Novell Identity Manager Driver for SOAP

1.0.2

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IMPLEMENTATION GUIDE

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Contents

About This Guide

This guide explains how to install and configure the Identity Manager Driver 1.0 for SOAP (also called the SOAP driver).

Audience

This guide is intended for eDirectory™ administrators implementing Identity Manager, application server developers, Web services administrators, and consultants. You should also have an understanding of DSML/SPML, SOAP, and HTML.

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 Identity Manager Driver for SOAP in the Driver Implementation Guides (http://www.novell.com/documentation/dirxmldrivers/index.html) section.

Additional Documentation

For information on Identity Manager, see the Identity Manager Documentation Web site (http://www.novell.com/documentation/dirxml20/index.html).For information on other Identity Manager drivers, see Driver Implementation Guides (http://www.novell.com/documentation/dirxmldrivers/index.html).

Documentation Conventions

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

A trademark symbol (®, ™, etc.) denotes a Novell trademark. An asterisk (*) denotes a third-party trademark.

When a single pathname can be written with a backslash for some platforms or a forward slash for other platforms, the pathname is presented with a backslash. Users of platforms that require a forward slash, such as Linux* or UNIX*, should use forward slashes as required by your software.

Overview

1

SOAP (Simple Object Access Protocol) is an XML-based protocol used for Internet communication between different applications and operating systems.

The SOAP driver uses a combination of language and protocols to enable identity provisioning and data synchronization between an Identity Vault with Identity Manager and an HTTP-enabled application, such as a SOAP-enabled Web service.

The driver isn't targeted to a specific Web service. The driver is a generic shim that simply handles the HTTP transport of data between the Identity Vault and a Web service. For this driver, a Web service is defined as an application that uses XML and HTTP as the transport protocol. The application can also use SOAP to encode the messages.

This section provides the following information on the Identity Manager Driver 1.0 for SOAP:

- Section 1.1, "Driver Concepts," on page 9
- Section 1.2, "Driver Features," on page 11

1.1 Driver Concepts

This section contains the following information:

- "Data Management" on page 9
- "How the Driver Works" on page 10

1.1.1 Data Management

The driver uses various Internet protocols and languages to exchange data between Identity Manager and a Web service.

- "SOAP" on page 9
- "SPML and DSML" on page 10
- "XML" on page 10
- "HTTP" on page 10

SOAP

SOAP (Simple Object Access Protocol) is an XML-based protocol for exchanging messages located in Identity Manager. It defines the message exchange but not the message content. The driver supports SOAP 1.1.

SOAP documents are organized into three elements:

- **Envelope:** The root XML node.
- **Header:** Provides context knowledge such as a transaction ID and security information.
- **Body:** The method-specific information.

SOAP follows the HTTP request/response message model, which provides SOAP request parameters in an HTTP request and SOAP response parameters in an HTTP response.

SPML and DSML

The SOAP driver includes sample configurations for two protocols: SPML 1.0 and DSML 2.0.

- **SPML 1.0:** Service Provisioning Markup Language is an XML-based provisioning request and response protocol. A client issues an SPML request to a server. The request describes the operation to be performed at a given service point. The service point performs the necessary operations to implement the requested service. After completing the operations, the service point returns an SPML response to the client detailing any results or errors pertinent to that request.

  The driver supports SPML 1.0. SPML binds with SOAP 1.1 and uses HTTP and HTTPS 1.1 as the transport.
- **DSML 2.0:** Directory Services Markup Language represents directory structural information, directory queries and updates, and the results of these operations as XML documents.

DSML binds with SOAP 1.1 and uses HTTP and HTTPS 1.1 as the transport.

For more information about the sample SPML and DSML configurations included with the driver, see "Using the Sample Driver Configurations" on page 15.

XML

XML (Extensible Markup Language) is a generic subset of Standard Generalized Markup Language (SGML) that allows for exchange of structured data on the Internet.

HTTP

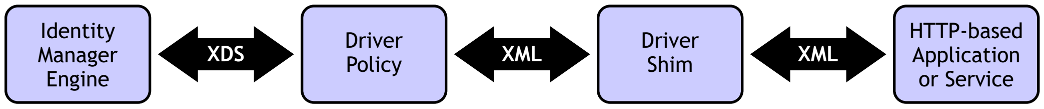
HTTP is a protocol used to request and transmit data over the Internet or other computer network.The protocol works well in an Internet infrastructure and with firewalls.

HTTP is a stateless request/response system because the connection is usually maintained only for the immediate request. The client establishes a TCP connection with the server and sends it a request command. The server then sends back its response.

1.1.2 How the Driver Works

The following diagram illustrates the data flow between Identity Manager and a Web service:

Figure 1-1 *SOAP Driver Data Flow*



The Identity Manager engine uses XDS, a specialized form of XML, to represent events in the Identity Vault. Identity Manager passes the XDS to the driver policy, which can consist of basic policies, DirXML® Script, and XSLT style sheets.

The driver policy translates the XDS to XML, such as SOAP, on the Subscriber channel. On the Publisher channel, the driver policy translates other forms of XML, such as SOAP, into XDS.

The driver shim receives the XML from the driver policy. The driver shim uses HTTP to communicate with the Web service. Generally the handoff between the driver shim and the application is serialized XML.

For example, suppose the driver is using the DSML sample configuration to talk to a DSML server that is configured only as a Subscriber. When an event occurs in the Identity Vault, Identity Manager creates an XDS command to represent that event. Identity Manager passes the XDS command to the driver policy.

The driver policy transforms that XDS command with an output transformation style sheet. The XSLT style sheet converts the XDS to a SOAP envelope containing DSML. That SOAP envelope is handed to the driver shim. The driver shim converts the SOAP envelope into an array of bytes, makes the appropriate HTTP connection, and performs an HTTP POST operation to submit the data to the Web service.

The Web service or application processes the request, and returns a SOAP response to the driver shim. The shim receives the response as an array of bytes, and converts it to an XML document before passing it back to the driver policies. The input transformation style sheet processes the response, converting it into appropriate XDS that is reported back to the Identity Manager engine.

1.1.3 Understanding Operation Data

The driver shim applies special handling to subscriber commands based on an XML element embedded in the command, which appears in the shim as `<operation-data>`. The `<operation-data>` element has two purposes. First, it can be used to match commands with the responses they generate, which can be useful for creating associations. Second, it can be used to override default Subscriber channel connection attributes.

The `<operation-data>` element is added to the command from one of the Subscriber channel policies. The driver shim removes the `<operation-data>` element from the command before it is sent to the application, and restores the `<operation-data>` element to the resulting response.

By default, when the `<operation-data>` element is restored on the response, it is appended as a child element of the root node. This can be overridden by providing one or more parent-node-*n* attributes to the <operation-data> element, where *n* is a number beginning with 1 that is incremented for each parent specifier you want to provide. The driver shim examines the operation data node looking for parent-node-*n* attributes. If attributes are found, each is tried in turn and if the named node exists, the node is used as the parent for the operation data on the response.

To see how the `<operation-data>` element works with the style sheets, see Section 4.5, "Operation Data," on page 30.

1.2 Driver Features

The driver contains the following features:

- HTTP transport of data between the Identity Vault and a Web service
- Sample configurations for SPML and DSML
- Customization of HTTP Request-Header fields

  By default, a basic authorization request header with an ID and password is provided for the Subscriber channel. For more information, see Section 3.1, "Creating a Driver Object Using a Driver Configuration File," on page 15.

- SSL connections using the HTTPS protocol
- Subscriber HTTP and HTTPS proxy servers
- Definition and selection of multiple subscriber connections in the policy at run time
- Potential to act as an HTTP or HTTPS listener for incoming connections on the publisher channel
- Potential extensibility using customized Java* code

  For more information, see Appendix A, “Using Java Extensions,” on page 39.

2 Installing the Driver

The section contains the following information about installing the driver:

- Section 2.1, “Driver Prerequisites,” on page 13
- Section 2.3, “Installing the Driver,” on page 13

2.1 Driver Prerequisites

- ❑ One of the following operating systems:
    - NetWare® 6 or 6.5 with the latest Support Pack
    - Novell® Open Enterprise Server wit latest Support Pack
    - Windows* NT*, 2000, or 2003 with the latest Service Patch
    - Linux Red Hat* AS, ES 2.1, or AS 3.0
    - SUSE® LINUX Enterprise Server 8 or 9 (including SP1)
    - Solaris* 8 or 9
    - AIX* 5.2L
- ❑ Novell eDirectory™ 8.7.3 with the latest Support Pack or Novell eDirectory 8.8
- ❑ Novell Identity Manager 3.0 or higher
- ❑ Novell iManager 2.5 or higher

2.2 New Features

- The ability to override SOAP-action
- Cookie handling

2.3 Installing the Driver

You install the driver as part of the Novell Identity Manager 3.0.1 installation program. For installation instructions, refer to the “ Installing Identity Manager” and the “Upgrading” chapters in the *Identity Manager 3.0.1 Installation Guide*.

Importing the driver configuration creates the driver object. After you have imported the configuration, you can use iManager to configure and manage the driver. See Chapter 3, “Using the Sample Driver Configurations,” on page 15 for instructions on how to configure the driver.

2.4 Upgrading

If you are upgrading to Identity Manager 3.0.1, follow the instructions in the “Upgrading” chapter of the *Identity Manager 3.0.1 Installation Guide*.

Using the Sample Driver Configurations 3

The Identity Manager Driver for SOAP includes two sample configurations that you can use as a starting point for creating the Driver object.

This section covers the following topics:

- Section 3.1, "Creating a Driver Object Using a Driver Configuration File," on page 15
- Section 3.3, "Understanding the SPML Configuration," on page 20
- Section 3.2, "Understanding the DSML Configuration," on page 20

3.1 Creating a Driver Object Using a Driver Configuration File

The SOAP driver comes with two configuration files that can be used to create a Driver object:

- SOAP-SPML.xml: The Service Provisioning Markup Language (SPML) configuration file
- SOAP-DSML.xml: The Directory Services Markup Language (DSML) configuration file

For more information about the sample files, see Section 3.3, "Understanding the SPML Configuration," on page 20 and Section 3.2, "Understanding the DSML Configuration," on page 20.

3.1.1 Importing the Driver Configuration File in Designer

Designer allows you to import the driver configuration files for the SOAP driver. These files create and configures the objects and policies needed to make the driver work properly. The following instructions explain how to create the driver and import the driver's configuration.

There are many different ways of importing the driver configuration file. This procedure only documents one way.

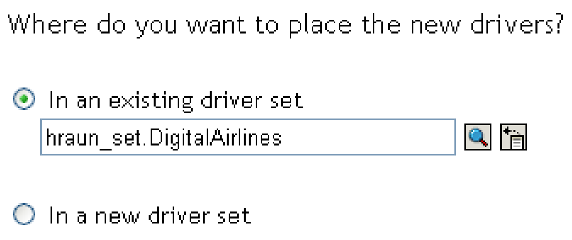
1. Open a project in Designer and in the modeler, right-click the Driver Set object, then select *Add Connected Application*.
2. From the drop-down list, select *SOAP-DSML.xml* or *SOAP-SPML.xml,* then click *Run*.
3. Click *Yes* in the Perform Prompt Validation window.
4. Configure the driver by filling in the fields. Specify information specific to your environment. For information on the settings, see Table 3-1 on page 17 and Table 3-2 on page 18.
5. After specifying parameters, click *OK* to import the driver.
6. After the driver is imported, customize and test the driver.
7. After the driver is fully tested, deploy the driver into the Identity Vault. See "Deploying a Driver to an Identity Vault" in the *Designer for Identity Manager 3: Administration Guide*.

3.1.2 Importing the Driver Configuration File in iManager

The SOAP preconfiguration files are an example configuration file. You installed this file when you installed the Identity Manager Web components on an iManager server. Think of the preconfiguration file as a template that you import and customize or configure for your environment.

1 In iManager, select *Identity Manager Utilities* > *Import Drivers*.

2 Select a driver set, then click *Next*.


Where do you want to place the new drivers?

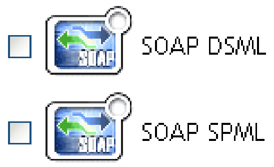
(●) In an existing driver set

hraun_set.DigitalAirlines

( ) In a new driver set

If you place this driver in a new driver set, you must specify a driver set name, context, and associated server.

3 Select *SOAP DSML* or *SOAP SPML*, then click *Next*.



4 Configure the driver by filling in the configuration parameters. For information on the settings, see Table 3-1 on page 17 and Table 3-2 on page 18.

5 Define security equivalences using a user object that has the rights that the driver needs to have on the server

The Admin user object is most often used for this task. However, you might want to create a DriversUser (for example) and assign security equivalence to that user. Whatever rights that the driver needs to have on the server, the DriversUser object must have the same security rights.

6 Identify all objects that represent administrative roles and exclude them from replication.

Exclude the security-equivalence object (for example, DriversUser) that you specified in Step 2. If you delete the security-equivalence object, you have removed the rights from the driver. Therefore, the driver can't make changes to Identity Manager.

7 Click Finish.

8 Configure additional settings for the driver.

For more information, see "Configuring the Driver" on page 23.

3.1.3 Configuration Parameters

The following table explains the parameters you must provide during initial driver configuration.

NOTE: The parameters are presented on multiple screens and some parameters are only displayed if the answer to a previous prompt requires more information to properly configure the policy.

Table 3-1 *Configuration Parameters for the SOAP DSML Driver*

Field	Description
Driver name	Specify the name of the driver object in Identity Manager.
Configure Data Flow	Specify the driver channels you want to be active. *eDirectory to DSML*: Sends Identity Vault events to the application. *DSML to eDirectory*: Receives events from the application. *Bi-Directional*: Activates both the eDirectory™ and the DSML channels.
<nds>, <input>, <output> element handling	Select one of the following: *Remove/Add Elements*: The driver shim removes and adds the required XML elements of nds, input, and output. These required elements are removed from XML documents sent to the application and are added to XML documents received from the application before sending the document to the Metadirectory engine. This is the preferred option for the SOAP Driver. *Pass Elements Through*: Turns off element handling. The required XML elements of nds, input, and output aren't added or removed to XML documents as necessary.
Driver is Local/Remote	Select one of the following: *Local*: Runs the driver shim from the server holding the driver set. *Remote*: Runs the driver from a remote server using the Remote Loader. If you specify this option, click Next, then specify Remote Loader configuration information. For more information, see "Setting Up a Connected System" in the *Novell Identity Manager 3.0.1 Administration Guide*.
URL of the remote DSML server: (Conditional) Subscriber Channel fields **NOTE:** These fields are displayed only if you select *eDirectory to DSML* or *Bi-Directional* in the *Configure Data Flow* field.	Specify the *URL of the remote DSML server* and the port number that the server listens on. For example: http://137.66.10.13:18180/soap The server is a software component that listens for, processes, and returns the results for valid DSML requests. **TIP:** If you configure the driver to use SSL, the URL must begin with https rather than http.
Authentication ID (Conditional) Subscriber Channel fields	If the remote server requires an *Authentication ID*, specify it in the field. Otherwise, leave the field empty.

Field	Description
Authentication Password (Conditional) Subscriber Channel fields	Specify the *Authentication Password* for the remote server if you specified an *Authentication ID* above. Otherwise, leave these fields empty.
Listening IP address and port (Conditional) Publisher Channel fields **NOTE:** These fields are displayed only if you select *DSML to eDirectory* or *Bi-Directional* in the *Configure Data Flow* field.	Specify the IP address of the server where the SOAP driver is installed and the port number that this driver listens on. You can specify 127.0.0.1 if there is only one network card installed in the server. Choose an unused port number on your server, for example, 127.0.0.1:18180. The driver listens on this address for requests, processes the requests, and returns a result.
Authentication ID (Conditional) Publisher Channel fields	Specify the *Authentication ID* of the remote DSML server to validate incoming requests. If the remote server does not send an *Authentication ID*, leave this field empty.
Authentication Password (Conditional) Publisher Channel fields	Specify the *Authentication Password* of the remote server to validate incoming requests, if you specified an *Authentication ID* above. Otherwise, leave these fields empty.
Remote Host Name and Port (Conditional) Remote Loader fields **NOTE:** These fields are displayed only if you select *Remote* in the *Driver is Local/ Remote* field.	Enter the host name or IP address of the server running the remote loader server and port. Example: 137.66.10.13:8090 The port 8090 is the default port the remote loader service listens on.
Driver password (Conditional) Remote Loader fields	The driver password is used by the remote loader to authenticate itself to the Identity Manager server. It must be the same password that is specified in the Driver Object Password in the remote loader server.
Remote password (Conditional) Remote Loader fields	The remote password is used to control access to the remote loader. It must be the same password that is specified as the Remote Loader password on the Remote Loader server.

Table 3-2 *Configuration Parameters for the SOAP SPML Driver*

Field	Description
Driver name	Specify the name of the driver object in Identity Manager.
Configure Data Flow	Specify the driver channels you want to be active. *eDirectory to SPML:* Sends Identity Vault events to the application. *SPML to eDirectory*: Receives events from the application. *Bi-Directional*: Activates both the eDirectory and the SPML channels.

Field	Description
<nds>, <input>, <output> element handling	Select one of the following: *Remove/Add Elements*: The driver shim removes and adds the required XML elements of nds, input, and output. These required elements are removed from XML documents sent to the application and are added to XML documents received from the application before sending the document to the Metadirectory (Identity Manager) engine. This is the preferred option for the SOAP Driver. *Pass Elements Trough*: Turns off element handling. The required XML elements of nds, input, and output aren't added or removed to XML documents as necessary.
Driver is Local/Remote	Select one of the following: *Local*: Runs the driver shim from the server holding the driver set. *Remote*: Runs the driver from a remote server using the Remote Loader. If you specify this option, click Next, then specify Remote Loader configuration information. For more information, see "Setting Up a Connected System" in the *Novell Identity Manager 3.0.1 Administration Guide*.
URL of the remote SPML Provisioning Service Point: (Conditional) Subscriber Channel fields **NOTE:** These fields are displayed only if you select *eDirectory to SPML* or *Bi-Directional* in the *Configure Data Flow* field.	Specify the URL of the remote SPML Provisioning Service Point (PSP). For example: http://137.66.10.13:18180/soap A PSP is a software component that listens for, processes, and returns the results for valid SPML requests. **TIP:** If you configure the driver to use SSL, the URL must begin with https rather than http.
Authentication ID (Conditional) Subscriber Channel fields	Specify the authentication ID of the remote SPML PSP. If the remote SPML PSP requires an authentication ID. Otherwise leave the field empty.
Authentication Password (Conditional) Subscriber Channel fields	Specify the authentication password for the remote SPML PSP to validate incoming request, if you specified an authentication ID above. Otherwise, leave this field empty.
Listening IP address and port (Conditional) Publisher Channel fields **NOTE:** These fields are displayed only if you select *SPML to eDirectory* or *Bi-Directional* in the *Configure Data Flow* field.	Specify the IP address of the server where the driver is installed and the port number that this driver listens on as a PSP. You might specify 127.0.0.1 if there is only one network card installed in the server. Choose an unused port number on your server. Example: 127.0.0.1:18180 The driver listens on this address for the SPML requests, processes them, and returns a result.
Authentication ID (Conditional) Publisher Channel fields	Specify the authentication ID to validate incoming SPML requests.

Field	Description
Authentication Password (Conditional) Publisher Channel fields	Specify the authentication password to validate incoming SPML requests.
Remote Host Name and Port (Conditional) Remote Loader fields **NOTE:** These fields are displayed only if you select *Remote* in the *Driver is Local/Remote* field.	Enter the hostname or IP address of the server running the Remote Loader server and port. Example: 137.66.10.13:8090 Port 8090 is the default port the Remote Loader service listens on.
Driver password (Conditional) Remote Loader fields	The driver password is used by the Remote Loader to authenticate itself to the Identity Manager server. It must be the same password that is specified in the Driver Object Password in the Remote Loader server.
Remote password (Conditional) Remote Loader fields	The remote password is used to control access to the Remote Loader. It must be the same password that is specified as the Remote Loader password on the Remote Loader server.

3.2 Understanding the DSML Configuration

The sample DSML configuration uses DSML 2.0 and binds with SOAP 1.1 using HTTP or HTTPS 1.1 as the transport. All data transformation and processing is done in policies and style sheets.

The sample DSML import file does the following:

- Shows a simple configuration for pairing with the Identity Vault DSML implementation.
- Provides XDS-to-DSML and DSML-to-XDS conversions in policies.
- Handles Users, Groups and Organizational Units.

  Other objects can be processed through policy and style sheet customization.
- Supports string, structured, and Distinguished Name (DN) attribute types.

  There are two examples of handling attributes with other data types. The Postal Address attribute shows how structured attributes can be handled. The Member attribute shows how a DN attribute can be handled. Other attribute data types can be handled through policy and style sheet customization.
- Handles a subset of the query operations.

  Specific query operations can be handled through policy and style sheet customizations.
- Supports password set operation.

  Password synchronization might be possible through policy and style sheet customization.
- The Subscriber channel uses the destination DN for the association key.
- The Publisher channel uses the application-provided DN for the association key.

3.3 Understanding the SPML Configuration

The sample SPML configuration uses SPML 1.0 and binds with SOAP 1.1 using HTTP or HTTPS 1.1 as the transport. All data transformation and processing is done in policies and style sheets.

The sample SPML import file does the following:

- Provides generic SPML functionality.

  The import file doesn't pair with a specific SPML application.
- Provides XDS-to-SPML and SPML-to-XDS conversions in policies.
- Handles Users, Groups, and Organizational Units

  Other objects can be handled through policy and style sheet customization.
- Handles a single value per attribute.

  Multiple values for an attribute can be handled through policy and style sheet customization.
- Handles a subset of the query operations.

  The configuration handles all queries as SPML scope = "subtree" and uses the entry and subordinate scope concepts. Specific query operations can be handled through policy and style sheet customization.
- Supports string, structured and Distinguished Name (DN) attribute types.
- Supports password set operation.

  Password synchronization might be possible through policy and style sheet customization.
- Handles the single (non-batch) operations of execution=synchronous and processing=sequential.

  Batch requests can be supported through policy and style sheet customization.
- Doesn't handle <addResponse><attributes> or <modifyResponse><modifications>.
- The Subscriber channel uses the application-returned Identifier value for the association key.
- The Publisher channel uses the DN for the association key and returns the association key as the Identifier value.

3.4 Handling Modify Events on the Publisher Channel for Unassociated Objects

The Publisher channel of the HTTP/SOAP driver has certain limitations that only allow it to listen for Change events. It has no way to query for additional information or to poll the HTTP/SOAP source. Therefore, Modify events received on the publisher channel for unassociated objects (or an object that was not created by the same instance of the driver) almost always fails (return an error). The reason for this is that the driver and the Metadirectory engine cannot successful change an unassociated Modify event into an Add command without the ability to send a query to the HTTP/SOAP source. Since the SOAP driver has no mechanism to query back to the source, it returns an error stating that query is not implemented.

There is no general solution for this limitation. Therefore, the sample configurations for DSML and SPML both return an error when this condition occurs. If, in a specific driver deployment, it becomes necessary to apply an association on an object; and the possibility of inconsistent information in that newly associated object is satisfactory, then this can be achieved in policy by setting the Destination DN in the Modify event and creating your own set-association event. This allows the modification to occur on the existing object, even when not previously associated.

Configuring the Driver 4

After you create the Driver object using one of the sample files, you need to configure the Identity Manager Driver for SOAP. This section contains the following information about configuring the driver:

- Section 4.1, “Configuring Driver Settings,” on page 23
- Section 4.2, “Configuring Subscriber Settings,” on page 27
- Section 4.3, “Configuring Publisher Settings,” on page 28
- Section 4.4, “Creating XSLT Style Sheets,” on page 29

4.1 Configuring Driver Settings

1 In iManager, click *Identity Manager* > *Identity Manager Overview*.

2 Locate the driver set that contains the SOAP driver, then click the driver’s icon.

3 From the *Identity Manager Driver Overview*, click the SOAP driver object, which displays the driver configurations.

4 Specify driver module information:

4a In the Driver Module section, select *Java*.

4b In the Name field, specify the following SOAP driver Java class name:

```
com.novell.nds.dirxml.driver.soap.SOAPDriver
```

5 Specify driver object password information:

5a Scroll to the Driver Object Password section, then click *Set password*.

5b In the fields, enter and re-enter the driver object password.

6 Specify authentication information:

6a Scroll to the Authentication section.

6b Specify the *Authentication ID*.

6c Specify the *Authentication context*.

6d Specify *Remote loader connection parameters*.

6e Specify the *Driver cache limit* (kilobytes).

6f Specify *Application password* by clicking *Set password*.

6g Enter and re-enter the *Application password*.

7 Specify startup information:

7a Scroll to the Startup section.

7b Select one of the following:

- *Auto Start*: The driver starts automatically when eDirectory™ starts.
- *Manual*: The driver must be started manually using iManager.
- *Disabled*: The driver will not run.

8 Specify the following driver settings:

Section	Field	Description
Driver Settings	*<nds>, <input>, <output> Element Handling*	Specify *Remove/add elements* if you want the driver shim to remove and add the required XML elements <nds>, <input>, and <output>. The required elements are removed from XML documents sent to the application and are added to XML documents received from the application before presenting the document to the Metadirectory engine. Otherwise, specify *Pass elements through* to turn off this element handling.
	Custom Java Extensions	Specify *Show* if you have developed custom Java classes to extend the driver shim's functionality. Otherwise, specify *Hide*. For more information, see Appendix A, "Using Java Extensions," on page 39.
Subscriber Settings	*URL of the Remote DSML Server*	Enter the URL of the remote server and the port number that the server listens on. The URL should begin with `http://` unless you have configured SSL settings, in which case it should begin with `https://` and use a DNS hostname rather than an IP address.
	(Conditional) *Authentication ID*	If the remote server requires an authentication ID, enter the ID in the field. Otherwise, leave the field empty.
	(Conditional) *Authentication Password* and *Re-Enter Authentication Password*	Enter the authentication password for the remote server if you entered an *Authentication ID* above. Otherwise, leave the field empty.
	Remove Existing Password	Click the box to remove the existing password. Then specify the new password in the *Authentication Password* and *Re-Enter Authentication Password* fields. You cannot change the password without selecting the box.
	Truststore File	Specify the name and path of the keystore file containing the trusted certificates used when the remote server is configured to provide server authentication. For example: `c:\security\truststore`. Leave this field empty when server authentication is not used.
	Set mutual authentication parameters	Specify *Show* to set mutual authentication information. Specify *Hide* to not use mutual authentication.

Section	Field	Description
	Proxy Host and Port	Specify the host address and the host port when a proxy host and port are used. For example: 192.10.1.3:18180. Or, if a proxy host and port are not used, leave this field empty.
	Handle HTTP session cookies	Some HTTP applications set cookies and expect them to be present on future requests. Select *Handle Cookies* if you want the driver to keep track of session cookies. Cookies are only kept until the driver is stopped. Select *Ignore Cookies* if the HTTP application does not require cookies.
	Customize HTTP Request Header Fields	Select *Show* to enable customized header fields or select *Hide* to disable the feature. Each of the following fields is conditional, depending on if you select *User* or *Ignore*. ◆ *Authorization*: If you select *Use*, specify the key and value in the appropriate fields. This header is automatically used if you enter an authentication ID and password in the Subscriber Settings. ◆ *Context Type*: If you select *Use*, specify the key and value in the appropriate fields. ◆ *SOAPAction*: If you select *Use*, specify the key and value in the appropriate fields. ◆ *Optional Request Header*: If you select *Use*, specify the key and value in the appropriate fields. You can specify up to three optional request headers.
Publisher Settings	*Listening IP address and port*	Specify the IP address of the server where the SOAP driver is installed and the port number that this driver listens on. If you imported a sample configuration file, this field contains the IP address and port that you specified in the wizard.
	(Conditional) *Authentication ID*	Specify the *Authentication ID* of the remote server to validate incoming requests. If the remote server does not send an *Authentication ID*, leave this field empty. If you imported a sample configuration file, this field contains the IP address and port that you specified in the wizard.

Section	Field	Description
	(Conditional) *Authentication Password* and *Re-Enter Authentication Password*	Specify the authentication password of the remote server to validate incoming requests if you entered an *Authentication ID* above. Otherwise, leave these fields empty.
	Remove existing password	Click the box to remove the existing password, then specify the new password in the *Authentication Password* and *Re-Enter Authentication Password* fields. You cannot change the password without selecting the box.
	KMO name	Specify the *KMO name* to be used in eDirectory. When the server is configured to accept HTTPS connections, this name becomes the KMO name in eDirectory. The *KMO name* is the name before the "-" (dash) in the RDN. Leave this field empty when a keystore file (see keystore file below) is used or when HTTPS connections are not used.
	Keystore file	Specify the keystore name and path to the keystore file. This file is used when the server is configured to accept HTTPS connections, Leave this field empty when a KMO name is used (see KMO name above) or when HTTPS connections are not used.
	Keystore password	Specify the keystore file password used with the keystore file specified above when this server is configured to accept HTTPS connections. Leave this field empty when a KMO name is used or when HTTPS connections are not used.
	Server key alias	Specify a Server key alias when this server is configured to accept HTTPS connections. Leave this field empty when a KMO name is used or when HTTPS connections are not used.
	Server key password	When this server is configured to accept HTTPS connections, this is the key alias password (not the keystore password). Leave this field empty when a KMO name is used (see above) or when HTTPS connections are not used.

Section	Field	Description
	Heartbeat Interval in Seconds	Specify the heartbeat interval in seconds. Leave this field empty to turn off the heartbeat. For more information about the heartbeat, see "Adding Driver Heartbeat" in the *Novell Identity Manager 3.0.1 Administration Guide*.

9 Click *Apply*, then click *OK*.

4.2 Configuring Subscriber Settings

1 In iManager, click *Identity Manager* > *Identity Manager Overview*.

2 Locate the driver set containing the SOAP driver, then click the driver's icon to display the Identity Manager Driver Overview page.

3 On the Identity Manager Driver Overview page, click the driver's icon again, then scroll to Subscriber Settings.

4 Specify the Subscriber settings as described in Step 8 on page 23.

5 Click *Apply*, then click *OK*.

4.2.1 Configuring the Subscriber to Make HTTPS Connections to the Remote Web Service

If the remote Web service you are accessing allows HTTPS connections, you can configure the Subscriber to take advantage of this capability. You need a trust store containing a certificate issued by the certificate authority that signed the server's certificate. See Section 4.3.1, "Configuring the Publisher to Receive HTTPS Connections," on page 28 for an example.

Import this certificate into a trust store using Java's keytool. For more information on keytool, see Keytool - Key and Certificate Management Tool (http://java.sun.com/j2se/1.4.2/docs/tooldocs/windows/keytool.html).

1 Import the certificate into your trust store or create a new trust store by entering the following command at the command prompt:

```
keytool -import -file name_of_cert_file -trustcacerts -noprompt -
keystore filename -storepass password
```

For example:

```
keytool -import -file tree_ca_root.b64 -trustcacerts -noprompt -
keystore dirxml.keystore -storepass novell
```

2 Configure the Subscriber to use the trust store you created in Step 1.

2a In iManager, click *Identity Manager* > *Identity Manager Overview*.

2b Locate the driver set containing the SOAP driver, then click the driver's icon to display the Identity Manager Driver Overview page.

2c On the Identity Manager Driver Overview page, click the driver's icon again, then scroll to Subscriber Settings.

2d In the *Truststore File* setting, specify the path to the trust store you created in Step 1.

3. Click *Apply*, then click *OK*.

4.2.2 Configuring the Subscriber to Use a Proxy

You can configure the subscriber to use an HTTP or HTTPS proxy server.

1. In iManager, click *Identity Manager > Identity Manager Overview*.
2. Locate the driver set containing the SOAP driver, then click the driver's icon to display the Identity Manager Driver Overview page.
3. On the Identity Manager Driver Overview page, click the driver's icon again, then scroll to Subscriber Settings.
4. In the Proxy Host and Port setting, specify the host and port of the proxy using the following format:

   ```
   host:port
   ```
5. Click *Apply*, then click *OK*.

4.3 Configuring Publisher Settings

1. In iManager, click *Identity Manager > Identity Manager Overview*.
2. Locate the driver set containing the SOAP driver, then click the driver's icon to display the Identity Manager Driver Overview page.
3. On the Identity Manager Driver Overview page, click the driver's icon again, then scroll to Publisher Settings.
4. Specify the Subscriber settings as described in Step 8 on page 23.
5. Click *Apply*, then click *OK*.

4.3.1 Configuring the Publisher to Receive HTTPS Connections

1. Create a server certificate in iManager.

   1a Click *Novell Certificate Server > Create Server Certificate*.

   1b Browse to and select the server object where the SOAP driver is installed.

   1c Specify a certificate nickname.

   1d Select *Standard* as the creation method, then click *Next*.

   1e Click *Finish*, then click *Close*.
2. Export a self-signed certificate from the certificate authority in eDirectory.

   2a Click *eDirectory Administration > Modify Object*.

   2b Select your tree's certificate authority object, then click *OK*.

   It is usually found in the Security container and is named something like *TREENAME CA.Security*.

   2c Click *Certificate > Self Signed Certificate*.

2d Click *Export*.

2e When asked if you want to export the private key with the certificate, click *No*, then click *Next*.

2f Based on the client to be accessing the Web service, select either *File in binary DER format* or *File in Base64 format* for the certificate, then click *Next*.

If the client uses a Java-based keystore or trust store, then you can choose either format.

2g Click *Save the exported certificate to a file*.

2h Click *Save* and browse to a known location on your computer.

2i Click *Save*, then click *Close*.

3 Import the self-signed certificate into the client's trust store.

The steps to import the certificate vary depending on the client that connects to the Publisher channel's HTTPS listener. If the client uses a typical Java keystore, you can perform the following steps to create the keystore:

3a Use the keytool executable that is included with any Java JDK*.

For more information on keytool, see Keytool - Key and Certificate Management Tool (http://java.sun.com/j2se/1.4.2/docs/tooldocs/windows/keytool.html).

3b Type the following command at a command prompt:

```
keytool -import -file name_of_cert_file -trustcacerts -noprompt
-keystore filename -storepass password
```

For example:

keytool -import -file tree_ca_root.b64 -trustcacerts -noprompt -keystore dirxml.keystore -storepass novell

4 Configure the Publisher to use the server certificate you created in Step 1.

4a In iManager, click *Identity Manager > Identity Manager Overview*.

4b Locate the driver set containing the SOAP driver, then click the driver's icon to display the Identity Manager Driver Overview page.

4c In the Identity Manager Driver Overview page, click the driver's icon again, then scroll to Publisher Settings.

4d In the *KMO name* setting, specify the certificate nickname you used in Step 1.

5 Click *Apply*, then click *OK*.

4.4 Creating XSLT Style Sheets

To enable the SOAP driver to work with any setup other than the default configuration for DSML or SPML, you need to create XSLT style sheets.The application-specific protocol handling is done in Input Transformation and Output Transformation style sheets.

For detailed information on writing style sheets to handle other document types, refer to the sample style sheets that come with this driver. For more information on style sheets see "Defining Policies using XSLT Style Sheets" in the *Policy Builder and Driver Customization Guide*.

4.5 Operation Data

The driver shim applies special handling to Subscriber commands based on the `<operation-data>` element. On the Subscriber channel, the `<operation-data>` element can be added to a command for two purposes.

1. Specify XML data that you want included with the command result. In this way you can match commands with the responses they generate, which is useful for creating associations.
2. Override default Subscriber options on a per-command basis.

As discussed in Chapter 1, "Overview," on page 9, the `<operation-data>` element is added to the command from one of the Subscriber channel policies. The driver shim removes the operation data from the command before it is sent to the application, and restores the `<operation-data>` element (and all child elements) to the resulting response. If needed, rules and style sheets can then access the operation-data element on the result.

4.5.1 Using Operation Data to Specify XML to be Returned on the Result

The sample configurations for the SOAP driver use the `<operation-data>` element to keep track of identifying information for a command, so the result can be recognized and associations can be properly assigned. Check these samples for details of how the `<operation-data>` element is used.

When the `<operation-data>` element is restored on the response, it appended as a child element of the root node. You can override this by providing one or more parent-node-*n* attributes to the `<operation-data>` element where *n* is a number beginning with 1 that is incremented for each parent specifier provided. The driver shim looks for parent-node-*n* attributes. When found, the attribute is checked to see if the named node exists. If the node is found, it uses as the parent for the `<operation-data>` element on the response.

4.5.2 Using Operation Data to Override Default Subscriber Options

There are two ways to override default Subscriber options for a command.

1. Create multiple sets of Subscriber options (called connections) in your configuration, and use the `<operation-data>` element to specify which connection set to use for the current command.
2. Specify a specific option to override for the current command, such as url, method, or soap-action.

Creating and Using Multiple Subscriber Option Sets (connections)

To use the `<operation-data>` element to override the default Subscriber connection parameters:

1 Edit the Subscriber settings section of the driver configuration.

2 Using the XML edit feature of iManager, find each Subscriber setting that ends with a dash and the number 1, such as subURL-1, duplicate it, and increment the number.

For example: `subURL-2`

3 Edit the values of the new settings to be the values you want to use for the second connection.

   You can configure any number of connections this way as long as the numbers you use are incremental without gaps.

4 Add an attribute to the `<operation-data>` element called `connection` and give it the value of the connection number you want to user.

   For example:

```
<operation-data connection="2">
...(other operation-data elements)
</operation-data>
```

Overriding Single Subscriber Options

Instead of using the concept of connections to override multiple Subscriber options, you can override only the url, the HTTP method, or the soap-action values, by directly using attributes on an `<operation-data>` element. The following table lists the attributes that can be used and the Subscriber option they are meant to override.

Table 4-1 *Attributes Used to Override the Subscriber Options*

<operation-data> Attribute	Subscriber Option Being Overridden	Description
url	subURL-1	This is the URL or (or URI) of the Web Service or HTTP application. Overriding the URL might be useful if, the application has one Web Service for adding a user and a different Web Service for deleting a user.
method	subHttpMethod-1	This is POST by default but can be set to other methods as defined in RFC 2616 Section 9 as needed.
soap-action	HTTP Request-Header field with key “SOAPAction”	With the DSML and SPML samples this value is always #batchRequest. However, there are some Web services that require this value to change, depending on the command.

Examples:

```
<operation-data url="http://137.66.10.13:18180/soap">
...(other operation-data elements if required)
</operation-data>

<operation-data method="GET">
...(other operation-data elements if required)
</operation-data>

<operation-data soap-action="addUser">
```

```
...(other operation-data elements if required)
</operation-data>
```

Using the Driver

5

After you complete the driver installation and import a sample configuration file, you must complete the following tasks:

- Section 5.1, "Starting the Driver," on page 33
- Section 5.2, "Migrating and Resynchronizing Data," on page 33
- Section 5.3, "Activating the Driver," on page 33

5.1 Starting the Driver

1 In iManager, click *Identity Manager* > *Identity Manager Overview*.
2 Browse to and select the driver set where the driver exists, then click *Search*.
3 Click the upper right corner of the SOAP driver icon, then click *Start driver*.

To further configure startup options, see Section 4.1, "Configuring Driver Settings," on page 23.

5.2 Migrating and Resynchronizing Data

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

- **Migrate Data from Identity Vault:** Allows you to select containers or objects you want to migrate from the Identity Vault to an application. When you migrate an object, the Identity Manager engine applies all of the Matching, Placement, and Create policies, as well as the Subscriber filter, to the object.
- **Migrate Data into Identity Vault:** Assumes that the remote application (usually a Web Service) can be queried for entries that match the criteria in the publisher filter. However, because of the general nature of the SOAP driver the method for querying the Web Service (if there is one) is not known to the driver shim. Therefore, this feature does not usually work with the SOAP driver.
- **Synchronize:** The Identity Manager engine looks in the Subscriber class filter and processes all objects for those classes. Associated objects are merged. Unassociated objects are processed as Add events.

To use one of the options explained above:

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

5.3 Activating the Driver

You must activate the driver within 90 days of installation or the driver stops working.

For activation information, refer to “Activating Novell Identity Manager Products” in the *Novell Identity Manager 3.0.1 Administration Guide*.

Troubleshooting the Driver

6

This section contains the following information on error messages:

- Section 6.1, "Driver Shim Errors," on page 35
- Section 6.2, "Java Customization Errors," on page 37

6.1 Driver Shim Errors

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

Error Message	Level	Description
307 Temporary Redirect	Retry	The Subscriber channel attempted to send data to the application or Web service but received a 307 Temporary Redirect response. The Subscriber waits for a period of time (usually 30 seconds) and tries again.
408 Request Timeout	Retry	The Subscriber channel attempted to send data to the application or Web service but received a 408 Request Timeout response. The Subscriber waits for a period of time (usually 30 seconds) and tries again.
503 Service Unavailable	Retry	The Subscriber channel attempted to send data to the application or Web service but received a 503 Service Unavailable response. The Subscriber waits for a period of time (usually 30 seconds) and tries again.
504 Gateway Timeout	Retry	The Subscriber channel attempted to send data to the application or Web service but received a 504 Gateway Timeout response. The Subscriber waits for a period of time (usually 30 seconds) and tries again.

Error Message	Level	Description
Various numeric error codes not listed above.	Error	HTTP servers, such as those the Subscriber channel might be communicating with, return numeric values and a short descriptive message to indicate the status of the request. Numbers in the range of 200-299 indicate success, so an error message isn't generated. Numbers listed above (307, 408, 503, and 504) indicate temporary conditions, so the request is retried. Other numerical error codes result in an error message containing that code and the message provided by the HTTP server. In most cases, the driver continues to run, and the command that caused the error isn't retried.
Problem communicating with HTTP server. Make sure server is running and accepting requests.	Retry	The Subscriber channel received an IOException while communicating or attempting to communicate with the HTTP server. You might receive this error because the server is either not running, is overloaded, cannot be accessed because of firewall or other restrictions, or the URL provided in the subscriber configuration is not correct. The command that caused this error is retried later.
The HTTP/SOAP driver doesn't return any application schema by default. If there is an application-specific schema you want the shim to report, you can write your own Java class that implements the SchemaReporter interface and then configure the driver to load your class as a Java extension.	Warning	The Metadirectory engine called the DriverShim.getSchema() method of the driver, and the driver has not been extended with a SchemaReporter customization. The driver continues to run.
Subscriber.execute() was called but the Subscriber was not configured correctly. The command was ignored. You should either configure the Subscriber or clear the Subscriber's filter so it doesn't receive commands.	Warning	The Subscriber channel of the driver isn't initialized properly. The most likely cause is an improperly formatted driver configuration. The driver continues to run but displays this message each time an event is received by the Subscriber channel.
pubHostPort must be in the form host:port	Fatal	An error occurred with the Publisher channel configuration. Review the Publisher channel parameters to verify that both a valid host and a valid port number are provided.
MalformedURLException	Fatal	The URL supplied in the Subscriber channel parameters isn't in a valid URL format.

Error Message	Level	Description
Multiple Exceptions	Fatal	This message appears in the trace when the HTTP listener fails to properly initialize. This can occur for a variety of reasons. Check your Publisher settings to make sure you have specified a port that is not already in use and that the other Publisher settings are correct.
HTTPS Hostname Wrong: Should Be . . .	Retry	This message appears when an SSL handshake fails on the Subscriber channel. It indicates that the subject presented with the server certificate doesn't match the IP address or hostname given in the HTTPS URL. Use a DNS hostname rather than an IP address in the URL.

6.2 Java Customization Errors

The following table identifies errors that might occur in the customized Java extensions.

Message	Level	Description
SchemaReporter init problem: *extension-specific message*	Fatal	The SchemaReporter Java customization had a problem initializing. The driver shuts down.
Extension (custom code) init problem: *extension specific message*	Fatal	One of the following Java extensions failed to initialize: ◆ SubscriberTransport ◆ PublisherTransport ◆ DocumentModifiers ◆ ByteArrayModifiers The driver shuts down.
Various other errors	Varies	The interfaces provided for Java extensions return error messages on the trace screen and sometimes to the Identity Manager engine. Sometimes it is difficult to distinguish errors of this type from other errors that originate in the core driver shim. If you get errors that are not listed in this table and you are using Java extensions, check with whomever provided you with the extensions for a list of error codes for that particular extension.

Using Java Extensions

A

The functionality of the Identity Manager Driver for SOAP can be extended by using Java. Using an API defined by Java interfaces, you can create your own custom Java classes that have access to the data passing through the Subscriber channel and Publisher channel. These classes can read and interpret the data, and, optionally, can modify the data. There are also Java interfaces defined to let you replace the default subscriber or publisher (that uses HTTP) with your own custom subscriber or publisher.

This section contains the following information on using Java extensions:

- Section A.1, “Overview,” on page 39
- Section A.2, “Creating and Configuring Java Extensions,” on page 40

A.1 Overview

If the application you are using with the Identity Manager Driver for SOAP uses non-XML data, you can create Java extensions to convert the non-XML data to XML data. Or, you might want to change various protocols, including XML and HTTP. For example, the default HTTP can be replaced. These Java extensions can be used to operate on data and they must be used to convert non-XML data to XML data.As illustrated in the following diagram, there are eleven points where functionality can be extended:

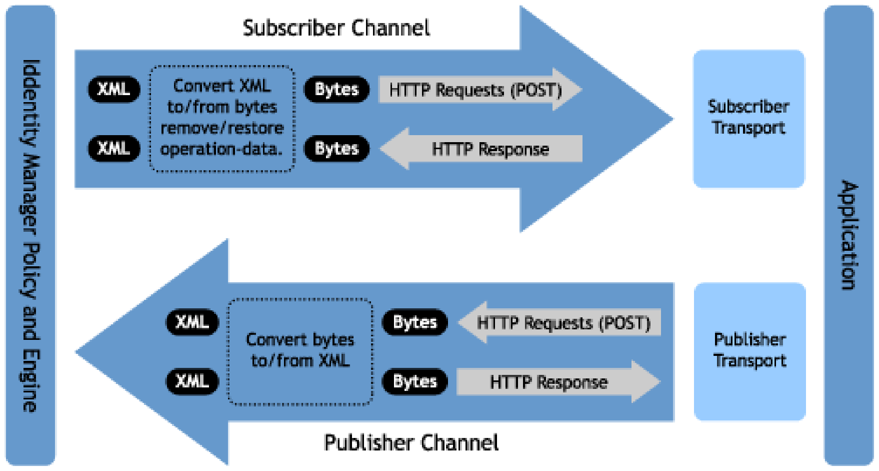
- Four in the Subscriber channel
- Four in the Publisher channel
- Two to specify the transport
- One to report the application schema

The SOAP driver was designed to be flexible and extensible. For the Java programmer who wants to extend or modify the capabilities of the driver, there are programming interfaces that can be used for this purpose. These interfaces should be used only when you need to do transformations that cannot be done in policies or style sheets.

The Javadoc (http://www.novell.com/documentation/dirxmldrivers/javadoc/api/index.html) describes these interfaces.

There are five Java interfaces that can be used to extend or customize the driver behavior. They are DocumentModifiers, ByteArrayModifiers, PublisherTransport, SubscriberTransport, and SchemaReporter.

Figure A-1 *How Functionality Can Be Extended Using Java*



DocumentModifiers and ByteArrayModifiers serve a similar purpose, so you should probably use one or the other. They are both used to access and to modify if desired the commands and events passing through the driver shim. DocumentModifiers gives you access to the data as XML DOM documents. ByteArrayModifiers gives you access to the same data, but serialized as byte arrays.

The PublisherTransport interface allows you to replace the default HTTP listener that the driver uses on the Publisher channel with something else. Your PublisherTransport implementation can either be event driven, or it can poll at a specified interval.

If you want to replace the HTTP or HTTPS connections that the driver uses on the Subscriber channel with something else, you would implement a SubscriberTransport.

The remaining interface, SchemaReporter, can be used if you have a way of programatically determining the classes and attributes used by the remote Web service. The advantage to this is that creating schema mapping rules is easier if the schema can be dynamically determined.

A.2 Creating and Configuring Java Extensions

Using the sample code and SOAP Driver Javadoc found at Novell's Developer Downloads Web site (http://developer.novell.com/ndk/downloadaz.htm) as a guide, write the Java code for your class. In the A-Z listing, search for SOAP Driver. You should name your class using any Java package and class name that is convenient to your environment and your organization.

For example, if you were writing your own class that implemented the DocumentModifiers interface, and you named your class *MyDocumentModifiers* within a package called com.novell.idm, then you would perform the following steps to compile, jar, and deploy your class:

1 Prepare your environment.

Make sure you have a current Java Development Kit (JDK) installed on your computer. Visit the Java Web Site (http://java.sun.com/) if you need to download one.

2 Gather your source code in the proper directory structure as defined by your package naming.

In the example given above, you would have a com directory that contained a novell directory that contained an idm directory. Within the idm directory you would have a source file named MyDocumentModifiers.java.

3. Make sure you have the jar files you need to compile your class.

   At a minimum, you need SOAPUtil.jar. If you are using XML documents within your class, you also need nxsl.jar.

4. Put a copy of the required jar files in a convenient location like the root of your compile directory just outside the com directory, then access a system command prompt or shell prompt with that location as the current directory.

5. Compile your class by entering one of the following:

   - For Windows: `javac -classpath SOAPUtil.jar;nxsl.jar com\novell\idm\*.java`
   - For Linux or UNIX: `javac -classpath SOAPUtil.jar:nxsl.jar com/novell/idm/*.java`

6. Create a Java archive file containing your class by entering one of the following:

   - For Windows: `jar cvf mydriverextensions.jar com\novell\idm\*.class`
   - For Linux or UNIX: `jar cvf mydriverextensions.jar com/novell/idm/*.class`

7. Place the jar file you created in Step 6 into the same directory that contains the SOAPShim.jar.

   In Windows this is often C:\Novell\NDS\lib.

8. In iManager, edit the driver settings.

   8a Next to Custom Java Extensions, select Show.

   8b Next to Document Handling, select Implemented.

   8c Specify *com.novell.idm.MyDocumentModifiers* as the value for Class and any string as the value for Init Parameter.

   The init parameter is the string that is passed to the init method of your class, so put any information here that you want to use during your class initialization.

9. Restart the driver.

You can now use your custom class.

Updates

B

This section contains information about documentation content changes that have been made in this guide.

The information is grouped according to the date the documentation updates were published.

The documentation is provided on the Web in two formats: HTML and PDF. The HTML and PDF documentation are both kept up-to-date with the documentation changes listed in this section.

If you need to know whether a copy of the PDF documentation you are using is the most recent, the PDF document contains the date it was published in the Legal Notices section immediately following the title page.

The documentation was updated on the following dates:

- Section B.1, “July 2, 2007,” on page 43

B.1 July 2, 2007

Made the following changes:

Location	Change
Appendix A, “Using Java Extensions,” on page 39	Fixed a broken link.