

Novell Identity Manager

3.5.1

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UNDERSTANDING POLICIES

October 30, 2007



Novell®

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About This Guide

Novell® Identity Manager 3.5.1 is a data sharing and synchronization service that enables applications, directories, and databases to share information. It links scattered information and enables you to establish policies that govern automatic updates to designated systems when identity changes occur.

Identity Manager provides the foundation for account provisioning, security, single sign-on, user self-service, authentication, authorization, automated workflows, and Web services. It allows you to integrate, manage, and control your distributed identity information so you can securely deliver the right resources to the right people.

This guide provides detailed explanation of policies and their components.

- ◆ Chapter 1, “Overview,” on page 9
- ◆ Chapter 2, “Upgrading Identity Manager Policies,” on page 15
- ◆ Chapter 3, “Understanding Types of Policies,” on page 25
- ◆ Chapter 4, “Understanding Policy Components,” on page 53
- ◆ Chapter 5, “Downloading Identity Manager Policies,” on page 59
- ◆ Chapter 6, “Defining Policies by Using XSLT Style Sheets,” on page 61

To see information about administering the policies, see *Policies in Designer 2.1* or *Policies in iManager for Identity Manager 3.5.1*.

Audience

This guide is intended for Identity Manager administrators.

Feedback

We want to hear your comments and suggestions about this manual and the other documentation included with this product. Please use the User Comments feature at the bottom of each page of the online documentation, or go to www.novell.com/documentation/feedback.html and enter your comments there.

Documentation Updates

For the most recent version of this document, see the [Identity Manager Documentation Web site](http://www.novell.com/documentation/idm35/) (<http://www.novell.com/documentation/idm35/>).

Additional Documentation

For documentation on using the Identity Manager drivers, see the [Identity Manager Driver Documentation Web site](http://www.novell.com/documentation/idm35drivers/index.html) (<http://www.novell.com/documentation/idm35drivers/index.html>).

For documentation on using Designer 2.1, see the [Designer 2.1 for Identity Manager 3.5.1 Documentation Web site](http://www.novell.com/documentation/designer21/) (<http://www.novell.com/documentation/designer21/>).

For a detailed discussion of the document type definitions (DTD) that Identity Manager uses, see the *Identity Manager 3.5.1 DTD Reference*.

Documentation Conventions

In this documentation, a greater-than symbol (>) is used to separate actions within a step and items within a cross-reference path.

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Policies are what Identity Manager uses to synchronize data to the different systems. They are the foundation of Identity Manager. Understanding policies and how they work is important to successfully working with Identity Manager.

- ◆ [Section 1.1, “What Are Policies?,” on page 9](#)
- ◆ [Section 1.2, “What’s New for Policies,” on page 10](#)

For administration information about policies, see

- ◆ [Policies in Designer 2.1](#)
- ◆ [Policies in iManager for Identity Manager 3.5.1](#)
- ◆ [Novell Credential Provisioning Policies for Identity Manager 3.5.1](#)
- ◆ [Identity Manager 3.5.1 DTD Reference](#)

1.1 What Are Policies?

At a high level, a policy is the set of rules that enables you to manage the way Identity Manager sends and receives updates. The driver sends changes from the connected system to the Identity Vault, where policies are used to manipulated the data to achieve the desired results.

As part of understanding how policies work, it is important to understand the components of policies.

- ◆ Policies are made up of rules.
- ◆ A rule is a set of conditions, see “**Conditions**” that must be met before a defined action, see “**Actions**” occurs.
- ◆ Actions can have dynamic arguments that derive from tokens that are expanded at run time.
- ◆ Tokens are broken up into two classifications: nouns and verbs.
 - ◆ Noun tokens, see “**Noun Tokens**” expand to values that are derived from the current operation, the source or destination data stores, or some external source.
 - ◆ Verb tokens, see “**Verb Tokens**” modify the concatenated results of other tokens that are subordinate to them.
- ◆ Regular expressions (see [Section 4.5, “Regular Expressions,” on page 56](#)) and XPath 1.0 expressions (see [Section 4.6, “XPath 1.0 Expressions,” on page 56](#)) are commonly used in the rules to create the desired results for the policies.
- ◆ A policy operates on an XDS document and its primary purpose is to examine and modify that document.
- ◆ An operation is any element in the XDS document that is a child of the input element and the output element. The elements are part of the Novell[®] `nds.dtd`; for more information, see “**NDS DTD**” in the [Identity Manager 3.5.1 DTD Reference](#).
- ◆ An operation usually represents an event, a command, or a status.
- ◆ The policy is applied separately to each operation. As the policy is applied to each operation in turn, that operation becomes the current operation. Each rule is applied sequentially to the

current operation. All of the rules are applied to the current operation unless an action is executed by a prior rule that causes subsequent rules to no longer be applied.

- ♦ A policy can also get additional context from outside of the document and cause side effects that are not reflected in the result document.

For detailed information, see the following sections in this guide:

- ♦ [Chapter 2, “Upgrading Identity Manager Policies,” on page 15](#)
- ♦ [Chapter 3, “Understanding Types of Policies,” on page 25](#)
- ♦ [Chapter 4, “Understanding Policy Components,” on page 53](#)
- ♦ [Chapter 5, “Downloading Identity Manager Policies,” on page 59](#)
- ♦ [Chapter 6, “Defining Policies by Using XSLT Style Sheets,” on page 61](#)
- ♦ [Section 3.6, “Understanding the Policy Flow,” on page 49](#)
- ♦ [“The Dataflow View” in *Designer 2.1 for Identity Manager 3.5.1*](#)

1.2 What’s New for Policies

Identity Manager 3.5 contains new functionality, including architecture changes, new objects called resource objects, and new functionality in DirXML[®] Script.

- ♦ [Section 1.2.1, “Identity Manager Architecture Changes,” on page 10](#)
- ♦ [Section 1.2.2, “Resource Objects,” on page 10](#)
- ♦ [Section 1.2.3, “New Functionality in DirXML Script,” on page 10](#)

1.2.1 Identity Manager Architecture Changes

Identity Manager 3.5 changes the architecture of how policies are referenced by the drivers. This change requires that drivers be upgraded in order to, to take advantage of resource objects. For more information about the architecture change, see [Chapter 2, “Upgrading Identity Manager Policies,” on page 15](#).

1.2.2 Resource Objects

Resource objects store information that drivers use. The resource objects can hold arbitrary data in any format. Novell[®] Identity Manager 3.5 contains different types of resource objects, including ECMA Script, Mapping Tables, Policy Libraries, and a generic resource object. See [“Storing Information in Resource Objects” in the *Policies in Designer 2.1*](#) or [“Storing Information in Resource Objects” in the *Policies in iManager for Identity Manager 3.5.1*](#).

1.2.3 New Functionality in DirXML Script

DirXML Script contains the following new functionality:

- ♦ [“Use of Variables in Policies” on page 11](#)
- ♦ [“Notrace Attribute Added” on page 11](#)
- ♦ [“The If Password Condition Contains New Operators” on page 11](#)
- ♦ [“The If Association, If Operation, and If Password Conditions Support Modes” on page 11](#)

- ◆ “Some Conditions Contain New Operators” on page 11
- ◆ “Some Actions Support the Optional Before Attribute” on page 12
- ◆ “Added the Scope Attribute to Variables in Policies” on page 12
- ◆ “Added the Ability to Set Passwords for Some Actions” on page 12
- ◆ “Added Support for Custom SMTP Headers” on page 12
- ◆ “Added Additional Attributes to Unique Name” on page 12
- ◆ “Added Passwords to Specific Associations or DN” on page 12
- ◆ “New DirXML Script Elements” on page 12

Use of Variables in Policies

DirXML Script allows for the use of variables in policies, and includes predefined variables. For more information, see [Section 4.2, “Variables,” on page 53](#) and [Section 4.3, “Variable Expansion,” on page 54](#).

Notrace Attribute Added

A Notrace attribute has been added to all `<rule>`, `<and>`, `<or>`, `<if>`, `<do>`, and `<token>` tags. The Identity Manager engine does not output any trace messages for these tags when the Notrace attribute is set to On.

The If Password Condition Contains New Operators

The “**If Password**” condition supports the equal and not equal operators.

The If Association, If Operation, and If Password Conditions Support Modes

The “**If Association**”, “**If Operation**”, and “**If Password**” conditions now support various modes for comparisons.

Some Conditions Contain New Operators

The of less than, not less than, greater than, and not greater than operators are supported by the following conditions:

- ◆ “**If Association**”
- ◆ “**If Attribute**”
- ◆ “**If Class Name**”
- ◆ “**If Destination Attribute**”
- ◆ “**If Entitlement**”
- ◆ “**If Global Configuration Value**”
- ◆ “**If Local Variable**”
- ◆ “**If Operation Attribute**”
- ◆ “**If Operation Property**”
- ◆ “**If Password**”
- ◆ “**If Source Attribute**”

Some Actions Support the Optional Before Attribute

The optional before attribute allows you to insert XML text before another XPath expression that is evaluated against the original matched expression. The following actions support the before attribute:

- ◆ “Append XML Element”
- ◆ “Append XML Text”
- ◆ “Clone By XPath Expression”

Added the Scope Attribute to Variables in Policies

The scope attribute allows you to set the scope for variables in the policies. The following elements now support the scope attribute:

- ◆ “If Local Variable”
- ◆ “Set Local Variable”
- ◆ “Local Variable”

Added the Ability to Set Passwords for Some Actions

Passwords can be used with the following actions:

- ◆ “Send Email”
- ◆ “Send Email from Template”
- ◆ “Start Workflow”

Added Support for Custom SMTP Headers

The “Send Email” and “Send Email from Template” actions now allow for the use of custom SMTP headers.

Added Additional Attributes to Unique Name

The counter-use, counter-patter, and on-unavailable attributes have been added to give more flexibility to the “Unique Name” token.

Added Passwords to Specific Associations or DN

The “Set Destination Password” and the “Set Source Password” actions allow you to set a password for a specific DN or association.

New DirXML Script Elements

The new DirXML Script functionality makes it easier to use Policy Builder instead of using XSLT style sheets. For information on how to use the new DirXML Script elements in Designer, see the following sections:

- ◆ “If XML Attribute”
- ◆ “Clear SSO Credential”
- ◆ “If”

- ◆ “Set SSO Credential”
- ◆ “Set SSO Passphrase”
- ◆ “Start Workflow”
- ◆ “While”
- ◆ “Character”
- ◆ “Document”
- ◆ “Generate Password”
- ◆ “Query”
- ◆ “Resolve”
- ◆ “Time”
- ◆ “Base64 Decode”
- ◆ “Base64 Encode”
- ◆ “Convert Time”
- ◆ “Join”
- ◆ “Map”
- ◆ “Split”

Upgrading Identity Manager Policies

If you have a prior version of Identity Manager installed, continue with this section. If you have installed Identity Manager 3.5 for the first time, skip to [Chapter 3, “Understanding Types of Policies,” on page 25](#). Identity Manager 3.5 contains a new architecture for how policies reference one another.

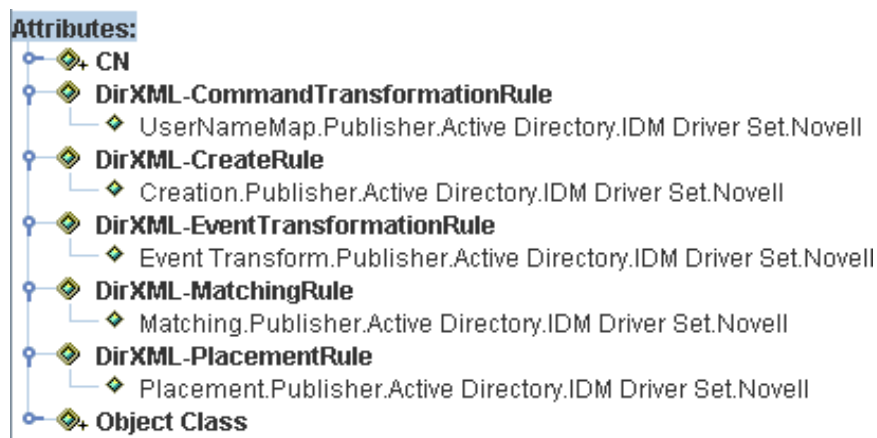
- ◆ [Section 2.1, “Previous Identity Manager Architecture,” on page 15](#)
- ◆ [Section 2.2, “New Identity Manager Architecture,” on page 16](#)
- ◆ [Section 2.3, “Upgrading Drivers to the New Architecture,” on page 17](#)
- ◆ [Section 2.4, “Methods for Upgrading the Driver Configuration File,” on page 21](#)
- ◆ [Section 2.5, “Recommended Driver Configuration Upgrade Procedure,” on page 22](#)

2.1 Previous Identity Manager Architecture

The previous architecture used a separate eDirectory™ attribute to represent each Policy Set on the driver, the Publisher object, or the Subscriber object that pointed to an individual policy (rule or style sheet) object. The driver object stored the Input Transformation, Output Transformation, and the Schema Mapping policy sets. The Publisher and Subscriber objects stored Event Transformation, Matching, Create, Placement, and Command Transformation Policy Sets.

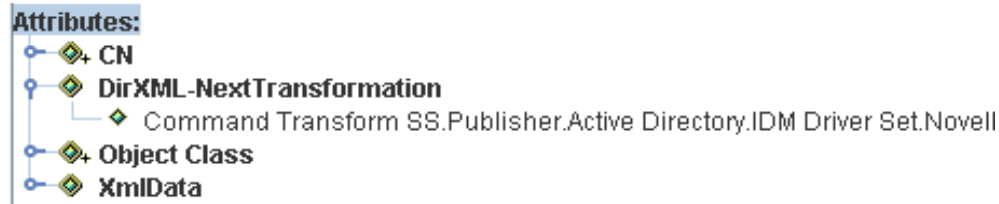
For more information about policy types, see [Chapter 3, “Understanding Types of Policies,” on page 25](#). [Figure 2-1 on page 15](#) shows all of the policies stored on the Publisher object for an Active Directory* driver.

Figure 2-1 Identity Manager Architecture Prior to Version 3.5



Each attribute contains the DN of the policy or the style sheet the Policy Set is referring to. If there are multiple policies in a Policy Set, then a chain of policies is created. The DirXML-NextRule attribute points to the next policy in the Policy Set that needs to be executed. [Figure 2-2 on page 16](#) shows a Command Transformation style sheet, including the next Command Transformation style sheet or policy that is executed in the DirXML-NextTransformation attribute.

Figure 2-2 DirXML-NextRule Attribute on a Policy



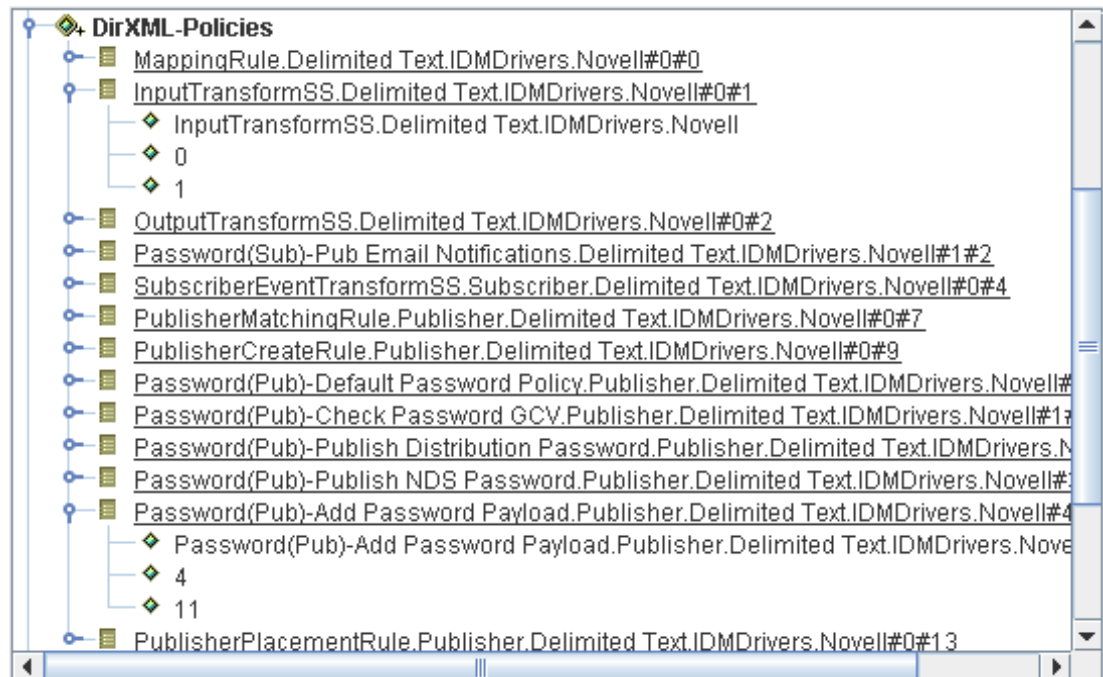
This allows for a convenient representation of order within a Policy Set, but has the drawback that individual policies cannot be shared without also sharing any subsequent policies in the chain.

2.2 New Identity Manager Architecture

The new Identity Manager 3.5 architecture uses a single attribute on the driver object call DirXML-Policies. DirXML-Policies is a multi-valued attribute, which consists of a DN field that points to a policy, and two integer fields that indicate *interval* and *level*. The *interval* field holds a number indicative of the Policy Set that the policy belongs to. The *level* field indicates the relative order (low to high) of the policies within the Policy Set.

Figure 2-3 on page 16 shows all of the Policy Sets in the DirXML-Policies attribute of a Delimited Text driver. The Password policy is a Subscriber Command Transformation policy. It is the fourth policy that is executed when the Command Transformation policies are run.

Figure 2-3 New Identity Manger Architecture



Each Policy Set is assigned a unique number for the integer field. Those values are:

- ◆ 0 = Schema Mapping

- ◆ 1 = Input Transformation
- ◆ 2 = Output Transformation
- ◆ 3 = ECMAScript Function Definition
- ◆ 4 = Subscriber Event Transformation
- ◆ 5 = Publisher Event Transformation
- ◆ 6 = Subscriber Matching
- ◆ 7 = Publisher Matching
- ◆ 8 = Subscriber Creation
- ◆ 9 = Publisher Creation
- ◆ 10 = Subscriber Command Transformation
- ◆ 11 = Publisher Command Transformation
- ◆ 12 = Subscriber Placement
- ◆ 13 = Publisher Placement

2.3 Upgrading Drivers to the New Architecture

For the new architecture to work properly, all of the drivers in a driver set must use the new architecture. You cannot have mixed versions of drivers in a driver set and have the new architecture function.

You use Designer or iManager to upgrade drivers, after Designer 2.0 and Identity Manager 3.5 plug-ins for iManager are installed. These procedures upgrade the driver to use the new architecture, but it does not upgrade the driver configuration file. To upgrade the driver configuration file, see [Section 2.4, “Methods for Upgrading the Driver Configuration File,” on page 21](#).

- ◆ [Section 2.3.1, “Upgrading Drivers in Designer,” on page 17](#)
- ◆ [Section 2.3.2, “Upgrading Drivers in iManager,” on page 20](#)

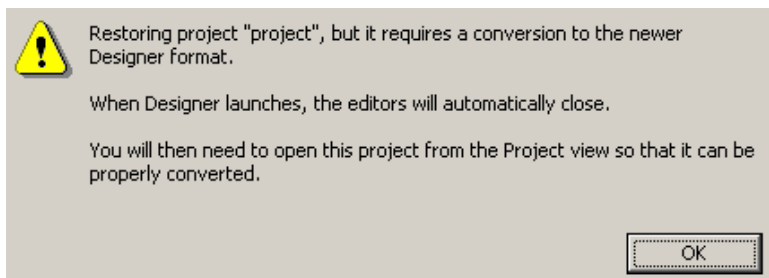
2.3.1 Upgrading Drivers in Designer

To upgrade drivers in Designer:

- 1 Install Designer version 2.0 or above, then launch Designer.

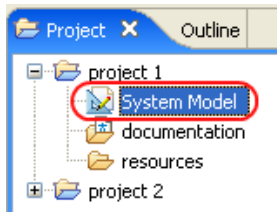
If you had a project open in Designer when you upgraded Designer, proceed to [Step 2](#). If you didn't have a project open in Designer when you upgraded Designer, skip to [step Step 3](#).

- 2 If you had a project open when upgrading Designer, the following warning message is displayed. Read the upgrade message, then click *OK*.

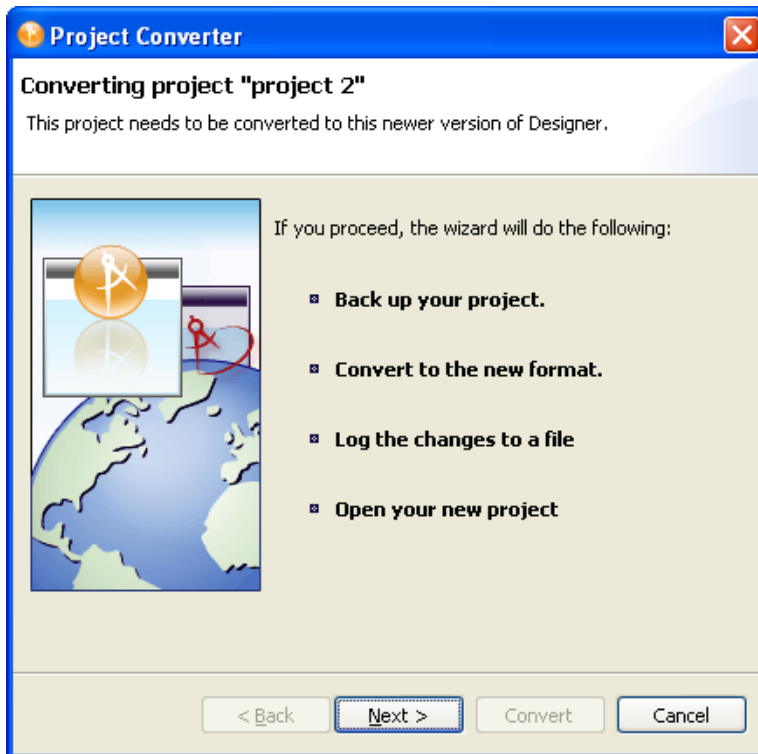


Designer closes the project to preform the upgrade.

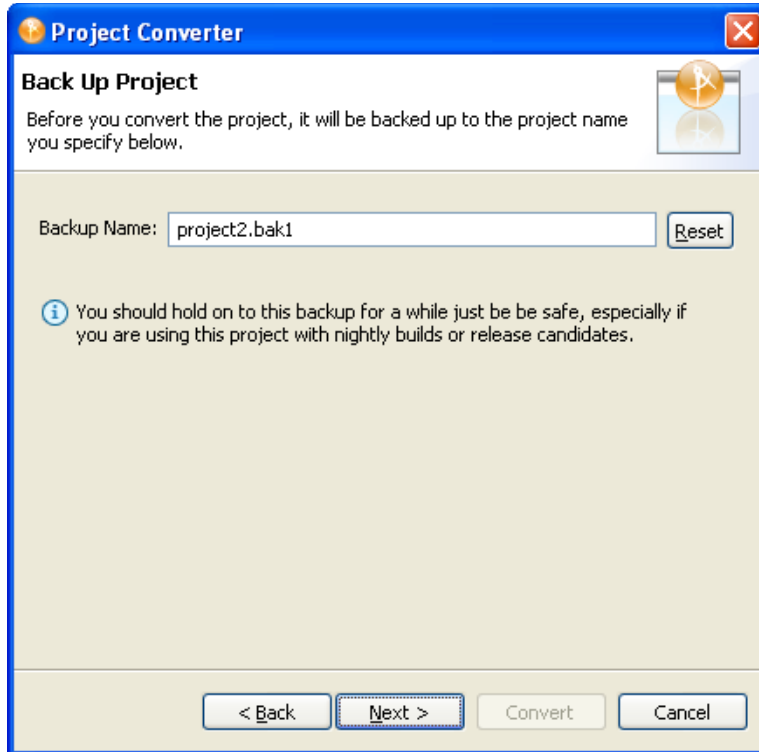
- 3 In the Project view, double-click *System Model* to open and convert the project.



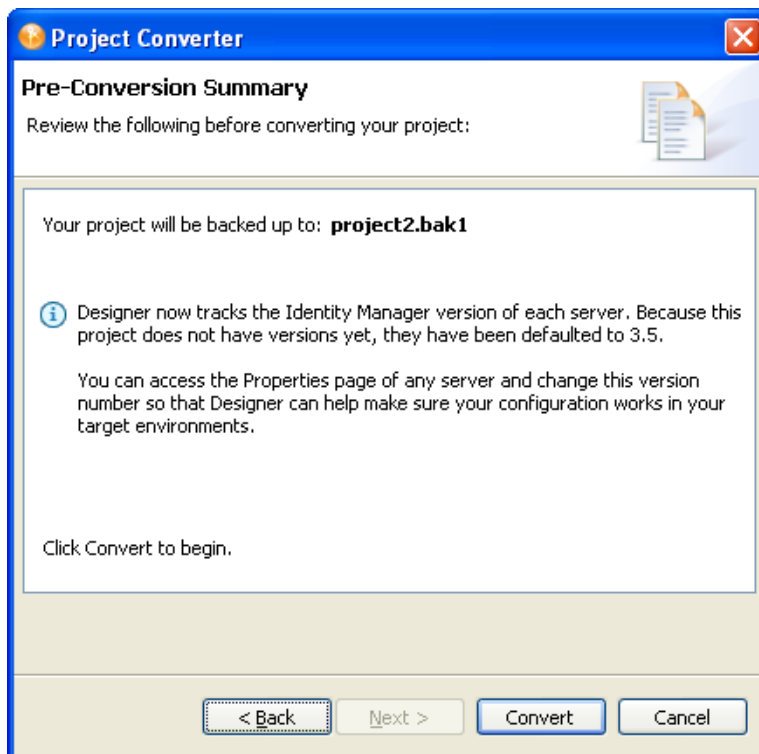
- 4 Read Project Converter message explaining that the project is backed up, converted to the new format, changes logged to a file, and the new project is opened, then click *Next*.



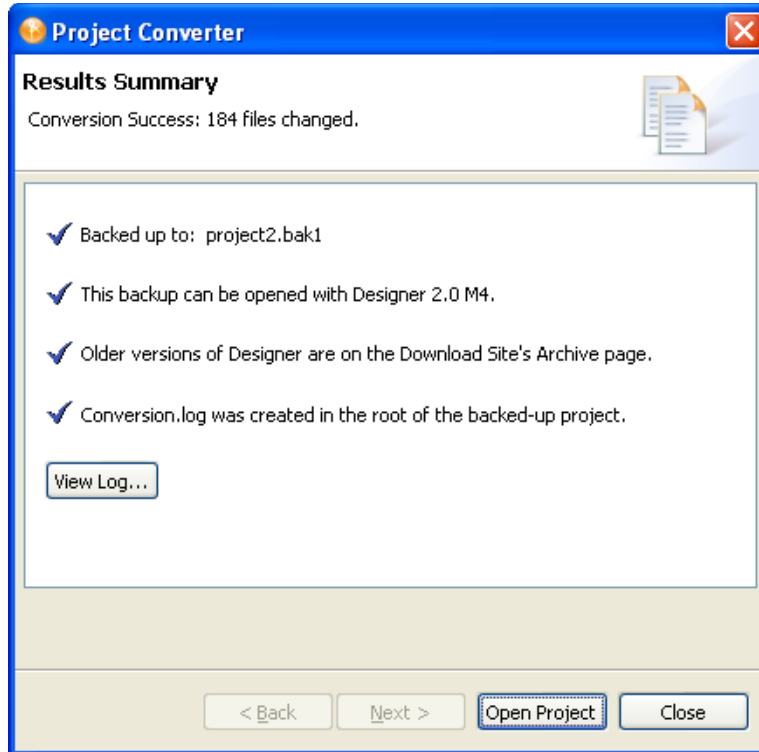
- 5 Specify the name of the backup project name, then click *Next*.



- 6 Read the project conversion summary, then click *Convert*.



- 7 Read the project conversion result summary, then click *Open Project*.

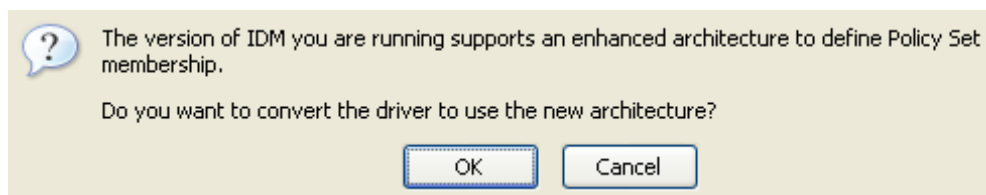


If you want to view the log file that is generated, click *View Log*.

2.3.2 Upgrading Drivers in iManager

To upgrade drivers in iManager:

- 1 Verify Identity Manager 3.5 has been installed and you have the current plug-ins installed, then launch iManager.
- 2 Click *Identity Manager > Identity Manager Overview*.
- 3 Click *Search* to find the Driver Set object, then click the driver you want to upgrade.
- 4 Read the message that is displayed, then click *OK*.



- 5 If there is more than one driver in the Driver Set, repeat **Step 2** through **Step 4** for each driver.

2.4 Methods for Upgrading the Driver Configuration File

There are multiple ways of upgrading an existing driver and its policies. There is no simple method, because there is no merge process in Identity Manager to merge customized policies. When a driver is upgraded, any policy that has the same name as a policy in the new driver is over written. If the policies have been customized, they are overwritten and the customization is lost.

There are many different ways of upgrading to address this issue, but this section discusses two of the upgrade methods. There are pros and cons to each upgrade method.

- ♦ [Section 2.4.1, “Installing a New Driver and Moving the Existing Policies from the Old Driver,” on page 21](#)
- ♦ [Section 2.4.2, “Overlay the New Driver Configuration File Over an Existing Driver,” on page 21](#)

2.4.1 Installing a New Driver and Moving the Existing Policies from the Old Driver

The pros to this method are:

- ♦ Any existing policies are not overwritten.

The cons to this method are:

- ♦ All associations for synchronized objects are lost and must be re-created, expanded, and reloaded.
- ♦ The amount of time it takes to make the associations again. If you have a policy that depends upon a specific association, that policy does not work.
- ♦ Complexity of making sure policies and rules are restored correctly.

2.4.2 Overlay the New Driver Configuration File Over an Existing Driver

The impact of this method depends upon how your policies are configured.

The pros are:

- ♦ If your policies have different names than the policies in the driver configuration file, they are not overwritten.
- ♦ The associations for the synchronized objects stay the same and do not need to be re-created.

The cons are:

- ♦ If your policies have the same name as policies in the driver configuration file, they are overwritten.

This is the recommended upgrade option. However, in order for this upgrade method to work, some methodology needs to be in place for creating policies.

- ♦ You should follow the same procedures when developing policies as when you upgrade the policies.

- ◆ Existing Novell policies or rules should never be modified.
- ◆ If you do not use a default policy, disable the policy, but do not delete it.
- ◆ Create new policies or rules to achieve the desired result for your business needs.
- ◆ Use a standard naming model for naming the policies in your company.
- ◆ Name your policies with a prefix of the policy set where the policy is stored. This allows you to know which policy set to attach the policy to.

If you have these methodologies in place, use [Section 2.5, “Recommended Driver Configuration Upgrade Procedure,” on page 22](#), to upgrade the driver configuration.

2.5 Recommended Driver Configuration Upgrade Procedure

This is Novell’s recommended driver configuration upgrade procedure. Make sure you do the procedure in a lab environment. The procedure can be performed in Designer or iManager.

- ◆ [Section 2.5.1, “Upgrading the Driver Configuration in Designer,” on page 22](#)
- ◆ [Section 2.5.2, “Upgrading the Driver Configuration in iManager,” on page 24](#)

2.5.1 Upgrading the Driver Configuration in Designer

The upgrade procedure has three different tasks that need to be completed:

- ◆ [“Creating an Export of the Driver” on page 22](#)
- ◆ [“Overlay the New Driver Configuration File Over the Existing Driver” on page 22](#)
- ◆ [“Restoring Custom Policies and Rules to the Driver” on page 23](#)

Creating an Export of the Driver

Creating an export of the driver makes a backup of your current configuration. Make sure you have a backup before upgrading.

- 1 Verify that your project in Designer has the most current version of your driver. For instructions, see [“Importing a Driver Set or Driver from the Identity Vault” in *Designer 2.1 for Identity Manager 3.5.1*](#).
- 2 In the Modeler, right-click the driver line of the driver you are upgrading.
- 3 Select *Export to a Configuration File*.
- 4 Browse to a location to save the configuration file, then click *Save*.
- 5 Click *OK* on the results page.

Overlay the New Driver Configuration File Over the Existing Driver

- 1 In the Modeler, right-click the driver line of the driver you are upgrading.
- 2 Select *Run Configuration Wizard*.
- 3 Click *Yes* on the warning page.

The warning is informing you that all of the driver setting and policies are reset.

IMPORTANT: Make sure that your customized policies have different names, from the default policies, so you do not lose any data.

- 4 Browse to and select the driver configuration for the driver are upgrading, then click *Run*.
- 5 Specify the information for the driver, then click *Next*.
There might be more than one page of information to specify.
- 6 Click *OK* on the results page.

Restoring Custom Policies and Rules to the Driver

You can add policies into the policy set in two different ways:

- ♦ [“Adding a Customized Policy Through the Outline View” on page 23](#)
- ♦ [“Adding a Customized Policy Through the Show Policy Flow View” on page 23](#)

Adding a Customized Policy Through the Outline View

- 1 In the *Outline* view, select the upgraded driver to display the *Policy Set* view.
- 2 Right-click the policy set where you need to restore the customized policy to the driver, then select *New > From Copy*.
- 3 Browse to and select the customized policy, then click *OK*.
- 4 Specify the name of the customized policy, then click *OK*.
- 5 Click *Yes* in the file conflict message to save your project.
- 6 After the Policy Builder opens the policy, verify that the information is correct in the copied policy.
- 7 Repeat [Step 2](#) through [Step 6](#) for each customized policy you need to restore to the driver.
- 8 Start the driver and test the driver.
- 9 After you verify that the policies work, move the driver to the production environment.

Adding a Customized Policy Through the Show Policy Flow View

- 1 In the *Outline* view, select the upgraded driver, then click the *Show Policy Flow* icon.
- 2 Right-click the policy set where you need to restore the customized policy to the driver, then select *Add Policy > Copy Existing*.
- 3 Browse to and select the customized policy, then click *OK*.
- 4 Specify the name of the customized policy, then click *OK*.
- 5 Click *Yes* in the file conflict message to save your project.
- 6 After the Policy Builder opens the policy, verify that the information is correct in the copied policy.
- 7 Repeat [Step 2](#) through [Step 6](#) for each customized policy you need to restore to the driver.
- 8 Start the driver and test the driver.
- 9 After you verify that the policies work, move the driver to the production environment.

2.5.2 Upgrading the Driver Configuration in iManager

The upgrade procedure has three different tasks that need to be completed:

- ♦ “Creating an Export of the Driver” on page 24
- ♦ “Overlaying the New Driver Configuration File Over the Existing Driver” on page 24
- ♦ “Restoring Custom Policies and Rules Back to the Driver” on page 24

Creating an Export of the Driver

Creating an export of the driver makes a backup of your current configuration. Make sure you have a backup before upgrading.

- 1 In iManager, select *Identity Manager > Identity Manager Overview*.
- 2 Click *Search* to find the Driver Set object that holds the driver you want to upgrade.
- 3 Click the driver you want to upgrade, then click *Export*.
- 4 Click *Next*, then select *Export all contained policies, linked to the configuration or not*.
- 5 Click *Next*, then click *Save As*.
- 6 Select *Save to Disk*, then click *OK*.
- 7 Click *Finish*.

Overlaying the New Driver Configuration File Over the Existing Driver

- 1 In iManager, select *Identity Manager > Identity Manager Overview*.
- 2 Click *Add Driver*, then click *Next* on the New Driver Wizard page.
- 3 Select the driver configuration you want to overlay, then click *Next*.
- 4 In the *Existing drivers* field, browse to and select the driver you want to upgrade.
- 5 Specify the information for the driver, then click *Next*.
- 6 On the summary page, select *Update everything about that driver and policy libraries*.

IMPORTANT: Make sure that any customized policies have a different name from the default, so you do not lose any data.

- 7 Click *Next*, then click *Finish* on the Summary page.

Restoring Custom Policies and Rules Back to the Driver

- 1 In iManager, select *Identity Manager > Identity Manager Overview*.
- 2 Click *Search* to find the Driver Set object, then click the upgraded driver.
- 3 Select the policy set where you need to restore the customized policy to the driver, then click *Insert*.
- 4 Select *Use an existing policy*, then browse to and select the custom policy.
- 5 Click *OK*, then click *Close*.
- 6 Repeat **Step 3** through **Step 5** for each custom policy you need to restore to the driver.
- 7 Start the driver and test the driver.
- 8 After you verify that the policies work, move the driver to the production environment.

Understanding Types of Policies

This section contains an overview of policies and filters, and their function in an Identity Manager environment. The following topics are covered:

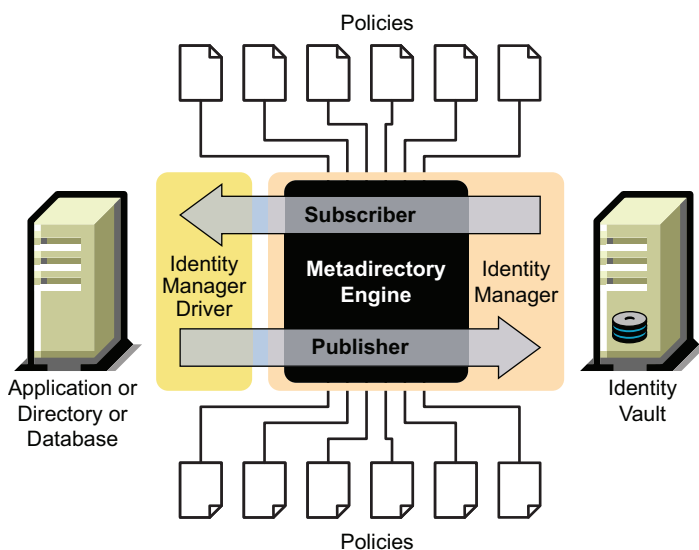
- ◆ Section 3.1, “Identity Manager Architecture in Relation to Policies,” on page 25
- ◆ Section 3.2, “Using Filters,” on page 26
- ◆ Section 3.3, “How Policies Function,” on page 26
- ◆ Section 3.4, “Policy Types,” on page 28
- ◆ Section 3.5, “Defining Policies,” on page 49
- ◆ Section 3.6, “Understanding the Policy Flow,” on page 49

3.1 Identity Manager Architecture in Relation to Policies

Identity Manager provides for the clean movement of data between the Identity Vault and any application, directory, or database. To accomplish this, Identity Manager has a well-defined interface that translates eDirectory™ data and events into XML format. This interface allows the data to flow in and out of the directory.

The following figure illustrates the basic Identity Manager components and their relationships.

Figure 3-1 Identity Manager Components



The Metadirectory engine is the key module in the Identity Manager architecture. It provides the interface that allows Identity Manager drivers to synchronize information with the Identity Vault, allowing even disparate data systems to connect and share data.

The Metadirectory engine exposes the Identity Vault data and the Identity Vault events by using an XML format. The Metadirectory engine employs a rules processor and a data transformation engine

to manipulate the data as it flows between two systems. Access to the rules processor and transformation engine is provided through control points called Policy Sets. Policy Sets can contain zero or more policies.

A policy implements business rules and processes primarily by transforming an event on a channel input into a set of commands on the channel output. The way each driver synchronizes data and events is configured by the administrator through a series of policies. For example, if a Creation Policy specifies that a User object must have a value for the Given Name attribute, any attempt to create a User object without a given name value is rejected.

3.2 Using Filters

Filters specify the object classes and the attributes for which the Metadirectory engine processes events and how changes to those classes and attributes are handled.

Filters only pass events occurring on objects whose base class matches one of those classes specified by the filter. Filters do not pass events occurring on objects that are a subordinate class of a class specified in the filter unless the subordinate class is also specified. There is a separate filter setting for each channel, which allows the control of the synchronization direction and the authoritative data source for each class and attribute.

NOTE: In eDirectory™, a base class is the object class that is used to create an entry. You must specify that class in the filter, rather than a super class from which the base class inherits or the auxiliary classes from which additional attributes might come.

For example, if the User class with the Surname and Given Name attributes is set to synchronize in the filter, the Metadirectory engine passes on any changes to these attributes. However, if the entry's Telephone Number attribute is modified, the Metadirectory engine drops this event because the Telephone Number attribute is not in the filter.

Filters must be configured to include the following:

- ◆ Attributes that are to be synchronized
- ◆ Attributes that are not synchronized, but are used to trigger policies to do something

See “[Controlling the Flow of Objects with the Filter](#)” in *Policies in Designer 2.1* or “[Controlling the Flow of Objects with the Filter](#)” in *Policies in iManager for Identity Manager 3.5.1* for information on defining filters.

3.3 How Policies Function

At a high level, a policy is a set of rules that enables you to customize the way Identity Manager sends and receives updates. The driver sends changes from the connected system to the Identity Vault, where policies are used to manipulate the data to achieve the desired results.

- ◆ [Section 3.3.1, “Detecting Changes and Sending Them to the Identity Vault,”](#) on page 27
- ◆ [Section 3.3.2, “Filtering Information,”](#) on page 27
- ◆ [Section 3.3.3, “Using Policies to Apply Changes,”](#) on page 27

3.3.1 Detecting Changes and Sending Them to the Identity Vault

When a driver is written, an attempt is made to include the ability to synchronize anything a company deploying the driver might use. The developer writes the driver to detect any relevant changes in the connected system, then pass these changes to the Identity Vault.

Changes are contained in an XML document, formatted according to the Identity Manager specification. The following snippet contains one of these XML documents:

```
<nds dtdversion="2.0" ndsversion="8.7.3">
<source>
  <product version="2.0">DirXML</product>
  <contact>Novell, Inc.</contact>
</source>

<input>
  <add class-name="User" event-id="0" src-dn="\ACME\Sales\Smith"
  src-entry-id="33071">
    <add-attr attr-name="Surname">
      <value timestamp="1040071990#3" type="string">Smith</value>
    </add-attr>
    <add-attr attr-name="Telephone Number">
      <value timestamp="1040072034#1" type="teleNumber">111-1111</
value>
    </add-attr>
  </add>
</input>
</nds>
```

3.3.2 Filtering Information

Drivers are designed to report any relevant changes, then enable you to filter the information, so only the information you desire enters your environment.

For example, if a company doesn't need information about groups, it can implement a filter to block all operations regarding groups in either the Identity Vault or the connected system. If the company does need information about users and groups, it can implement a filter to allow both types of objects to synchronize between the Identity Vault and the connected system.

Defining filters to allow the synchronization of only objects that are interesting to you is the first step in driver customization.

The next step defines what Identity Manager does with the objects that are allowed by the filter. As an example, refer to the add operation in the XML document above. A user named Smith with a telephone number of 111-1111 was added to the connected system. Assuming you allow this operation, Identity Manager needs to decide what to do with this user.

3.3.3 Using Policies to Apply Changes

To make changes, Identity Manager applies a set of policies, in a specific order.

First, a Matching policy answers the question, "Is this object already in the data store?" To answer this, you need to define the characteristics that are unique to an object. A common attribute to check

might be an e-mail address, because these are usually unique. You can define a policy that says “If two objects have the same e-mail address, they are the same object.”

If a match is found, Identity Manager notes this in an attribute called an association. An association is a unique value that enables Identity Manager to associate objects in connected systems.

In circumstances where a match is not found, a Creation policy is called. The Creation policy tells Identity Manager under what conditions you want objects to be created. You can make the existence certain attributes mandatory in the creation rule. If these attributes do not exist, Identity Manager blocks the creation of the object until the required information is provided.

After the object is created, a Placement policy tells Identity Manager where to put it. You can specify that objects should be created in a hierarchical structure identical to the system they came from, or you can place them somewhere completely different, based on an attribute value.

If you want to place users in a hierarchy according to a location attribute on the object, and name them according to the Full Name, you can require these attributes in the Creation policy. This ensures that the attribute exists so your placement strategy works correctly.

There are many other things you can do with policies. Using the Policy Builder, you can easily generate unique values, add and remove attributes, generate events and commands, send e-mail, and more. Even more advanced transformations are available by using XSLT to directly transform the XML document that carries information between applications.

Continue to [Chapter 3, “Understanding Types of Policies,” on page 25](#) to learn more about the different types of policies, then move on to [Policies in Designer 2.1](#) or [Policies in iManager for Identity Manager 3.5.1](#) to learn how to use the Policy Builder.

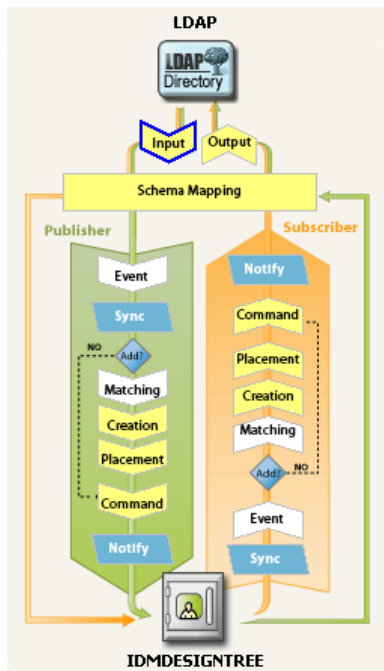
3.4 Policy Types

There are several different types of policies you can define on both the Subscriber and Publisher channels. Each policy is applied at a different step in the data transformation, and some policies are only applied when a certain action occurs. For example, a Creation policy is applied only when a new object is created.

The different policy types and their order of execution on the channel are:

- ◆ [Section 3.4.1, “Event Transformation Policy,” on page 29](#)
- ◆ [Section 3.4.2, “Matching Policies,” on page 32](#)
- ◆ [Section 3.4.3, “Creation Policy,” on page 33](#)
- ◆ [Section 3.4.4, “Placement Policy,” on page 37](#)
- ◆ [Section 3.4.5, “Command Transformation Policy,” on page 40](#)
- ◆ [Section 3.4.6, “Schema Mapping Policy,” on page 42](#)
- ◆ [Section 3.4.7, “Output Transformation Policy,” on page 45](#)
- ◆ [Section 3.4.8, “Input Transformation Policy,” on page 47](#)

Figure 3-2 Order of Execution of the Policies



3.4.1 Event Transformation Policy

Event Transformation policies alter the Metadirectory engine's view of the events that happen in the Identity Vault or the connected application. The most common task performed in an Event Transformation policy is custom filtering, such as scope filtering and event-type filtering.

Scope filtering removes unwanted events based on event location or an attribute value. For example, removing the event if the department attribute is not equal to a specific value or is not a member of a specific group.

Event-type filtering removes unwanted events based on event type. For example, removing all delete events.

Examples:

- ◆ “Scope Filtering: Example 1” on page 29
- ◆ “Scope Filtering: Example 2” on page 30
- ◆ “Type Filtering: Example 1” on page 31
- ◆ “Type Filtering: Example 2” on page 32

Scope Filtering: Example 1

This example DirXML Script policy allows events only for users who are contained within the Users subtree, are not disabled, and do not contain the word Consultant or Manager in the Title attribute. It also generates a status document indicating when an operation has been blocked. To view the policy in XML, see [Event_Transformation_Scope1.xml](#) (../samples/Event_Transformation_Scope1.xml).

```

<policy>
  <rule>
    <description>Scope Filtering</description>
    <conditions>
      <or>
        <if-class-name op="equal">User</if-class-name>
      </or>
      <or>
        <if-src-dn op="not-in-subtree">Users</if-
src-dn>
        <if-attr name="Login Disabled"
op="equal">True</if-attr>
        <if-attr mode="regex" name="Title"
op="equal">.*Consultant.*</if-attr>
        <if-attr mode="regex" name="Title"
op="equal">.*Manager.*</if-attr>
      </or>
    </conditions>
    <actions>
      <do-status level="error">
        <arg-string>
          <token-text>User doesn't meet required
conditions</token-text>
        </arg-string>
      </do-status>
      <do-veto/>
    </actions>
  </rule>
</policy>

```

Scope Filtering: Example 2

This DirXML Script policy vetoes modify operations on User objects except for modifies of objects that are already associated. To view the policy in XML, see [Event_Transformation_Scope2.xml](#). ([../samples/Event_Transformation_Scope2.xml](#)).

```

<policy>
  <rule>
    <description>Veto all operation on User except modifies
of already associated objects</description>
    <conditions>
      <or>
        <if-class-name op="equal">User</if-class-name>
      </or>
      <or>
        <if-operation op="not-equal">modify</if-
operation>
        <if-association op="not-associated"/>
      </or>
    </conditions>
    <actions>
      <do-veto/>
    </actions>
  </rule>
</policy>

```

```

    </rule>
</policy>

```

Type Filtering: Example 1

The first rule of this example DirXML Script policy allows only objects in the Employee and Contractor containers to be synchronized. The second rule blocks all Rename and Move operations. To view the policy in XML, see [Event_Transformation_Type1.xml \(../samples/Event_Transformation_Type1.xml\)](#).

```

<policy>
  <rule>
    <description>Only synchronize the Employee and Contractor
subtrees</description>
    <conditions>
      <and>
        <if-src-dn op="not-in-
container">Employees</if-src-dn>
        <if-src-dn op="not-in-
container">Contractors</if-src-dn>
      </and>
    </conditions>
    <actions>
      <do-status level="warning">
        <arg-string>
          <token-text>Change ignored: Out of
scope.</token-text>
        </arg-string>
      </do-status>
      <do-veto/>
    </actions>
  </rule>
  <rule>
    <description>Don't synchronize moves or renames</
description>
    <conditions>
      <or>
        <if-operation op="equal">move</if-
operation>
        <if-operation op="equal">rename</if-
operation>
      </or>
    </conditions>
    <actions>
      <do-status level="warning">
        <arg-string>
          <token-text>Change ignored:
We don't like you to do that.</token-text>
        </arg-string>
      </do-status>
      <do-veto/>
    </actions>
  </rule>
</policy>

```

Type Filtering: Example 2

This DirXML Script policy blocks all Add events. To view the policy in XML, see [Event_Transformation_Type2.xml \(../samples/Event_Transformation_Type2.xml\)](#).

```
<policy>
  <rule>
    <description>Type Filtering</description>
    <conditions>
      <and>
        <if-operation op="equal">add</if-
operation>
      </and>
    </conditions>
    <actions>
      <do-status level="warning">
        <arg-string>
          <token-text>Change ignored:
Adds are not allowed.</token-text>
        </arg-string>
      </do-status>
      <do-veto/>
    </actions>
  </rule>
</policy>
```

3.4.2 Matching Policies

Matching policies, such as Subscriber Matching and Publisher Matching, look for an object in the destination data store that corresponds to an unassociated object in the source datastore. It is important to note that Matching policies are not always needed or desired.

For example, a Matching policy might not be desired when performing an initial migration if there are no preexisting or corresponding objects.

A Matching policy must be carefully crafted to ensure that the Matching policy doesn't find false matches.

- ◆ [“Match by Internet E-Mail Address: Example” on page 32](#)
- ◆ [“Match by Name: Example” on page 33](#)

Match by Internet E-Mail Address: Example

This example DirXML Script policy matches users based on the Internet E-mail Address. To view the policy in XML, see [Matching1.xml \(../samples/Matching1.xml\)](#).

```
<policy>
  <rule>
    <description>Match Users based on email address</
description>
    <conditions>
      <and>
        <if-class-name op="equal">User</if-class-name>
      </and>
    </conditions>
```



```

        <actions>
            <do-find-matching-object>
                <arg-dn>
                    <token-text>ou=people,o=novell</token-text>
                </arg-dn>
                <arg-match-attr name="Internet EMail Address"/>
            </do-find-matching-object>
        </actions>
    </rule>
</policy>

```

Match by Name: Example

This example DirXML Script policy matches a Group object based on its Common Name attribute. To view the policy in XML, see [Matching2.xml \(../samples/Matching2.xml\)](#).

```

<?xml version="1.0" encoding="UTF-8"?>
<policy>
    <rule>
        <description>Match Group by Common Name</description>
        <conditions>
            <or>
                <if-class-name op="equal">Group</if-class-name>
            </or>
        </conditions>
        <actions>
            <do-find-matching-object scope="subtree">
                <arg-match-attr name="CN"/>
            </do-find-matching-object>
        </actions>
    </rule>
</policy>

```

3.4.3 Creation Policy

Creation policies, such as the Subscriber Creation policy and the Publisher Creation policy, define the conditions that must be met to create a new object. The absence of a Creation policy implies that the object can be created.

For example, you create a new user in the Identity Vault, but you give the new User object only a name and ID. This creation is mirrored in the eDirectory tree, but the addition is not immediately reflected in applications connected to the Identity Vault because you have a Creation policy specifying that only User objects with a more complete definition are allowed.

A Creation policy can be the same for both the Subscriber and the Publisher, or it can be different.

Template objects can be specified for use in the creation process when the object is to be created in eDirectory.

Creation policies are commonly used to:

- ◆ Veto creation of objects that don't qualify, possibly because of to a missing attribute.
- ◆ Provide default attribute values.

- ◆ Provide a default password.

Examples:

- ◆ “Required Attributes: Example” on page 34
- ◆ “Default Attribute Values: Example” on page 35
- ◆ “Default Password: Example” on page 35
- ◆ “Specify Template: Example” on page 36

Required Attributes: Example

The first rule of this example DirXML Script policy requires that a User object contain a CN, Given Name, Surname, and Internet EMail Address attribute before the user can be created. The second rule requires an OU attribute for all Organizational Unit objects. The final rule vetoes all User objects with a name of Fred. To view the policy in XML, see [Create1.xml \(../samples/Create1.xml\)](#).

```
<policy>
  <rule>
    <description>Veto if required attributes CN, Given Name,
Surname and Internet EMail Address not available</description>
    <conditions>
      <or>
        <if-class-name op="equal">User</if-class-
name>
        </or>
      </conditions>
    <actions>
      <do-veto-if-op-attr-not-available name="CN"/>
      <do-veto-if-op-attr-not-available name="Given Name"/>
      <do-veto-if-op-attr-not-available name="Surname"/>
      <do-veto-if-op-attr-not-available name="Internet
EMail Address"/>
    </actions>
  </rule>
  <rule>
    <description>Organizational Unit Required Attributes</
description>
    <conditions>
      <or>
        <if-class-name op="equal">Organizational
Unit</if-class-name>
        </or>
      </conditions>
    <actions>
      <do-veto-if-op-attr-not-available name="OU"/>
    </actions>
  </rule>
  <rule>
    <description>Conditionally veto guys named "Fred"</
description>
    <conditions>
      <and>
        <if-global-variable name="no-fred"
```

```

op="equal">true</if-global-variable>
      <if-op-attr name="Given Name"
op="equal">Fred</if-op-attr>
      </and>
    </conditions>
    <actions>
      <do-status level="warning">
        <arg-string>
          <token-text xml:space="preserve"
xmlns:xml="http://www.w3.org/XML/1998/namespace">Vetoed "Fred"</token-
text>
          </arg-string>
        </do-status>
      <do-veto/>
    </actions>
  </rule>
</policy>

```

Default Attribute Values: Example

This example DirXML Script policy adds a default value for a user's Description attribute. To view the policy in XML, see [Create2.xml \(../samples/Create2.xml\)](#).

```

<policy>
  <rule>
    <description>Default Description of New Employee</
description>
    <conditions>
      <or>
        <if-class-name op="equal">User</if-class-name>
      </or>
    </conditions>
    <actions>
      <do-set-default-attr-value name="Description">
        <arg-value type="string">
          <token-text>New Employee</token-text>
        </arg-value>
      </do-set-default-attr-value>
    </actions>
  </rule>
</policy>

```

Default Password: Example

This example DirXML Script policy provides creates a password value comprised of the first two characters of the first name and the first six characters of the last name, all in lowercase. To view the policy in XML, see [Create3.xml \(../samples/Create3.xml\)](#)

```

<policy>
  <rule>
    <description>Default Password of [2]FN+[6]LN</
description>
    <conditions>
      <and>
        <if-class-name op="equal">User</if-class-name>

```

```

                <if-password op="not-available"/>
            </and>
        </conditions>
        <actions>
            <do-set-dest-password>
                <arg-string>
                    <token-lower-case>
                        <token-substring length="2">
                            <token-op-attr name="Given
Name"/>
                                </token-substring>
                            <token-substring length="6">
                                <token-op-attr
name="Surname"/>
                                    </token-substring>
                                </token-lower-case>
                            </arg-string>
                        </do-set-dest-password>
                    </actions>
                </rule>
            </policy>

```

Specify Template: Example

This example DirXML Script policy specifies a template object if a user's Title attribute indicates that the user is a Manager (contains "Manager"). To view the policy in XML, see [Create4.xml \(./samples/Create4.xml\)](#).

```

<policy>
    <rule>
        <description>Assign Manager Template if Title
contains Manager</description>
        <conditions>
            <and>
                <if-class-name op="equal">User</if-class-
name>
                    <if-op-attr name="Title" op="available"/>
                    <if-op-attr mode="regex" name="Title"
op="equal">.*Manager.*</if-op-attr>
                </and>
            </conditions>
            <actions>
                <do-set-op-template-dn>
                    <arg-dn>
                        <token-text>Users\Manager
Template</token-text>
                    </arg-dn>
                </do-set-op-template-dn>
            </actions>
        </rule>
    </policy>

```

3.4.4 Placement Policy

Placement policies determine where new objects are placed and what they are named in the Identity Vault and the connected application.

A Placement policy is required on the Publisher channel if you want object creation to occur in the Identity Vault. A Placement policy might not be necessary on the Subscriber channel even if you want object creations to occur in the connected application, depending on the nature of the destination data store. For example, no Placement policy is needed when synchronizing to a relational database because rows in a relational database do not have a location or a name.

- ◆ “Placement By Attribute Value: Example 1” on page 37
- ◆ “Placement By Attribute Value: Example 2” on page 38
- ◆ “Placement By Name: Example” on page 38

Placement By Attribute Value: Example 1

This example DirXML Script policy creates the user in a specific container based on the value of the Department attribute. To view the policy in XML, see [Placement1.xml \(./samples/Placement1.xml\)](#).

```
<policy>
  <rule>
    <description>Department Engineering</description>
    <conditions>
      <and>
        <if-class-name op="equal">User</if-class-name>
        <if-op-attr mode="regex" name="Department"
op="equal">.*Engineering.*</if-op-attr>
      </and>
    </conditions>
    <actions>
      <do-set-op-dest-dn>
        <arg-dn>
          <token-text>Eng</token-text>
          <token-text>\</token-text>
          <token-op-attr name="CN"/>
        </arg-dn>
      </do-set-op-dest-dn>
    </actions>
  </rule>
  <rule>
    <description>Department HR</description>
    <conditions>
      <and>
        <if-class-name op="equal">User</if-class-
name>
        <if-op-attr mode="regex" name="Department"
op="equal">.*HR.*</if-op-attr>
      </and>
    </conditions>
    <actions>
      <do-set-op-dest-dn>
        <arg-dn>
          <token-text>HR</token-text>
```

```

                <token-text>\</token-text>
                <token-op-attr name="CN"/>
            </arg-dn>
        </do-set-op-dest-dn>
    </actions>
</rule>
</policy>

```

Placement By Attribute Value: Example 2

This DirXML Script policy determines placement of a User or Organization Unit by the src-dn in the input document. To view the policy in XML, see [Placement2.xml \(../samples/Placement2.xml\)](#).

```

<policy>
  <rule>
    <description>PublisherPlacementRule</description>
    <conditions>
      <or>
        <if-class-name op="equal">User</if-class-
name>
        <if-class-name op="equal">Organizational
Unit</if-class-name>
      </or>
      <or>
        <if-src-dn op="in-subtree">o=people,
o=novell</if-src-dn>
      </or>
    </conditions>
    <actions>
      <do-set-op-dest-dn>
        <arg-dn>
          <token-text>People</token-text>
          <token-text>\</token-text>
          <token-unmatched-src-dn convert="true"/>
        </arg-dn>
      </do-set-op-dest-dn>
    </actions>
  </rule>
</policy>

```

Placement By Name: Example

This example DirXML Script policy creates the user in a specific container based on the first letter of the user's last name. Users with a last name beginning with A-I are placed in the container Users1, while J-R are placed in Users2, and S-Z in Users3. To view the policy in XML, see [Placement3.xml \(../samples/Placement3.xml\)](#).

```

<policy>
  <rule>
    <description>Surname - A to I in Users1</description>
    <conditions>
      <and>
        <if-class-name op="equal">User</if-
class-name>
        <if-op-attr mode="regex" name="Surname"

```

```

op="equal">[A-I].*</if-op-attr>
    </and>
</conditions>
<actions>
    <do-set-op-dest-dn>
        <arg-dn>
            <token-text>Users1</token-text>
            <token-text>\</token-text>
            <token-op-attr name="CN"/>
        </arg-dn>
    </do-set-op-dest-dn>
</actions>
</rule>
<rule>
    <description>Surname - J to R in Users2</description>
    <conditions>
        <and>
            <if-class-name op="equal">User</if-class-
name>
            <if-op-attr mode="regex" name="Surname"
op="equal">[J-R].*</if-op-attr>
                </and>
            </conditions>
            <actions>
                <do-set-op-dest-dn>
                    <arg-dn>
                        <token-text>Users2</token-text>
                        <token-text>\</token-text>
                        <token-op-attr name="CN"/>
                    </arg-dn>
                </do-set-op-dest-dn>
            </actions>
        </rule>
        <rule>
            <description>Surname - S to Z in Users3</description>
            <conditions>
                <and>
                    <if-class-name op="equal">User</if-class-
name>
                    <if-op-attr mode="regex" name="Surname"
op="equal">[S-Z].*</if-op-attr>
                        </and>
                    </conditions>
                    <actions>
                        <do-set-op-dest-dn>
                            <arg-dn>
                                <token-text>Users3</token-text>
                                <token-text>\</token-text>
                                <token-op-attr name="CN"/>
                            </arg-dn>
                        </do-set-op-dest-dn>
                    </actions>
                </rule>
            </policy>

```

3.4.5 Command Transformation Policy

Command Transformation policies alter the commands that Identity Manager is sending to the destination data store by either substituting or adding commands. Intercepting a Delete command and replacing it with Modify, Move, or Disable command is an example of substituting commands in a Command Transformation policy. Creating a Modify command based on the attribute value of an Add command is a common example of adding commands in a Command Transformation policy.

In the most general terms, Command Transformation policies are used to alter the commands that Identity Manager executes as a result of the default processing of events that were submitted to the Metadirectory engine.

It is also common practice to include policies here that do not fit neatly into the descriptions of any other policy.

- ◆ “Convert Delete to Modify: Example” on page 40
- ◆ “Create Additional Operation: Example” on page 40
- ◆ “Setting Password Expiration Time: Example” on page 42

Convert Delete to Modify: Example

This DirXML Script policy converts a Delete operation to a Modify operation of the Login Disabled attribute. To view the policy in XML, see [Comandn1.xml \(../samples/Command1.xml\)](#).

```
<policy>
  <rule>
    <description>Convert User Delete to Modify</description>
    <conditions>
      <and>
        <if-operation op="equal">delete</if-
operation>
        <if-class-name op="equal">User</if-class-name>
      </and>
    </conditions>
    <actions>
      <do-set-dest-attr-value name="Login Disabled">
        <arg-value type="state">
          <token-text>>true</token-text>
        </arg-value>
      </do-set-dest-attr-value>
      <do-veto/>
    </actions>
  </rule>
</policy>
```

Create Additional Operation: Example

This DirXML Script policy determines if the destination container for the user already exists. If the container doesn't exist, the policy creates an Add operation to create the Container object. To view the policy in XML, see [Command2.xml \(../samples/Command2.xml\)](#).

```
<policy>
  <rule>
    <description>Check if destination container already
exists</description>
```



```

        <conditions>
            <and>
                <if-operation op="equal">add</if-operation>
            </and>
        </conditions>
    </actions>
    <do-set-local-variable name="target-container">
        <arg-string>
            <token-dest-dn length="-2"/>
        </arg-string>
    </do-set-local-variable>
    <do-set-local-variable name="does-target-exist">
        <arg-string>
            <token-dest-attr class-
name="OrganizationalUnit" name="objectclass">
                <arg-dn>
                    <token-local-variable
name="target-container"/>
                </arg-dn>
            </token-dest-attr>
        </arg-string>
    </do-set-local-variable>
    </actions>
</rule>
<rule>
    <description>Create the target container if necessary</
description>
    <conditions>
        <and>
            <if-local-variable name="does-target-exist"
op="available"/>
            <if-local-variable name="does-target-exist"
op="equal"/>
        </and>
    </conditions>
    <actions>
        <do-add-dest-object class-name="organizationalUnit"
direct="true">
            <arg-dn>
                <token-local-variable name="target-
container"/>
            </arg-dn>
        </do-add-dest-object>
        <do-add-dest-attr-value direct="true" name="ou">
            <arg-dn>
                <token-local-variable name="target-
container"/>
            </arg-dn>
            <arg-value type="string">
                <token-parse-dn dest-dn-format="dot"
length="1" src-dn-format="dest-dn" start="-1">
                    <token-local-variable
name="target-container"/>
                </token-parse-dn>
            </arg-value>
        </do-add-dest-attr-value>
    </actions>
</rule>

```

```

                </arg-value>
            </do-add-dest-attr-value>
        </actions>
    </rule>
</policy>

```

Setting Password Expiration Time: Example

This DirXML Script policy modifies an eDirectory user's Password Expiration Time attribute. To view the policy in XML, see [Command3.xml \(./samples/Command3.xml\)](#).

```

<?xml version="1.0" encoding="UTF-8"?>
<policy xmlns:jssystem="http://www.novell.com/nxsl/java/
java.lang.System">
    <rule>
        <description>Set password expiration time for a given
interval from current day</description>
        <conditions>
            <and>
                <if-operation op="equal">modify-password</if-
operation>
            </and>
        </conditions>
        <actions>
            <do-set-local-variable name="interval">
                <arg-string>
                    <token-text>30</token-text>
                </arg-string>
            </do-set-local-variable>
            <do-set-dest-attr-value class-name="User"
name="Password Expiration Time" when="after">
                <arg-association>
                    <token-association/>
                </arg-association>
                <arg-value type="string">
                    <token-
xpath expression="round(jssystem:currentTimeMillis() div 1000 +
(86400*$interval))"/>
                </arg-value>
            </do-set-dest-attr-value>
        </actions>
    </rule>
</policy>

```

3.4.6 Schema Mapping Policy

Schema Mapping policies hold the definition of the schema mappings between the Identity Vault and the connected system.

The Identity Vault schema is read from eDirectory. The Identity Manager driver for the connected system supplies the connected application's schema. After the two schemas have been identified, a simple mapping is created between the Identity Vault and the target application.

After a Schema Mapping policy is defined in the Identity Manager driver configuration, the corresponding data can be mapped.

It is important to note the following:

- The same policies are applied in both directions.
- All documents that are passed in either direction on either channel between the Metadirectory engine and the application shim are passed through the Schema Mapping policies.

See “[Defining Schema Mapping Policies](#)” in *Policies in Designer 2.1* or “[Defining Schema Mapping Policies](#)” in *Policies in iManager for Identity Manager 3.5.1* for administrative information.

- “[Basic Schema Mapping Policy: Example](#)” on page 43
- “[Custom Schema Mapping Policy: Example](#)” on page 44

Basic Schema Mapping Policy: Example

This example DirXML Script policy shows the raw XML source of a basic Schema Mapping policy. However, when you edit the policy through Designer for Identity Manager, the default Schema Mapping editor allows the policy to be displayed and edited graphically. To view the policy in XML, see [SchemaMap1.xml \(./samples/SchemaMap1.xml\)](#).

```
<?xml version="1.0" encoding="UTF-8"?><attr-name-map>
  <class-name>
    <app-name>WorkOrder</app-name>
    <nds-name>DirXML-nwoWorkOrder</nds-name>
  </class-name>
  <class-name>
    <app-name>PbxSite</app-name>
    <nds-name>DirXML-pbxSite</nds-name>
  </class-name>
  <attr-name class-name="DirXML-pbxSite">
    <app-name>PBXName</app-name>
    <nds-name>DirXML-pbxName</nds-name>
  </attr-name>
  <attr-name class-name="DirXML-pbxSite">
    <app-name>TelephoneNumber</app-name>
    <nds-name>Telephone Number</nds-name>
  </attr-name>
  <attr-name class-name="DirXML-pbxSite">
    <app-name>LoginName</app-name>
    <nds-name>DirXML-pbxLoginName</nds-name>
  </attr-name>
  <attr-name class-name="DirXML-pbxSite">
    <app-name>Password</app-name>
    <nds-name>DirXML-pbxPassword</nds-name>
  </attr-name>
  <attr-name class-name="DirXML-pbxSite">
    <app-name>Nodes</app-name>
    <nds-name>DirXML-pbxNodesNew</nds-name>
  </attr-name>
</attr-name-map>
```

Custom Schema Mapping Policy: Example

This example DirXML Script policy uses DirXML Script to perform custom Schema Mapping. To view this policy in XML, see [SchemaMap2.xml \(../samples/SchemaMap2.xml\)](#).

```
<?xml version="1.0" encoding="UTF-8"?><policy>
  <rule>
    <!--
      The Schema Mapping Policy can only handle one-to-one
mappings.
      That Mapping Policy maps StudentPersonal addresses.
      This rule maps StaffPersonal addresses.
    -->
    <description>Publisher Staff Address Mappings</
description>
    <conditions>
      <and>
        <if-local-variable name="fromNds"
op="equal">>false</if-local-variable>
        <if-xpath op="true">@original-class-name =
'StaffPersonal'</if-xpath>
      </and>
    </conditions>
    <actions>
      <do-rename-op-attr dest-name="SA" src-name="Address/
Street/Line1"/>
      <do-rename-op-attr dest-name="Postal Office Box"
src-name="Address/Street/Line2"/>
      <do-rename-op-attr dest-name="Physical Delivery
Office Name" src-name="Address/City"/>
      <do-rename-op-attr dest-name="S" src-name="Address/
StatePr"/>
      <do-rename-op-attr dest-name="Postal Code" src-
name="Address/PostalCode"/>
    </actions>
  </rule>
  <rule>
    <description>Subscriber Staff Address Mappings</
description>
    <!--
      The Schema Mapping Policy has already mapped addresses to
StudentPersonal.
      This rule maps StudentPersonal to StaffPersonal.
    -->
    <conditions>
      <and>
        <if-local-variable name="fromNds"
op="equal">>true</if-local-variable>
        <if-op-attr name="DirXML-sifIsStaff"
op="equal">>true</if-op-attr>
      </and>
    </conditions>
    <actions>
      <do-rename-op-attr dest-name="Address/Street/Line1"
src-name="StudentAddress/Address/Street/Line1"/>
```

```

        <do-rename-op-attr dest-name="Address/Street/Line2"
src-name="StudentAddress/Address/Street/Line2"/>
        <do-rename-op-attr dest-name="Address/City" src-
name="StudentAddress/Address/City"/>
        <do-rename-op-attr dest-name="Address/StatePr" src-
name="StudentAddress/Address/StatePr"/>
        <do-rename-op-attr dest-name="Address/PostalCode"
src-name="StudentAddress/Address/PostalCode"/>
    </actions>
</rule>
</policy>

```

3.4.7 Output Transformation Policy

Output Transformation policies primarily handle the conversion of data formats from data that the Metadirectory engine provides to data that the application shim expects. Examples of these conversions include:

- ◆ Attribute value format conversion
- ◆ XML vocabulary conversion
- ◆ Custom handling of status messages returned from the Metadirectory engine to the application shim

All documents that the Metadirectory engine supplies to the application shim on either channel pass through the Output Transformation policies. Since the Output Transformation happens after schema mapping, all schema names are in the application namespace.

- ◆ [“Attribute Value Conversion: Example” on page 45](#)
- ◆ [“Customer Handling of Status Messages:” on page 46](#)

Attribute Value Conversion: Example

This example DirXML Script policy reformats the telephone number from the (nnn) nnn-nnnn format to the nnn.nnn.nnnn format. The reverse transformation can be found in the Input Transformation policy examples. To view the policy in XML, see [Output_Transformation1.xml \(../samples/Output_Transformation1.xml\)](#).

```

<policy>
  <rule>
    <description>Reformat all telephone numbers from (nnn)
nnn-nnnn to nnn.nnn.nnnn</description>
    <conditions/>
    <actions>
      <do-reformat-op-attr name="telephoneNumber">
        <arg-value type="string">
          <token-replace-first
regex="^\((\d\d\d)\) *(\d\d\d)-(\d\d\d\d)$" replace-with="$1.$2.$3">
            <token-local-
variable name="current-value"/>
          </token-replace-first>
        </arg-value>
      </do-reformat-op-attr>
    </actions>
  </rule>
</policy>

```

```

    </rule>
</policy>

```

Customer Handling of Status Messages:

This example DirXML Script policy detects status documents with a level not equal to success that also contain a child password-publish-status element within the operation data and then generates an e-mail message using the DoSendEmailFromTemplate action. To view the policy in XML, see [Output_Transformation2.xml \(./samples/Output_Transformation2.xml\)](#).

```

<?xml version="1.0" encoding="UTF-8"?>
  <policy>
    <description>Email notifications for failed password
publications</description>
    <rule>
      <description>Send e-mail for a failed publish
password operation</description>
      <conditions>
        <and>
          <if-global-variable
mode="nocase" name="notify-user-on-password-dist-failure"
op="equal">true</if-global-variable>
          <if-operation
op="equal">status</if-operation>
          <if-xpath
op="true">self::status[@level != 'success']/operation-data/password-
publish-status</if-xpath>
        </and>
      </conditions>
      <actions>
        <!-- generate email notification -->
        <do-send-email-from-template notification-
dn="\cn=security\cn=Default Notification Collection" template-
dn="\cn=security\cn=Default Notification Collection\cn=Password Sync
Fail">
          <arg-string name="UserFullName">
            <token-src-attr name="Full Name">
              <arg-association>
                <token-xpath
expression="self::status/operation-data/password-publish-status/
association"/>
              </arg-association>
            </token-src-attr>
          </arg-string>
          <arg-string name="UserGivenName">
            <token-src-attr name="Given Name">
              <arg-association>
                <token-xpath
expression="self::status/operation-data/password-publish-status/
association"/>
              </arg-association>
            </token-src-attr>
          </arg-string>
          <arg-string name="UserLastName">

```

```

        <token-src-attr name="Surname">
            <arg-association>
                <token-xpath
expression="self::status/operation-data/password-publish-status/
association"/>
            </arg-association>
        </token-src-attr>
    </arg-string>
    <arg-string name="ConnectedSystemName">
        <token-global-variable
name="ConnectedSystemName"/>
    </arg-string>
    <arg-string name="to">
        <token-src-attr name="Internet Email
Address">
            <arg-association>
                <token-xpath
expression="self::status/operation-data/password-publish-status/
association"/>
            </arg-association>
        </token-src-attr>
    </arg-string>
    <arg-string name="FailureReason">
        <token-text/>
        <token-xpath
expression="self::status/child::text()"/>
    </arg-string>
    </do-send-email-from-template>
</actions>
</rule>
</policy>

```

3.4.8 Input Transformation Policy

Input Transformation policies primarily handle the conversion of data formats from data that the application shim provides to data that the Metadirectory engine expects. Examples of these conversions include:

- ◆ Attribute value format conversion
- ◆ XML vocabulary conversion
- ◆ Driver heartbeat
- ◆ Custom handling of status messages returned from the application shim to the Metadirectory engine

All documents supplied to the Metadirectory engine by the application shim on either channel pass through the Input Transformation policies.

- ◆ [“Attribute Value Format Conversion: Example” on page 48](#)
- ◆ [“Driver Heartbeat: Example” on page 48](#)

Attribute Value Format Conversion: Example

This example DirXML Script policy reformats the telephone number from the nnn.nnn.nnnn format to the (nnn) nnn-nnnn format. The reverse transformation can be found in [Section 3.4.7, “Output Transformation Policy,” on page 45](#) examples. To view the policy in XML, see [Input_Transformation1.xml \(../samples/Input_Transformation1.xml\)](#).

```
<policy>
  <rule>
    <description>Reformat all telephone numbers from
nnn.nnn.nnnn to (nnn) nnn-nnnn</description>
    <conditions/>
    <actions>
      <do-reformat-op-attr name="telephoneNumber">
        <arg-value type="string">
          <token-replace-first
regex="^(\\d\\d\\d)\\. (\\d\\d\\d)\\. (\\d\\d\\d\\d)$" replace-with="(\\$1) \\$2-\\$3">
<token-local-variable name="current-value"/>
          </token-replace-first>
        </arg-value>
      </do-reformat-op-attr>
    </actions>
  </rule>
</policy>
```

Driver Heartbeat: Example

This DirXML Script policy creates a status heartbeat event. The driver’s heartbeat functionality is used to send a success message (HEARTBEAT: \$driver) at each heartbeat interval. The message can be monitored by Novell® Audit. The Identity Manager driver must support heartbeat, and heartbeat must be enabled at the driver configuration page. To view the policy in XML, see [Input_Transformation2.xml \(../samples/Input_Transformation2.xml\)](#).

```
<?xml version="1.0" encoding="UTF-8" ?>
<policy>
  <rule>
    <description>Heartbeat Rule, v1.01, 040126, by Holger Dopp</
description>
    <conditions>
      <and>
        <if-operation op="equal">status</if-operation>
        <if-xpath op="true">@type="heartbeat"</if-
xpath>
      </and>
    </conditions>
    <actions>
      <do-set-xml-attr expression="." name="text1">
        <arg-string>
          <token-global-variable
name="dirxml.auto.driverdn" />
        </arg-string>
      </do-set-xml-attr>
      <do-set-xml-attr expression="." name="text2">
        <arg-string>
```



```
                <token-text>HEARTBEAT</token-text>
            </arg-string>
        </do-set-xml-attr>
    </actions>
</rule>
</policy>
```

3.5 Defining Policies

All policies are defined in one of two ways:

- ♦ Using the Policy Builder interface to generate DirXML Script. Existing, non-XSLT rules are converted to DirXML Script automatically upon import.
- ♦ Using XSLT style sheets.

Schema Mapping policies can also be defined (and usually are) using a schema mapping table.

3.5.1 Policy Builder and DirXML Script

The Policy Builder interface is used to define the majority of policies you might implement. The Policy Builder interface uses a graphical environment to enable you to easily define and manage policies.

The underlying functionality of rule creation within Policy Builder is provided by DirXML Script, however, you do not need to work directly with DirXML Script.

Instead, you have access to a wide variety of conditions you can test, actions to perform, and dynamic values to add to your policies. Each option is presented using intelligent drop-down lists, providing only valid selections at each point, and quick links to common values.

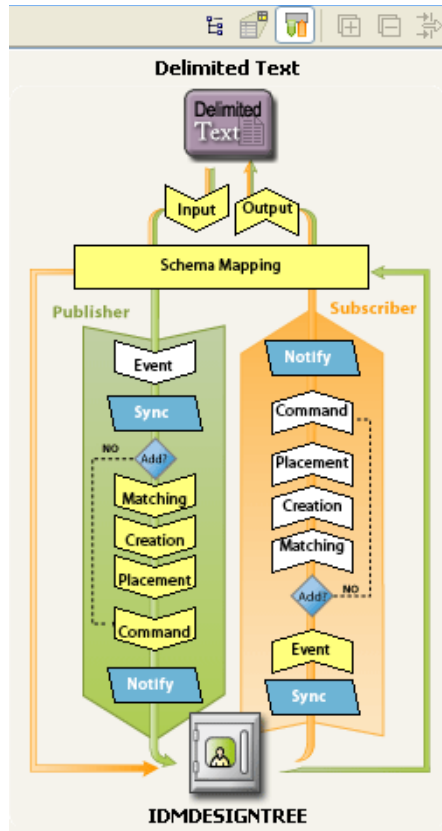
See *Policies in Designer 2.1* and *Policies in iManager for Identity Manager 3.5.1*, for more information on Policy Builder. See [Section 4.1, “DirXML Script,” on page 53](#) for more information on DirXML Script.

TIP: Although it is not necessary for using Policy Builder, the “[DirXML Script DTD](#)” is available in the [Identity Manager 3.5.1 DTD Reference](#).

3.6 Understanding the Policy Flow

The Policy Flow area in Designer enables you to view and manage the drivers class and attribute filter as well as policies contained in the various policy sets. When you select a policy set (for example, a Publisher matching policy set), the Policy Set displays the policies contained in that set, and the Policy Builder displays the rules in a selected policy. See *Policies in Designer 2.1* for more information about Designer.

Figure 3-3 Policy Flow in Designer



The policy flow image also displays the flow of documents through the system. For example, an input document generated by the application follows the Publisher path identified by the green arrow beginning with the Input Policy Set and moving toward the Identity Vault. Result documents generated by the Metadirectory engine for the input document continue to follow the green arrow flowing back to the connected system through the Schema Mapping and Output Policy sets.

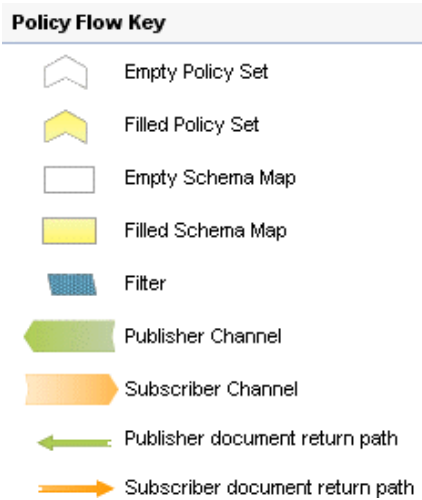
Input documents generated on the Subscriber channel behave similarly by following the orange arrow beginning at the Identity Vault and flowing to the connected application. Result documents generated by the application and Identity Manager driver continue to follow the orange arrow back through the Input and Schema Mapping policy sets to the Identity Vault.

Only Add operations flow through the Matching, Creation, and Placement policy sets on both the Subscriber and Publisher channels. All other operations follow the dotted line, bypassing these policy sets to the Command policy set.

3.6.1 Policy Flow Key

The Policy Flow Key describes aspects of the policy flow image, such as empty or filled policy sets, as well as the path that documents take on the Publisher and Subscriber channels. Documents on the Subscriber channel begin at the Identity Vault, while documents on the Publisher channel begin at the connected application.

Figure 3-4 Policy Flow Key



3.6.2 Keyboard Support for the Policy Flow

The Policy Flow view supports keystrokes. See [Table 3-1 on page 51](#) for the supported keystrokes.

Table 3-1 Keyboard Support for the Policy Flow

Keystroke	Description
Up-Arrow	Navigate Up
Down-Arrow	Navigate Down
Tab	Navigate Down
Shift+Tab	Navigate Up
Left-Arrow	Switch Channels
Right-Arrow	Switch Channels

Understanding Policy Components

- ◆ Section 4.1, “DirXML Script,” on page 53
- ◆ Section 4.2, “Variables,” on page 53
- ◆ Section 4.3, “Variable Expansion,” on page 54
- ◆ Section 4.4, “Date/Time Parameters,” on page 55
- ◆ Section 4.5, “Regular Expressions,” on page 56
- ◆ Section 4.6, “XPath 1.0 Expressions,” on page 56

4.1 DirXML Script

DirXML[®] Script is the primary method of implementing Identity Manager policies. It describes a policy that is implemented by an ordered set of rules. A rule consists of a set of conditions to be tested and an ordered set of actions to be performed when the conditions are met.

DirXML Script is created using the Policy Builder, which provides a GUI interface for easy use.

Identity Manager is an XML-based application, and DirXML Script uses XML documents to modify and manipulate the data being sent between the Identity Vault and the external data store. To understand DirXML Script, you need to understand XML. For more information on XML, see the [W3C Extensible Markup Language \(XML\) \(http://www.w3.org/XML/\)](http://www.w3.org/XML/) Web site.

DirXML Script has a document type definition (DTD) that defines how DirXML Script works. To read the DTDs that Identity Manager uses, see *Identity Manager 3.5.1 DTD Reference*. It contains the following DTDs:

- ◆ “Filter DTD”
- ◆ “NDS DTD”
- ◆ “Map DTD”
- ◆ “DirXML Script DTD”
- ◆ “DirXML Entitlements DTD”

4.2 Variables

DirXML Script supports two kinds of variables: global and local. A global variable is a variable that is defined in a global configuration value for the driver or the driver set. Global variables are by definition read-only. A local variable is a variable that is set by a policy. A local variable can exist in one of two different scopes: policy or driver. A policy-scoped variable is only visible during the processing of the current operation by the policy that sets the variable. A driver-scoped variable is visible from all DirXML Script policies running within the same driver until the driver is stopped.

A variable name must be a legal XML name. For information on what is a legal XML name, see [W3C Extensible Markup Language \(XML\) \(http://www.w3.org/TR/2006/REC-xml11-20060816/#sec-suggested-names\)](http://www.w3.org/TR/2006/REC-xml11-20060816/#sec-suggested-names).

There are a number of global and local variables that are automatically defined.

Table 4-1 *Defined Global and Local Variables*

Name	Type	Description
dirxml.auto.driverdn	global/string	Slash format DN of the current driver.
dirxml.auto.driverguid	global/string	GUID of the current driver.
dirxml.auto.treename	global/string	Tree name of the local eDirectory™ instance.
fromNDS	policy local/boolean	True if the source data store is eDirectory. False if the source data store is the connected application.
destQueryProcessor	policy local/java object	Instance of XdsQueryProcessor used to query the source data store.
srcQueryProcessor	policy local/java object	Instance of XdsQueryProcessor used to query the destination data store.
destCommandProcessor	policy local/java object	Instance of XdsCommandProcessor used to query the destination data store.
srcCommandProcessor	policy local/java object	Instance of XdsCommandProcessor used to query the source data store.
dnConverter	policy local/java object	Instance of DNConverter.
current-node	policy local/node set	The loop variable for each iteration of the for each element.
current-value	policy local/node set	The loop variable for each iteration of the reformat operation attribute.
current-op	policy local/node set	The current operation. Setting this variable using the <code><do-set-local-variable></code> element causes the first operation specified by <code><arg-node-set></code> to become the current operation for the remainder of the current policy execution or until it is set to another value. The new current operation must be an element sibling of the original current operation and must have been added by the current policy.

4.3 Variable Expansion

Many conditions, actions, and tokens support dynamic variable expansion in their attributes or content. Where supported, an embedded reference of the form `$<variable-name>$` is replaced with the value of the local or global variable with the given name. `$<variable-name>$` must be a legal variable name. For information on what is a legal XML name, see [W3C Extensible Markup Language \(XML\) \(http://www.w3.org/TR/2004/REC-xml-20040204/#NT-Name\)](http://www.w3.org/TR/2004/REC-xml-20040204/#NT-Name).

If the given variable does not exist, the reference is replaced with the empty string. Where it is desirable to use a single `$` and not have it interpreted as a variable reference, it should be escaped

with an additional \$ (for example, You owe me \$\$100.00). See the *Identity Manager 3.5.1 DTD Reference* for the content attributes that support variable expansion.

4.4 Date/Time Parameters

Tokens that deal with dates and times have arguments that deal with the format, language, and time zone of the date and time representation. Date format arguments can be specified with a ‘!’ character or without a ‘!’ character. If the format begins with a ‘!’ character, then the format is a named format. Legal names are defined in [Table 4-2 on page 55](#).

Table 4-2 *Legal Date/Time Parameters*

Name	Description
!CTIME	Number of seconds since midnight, January 1, 1970. (Compatible with eDirectory time syntaxes).
!JTIME	Number of milliseconds since midnight, January 1, 1970. (Compatible with Java* time).
!FILETIME	Number of 100-nanosecond intervals since January 1, 1601 (Compatible with Win32 FILETIME).
!FULL.TIME	Language-specific FULL time format.
!LONG.TIME	Language-specific LONG time format.
!MEDIUM.TIME	Language-specific MEDIUM time format.
!SHORT.TIME	Language-specific SHORT time format.
!FULL.DATE	Language-specific FULL date format.
!LONG.DATE	Language-specific LONG date format.
!MEDIUM.DATE	Language-specific MEDIUM date format.
!SHORT.DATE	Language-specific SHORT date/time format.
!FULL.DATETIME	Language-specific FULL date/time format.
!LONG.DATETIME	Language-specific LONG date/time format.
!MEDIUM.DATETIME	Language-specific MEDIUM date/time format.
!SHORT.DATETIME	Language-specific SHORT date/time format.

If the format does not begin with ‘!’, then it is interpreted as a custom date/time format conforming to the patterns recognized by the Java class `java.text.SimpleDateFormat`.

Language arguments can be specified by an identifier that conforms to IETF RFC 3066. The list of identifiers understood by the system can be obtained by calling the Java class `java.util.Locale.getAvailableLocales()` and replacing all underscores in the result with hyphens. If a language argument is omitted or blank, then the default system language is used.

Time zone arguments can be specified in any identifier recognizable by the Java class `java.util.TimeZone.getTimeZone()`. A list of identifiers understood by the system can be obtained by

the Java class calling `java.util.TimeZone.getAvailableIDs()`. If a time zone argument is omitted or blank, then the default system time zone is used.

4.5 Regular Expressions

A regular expression is a formula for matching text strings that follow some pattern. Regular expressions are made up of normal characters and metacharacters. Normal characters include uppercase and lowercase letters and digits. Metacharacters have special meanings. The following table contains some of the most common metacharacters and their meanings.

Table 4-3 *Common Regular Expressions*

Metacharacter	Description
.	Matches any single character.
\$	Matches the end of the line.
^	Matches the beginning of a line.
*	Matches zero or more occurrences of the character immediately preceding.
\	Literal escape character. It allows you to search for any of the metacharacters. For example <code>\\$</code> finds \$1000 instead of matching at the end of the line.
[]	Matches any one of the characters between the brackets.
[0-9]	Matches a range of characters with the hyphen. The example matches any digit.
[A-Za-z]	Matches multiple ranges. The example matches all uppercase and lowercase letters.
(?u)	Enables Unicode*-aware case folding. This flag can impact performance.
(?i)	Enables case-insensitive matching.

The Argument Builder is designed to use regular expressions as defined in Java. The [Java Web site](http://java.sun.com/j2se/1.4.2/docs/api/java/util/regex/Pattern.html) (<http://java.sun.com/j2se/1.4.2/docs/api/java/util/regex/Pattern.html>) contains further information.

4.6 XPath 1.0 Expressions

Arguments to some conditions, actions, and tokens use XPath 1.0 expressions. XPath is a language created to provide a common syntax and semantics for functionality shared between XSLT and XPointer. It is used primarily for addressing parts of an XML document, but also provides basic facilities for manipulation of strings, numbers, and Booleans.

The XPath specification requires that the embedding application provide a context with several application-defined pieces of information. In DirXML Script (see [Section 4.1, “DirXML Script,” on page 53](#)), XPath is evaluated with the following context:

- ◆ The context node is the current operation, unless otherwise specified in the description of the expression.
- ◆ The context position and size are 1.
- ◆ There are several available variables:
 - ◆ Variables available as parameters to style sheets within Identity Manager (currently fromNDS, srcQueryProcessor, destQueryProcessor, srcCommandProcessor, destCommandProcessor, and dnConverter).
 - ◆ Global configuration variables.
 - ◆ Local policy variables.
 - ◆ If there is a name conflict between the different variable sources, the order of precedence is local (policy scope), local (driver scope), and global.
 - ◆ Because of the XPath syntax, any variable that has a colon character in its name is not accessible from XPath.
- ◆ There are several available namespaces definitions:
 - ◆ Any namespaces that are explicitly declared on the <policy> element using the XMNS:prefix.
 - ◆ The following implicitly defined namespaces (unless the same prefix has been explicitly defined):
 - ◆ xmlns:js="http://www.novell.com/nxsl/ecmascript"
 - ◆ xmlns:es="http://www.novell.com/nxsl/ecmascript"
 - ◆ xmlns:query="http://www.novell.com/nxsl/java/com.novell.nds.dirxml.driver.XdsQueryProcessor"
 - ◆ xmlns:cmd="http://www.novell.com/nxsl/java/com.novell.nds.dirxml.driver.XdsCommandProcessor"
 - ◆ xmlns:jdbc="urn:dirxml:jdbc"
 - ◆ Any namespace prefix that is not otherwise mapped is automatically mapped to http://www.novell.com/nxsl/java/<prefix> if and only if prefix is the fully qualified class name of Java class that can be resolved to an available Java class via introspection.
 - ◆ Namespace declarations to associate a prefix with a Java class must be declared on the policy element.
- ◆ There are several available functions:
 - ◆ All built-in XPath 1.0 functions.
 - ◆ Java extension functions as provided by NXSL.
 - ◆ Java extension functions are accessed via a namespace prefix mapped to a URI of the form: http://www.novell.com/nxsl/java/<fully-qualified-class-name>.
 - ◆ For convenience, any prefix that is not otherwise mapped, is mapped to http://www.novell.com/nxsl/java/<prefix> if prefix is the fully qualified class name of a Java class that can be discovered via introspection.

- ◆ ECMAScript extension functions as provided by NXSL:
 - ◆ ECMAScript extension function definitions come from the set of ECMAScript resources that are associated with the driver.
 - ◆ ECMAScript extension functions are accessed via a namespace prefix mapped to the URI `http://www.novell.com/nxsl/ecmascript`.
 - ◆ For convenience, the prefixes `js` and `es` are both implicitly mapped to `http://www.novell.com/nxsl/ecmascript` unless otherwise explicitly defined.

The [W3 Web site \(http://www.w3.org/TR/1999/REC-xpath-19991116\)](http://www.w3.org/TR/1999/REC-xpath-19991116) contains further information about XPath.

Downloading Identity Manager Policies

Novell® has provided sample policies you can download and use in your environment. The policies are available at the [Novell Support Web site \(http://support.novell.com/patches.html\)](http://support.novell.com/patches.html). To download the policies:

- 1 At the [Novell Support Web site \(http://support.novell.com/patches.html\)](http://support.novell.com/patches.html) select *View mandatory patch list*.
- 2 Select *All* in the Find Patches by Patch Type field, then click *search*.
- 3 Browse to and select Novell Nsure Identity Manager 2.0.1.
These policies can be used with any version of Identity Manager.
- 4 Browse to and select the desired policy.
Table 5-1 contains a list of the policies available for download.
- 5 Select *proceed to download*, to download the policy.
- 6 Click *download* by the file name.
- 7 Click *Save*, then browse to and select a location to save the file.
- 8 Click *Save*, then click *Close*.
- 9 Extract the file, then read the `How_To_Install.rtf` file for installation instructions.

Table 5-1 Downloadable Policies

Name	File Name
Policy to Place by Surname	placebyname.tgz
Policy: Reset value of the email attribute	pushback.tgz
Policy to enforce the presence of attributes	requiredattrs.tgz
Policy: Create email from GivenName & Surname	setemailname.tgz
Policy: Create FullName from GivenName, Surname	synthfullname.tgz
Policy: Convert First/Last name to uppercase	uppercasenames.tgz
Policy to add user to group based on Title	addcreategroups.tgz
Policy: Assign template to user based on title	assigntemplate.tgz
Disable user account and move when terminated	dismvonterm.tgz
Policy to filter events	filterby.tgz
Govern Groups for user based on the title attribute	groupchange.tgz

To use Designer to import the files, see “[Importing a Policy From an XML File](#)” in *Policies in Designer 2.1*. To use iManager to import the files, see “[Importing a Policy from an XML File](#)” in *Policies in iManager for Identity Manager 3.5.1*.

Defining Policies by Using XSLT Style Sheets

XSLT, which is a standard language for transforming XML documents, can be used for implementing policies as XSLT style sheets. The XSLT processor in the Metadirectory engine is compliant with the 16 November 1999 W3C recommendation. For the relevant specifications, see the following:

- ♦ [XSL Transformations \(XSLT\)](http://www.w3.org/TR/1999/REC-xslt-19991116) (<http://www.w3.org/TR/1999/REC-xslt-19991116>)
- ♦ [XML Path Language \(XPath\)](http://www.w3.org/TR/1999/REC-xpath-19991116) (<http://www.w3.org/TR/1999/REC-xpath-19991116>)

The following sections describe the specifics of using XSLT style sheets with Identity Manager.

- ♦ [Section 6.1, “Managing XSLT Style Sheets in Designer,”](#) on page 61
- ♦ [Section 6.2, “Managing XSLT Style Sheets in iManager,”](#) on page 63
- ♦ [Section 6.3, “Prepopulated Information in the XSLT Style Sheet,”](#) on page 64
- ♦ [Section 6.4, “Using the Parameters that Identity Manager Passes,”](#) on page 65
- ♦ [Section 6.5, “Using Extension Functions,”](#) on page 67
- ♦ [Section 6.6, “Creating a Password: Example Creation Policy,”](#) on page 68
- ♦ [Section 6.7, “Creating an eDirectory User: Example Creation Policy,”](#) on page 69

6.1 Managing XSLT Style Sheets in Designer

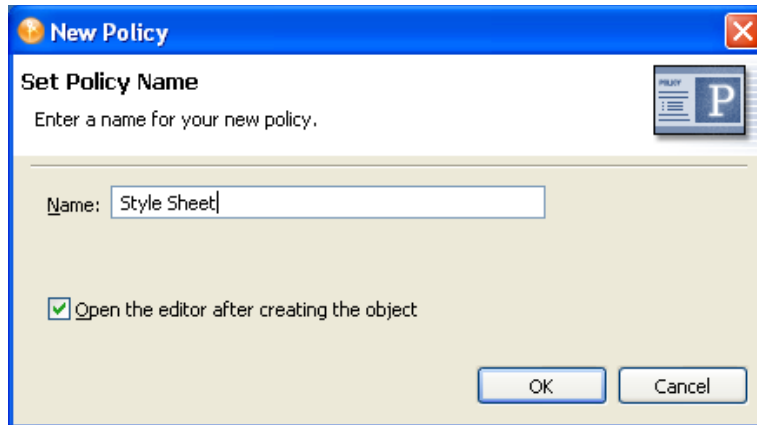
XSLT policy style sheets can be added, modified, and deleted using Designer. The following sections provide details:

- ♦ [Section 6.1.1, “Adding an XSLT Style Sheet in Designer,”](#) on page 61
- ♦ [Section 6.1.2, “Modifying an XSLT Style Sheet in Designer,”](#) on page 63
- ♦ [Section 6.1.3, “Deleting an XSLT Style Sheet in Designer,”](#) on page 63

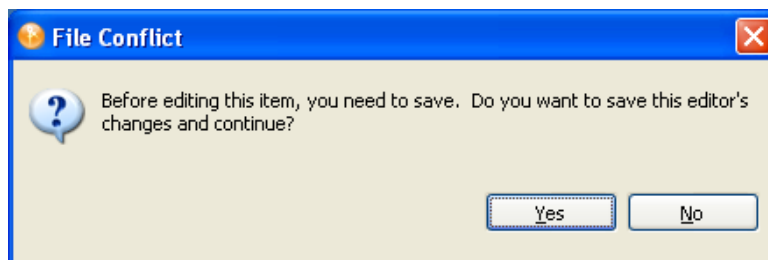
6.1.1 Adding an XSLT Style Sheet in Designer

- 1 Open a project in Designer and select the *Outline* tab.
- 2 Select the driver and location where you want the style sheet.
- 3 Right-click and select *New > XSLT*.
- 4 Specify the name of the style sheet.

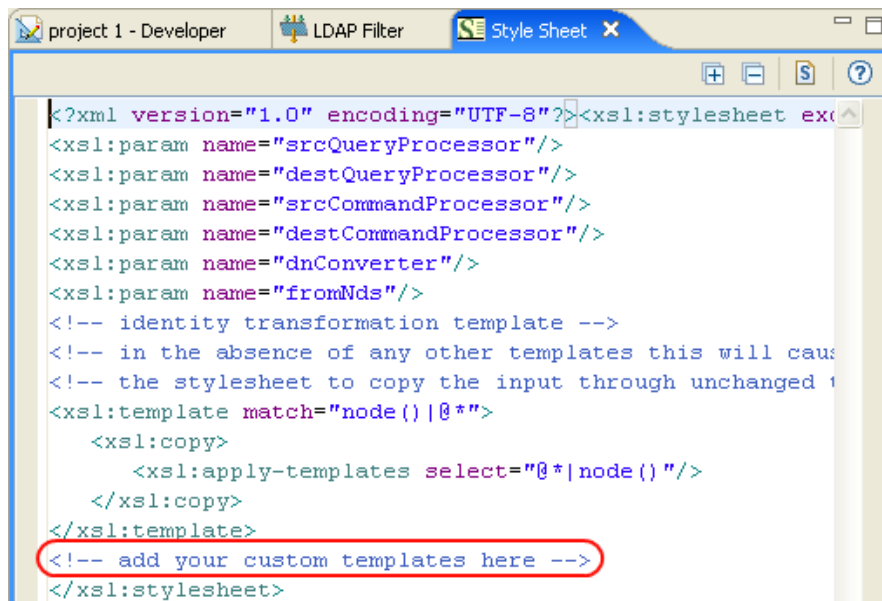
- 5 Select *Open Editor after creating policy*, then click *OK*.



- 6 Select *Yes* to save the project before editing the new style sheet.



- 7 Add the style sheet information below the line *add your custom templates here*.



- 8 Click *File > Save to*, to save the style sheet.

6.1.2 Modifying an XSLT Style Sheet in Designer

- 1 Open a project in Designer and select the *Outline* tab.
- 2 Select the XSLT style sheet you want to modify.
- 3 Right-click, then select *Edit*.

6.1.3 Deleting an XSLT Style Sheet in Designer

- 1 Open a project in Designer and select the *Outline* tab.
- 2 Select the XSLT style sheet that you want to delete, right-click, then select *Delete*.

6.2 Managing XSLT Style Sheets in iManager

XSLT policy style sheets are added, modified, and deleted using iManager. The following sections provide details:

- ♦ [Section 6.2.1, “Adding an XSLT Policy in iManager,” on page 63](#)
- ♦ [Section 6.2.2, “Modifying an XSLT Style Sheet in iManager,” on page 64](#)
- ♦ [Section 6.2.3, “Deleting an XSLT Style Sheet in iManager,” on page 64](#)

6.2.1 Adding an XSLT Policy in iManager

- 1 Open the Identity Manager Driver Overview for the driver you want to manage.
- 2 Click the icon representing the policy where you want to add the XSLT style sheet.
- 3 Click *Insert*.
- 4 Provide a name for the new XSLT style sheet, select *XSLT*, then click *OK*.
- 5 Select *Enable XML Editing* to edit the XSLT style sheet.

- 6 Add the style sheet information below the line *add your custom templates here*.

Identity Manager Policy: XSLT.Subscriber.Delimited Text.DriverSet.Novell



Identity Manager

Edit XML | Usage

XML Editor: Enable XML editing

```
<?xml version="1.0" encoding="UTF-8"?><xsl:stylesheet exclude-result-prefixes="qu
  <!-- parameters passed in from the DirXML engine -->
  <xsl:param name="srcQueryProcessor"/>
  <xsl:param name="destQueryProcessor"/>
  <xsl:param name="srcCommandProcessor"/>
  <xsl:param name="destCommandProcessor"/>
  <xsl:param name="dnConverter"/>
  <xsl:param name="fromNds"/>
  <!-- identity transformation template -->
  <!-- in the absence of any other templates this will cause -->
  <!-- the stylesheet to copy the input through unchanged to the output -->
  <xsl:template match="node()|@*">
    <xsl:copy>
      <xsl:apply-templates select="@*|node()"/>
    </xsl:copy>
  </xsl:template>
  <!-- add your custom templates here -->
</xsl:stylesheet>
```

- 7 Click *OK* to save the XSLT style sheet.

6.2.2 Modifying an XSLT Style Sheet in iManager

- 1 Open the Identity Manager Driver Overview for the driver you want to manage.
- 2 Click the icon representing the policy where the XSLT style sheet you want to modify is stored.
- 3 Select the XSLT style sheet you want to modify from the list of policies, then click Edit.
- 4 Edit the XSLT style sheet, then click *OK*.

6.2.3 Deleting an XSLT Style Sheet in iManager

- 1 Open the Identity Manager Driver Overview for the driver you want to manage.
- 2 Click the icon representing the policy where the XSLT style sheet you want to delete is stored.
- 3 Select the XSLT style sheet you want to delete from the list of policies, then click Delete.
- 4 Click *OK*, to verify that you want to delete the XSLT style sheet.

6.3 Prepopulated Information in the XSLT Style Sheet

When you create a new style sheet in iManager or Designer, it is prepopulated with a style sheet that implements the identity transformation. In the absence of additional templates, the identity transformation allows the input XML document to pass through the style sheet unchanged. You usually implement policy by adding additional templates to act on only the XML that you want to be

changed. If your style sheet is being used to translate a document to or from an XML vocabulary that is different than XDS (such as the Input and Output Transformations for the SOAP and Delimited Text drivers) you might need to remove the identity template.

6.4 Using the Parameters that Identity Manager Passes

The Metadirectory engine passes the policy style sheets the following parameters to the style sheet:

Table 6-1 *Style Sheet Parameters*

Parameter	Description
srcQueryProcessor	A Java object that implements the XdsQueryProcessor interface. This allows the style sheet to query the source data store for more information.
destQueryProcessor	A Java object that implements the XdsQueryProcessor interface. This allows the style sheet to query the destination data store for more information.
srcCommandProcessor	A Java object that implements the XdsCommandProcessor interface. This allows the style sheet to write back a command to the event source.
destCommandProcessor	A Java object that implements the XdsCommandProcessor interface. This allows the style sheet to issue a command directly to send a command to the destination data store.
dnConverter	A Java object that implements the XdsCommandProcessor interface. This allows the style sheet to convert Identity Vault object DNs from one format to another. For more information, see Interface DNConverter (http://developer.novell.com/ndk/doc/dirxml/dirxmlbk/api/com/novell/nds/dirxml/driver/DNConverter.html) .
fromNds	A Boolean value that is True if the source data store is the Identity Vault and False if it is the connected application.

When you create a new style sheet in iManager or Designer, it is prepopulated with a style sheet that contains the declarations for these parameters.

When using the query and command parameters with the schema mapping policies, input transformation policies, and output transformation policies, the following limitations apply:

- ◆ Queries issued to the application shim must be in the form expected by the application shim. In other words, schema names must be in the application namespace and the query must conform to whatever XML vocabulary is used natively by the shim. No association references are added to the query.
- ◆ Responses from the application shim are in the form returned by the shim with no modification or schema mapping performed and no resolution of association references.
- ◆ Queries issued to eDirectory™ must be in the form expected by eDirectory. In other words, schema names must be in the eDirectory namespace and the query must be XDS. Association references are not resolved.

- ◆ Responses from the application shim are in the form returned by the shim with no modification or schema mapping performed.

Query Processors

Use of the query processors depends on the Novell® XSLT implementation of extension functions. To make a query, you need to declare a namespace for the XdsQueryProcessor interface. This is done by adding the following to the <xsl:stylesheet> or <xsl:transform> element of the style sheet.

```
xmlns:query="http://www.novell.com/nxsl/java/
com.novell.nds.dirxml.driver.XdsQueryProcessor"
```

When you create a new style sheet in iManager or Designer, it is prepopulated with the namespace declaration. For more information about query processors see [Class XdsQueryProcessor \(http://developer.novell.com/ndk/doc/dirxml/dirxmlbk/api/com/novell/nds/dirxml/driver/XdsQueryProcessor.html\)](http://developer.novell.com/ndk/doc/dirxml/dirxmlbk/api/com/novell/nds/dirxml/driver/XdsQueryProcessor.html).

The following example uses one of the query processors (the long lines are wrapped and do not begin with a <): To view the style sheet, see [Query_Processors.xml \(../samples/Query_Processors.xml\)](#).

```
<!-- Query object name queries NDS for the passed object name -->

<xsl:template name="query-object-name">
  <xsl:param name="object-name"/>

  <!-- build an xds query as a result tree fragment -->
  <xsl:variable name="query">
    <query>
      <search-class class-name="{ancestor-or-self:
        :add/@class-name}"/>

      <!-- NOTE: depends on CN being the naming attribute -->
      <search-attr attr-name="CN">
        <value><xsl:value-of select="$object-name"/
          ></value>
      </search-attr>

      <!-- put an empty read attribute in so that we don't get -->
      <!-- the whole object back -->
      <read-attr/>
    </query>
  </xsl:variable>

  <!-- query NDS -->
  <xsl:variable name="result" select="query:query($destQuery
    Processor,$query)"/>

  <!-- return an empty or non-empty result tree fragment -->
  <!-- depending on result of query -->
  <xsl:value-of select="$result//instance"/>
</xsl:template>
```

Here is another example.

```
<?xml version="1.0"?>
<xsl:transform
```

```

        version="1.0"
        xmlns:xsl="http://www.w3.org/1999/XSL/Transform"
        xmlns:cmd="http://www.novell.com/nxsl/java
        com.novell.nds.dirxml.driver.XdsCommandProcessor"
    >
    <xsl:param name="srcCommandProcessor"/>

    <xsl:template match="node()|@*">
        <xsl:copy>
            <xsl:apply-templates select="@*|node()"/>
        </xsl:copy>
    </xsl:template>

    <xsl:template match="add">
        <xsl:copy>
            <xsl:apply-templates select="@*|node()"/>
        </xsl:copy>

        <!-- on a user add, add Engineering department to the source
        object -->
        <xsl:variable name="dummy">
            <modify class-name="{@class-name}" dest-dn="{@src-dn}">
                <xsl-copy-of select="association"/>
                <modify-attr attr-name="OU">
                    <add-value>
                        <value type="string">Engineering</value>
                    </add-value>
                </modify-attr>
            </modify>
        </xsl:variable>
        <xsl:variable name="dummy2"
            select="cmd:execute($srcCommandProcessor, $dummy)"/>
    </xsl:template>

</xsl:transform>

```

6.5 Using Extension Functions

XSLT is an excellent tool for performing some kinds of transformations and a rather poor tool for other types of transformations, such as non-trivial string manipulation and iterative processes. However, the Novell XSLT processor implements extension functions that allow the style sheet to call a function implemented in Java, and by extension, any other language that can be accessed through JNI.

For specific examples, see [“Query Processors” on page 66](#) using the query processor, and the following example that illustrates using Java for string manipulation. The long lines are wrapped and do not begin with a <. To view the style sheet, see [Extension_Functions.xml \(./samples/Extension_Functions.xml\)](#).

```

<!-- get-dn-prefix places the part of the passed dn that -->
<!-- precedes the last occurrence of '\ ' in the passed dn -->
<!-- in a result tree fragment meaning that it can be -->
<!-- used to assign a variable value -->

```

```

<xsl:template name="get-dn-prefix" xmlns:jstring="http://
  www.novell.com/nxsl/java/java.lang.String">

  <xsl:param name="src-dn"/>

  <!-- use java string stuff to make this much easier -->
  <xsl:variable name="dn" select="jstring:new($src-dn)"/>
  <xsl:variable name="index" select="jstring:lastIndexOf
    ($dn,'\')"/>
  <xsl:if test="$index != -1">
    <xsl:value-of select="jstring:substring($dn,0,$index)
      "/>
  </xsl:if>
</xsl:template>

```

6.6 Creating a Password: Example Creation Policy

The following style sheet can be used for a Creation policy. It creates a user, generates a password for the user from the user's Surname and CN attributes, and performs an identity transformation that passes through everything in the document except the events you are trying to intercept and transform. To view the style sheet, see [Create_Password.xml \(./samples/Create_Password.xml\)](#).

```

<?xml version="1.0" encoding="ISO-8859-1"?>

<!-- This stylesheet has an example of how to replace a create rule
with
  an XSLT stylesheet and supply an initial password for "User"
objects. -->

<xsl:transform xmlns:xsl="http://www.w3.org/1999/XSL/Transform
  "version="1.0">

  <!-- ensure we have required NDS attributes -->
  <xsl:template match="add">
    <xsl:if test="add-attr[@attr-name='Surname'] and
      add-attr[@attr-name='CN']">
      <!-- copy the add through -->
      <xsl:copy>
        <xsl:apply-templates select="@*|node()"/>
        <!-- add a <password> element -->
        <xsl:call-template name="create-password"/>
      </xsl:copy>
    </xsl:if>

    <!-- if the xsl:if fails, we don't have all the required attributes
      so we won't copy the add through, and the create rule will veto
      the add -->

  </xsl:template>

  <xsl:template name="create-password">
    <password>

```

```

        <xsl:value-of select="concat (add-attr[@attr-name=' Surname' ]/
value,
        '--',add-attr[@attr-name=' CN' ]/value)"/>
    </password>
</xsl:template>

<!-- identity transform for everything we don't want to change -->

<xsl:template match="@*|node()">
    <xsl:copy>
        <xsl:apply-templates select="@*|node()"/>
    </xsl:copy>
</xsl:template>

</xsl:transform>

```

6.7 Creating an eDirectory User: Example Creation Policy

This style sheet can be used for a Creation policy. It shows how to create an eDirectory user from an entry created in an external application. This example is based on the idea that a newly hired person is first created in the Human Resources database and then on the network. It takes the user's first name and last name and generates a unique CN in the eDirectory tree. Although eDirectory requires the CN to be unique in only the container, this style sheet ensures that it is unique across all containers in the eDirectory tree. To view the style sheet, see [Create_User.xml \(../samples/Create_User.xml\)](#)

```

<?xml version="1.0" encoding="ISO-8859-1"?>

<!-- This stylesheet is an example of how to replace a create rule
with an
    XSLT stylesheet and that creates the User name from the Surname
and
    given Name attributes -->

<xsl:transform
    xmlns:xsl="http://www.w3.org/1999/XSL/Transform" version="1.0"
    xmlns:query="http://www.novell.com/nxsl/java/
com.novell.nds.dirxml.driver.
        XdsQueryProcessor"
    >

<!-- This is for testing the stylesheet outside of Identity Manager so
things
    are pretty to look at -->
<xsl:strip-space elements="*" />
<xsl:preserve-space elements="value,component" />
<xsl:output method="xml" indent="yes" />

<!-- Identity Manager always passes two stylesheet parameters to an
XSLT rule:
    an inbound and outbound query processor -->
<xsl:param name="srcQueryProcessor" />

```

```

<xsl:param name="destQueryProcessor"/>

<!-- match <add> elements -->
<xsl:template match="add">

    <!-- ensure we have required NDS attributes we need for the name -->
    <xsl:if test="add-attr[@attr-name='Surname'] and
        add-attr[@attr-name='Given Name']">

        <!-- copy the add through -->
        <xsl:copy>
            <!-- copy any attributes through except for the src-dn -->
            <!-- we'll construct the src-dn below so that the placement
rule will work -->
            <xsl:apply-templates select="*[string(.) != 'src-dn']"/>

            <!-- call a template to construct the object name and place the
result in a variable -->
            <xsl:variable name="object-name">
                <xsl:call-template name="create-object-name"/>
            </xsl:variable>

            <!-- now create the src-dn attribute with the created name -->
            <xsl:attribute name="src-dn">
                <xsl:variable name="prefix">
                    <xsl:call-template name="get-dn-prefix">
                        <xsl:with-param name="src-dn" select="string(@src-
dn)"/>
                    </xsl:call-template>
                </xsl:variable>
                <xsl:value-of select="concat($prefix,'\',$object-name)"/>
            </xsl:attribute>

            <!-- if we have a "CN" attribute, set it to the constructed
name -->
            <xsl:if test="./add-attr[@attr-name='CN']">
                <add-attr attr-name="CN">
                    <value type="string"><xsl:value-of select="$object-
name"/></value>
                </add-attr>
            </xsl:if>

            <!-- copy the rest of the stuff through, except for what we
have already copied -->
            <xsl:apply-templates select="*[name() != 'add-attr' or @attr-
name != 'CN'] |
                comment() |
                processing-instruction() |
                text()"/>

            <!-- add a <password> element -->
            <xsl:call-template name="create-password"/>

        </xsl:copy>

```

```

    </xsl:if>
    <!-- if the xsl:if fails, it means we don't have all the required
attributes
    so we won't copy the add through, and the create rule will veto
the add -->
</xsl:template>

<!-- get-dn-prefix places the part of the passed dn that precedes the
-->
<!-- last occurrence of '\' in the passed dn in a result tree fragment
-->
<!-- meaning that it can be used to assign a variable value
-->
<xsl:template name="get-dn-prefix" xmlns:jstring="http://
www.novell.com/nxsl/java/java.lang.String">
    <xsl:param name="src-dn"/>

    <!-- use java string stuff to make this much easier -->
    <xsl:variable name="dn" select="jstring:new($src-dn)"/>
    <xsl:variable name="index" select="jstring:lastIndexOf($dn,'\')"/>
    <xsl:if test="$index != -1">
        <xsl:value-of select="jstring:substring($dn,0,$index)"/>
    </xsl:if>
</xsl:template>

<!-- create-object-name creates a name for the user object and places
the -->
<!-- result in a result tree fragment
-->
<xsl:template name="create-object-name">

    <!-- first try is first initial followed by surname -->
    <xsl:variable name="given-name" select="add-attr[@attr-name='Given
Name']/value"/>
    <xsl:variable name="surname" select="add-attr[@attr-
name='Surname']/value"/>
    <xsl:variable name="prefix" select="substring($given-name,1,1)"/>
    <xsl:variable name="object-name" select="concat($prefix,$surname)"/
>

    <!-- then see if name already exists in NDS -->
    <xsl:variable name="exists">
        <xsl:call-template name="query-object-name">
            <xsl:with-param name="object-name" select="$object-name"/>
        </xsl:call-template>
    </xsl:variable>

    <!-- if exists, then try 1st fallback, else return result -->
    <xsl:choose>
        <xsl:when test="$exists != ''">
            <xsl:call-template name="create-object-name-2"/>
        </xsl:when>
        <xsl:otherwise>
            <xsl:value-of select="$object-name"/>
        </xsl:otherwise>
    </xsl:choose>

```

```

        </xsl:otherwise>
    </xsl:choose>

</xsl:template>

<!-- create-object-name-2 is the first fallback if the name created by
-->
<!-- create-object-name already exists
-->
<xsl:template name="create-object-name-2">

    <!-- first try is first name followed by surname -->
    <xsl:variable name="given-name" select="add-attr[@attr-name='Given
Name']/value"/>
    <xsl:variable name="surname" select="add-attr[@attr-
name='Surname']/value"/>
    <xsl:variable name="object-name" select="concat($given-
name,$surname)"/>

    <!-- then see if name already exists in NDS -->
    <xsl:variable name="exists">
        <xsl:call-template name="query-object-name">
            <xsl:with-param name="object-name" select="$object-name"/>
        </xsl:call-template>
    </xsl:variable>

    <!-- if exists, then try last fallback, else return result -->
    <xsl:choose>
        <xsl:when test="$exists != ''">
            <xsl:call-template name="create-object-name-fallback"/>
        </xsl:when>
        <xsl:otherwise>
            <xsl:value-of select="$object-name"/>
        </xsl:otherwise>
    </xsl:choose>

</xsl:template>

<!-- create-object-name-fallback recursively tries a name created by
-->
<!-- concatenating the surname and a count until NDS doesn't find
-->
<!-- the name. There is a danger of infinite recursion, but only if
-->
<!-- there is a bug in NDS
-->
<xsl:template name="create-object-name-fallback">
    <xsl:param name="count" select="1"/>

    <!-- construct the a name based on the surname and a count -->
    <xsl:variable name="surname" select="add-attr[@attr-
name='Surname']/value"/>
    <xsl:variable name="object-name" select="concat($surname,'-
', $count)"/>

```



```

<!-- see if it exists in NDS -->
<xsl:variable name="exists">
  <xsl:call-template name="query-object-name">
    <xsl:with-param name="object-name" select="$object-name"/>
  </xsl:call-template>
</xsl:variable>

<!-- if exists, then try again recursively, else return result -->
<xsl:choose>
  <xsl:when test="$exists != ''">
    <xsl:call-template name="create-object-name-fallback">
      <xsl:with-param name="count" select="$count + 1"/>
    </xsl:call-template>
  </xsl:when>
  <xsl:otherwise>
    <xsl:value-of select="$object-name"/>
  </xsl:otherwise>
</xsl:choose>

</xsl:template>

<!-- query object name queries NDS for the passed object-name. Ideally,
this would -->
<!-- not depend on "CN": to do this, add another parameter that is the
name of the -->
<!-- naming attribute.
-->
<xsl:template name="query-object-name">
  <xsl:param name="object-name"/>

  <!-- build an xds query as a result tree fragment -->
  <xsl:variable name="query">
    <nds ndsversion="8.5" dtdversion="1.0">
      <input>
        <query>
          <search-class class-name="{ancestor-or-self::add/@class-
name}"/>
          <!-- NOTE: depends on CN being the naming attribute -->
          <search-attr attr-name="CN">
            <value><xsl:value-of select="$object-name"/></value>
          </search-attr>
          <!-- put an empty read attribute in so that we don't get
the whole object back -->
          <read-attr/>
        </query>
      </input>
    </nds>
  </xsl:variable>

  <!-- query NDS -->
  <xsl:variable name="result"
select="query:query($destQueryProcessor,$query)"/>

```

```
<!-- return an empty or non-empty result tree fragment depending on
result of query -->
  <xsl:value-of select="$result//instance"/>
</xsl:template>

<!-- create an initial password -->
<xsl:template name="create-password">
  <password>
    <xsl:value-of select="concat(add-attr[@attr-name='Surname']/
value,'-',add-attr[@attr-name='CN']/value)"/>
  </password>
</xsl:template>

<!-- identity transform for everything we don't want to mess with -->
<xsl:template match="@*|node() ">
  <xsl:copy>
    <xsl:apply-templates select="@*|node()"/>
  </xsl:copy>
</xsl:template>

</xsl:transform>
```

Documentation Updates

A

The documentation was updated on the following dates:

- ♦ [Section A.1, “October 30, 2007,” on page 75](#)

A.1 October 30, 2007

Updates were made to the following sections. The changes are explained below.

A.1.1 Downloading Policies

Location	Change
“Downloading Identity Manager Policies” on page 59	Changes the steps for access the policies.