTrace increases.<br><br>Trace level one shows errors, but not the cause of the errors. If you want to see password synchronization information, set the trace level to five. |

| Parameter | Description |
|---|---|
| XSL trace level | DSTrace displays XSL events. Only set this trace level when troubleshooting XSL style sheets. If you do not want to see XSL information, set the level to zero. |
| Java debug port | Allows developers to attach a Java debugger. |
| Java trace file | When a value is set in this field, all Java information for the driver set is written to a file. The value for this field is the patch for that file.<br><br>As long as the file is specified, Java information is written to this file. If you do not need to debug Java, leave this field blank. |
| Trace file size limit | Allows you to set a limit for the Java trace file. If you set the file size to unlimited, the file grows in size until there is no disk space left.<br><br>**NOTE:** The trace file is created in multiple files. Identity Manager automatically divides the maximum file size by ten and creates ten separate files. The combined size of these files equals the maximum trace file size. |

# 15.2 Adding Trace Levels in iManager

You can add trace levels to the driver set or to each driver.


- Section 15.2.1, "Driver," on page 89
- Section 15.2.2, "Driver Set," on page 89


## 15.2.1 Driver

1. Click to display the Identity Manager Administration page.
2. Open the properties for the driver set that contains the driver you want to configure:
   - **2a** In the *Administration* list, click *Identity Manager Overview*.
   - **2b** If the driver set is not listed on the *Driver Sets* tab, use the *Search In* field to search for and display the driver set.
   - **2c** Click the driver set to open the Driver Set Overview page.
3. Click the upper right corner of the driver, then click *Edit properties*.
4. Select the *Misc* tab for the driver.
5. Set the parameters for tracing, then click *OK*. See Table 15-1 on page 87 for information.

## 15.2.2 Driver Set

1. Click to display the Identity Manager Administration page.

2 Open the properties for the driver set whose parameters you want to configure:

   2a In the *Administration* list, click *Identity Manager Overview*.

   2b If the driver set is not listed on the *Driver Sets* tab, use the *Search In* field to search for and display the driver set.

   2c Click the driver set to open the Driver Set Overview page.

   2d Click the *Driver Set* menu, then click *Edit Driver Set properties*.

3 Select the *Misc* tab for the driver set.

4 Set the parameters for tracing, then click *OK*. See Table 15-2 on page 88 for information about these parameters.

# 15.3 Capturing Identity Manager Processes to a File

Identity Manager processes are saved to a file by using a parameter on the driver or through DSTrace. The parameter on the driver is the Trace file parameter.

The driver processed that are captured through DSTrace are the processes that occur on the Identity Manager engine. If you use the Remote Loader, you need to capture a trace on the Remote Loader at the same time as you are capturing the trace on the Identity Manager engine.

The following methods helps you capture and save Identity Manager processes through DSTrace on different OS platforms.

## 15.3.1 Windows

1 Open the Control Panel > *NDS Services* > *dstrace.dlm*, then click *Start*.

   A window opens named NDS Server Trace Utility.

2 Select *Edit* > *Options*, then click *Clear All*.

   This clears all of the default flags.

3 Select *DirXML* and *DirXML Drivers*.

4 Click *OK*.

5 Select *File* > *New*.

6 Specify the filename and location of where you want the DSTrace information saved, then click *Open*.

7 Wait for the event to occur.

8 Select *File* > *Close*.

   This stops the information from being written to the log file.

9 Open the file in a text editor and search for the event or the object you modified.

## 15.3.2 UNIX

1 Enter `ndstrace` to start the ndstrace utility.

2 Enter `set ndstrace=nodebug`

   Turns off all trace flags currently set.

3. Enter `set ndstrace on`

   Displays trace messages to the console.

4. Enter `set ndstrace file on`

   Captures trace messages to the file `ndstrace.log` the directory where eDirectory is installed. By default it is `/var/nds`.

5. Enter `set ndstrace=+dxml`

   Displays the Identity Manager events.

6. Enter `set ndstrace=+dvrs`

   Displays the Identity Manager driver events.

7. Wait for the event to occur.

8. Enter `set ndstrace file off`

   This stops the logging of information to the file.

9. Enter `exit` to quit the ndstrace utility.

10. Open the file in a text editor. Search for the event or the object that was modified.

### 15.3.3 iMonitor

iMonitor allows you to get DSTrace information from a web browser. It does not matter where Identity Manager is running. These are the files that run iMonitor:

- `NDSIMON.DLM` Runs on Windows.
- `ndsimonitor` Runs on UNIX.

1. Access iMonitor from http://*server_ip*:8008/nds.

   Port 8008 is the default port.

2. Enter a username and password with administrative rights, then click *Login*.
3. Select *Trace Configuration* on the left side.
4. Click *Clear All*.
5. Select *DirXML and DirXML Drivers*.
6. Click *Trace On*.
7. Select *Trace History* on the left side.
8. Click the document with the *Modification Time* of *Current* to see a live trace.
9. Change the *Refresh Interval* if you want to see information more often.
10. Select *Trace Configuration* on the left side, then click *Trace Off* to turn the tracing off.
11. You can view the trace history by selecting Trace History. The files are distinguished by their time stamps.

If you need a copy of the HTML file, the default location is:

- Windows: `Drive_letter:\Novell\NDS\ndsimon\dstrace\*.htm`
- UNIX/Linux: `/var/nds/dstrace/*.htm`

## 15.3.4 Remote Loader

You can capture the events that occur on the machine running the Remote Loader service.

1. Launch the Remote Loader Console by clicking the icon.
2. Select the driver instance, then click *Edit*.
3. Set the *Trace Level* to 3 or above.
4. Specify a location and file for the trace file.
5. Specify the amount of disk space that the file is allowed.
6. Click *OK* twice to save the changes.

You can also enable tracing from the command line by using the following switches. For more information, see "Configuring the Remote Loader" in the *Identity Manager 4.0 Remote Loader Guide*.

***Table 15-3*** *Command Line Tracing Switches*

| Switch | Secondary Name | Parameter | Description |
|---|---|---|---|
| -trace | -t | integer | Specifies the trace level. This is only used when hosting an application shim. Trace levels correspond to those used on the Identity Manager server.<br><br>Example: `-trace 3` or `-t3` |
| -tracefile | -tf | filename | Specify a file to write trace messages to. Trace messages are written to the file if the trace level is greater than zero. Trace messages are written to the file even if the trace window is not open.<br><br>Example:<br><br>`-tracefile c:\temp\trace.txt`<br><br>or<br><br>`-tf c:\temp\trace.txt` |
| -tracefilemax | -tfm | size | Specifies the approximate maximum size that trace file data can occupy on disk. If you specify this option, there is a trace file with the name specified using the tracefile option and up to 9 additional "roll-over" files. The roll-over files are named using the base of the main trace filename plus "_n", where n is 1 through 9.<br><br>The size parameter is the number of bytes. Specify the size by using the suffixes K, M, or G for kilobytes, megabytes, or gigabytes.<br><br>If the trace file data is larger than the specified maximum when the Remote Loader is started, the trace file data remains larger than the specified maximum until roll-over is completed through all 10 files.<br><br>Example: `-tracefilemax 1000M or -tfm 1000M` |

# Editing Driver Configuration Files 16

Driver configuration files are replaced with packages. You can still use driver configuration files, but all updated information for the drivers are contained in packages. For more information, see "Managing the Identity Manager Content" in the *Designer 4.0 for Identity Manager 4.0 Administration Guide*.

You must have a good knowledge of XML to use the information in this section. This information allows you to add custom prompts to drivers you have created.


- Section 16.1, "Variables in a Driver Configuration File," on page 93
- Section 16.2, "Flexible Prompting in a Driver Configuration File," on page 96
- Section 16.3, "Viewing the Informal Identity Manager Driver Configuration DTD," on page 98


## 16.1 Variables in a Driver Configuration File

For the iManager plug-ins, several node types are defined for the driver configuration files. The following is a list of actions that the Identity Manager engine supports:

- Prompting once for a value that is used repeatedly throughout a single driver configuration file.
- Prompting once for a value that is used across multiple driver configuration files, as part of the Import Drivers Wizard.
- Allowing the user to select a value from a drop-down list of values.
- Global modification of the driver configuration files according to a contained XSL style sheet.
- Built-in variables that can be referenced without declaring them to access information about the driver and its environment. For example, tree name, driver set name, driver set DN, server name, server DN, driver name, and driver DN.
- The ability to layer prompts. It is possible to ask the user multiple sets of questions, with the second and later sets being controlled by the user's responses to prior sets of questions. For more information, see Section 16.2, "Flexible Prompting in a Driver Configuration File," on page 96.

The primary new node types are:

- **variable-decl:** Allows you to define driver configuration variables that are prompted for and placed into a driver configuration file during its import. Multiple `variable-decl` blocks can be used to define a layered set of prompts. For more information, see Section 16.2, "Flexible Prompting in a Driver Configuration File," on page 96.
- **variable-ref:** Used to reference a variable defined in a `variable-decl` within your driver configuration files.
- **xsl-modify:** Used to globally modify the driver configuration file after all variables and prompts have been resolved. The contents of this node are extracted and used as an XSL style sheet that is applied to the patched driver configuration file.

To view the driver configuration file XML extensions, see DriverConfigXMLExtension.txt (../samples/DriverConfigXMLExtension.txt).

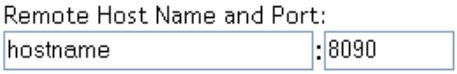
In addition, be aware of the following:

- Section 16.1.1, “General Notes,” on page 94
- Section 16.1.2, “Import Driver Notes,” on page 96

## 16.1.1 General Notes

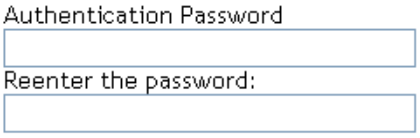
- A `variable-decl` can contain `text-var` but not `node-var`. It can contain `variable-refs` as long as the order they are resolved is taken into account.
- If a `variable-decl` contains an optional prompt attribute and an optional prompt-type attribute and does not contain an optional `browse="yes"` attribute setting, the prompt-type is treated as follows:
  - A prompt-type of `"ipa"` results in two edit fields. See Figure 16-1 for an example. The value the user specifies for the first part is appended by a colon (:) and the value the user specifies for the second part in the value is rendered by the variable.

***Figure 16-1*** *Two Edit Fields*




  - A prompt-type of `"password"` results in two password edit fields. See Figure 16-2 for an example. The first prompt is for the actual password, and the second prompt is used to verify that the password specified in the first field is correct. The value rendered by the variable reference is the password.

***Figure 16-2*** *Two Password Fields*




  - A prompt-type of `"hidden"` results in a field that is not displayed, but is checked to make sure a previous condition is met before proceeding to the next screen.
  - Any other prompt-type value is ignored.
- If a `variable-decl` contains an optional description attribute in addition to a prompt attribute, the description is displayed in the UI along with the prompt. The purpose of the description attribute is to allow a complete description of what’s being asked for along with a simple prompt.

  For example:

```
<text-var
        var-name="eProv.Company"
        prompt="Company name:" description="Please enter the name of your
company. This must be the same name as you entered during the initial
installation."
        browse="no">
      Novell
    </text-var>
```

  Note the differences between the `prompt` and the `description`.

If a `variable-decl` contains an optional description attribute and an optional highlight attribute, the highlight attribute is handled as follows:

- If the highlight is not two characters in length, it is ignored.
- If the highlight is two characters in length, all occurrences of the first character are preceded with HTML tags to turn on highlighting and all occurrences of the second character are followed by HTML tags to turn off highlighting.

  For example:

  ```
  <text-var
              var-name="foo"
              prompt="Foo:"
              description="Please enter some foo.  Format:  [foo looks
  like this]">
            Bar
          </text-var>
  ```

  When the description is displayed, [foo looks like this] is displayed and highlighted.

- If a `variable-decl` contains a `browse="yes"` attribute, it is assumed to supply a DN and is formatted in slash format by default when applied to the driver configuration file.

  This is assumed to be more generally useful for driver writers and can be overridden on a per reference basis by adding a `dn-format="dot"` attribute to `variable-ref` nodes that reference it.

- If a `variable-ref` is to `text-var` with a `prompt-type="ipa"` attribute, a `part="..."` attribute can be included in the `variable-ref`. Supported parts are `"ipa"` and `"port"`. If `part="ipa"` is specified, only the IP address portion of the variable's value is returned. If `part="port"` is specified, only the port portion of the variable's value is returned. Any other setting is ignored and the variable's entire value is returned.
- A `dn-format` attribute on a `variable-ref` that does not have `browse="yes"` specified in its `variable-decl` causes that variable to be treated as though it supplies a DN. The DN is rendered in the `dn-format` specified.
- The supported values for the `dn-format` attribute are `"dot"` and `"slash"`. Any other value is treated as `"slash"` without an error being generated.
- The built-in defined variables are:
  - System.TreeName
  - System.DSetDN
  - System.DSetName
  - System.DriverDN
  - System.DriverName
  - System.ServerDN
  - System.ServerName
- Built-in variables can be overridden. If you include a `variable-decl` for a variable named with one of the built-in variable names, your definition overrides the built-in variable of the same name.

  This is implemented after all variable declarations have been processed (prompting, ...). Just before the code begins applying values, it walks the variables and defines all the built-ins that haven't otherwise been defined.

- The built-in variables that provide a DN can include a `dn-format` attribute in the variable-ref to control the format the DN is rendered in. By default, these are rendered in slash format.
- A `node-var` and a `text-var` cannot be named the same thing. They use the same namespace.
- If a `variable-ref` references a `node-var` and contains an `attr-name` attribute, the XSL string value of the `node-var` is stored in as the named attribute on the parent node of the `variable-ref`. The `node-var` used in this manner can have a `node-name` attribute of `"#text",` which removes the requirement of having an `attr-name` attribute on the `node-var`.

  A `node-var` with a node-name of `"#text"` can only be referenced in this manner. Any other reference causes an error when the driver configuration file is imported.
- At patch time after the user has responded to the prompts but before the XML is actually imported. patching is done in the following order:
  1. `The text-var variable-refs` are processed.
  2. `The node-var variable-refs` are processed.
  3. `The xsl-modify` commands are processed.
  4. The `ds-object` commands are processed.
     - Patching is performed in the `variable-decl` so that by the time the `node-var` commands are patched, all the `text-var` commands contained in them have been resolved.
     - The `node-var` commands cannot contain `node-var variable-ref`.

### 16.1.2 Import Driver Notes

- The order in which the selected driver configuration files are processed is not defined and no order can be assumed.
- For `variable-decl` commands:
  - Commands from selected drivers are carried forward from driver to driver.
  - The first one wins.
    - The first driver encountered that defines a variable foo has its variable foo used throughout all remaining driver configuration files. Care must be taken to coordinate this between drivers.
    - A variable foo that is used in multiple driver configuration files is only prompted for once, with the first driver configuration file encountered that declares it.
- Built-in variables are not propagated between drivers. This includes any variables you define to override a built-in variable. The built-in variables for each driver are handled separately.
- Other prompting is handled unchanged at the beginning of each driver configuration file's import sequence.
- Refer to Section 16.2, "Flexible Prompting in a Driver Configuration File," on page 96 for information about prompt layering supported by flexible prompting.

## 16.2 Flexible Prompting in a Driver Configuration File

`variable-decl` blocks can be marked to allow them to be prompted for separately, based on user input.

```
DTD changes:
-----------
* <!ENTITY % CompareMode "equals | not-equals">

  <!--******************************************************** -->
  <!--The variable-decl element contains definitions of variables   -->
  <!-- whose values can be prompted for and referred to throughout  -->
  <!-- the pre-configured driver file.                              -->
  <!-- ******************************************************** -->
  <!ELEMENT variable-decl(
    node-var*,
    text-var*)>
*  <!ATTLIST variable-decl
*    <!-- The following are used in the support of flexible -->
*    <!-- prompting.                                         -->
*    use-when-var  CDATA #IMPLIED
*    use-when-value  CDATA #IMPLIED
*    use-when-mode  (%CompareMode) "equals"
  >

* Added for flexible prompting.
```

### Semantics

1. All `variable-decl` blocks with no `use-when-var` attribute are added to the prompt set.
2. All `variable-decl` blocks with a `use-when-var` attribute where the variable is defined and the variable value meets the condition are added to the prompt set.

   Variable analysis includes built-ins and variables carried forward from any previous import.
3. The user is prompted.
4. The prompt set is emptied and Steps 2 and 3 are repeated until there are no more prompts to process or all `variable-decl` blocks have been processed.
5. The import proceeds as before.

---

**NOTE:** The comparisons for `use-when-var` variables are case insensitive.

---

### Example 1

```
     <variable-decl use-when-var="varCheck" use-when-value="Fu" use-when-
mode="equals">
    <text-var prompt="When Fu?" var-name="fuVar"/>
  </variable-decl>

  <variable-decl use-when-var="varCheck" use-when-value="Fu" use-when-
mode="not-equals">
    <text-var prompt="When not Fu?" var-name="fuVar"/>
  </variable-decl>

  <variable-decl>
```

```
    <text-var prompt="Which other <variable-decl>?" var-name="varCheck">
      <dropdown>
        <value>Fu</value>
        <value>Bar</value>
      </dropdown>
    </text-var>
  </variable-decl>
```

In this example, the user would be prompted with a drop-down list. The description of the drop-down list is “Which other <variable-decl>?” The options in the list are Fu and Bar.

If the user select Fu from the drop-down and clicks *Next*, he or she is prompted again with a box. The description of the box is “When Fu?”

If the user selects anything else from the drop-down list and clicks *Next*, he or she is prompted with another box. The description of the box is “When not Fu?”

### Example 2

```
<variable-decl use-when-var="varCheck" use-when-value="Fu">
    <text-var prompt="When Fu?" var-name="fuBarVar"/>
  </variable-decl>

  <variable-decl use-when-var="varCheck" use-when-value="Bar">
    <text-var prompt="When when Bar?" var-name="fuBarVar"/>
  </variable-decl>

  <variable-decl>
    <text-var prompt="Which other <variable-decl>?" var-name="varCheck"/>
  </variable-decl>
```

In this example, the user is presented with a box. The description of the box is “Which other <variable-decl>?” If the user specifies “Fu” in the box and clicks *Next*, he or she is presented with another box. The description on the second box is “When Fu?”

If the user specifies “Bar” in the box and clicks *Next*, he or she is presented with a box. The description is “When Bar?” If he or she specifies anything else, there are no further prompts and the variable fuBarVar is not defined.

## 16.3 Viewing the Informal Identity Manager Driver Configuration DTD

To view the informal Identity Manager Driver Configuration DTD, go to PCDrivers.txt (../samples/PCDrivers.txt). The DTD cannot be used for validation. It is not a valid XML DTD. It is a mechanism to document the valid constructs in a driver configuration file.

# Troubleshooting the Driver

# 17

This chapter discusses the following ways to troubleshoot the driver:


- Section 17.1, "Using Novell Sentinel to Log Identity Manager Events," on page 99
- Section 17.2, "Troubleshooting Driver Processes," on page 99
- Section 17.3, "Driver Shim Errors," on page 99
- Section 17.4, "Identity Manager Driver Errors," on page 102
- Section 17.5, "Java Customization Errors," on page 105


## 17.1 Using Novell Sentinel to Log Identity Manager Events

You can log Identity Manager events by using Novell Sentinel. Using this service in combination with the driver log level setting provides you with tracking control at a very granular level. For more information, see the *Identity Manager 4.0 Reporting Guide for Novell Sentinel*.

## 17.2 Troubleshooting Driver Processes

Viewing driver processes is necessary to analyze unexpected behavior. To view the driver processing events, use DSTrace. You should only use it during testing and troubleshooting the driver. Running DSTrace while the drivers are in production increases the utilization on the Identity Manager server and can cause events to process very slowly. For more information, see Chapter 15, "Viewing Identity Manager Processes," on page 87.

## 17.3 Driver Shim Errors

This section identifies errors that might occur in the core driver shim. Error messages that contain a numerical code can have various messages depending on the application or Web service.

### 307 Temporary Redirect

Source: The status log or DSTrace screen.

Explanation: The Subscriber channel attempted to send data to the application or Web service but received a 307 Temporary Redirect response.

Possible Cause: The Web service is not available.

Action: The Subscriber waits for a period of time (usually 30 seconds) and tries again.

Level: Retry

### 408 Request Timeout

Source: The status log or DSTrace screen.

Explanation: The Subscriber channel attempted to send data to the application or Web service but received a 408 Request Timeout response.

Possible Cause: The Web service or application is busy.

Action: The Subscriber waits for a period of time (usually 30 seconds) and tries again.

Level: Retry

### 503 Service Unavailable

Source: The status log or DSTrace screen.

Explanation: The Subscriber channel attempted to send data to the application or Web service but received a 503 Service Unavailable response.

Possible Cause: The Web service or application is down.

Action: The Subscriber waits for a period of time (usually 30 seconds) and tries again.

Level: Retry

### 504 Gateway Timeout

Source: The status log or DSTrace screen.

Explanation: The Subscriber channel attempted to send data to the application or Web service but received a 504 Gateway Timeout response.

Possible Cause: The gateway is down.

Action: The Subscriber waits for a period of time (usually 30 seconds) and tries again.

Level: Retry

### 200-299 Messages

Source: The HTTP server.

Explanation: The messages in the 200-299 range indicate success.

Action: No action required.

Level: Success

### Other HTTP Errors Messages

Source: The status log or DSTrace screen.

Explanation: Other numerical error codes result in an error message containing that code and the message provided by the HTTP server. In most cases, the driver continues to run, and the command that caused the error isn't retried.

Possible Cause: There are multiple causes for the different errors.

Action: See RFC 2616 (http://www.w3.org/Protocols/rfc2616/rfc2616-sec10.html) for a list of all HTTP error codes and explanations.

Level: Error

### Problem communicating with HTTP server. Make sure server is running and accepting requests.

Source: The status log or DSTrace screen.

Explanation: The Subscriber channel received an IOException while communicating or attempting to communicate with the HTTP server.

Possible Cause: The HTTP server is not running.

Possible Cause: The HTTP server is overloaded.

Possible Cause: There are firewall restrictions blocking access to the HTTP server.

Possible Cause: The URL provided in the Subscriber configuration is not correct.

Action: Start the HTTP server.

Action: Remove services, if the HTTP server is overloaded.

Action: Change the firewall restrictions to allow access to the HTTP server.

Level: Retry

### The HTTP/SOAP driver doesn't return any application schema by default.

Source: The status log or DSTrace screen.

Explanation: The driver is not returning any application schema, but the driver continues to run.

Possible Cause: The Metadirectory engine calls the DriverShim.getSchema() method of the driver, and the driver is not using the SchemaReporter customization.

Action: A Java class needs to be written that implements the SchemaReporter interface, and the driver needs to be configured to load the class as a Java extension.

Level: Warning

### Subscriber.execute() was called but the Subscriber was not configured correctly. The command was ignored.

Source: The status log or DSTrace screen.

Explanation: The Subscriber channel of the driver isn't initialized properly. The driver continues to run but displays this message each time an event is received by the Subscriber channel.

Possible Cause: An improperly formatted driver configuration.

Action: Configure the driver correctly.

Action: Clear the Subscriber's filter so it doesn't receive commands.

Level: Warning

### pubHostPort must be in the form host:port

Source: The status log or DSTrace screen.

Explanation: The driver cannot communicate.

Possible Cause: An error occurred with the Publisher channel configuration.

Action: Review the Publisher channel parameters to verify that both a valid host and a valid port number are provided.

Level: Fatal

### MalformedURLException

Source: The status log or the DSTrace screen.

Explanation: There is a problem with the format of the URL.

Possible Cause: The URL supplied in the Subscriber channel parameters isn't in a valid URL format.

Action: Change the URL to a valid format.

Level: Fatal

### Multiple Exceptions

Source: The status log or the DSTrace screen.

Explanation: The HTTP listener fails to properly initialize.

Possible Cause: There are a variety of reasons for this error.

Action: Check your Publisher settings to make sure you have specified a port that is not already in use and that the other Publisher settings are correct.

Level: Fatal

### HTTPS Hostname Wrong: Should Be ...

Source: The status log or the DSTrace screen.

Explanation: An SSL handshake failed on the Subscriber channel.

Possible Cause: The subject presented with the server certificate doesn't match the IP address or hostname given in the HTTPS URL.

Action: Use a DNS hostname rather than an IP address in the URL.

Level: Retry

## 17.4 Identity Manager Driver Errors

The following errors might occur with Identity Manager drivers:

### 641 Unable to start the driver

Source: DSTrace screen.

Explanation: You might receive this error message when you start a Identity Manager driver through either iManager or Designer.

Possible Cause: There are several causes. The error means the Identity Manager engine cannot load properly when eDirectory loads.

Action: Perform the following troubleshooting steps on Identity Manager engine to know what exactly the engine is doing when it is loaded, and all jvmloader related messages.

**Identity Manager engine running on Windows:**

**NOTE:** Identity Manager is installed in the directory where eDirectory's dlms are present, by default, `C:\Novell\NDS`.

1. Stop the eDirectory service.
2. Move the `dirxml.dlm` file from the directory where eDirectory is installed.
3. Start the eDirectory service.
4. After eDirectory is loaded, start `DSTRACE.dlm`.
5. Click *Edit* > *Option*.
6. Set the following flags:

   *DirXML*
   *DirXML Drivers*
   *Misc Other*

   Unselect all other options and click *OK*.
7. Click *File* > *New* and specify a filename for your trace file.
8. Move the `dirxml.dlm` file back to its original location.
9. Close/reopen the eDirectory services console.
10. Select `dirxml.dlm` and click `Start`.

The trace file contains the messages related to why the VRDIM module (IDM Engine) does not start.

**Identity Manager engine running on Linux/Solaris/AIX:**

1. Stop `ndsd` by using the following command:

   ```
   /etc/init.d/ndsd stop
   ```
2. Move the `libvrdim.*` files from their original directory to a different directory.

   In eDirectory 8.8.x, the files are present in the `/opt/novell/eDirectory/lib/nds-modules/` directory.
3. Start `ndsd` by using the following command:

   ```
   /etc/init.d/ndsd start
   ```
4. Start `ndstrace`.
5. In the `ndstrace`, type the following:

   ```
   set ndstrace=nodebug
   set ndstrace=+time
   set ndstrace=+tags
   set ndstrace=+misc
   set ndstrace=+dxml
   set ndstrace=+dvrs
   ndstrace file on
   ```
6. Let `ndstrace` run on the screen.

7 Move the `libvrdim.*` files back to their original location.

8 In the `ndstrace` screen, type the following:

```
load vrdim
```

9 After you see the errors, stop `ndstrace`.

The trace file contains the messages related to why the VRDIM module (IDM Engine) does not start.

After you have performed the specified troubleshooting steps, you might encounter the "783 Unable to start the driver" on page 104error.

Level: Error

### 783 Unable to start the driver

Source: DSTrace screen

Explanation: You might encounter this error message after performing the Action specified under "641 Unable to start the driver" on page 102.

Possible Cause: There are several possible causes for the error. The following is a list of few possible causes with suggestions to help fix and/or track them further:

Possible Cause: Corruption in the association between the driver set and the server.

Action: Remove the association between the driverset and the server, cycle ndsd, and add the association back again.

Possible Cause: Damage/corruption in the DirXML-ServerKeys attribute that exists in the local DIB's Pseudo-Server object.

Action: DSDUMP (only done by Novell support) is needed to remove the attribute with pre-IDM 3.6. Use the new command within the dxcmd utility for IDM 3.6 and later.

Possible Cause: Using Dib Clone or dsbk will cause damage or corruption in the DirXML-ServerKeys attribute that exists in the local DIB's Pseudo-Server object.

Action: DSDUMP (only done by Novell support) is needed to remove the attribute with pre-IDM 3.6. Use the new command within the dxcmd utility for IDM 3.6 and later.

Possible Cause: Misconfiguration of the JVM heap sizes.

Action: This is shown in the +*misc* flag in `ndstrace`. All jvmloader messages exist under the *MISC* flag on Linux/Unix, and the *MISC OTHER* flag on dstrace.dlm (Windows). You cannot see the jvmloader messages on Netware. But you can always check the `SYS:/ETC/JAVA.CFG` file.

Possible Cause: Corruption/damage/insufficient rights on the libraries IDM requires in the box (check the install log, also do an rpm -V on the IDM packages)

Action: Try the following options:

- Use `rpm -V` liberally against all IDM-related libraries. The command line works well for that:

  ```
  rpm -qa | grep DXML | xargs rpm -V
  ```

- ldd your IDM libraries to see the dependencies they have, and check the dependencies also. The `checkbin.sh` script can be of great help when checking dependencies. It is part of the `ntsutils` package that can be downloaded from the following location:

  http://www.novell.com/communities/node/2332/supportconfig-linux (http://www.novell.com/communities/node/2332/supportconfig-linux)

- Use `strace/ltrace` tool to track what is happening. Because `strace` works on scripts, it is the best option. `ltrace` can only be run against binary files. These tools provide a lot of information, and quite a bit of it requires basic knowledge of C programming language.
- Reinstall Identity Manager on top of itself. The process overwrites the libraries/rights.

Level: Error

### Identity Manager Driver that is deleted without stopping, and re-created with the same port number fails to start

Source: DSTrace screen

Explanation: Delete a driver without stopping it, re-create the same driver with the same port number, and start the driver. The driver fails to start.

Possible Cause: IDM does not release the used port of a driver if the driver is deleted without stopping.

Action: Edit the driver to use another port. The driver starts.

## 17.5 Java Customization Errors

The following errors might occur in the customized Java extensions.

### SchemaReporter init problem: extension-specific message

Source: The status log or DSTrace screen.

Explanation: The SchemaReporter Java customization had a problem initializing, and the driver shuts down.

Possible Cause: The Java extension is not initialized correctly.

Action: Verify that the Java extension is enabled in the driver.

Level: Fatal

### Extension (custom code) init problem: extension-specific message

Source: The status log or DSTrace screen.

Explanation: One of the following Java extensions failed to initialize:

- SubscriberTransport
- PublisherTransport
- DocumentModifiers
- ByteArrayModifiers

Possible Cause: The Java extension is incorrect.

Action: Review the Java extension and verify it is enabled in the driver.

Level: Fatal

### Various other errors

Source: The interfaces provided for Java extensions return error messages on the trace screen and sometimes to the Identity Manager engine.

Explanation: Sometimes it is difficult to distinguish errors of this type from other errors that originate in the core driver shim. If you get errors that are not listed in this section and you are using Java extensions, check with whomever provided you with the extensions for a list of error codes for that particular extension.

Level: Varies

# When and How to Use Global Configuration Values

# 18

Global Configuration Values (GCVs) are settings that are similar to driver parameters. GCVs are constant values, not global variables. There is no way to change a GCV value at runtime. the GCVs are globally accessible to the driver and driver set, but not to the tree or network.

Given these facts, GCVs are constants and cannot be changed at runtime, but they can be consumed by all drivers in a driver set or by all policies in a driver. This makes GCVs a very powerful configuration tool. The following guidelines are used when developing driver configuration files with GCVs.


- Section 18.1, "Using GCVs to Adapt the Driver Configuration File to Changing Environments," on page 107
- Section 18.2, "When Not to Use GCVs," on page 107
- Section 18.3, "When to Use Driver Set GCVs, Driver GCVs, or Global Configuration Objects in Packages," on page 108
- Section 18.4, "Naming Convention for GCVs," on page 108


## 18.1 Using GCVs to Adapt the Driver Configuration File to Changing Environments

GCVs help driver configuration files adapt to changing environments by externalizing environment-specific, such as placement contexts, domain names, IP addresses, usernames, dates, and times.

It is a bad practice to configure the driver to prompt for information during import and then add the answer directly into policy code. The better approach is to store the answer in a GCV and make the policies reference the GCV. If the answer to the prompt is wrong or the environment changes, the answer also needs to change. It is much simpler to change a single GCV value than to go through all policies that have the value and change the value in each policy.

By adding the configuration data as a GCV, the GCVs become the controls of the driver.

## 18.2 When Not to Use GCVs

If there are certain configuration values that must never change, they should not be surfaced in a GCV.

All information in a GCV can be easily changed or tuned. To keep certain configuration values and implementation details from being changed, add this information directly into the code. Everything that an administrator should see and be able to change should go into a GCV. Everything that only a developer sees or changes should go directly into the driver policy code.

The only reason to add a static value to a GCV is if it is used in many different places and it does not make sense to add it directly to the code.

## 18.3 When to Use Driver Set GCVs, Driver GCVs, or Global Configuration Objects in Packages

GCVs can be defined on a driver or driver set. The GCV location determines its scope and visibility. GCVs defined on the driver set are visible to all drivers and their policies in that driver set. GCVs defined on a driver can only be consumed by policies of the driver.

You can also create a Global Configuration objects that contain GVCs and should be used when the configuration values are being referenced from content contained in packages. GCVs on the driver or driver set cannot be packaged. However, GCVs within a Global Configuration object can be installed, upgraded, downgraded, or removed with packages.

The scope of the Global Configuration object is determined by which driver or driver set the Global Configuration object is included in the Global Configuration list. Each driver and driver set has a Global Configuration list. The list is edited through the driver or driver set properties. On a driver, the Global Configuration list is located under the Driver Configuration option. On a driver set, the Global Configuration list is located under the Configuration option.

The GCV definitions in a Global Configuration object are identical to the GCVs that are contained on a driver or driver set. The precedence of GCV is as follows:

- GCVs from the driver
- GCVs from the driver Global Configuration list (Global Configuration objects)
- GCVs from the driver set
- GCVs from the driver set Global Configuration list (Global Configuration objects)

If a GCV defined on a driver has the same name as a GCV defined on the driver set, the driver GCV takes precedence in all policies that belong to that driver. All drivers that do not explicitly define the GCV on the driver, inherit this GCV from the driver set.

Global Configuration objects can be contained in a driver, driver set, or library. For more information, see "Global Configuration Value Definition Editor" in the *Policies in Designer 4.0*.

## 18.4 Naming Convention for GCVs

The GCV naming convention addresses the different types of GCVs, the different purposes of the GCVs, and the scopes of the GCVs.

```
[<purpose/scope>.]<group>.[<subgroup>.]<name>
```

- **Purpose/Scope:** The prefix idv (Identity Value) is used with the driver set GCVs. Driver-specific values are drv or driver.
- **Group:** Groups GCVs that belong together. Examples for groups could be communications, notification, logging, or security.
- **Subgroup:** Form subgroups within groups, such as smtp or snmp.
- **Name:** Descriptive name for the GCV.

For example:

```
idv.notification.smtp.ip
idv.notification.smtp.user
idv.notification.smtp.pwd
idv.notification.snmp.ip
idv.dit.data.locations
idv.dit.system.rbs
driver.samba.server
```

# Driver Properties

A

This section provides information about the properties that are common to all drivers. This includes all properties (Named Password, Engine Control Values, Log Level, and so forth) other than the Driver Configuration and Global Configuration Values properties.

The information is presented from the viewpoint of iManager. If a field is different in Designer for Identity Manager, it is marked with a Designer icon.


- Section A.1, “Accessing the Properties,” on page 111
- Section A.2, “Named Passwords,” on page 112
- Section A.3, “Engine Control Values,” on page 112
- Section A.4, “Log Level,” on page 114
- Section A.5, “Driver Image/iManager Icon,” on page 115
- Section A.6, “Security Equals,” on page 115
- Section A.7, “Filter,” on page 115
- Section A.8, “Edit Filter XML,” on page 115
- Section A.9, “Misc/Trace,” on page 116
- Section A.10, “Excluded Objects,” on page 116
- Section A.11, “Driver Health Configuration,” on page 116
- Section A.12, “Driver Manifest,” on page 116
- Section A.13, “Driver Cache Inspector,” on page 116
- Section A.14, “Driver Inspector,” on page 117
- Section A.15, “Server Variables,” on page 117


## A.1 Accessing the Properties

In iManager:

1. In iManager, click to display the Identity Manager Administration page.
2. Open the driver set that contains the driver whose properties you want to edit:
   - **2a** In the *Administration* list, click *Identity Manager Overview*.
   - **2b** If the driver set is not listed on the *Driver Sets* tab, use the *Search In* field to search for and display the driver set.
   - **2c** Click the driver set to open the Driver Set Overview page.
3. Locate the driver icon, then click the upper right corner of the driver icon to display the *Actions* menu.
4. Click *Edit Properties* to display the driver’s properties page.

In Designer:

1. Open a project in the Modeler.
2. Right-click the driver icon or line, then select click *Properties* > *Driver Configuration*.

## A.2 Named Passwords

Identity Manager enables you to securely store multiple passwords for a driver set or individual drivers. This functionality is referred to as Named Passwords. Each different password is accessed by a key, or name.

You can also use the Named Passwords feature to store other pieces of information, such as a user name.

Named Passwords are discussed in detail in Chapter 9, "Securely Storing Driver Passwords with Named Passwords," on page 47.

## A.3 Engine Control Values

The engine control values are a way that certain default behaviors of the Metadirectory engine can be changed. The values can only be accessed if a server is associated with the Driver Set object.

| Option | Description |
|---|---|
| *Subscriber channel retry interval in seconds* | The Subscriber channel retry interval controls how frequently the Metadirectory engine retries the processing of a cached transaction after the application shim's Subscriber object returns a retry status. |
| *Qualified form for DN-syntax attribute values* | The qualified specification for DN-syntax attribute values controls whether values for DN-syntax attribute values are presented in unqualified slash form or qualified slash form. A True setting means the values are presented in qualified form. |
| *Qualified form from rename events* | The qualified form for rename events controls whether the new-name portion of rename events coming from the Identity Vault are presented to the Subscriber channel with type qualifiers. For example, CN=. A True setting means the names are presented in qualified form. |
| *Maximum eDirectory replication wait time in seconds* | This setting controls the maximum time that the Metadirectory engine waits for a particular change to replicate between the local replica and a remote replica. This only affects operations where the Metadirectory engine is required to contact a remote eDirectory server in the same tree to perform an operation and might need to wait until some change has replicated to or from the remote server before the operation can be completed (for example, object moves when the Identity Manager server does not hold the master replica of the moved object; file system rights operations for Users created from a template.) |
| *Use non-compliant backwards-compatible mode for XSLT* | This control sets the XSLT processor used by the Metadirectory engine to a backwards-compatible mode. The backward-compatible mode causes the XSLT processor to use one or more behaviors that are not XPath 1.0 and XSLT 1.0 standards-compliant. This is done for backward compatibility with existing DirXML style sheets that depend on the non-standard behaviors.<br><br>For example, the behavior of the XPath "!=" operator when one operand is a node-set and the other operand is other than a node-set is incorrect in DirXML releases up to and including Identity Manager 2.0. This behavior has been corrected; however, the corrected behavior is disabled by default through this control in favor of backward compatibility with existing DirXML style sheets. |

| Option | Description |
| --- | --- |
| *Maximum application objects to migrate at once* | This control is used to limit the number of application objects that the Metadirectory engine requests from an application during a single query that is performed as part of a Migrate Objects from Application operation.<br><br>If java.lang.OutOfMemoryError errors are encountered during a Migrate from Application operation, this number should be set lower than the default. The default is 50.<br><br>**NOTE:** This control does not limit the number of application objects that can be migrated; it merely limits the batch size. |
| *Set creatorsName on objects created in Identity Vault* | This control is used by the Identity Manager engine to determine if the creatorsName attribute should be set to the DN of this driver on all objects created in the Identity Vault by this driver.<br><br>Setting the creatorsName attribute allows for easily identifying objects created by this driver, but also carries a performance penalty. If not set, the creatorsName attribute defaults to the DN of the NCP Server object that is hosting the driver. |
| *Write pending associations* | This control determines whether the Identity Manager engine writes a pending association on an object during Subscriber channel processing.<br><br>Writing a pending association confers little or no benefit but does incur a performance penalty. Nevertheless, the option exists to turn it on for backward compatibility. |
| *Use password event values* | This control determines the source of the value reported for the nspmDistributionPassword attribute for Subscriber channel Add and Modify events.<br><br>Setting the control to False means that the current value of the nspmDistributionPassword is obtained and reported as the value of the attribute event. This means that only the current password value is available. This is the default behavior.<br><br>Setting the control to True means that the value recorded with the eDirectory event is decrypted and is reported as the value of the attribute event. This means that both the old password value (if it exists) and the replacement password value at the time of the event are available. This is useful for synchronizing passwords to certain applications that require the old password to enable setting a new password. |
| *Enable password synchronization status reporting* | This control determines whether the Identity Manager engine reports the status of Subscriber channel password change events.<br><br>Reporting the status of Subscriber channel password change events allows applications such as the Identity Manager User Application to monitor the synchronization progress of a password change that should be synchronized to the connected application. |
| *Combine values from template object with those from add operation* | This value determines whether the Metadirectory engine combines like values from a creation template and an add operation when performing the add operation. Setting the value to True causes the template's multi-valued attribute values to be used in addition to the values for the same attribute that are specified in the add operation. Setting the value to False causes the values from the template to be ignored if there are values for the same attribute specified in the Add operation. |

| Option | Description |
|---|---|
| *Allow event loopback from publisher to subscriber channel* | This value determines whether the Metadirectory engine allows an event to loop from the driver's Publisher channel to the Subscriber channel. Setting the value to False causes the Metadirectory engine to not allow events to loop back. Setting the value to True causes the Metadirectory engine to allow events to loop from the Publisher channel to the Subscriber channel. |
| *Revert to calculated membership value behavior* | This value determines the method used by the Metadirectory engine when performing read and search actions related to group membership.<br><br>Setting this value to False (the default setting) causes the Metadirectory engine, when reading or searching the Member and Group Member attributes of Identity Vault objects, to return only those values that are "static" values. Static values are objects that received group membership by direct assignment to the group rather than inherited assignment through a nested group.<br><br>Setting this value to True causes the Metadirectory engine to revert to the method used prior to Identity Manager 3.6. In pre-3.6 versions, the Metadirectory engine's search of the Member and Group Member attributes retrieved all "calculated" values. Calculated values include objects that are either 1) statically assigned membership or 2) dynamically assigned membership by virtue of the nested group hierarchy calculations used by eDirectory. A search of a group's Members attribute returns any objects that were directly assigned to the group or that were assigned membership through a nested group. |

# A.4 Log Level

Each driver set and each driver has a log level field where you can define the level of errors that should be tracked. The level you indicate here determines which messages are available to the logs. By default, the log level is set to track error messages. (This also includes fatal messages.) To track additional message types, change the log level.

Novell recommends that you use Novell Audit or Novell Sentinel for logging and reporting if possible. See the *Identity Reporting Module Guide* and *Identity Manager 4.0 Reporting Guide for Novell Sentinel*.

| Option | Description |
|---|---|
| *Use log settings from the DriverSet* | If this is selected, the driver logs events as the options are set on the Driver Set object. |
| *Log errors* | Logs just errors. |
| *Log errors and warnings* | Logs errors and warnings. |
| *Log specific events* | Logs the events that are selected. Click the icon to see a list of the events. |
| *Only update the last log time* | Updates the last log time. |
| *Logging off* | Turns logging off for the driver. |
| *Turn off logging to DriverSet, Subscriber and Publisher logs* | Turns all logging off for this driver on the Driver Set object, Subscriber channel, and the Publisher channel. |

| Option | Description |
| --- | --- |
| *Maximum number of entries in the log (50-500)* | Number of entries in the log. The default value is 50. |

# A.5 Driver Image/iManager Icon

Allows you to change the image associated with the driver in iManager. You can browse and select a different image from the default image.

The image associated with a driver is used by the Identity Manager Overview plug-in when showing the graphical representation of your Identity Manager configuration. Although storing an image is optional, it makes the overview display more intuitive.

**NOTE:** The driver image is maintained when a driver configuration is exported.

# A.6 Security Equals

Use the Security page to view or change the list of objects that the driver is explicitly security equivalent to. This object effectively has all rights of the listed objects.

If you add or delete an object in the list, the system automatically adds or deletes this object in that object's "Security Equal to Me" property. You don't need to add the [Public] trustee or the parent containers of this object to the list, because this object is already implicitly security equivalent to them.

Designer does not list the users the driver is security equals to.

# A.7 Filter

Launches the Filter editor.

In Designer, the Filter editor is not included with the driver properties. To access the Filter editor in Designer:

1. In an open project, click the *Outline* tab (Outline view).
2. Select the driver you want to manage the filter for, then click the plus sign to the left.
3. Double-click the *Filter* icon to launch the Filter editor.

# A.8 Edit Filter XML

Allows you to edit the filter directly in XML instead of using the Filter editor.

In Designer, the XML Filter editor is not included in the driver properties. To access the XML Filter editor in Designer:

1. In an open project, click the *Outline* tab (Outline view).
2. Select the driver you want to manage the filter for, then click the plus sign to the left.
3. Double-click the *Filter* icon to launch the Filter editor, then click *XML Source* at the bottom of the Filter editor.

## A.9 Misc/Trace

Allows you to add a trace level to your driver. With the trace level set, DSTrace displays the Identity Manager events as the Metadirectory engine processes the events. The trace level affects only the driver it is set for. Use the trace level for troubleshooting issues with the driver when the driver is deployed. DSTRACE displays the output of the specified trace level.

| Option | Description |
|---|---|
| *Trace level* | Increases the amount of information displayed in DSTRACE. Trace level 1 shows errors, but not the cause of the errors. If you want to see password synchronization information, set the trace level to 5. |
| *Trace file* | When a value is set in this field, all Java information for the driver is written to the file. The value for this field is the path for that file.<br><br>As long as the file is specified, Java information is written to this file. If you do not need to debug Java, leave this field blank. |
| *Trace file size limit* | Allows you to set a limit for the Java trace file. If you set the file size to Unlimited, the file grows in size until there is no disk space left. |
| *Trace name* | Driver trace messages are prepended with the value entered in this field. |
| *Use setting from Driver Set* | This option is only available in Designer. It allows the driver to use the same setting that is set on the Driver Set object. |

## A.10 Excluded Objects

Use this page to create a list of users or resources that are not replicated to the application. Novell recommends that you add all objects that represent an administrative role to this list (for example, the Admin object).

Designer does not list the excluded users.

## A.11 Driver Health Configuration

Driver health monitoring allows you to view a driver's current state of health as either green, yellow, or red, and to define the actions to perform in response to each of these health states. The Driver Health Configuration options are used to configure the health monitoring.

Driver health is discussed in detail in Chapter 5, "Monitoring Driver Health," on page 23.

## A.12 Driver Manifest

The driver manifest is like a resumé for the driver. It states what the driver supports, and includes a few configuration settings. The driver manifest is created by default when the Driver object is imported. A network administrator usually does not need to edit the driver manifest.

## A.13 Driver Cache Inspector

The Driver Cache Inspector displays information about the cache file that stores events being processed by the driver. The Driver Cache Inspector is discussed in detail in Chapter 8, "Inspecting a Driver's Cache File," on page 45.

Designer does not include the Driver Cache Inspector.

## A.14 Driver Inspector

The Driver Inspector displays information about objects associated with the driver. The Driver Inspector is discussed in detail in Chapter 7, "Managing Associations between Drivers and Objects," on page 39.

Designer does not include the Driver Inspector.

## A.15 Server Variables

This page lets you enable and disable Password Synchronization and the associated options for the selected driver.

When setting up Password Synchronization, consider both the settings on this page for an individual driver and the Universal Password Configuration options in your password policies.

This page lets you control which password Identity Manager updates directly, either the Universal Password for an Identity Vault, or the Distribution Password used for password synchronization by Identity Manager.

However, Novell Modular Authentication Service (NMAS) controls whether the various passwords inside the Identity Vault are synchronized with each other. Password Policies are enforced by NMAS, and they include settings for synchronizing Universal Password, NDS Password, Distribution Password, and Simple Password.

To change these settings in iManager:

1. In iManager, select *Passwords* > *Password Policies*.
2. Select a password policy, then click *Edit*.
3. Select *Universal Password*.

   This option is available from a drop-down list or a tab, depending on your version of iManager and your browser.
4. Select *Configuration Options*, make changes, then click *OK*.

**NOTE:** Enabling or disabling options on this page corresponds to values of True or False for certain global configuration values (GCVs) used for password synchronization in the driver parameters. Novell recommends that you edit them here in the graphical interface, instead of on the GCVs page. This interface helps ensure that you don't set conflicting values for the password synchronization GCVs.

| Option | Description |
|---|---|
| *Identity Manager accepts password (Publisher Channel)* | If this option is enabled, Identity Manager allows passwords to flow from the connected system driver into the Identity Vault data store.<br><br>Disabling this option means that no <`password`> elements are allowed to flow to Identity Manager. They are stripped out of the XML by a password synchronization policy on the Publisher channel.<br><br>If this option is enabled, and the option below it for Distribution Password is disabled, a <`password`> value coming from the connected system is written directly to the Universal Password in the Identity Vault if it is enabled for the user. If the user's password policy does not enable Universal Password, the password is written to the NDS Password. |
| *Use Distribution Password for password synchronization* | To use this setting, you must have a version of eDirectory that supports Universal Password, regardless of whether you have enabled Universal Password in your password policies.<br><br>If this option is enabled, a password value coming from the connected system is written to the Distribution Password. The Distribution Password is reversible, which means that it can be retrieved from the Identity Vault data store for password synchronization. It is used by Identity Manager for bidirectional password synchronization with connected systems. For Identity Manager to distribute passwords to connected systems, this option must be enabled.<br><br>NMAS and Password policies control whether the Distribution Password is synchronized with other passwords in the Identity Vault. By default, the Distribution Password is the same as the Universal Password in the Identity Vault.<br><br>If the password in the Identity Vault is to be independent of Password Synchronization, so that Identity Manager is a conduit only for synchronizing passwords among connected systems, change this default setting. In the Universal Password Configuration Options in a Password policy, disable *Synchronize Universal Password with Distribution Password*. This use of Identity Manager Password Synchronization is also referred to as “tunneling.” |
| *Accept password only if it complies with user’s Password Policy* | To use this setting, users must have a Password policy assigned that has Universal Password enabled, and Advanced Password Rules enabled and configured.<br><br>If this option is chosen, Identity Manager does not write a password from this connected system to the Distribution Password in the Identity Manager data store or publish it to connected systems unless the password complies with the user's Password policy.<br><br>By using the notification option that is also on this page, you can inform users when a password is not set because it is not compliant. |

| Option | Description |
| --- | --- |
| *If password does not comply, ignore Password Policy on the connected system by resetting user's password to the Distribution Password* | This option lets you enforce Password policies on the connected system by replacing a password that does not comply. If you select this option, and a user's password on the connected system does not comply with the user's Password policy, Identity Manager resets the password on the connected system by using the Distribution Password from the Identity Vault data store.<br><br>Keep in mind that if you do not select this option, user passwords can become out-of-sync on connected systems.<br><br>By using the notification option that is also on this page, you can inform users when a password is not set or reset. Notification is especially helpful for this option. If the user changes to a password that is allowed by the connected system but rejected by Identity Manager because of the Password policy, the user won't know that the password has been reset until the user receives a notification or tries to log in to the connected system with the old password.<br><br>**NOTE:** Consider the connected system's password policies when deciding whether to use this option. Some connected systems might not allow the reset because they don't allow you to repeat passwords. |
| *Always accept password; ignore Password Policies* | If you select this option, Identity Manager does not enforce the user's Password policy for this connected system. Identity Manager writes the password from this connected system to the Distribution Password in the Identity Vault data store, and distributes it to other connected systems, even if the password does not comply with the user's Password policy. |
| *Application accepts passwords (Subscriber Channel)* | If you select this option, the driver sends passwords from the Identity Vault data store to this connected system. This also means that if a user changes the password on a different connected system that is publishing passwords to the Distribution Password in the Identity Vault data store, the password is changed on this connected system.<br><br>By default, the Distribution Password is the same as the Universal Password in the Identity Vault, so changes to the Universal Password made in the Identity Vault are also sent to the connected system.<br><br>If you want the password in the Identity Vault to be independent of Password Synchronization, so that Identity Manager is a conduit only for synchronizing passwords among connected systems, you can change this default setting. In the Universal Password Configuration Options in a password policy, disable *Synchronize Universal Password with Distribution Password*. This use of Password Synchronization is also referred to as "tunneling." |
| *Notify the user of password synchronization failure via-email* | If you select this option, e-mail is sent to the user if a password is not synchronized, set, or reset. The e-mail that is sent to the user is based on an e-mail template. This template is provided by the Password Synchronization application. However, for the template to work, you must customize it and specify an e-mail server to send the notification messages.<br><br>**NOTE:** To set up e-mail notification, select *Passwords > Edit EMail Templates*. |