Novell
Identity Manager Driver for User Management of SAP* Software

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DRIVER GUIDE

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About This Guide

Audience

This manual is for Novell® Identity Manager administrators, SAP developers and administrators, and others who implement the Identity Manager Driver 1.0 for User Management of SAP Software.

The guide contains the following sections:

- Chapter 1, “Introducing the Identity Manager Driver for User Management of SAP Software,” on page 11
- Chapter 2, “Installing the Driver,” on page 17
- Chapter 5, “Understanding ALE Technologies,” on page 31
- Chapter 6, “Configuring the SAP System,” on page 35
- Chapter 7, “Using the SAP Java Connector Test Utility,” on page 41
- Chapter 8, “Understanding the Default Driver Configuration,” on page 49
- Chapter 9, “Using the Driver in a Central User Administration Environment,” on page 63
- Chapter 12, “Troubleshooting the Driver,” on page 95
- Appendix B, “Example XML Document Received from the Driver,” on page 123
- Appendix C, “Structured Format Examples,” on page 125
- Appendix D, “Configuration and Deployment Notes,” on page 127
- Appendix E, “Using Wildcard Search Capabilities,” on page 135

Feedback

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

Documentation Updates

For the most recent version of this document, see the Drivers Documentation Web site (http://www.novell.com/documentation/idm35drivers/index.html).

Additional Documentation

For documentation on using Identity Manager and the other drivers, see the Identity Manager Documentation Web site (http://www.novell.com/documentation/idm35).

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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Introducing the Identity Manager Driver for User Management of SAP Software

1

The Identity Manager Driver 1.0 for User Management of SAP Software, subsequently referred to as the driver, creates an automated link between the Identity Vault and SAP User Management systems (BASIS or Web Application Server.) This technology enables data flow within a business enterprise based on its own unique requirements, and eliminates the labor-intensive and error-prone practice of re-entering the same data into multiple databases. As User object records are added, modified, deactivated (disabled), or deleted in SAP or the Identity Vault, network tasks associated with these events can be processed automatically.

The driver allows administrators to propagate User data between SAP systems and other business applications and databases without the need for custom integration solutions. Administrators can decide what data will be shared and how data will be presented within their enterprises.

In this section:

- Section 1.1, “Understanding Driver Concepts,” on page 11
- Section 1.2, “Understanding Driver Components,” on page 16
- Section 1.3, “New Features,” on page 16

1.1 Understanding Driver Concepts

The driver is a bidirectional synchronization product between SAP R/3 and Enterprise R/3 systems and the Identity Vault. This framework uses XML and XSLT to provide data and event transformation capabilities that convert Identity Vault data and events into SAP data and vice-versa.

The Identity Vault acts as a hub, with other applications and directories publishing their changes to it. The Identity Vault then sends changes to the applications and directories that have subscribed for them. This results in two main flows of data: the Publisher channel and the Subscriber channel.

1.1.1 Publisher Channel

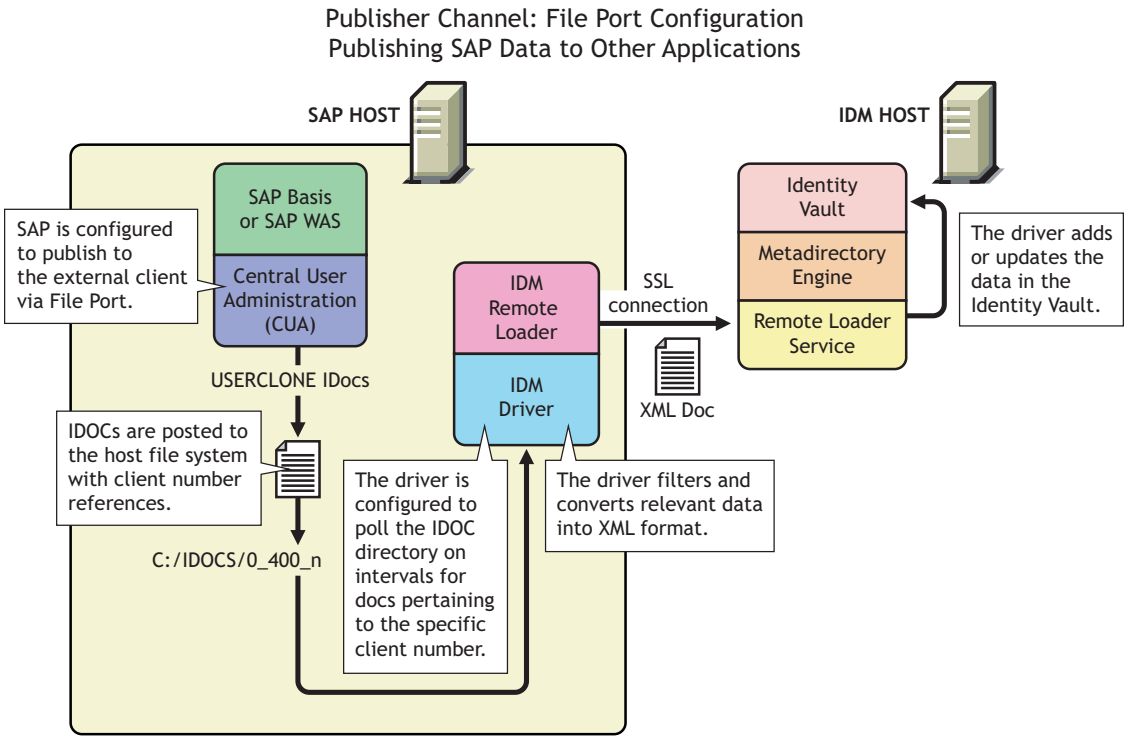
The SAP system publishes User object information in the form of USERCLONE IDocs using Application Link Enabling (ALE) and Central User Administration (CUA) technology. If desired and properly configured, the SAP system can propagate all Add, Delete, Lock, Unlock, and Modify User event data to the Identity Vault. The driver consumes the IDoc data and converts it into XML format. For more information on how the driver handles IDoc processing, refer to “IDoc Consumption by the Driver” on page 13.

The Publisher channel then submits XML-formatted documents to the Metadirectory engine for publication into the Identity Vault. By using Identity Manager and other IDM drivers, the data can be shared with other business applications and directories. These other applications can add additional data, which in turn can be transferred back into the SAP User records using the standard SAP Business Application Programming Interface (BAPI).

Depending on the ALE port configuration you choose, the Publisher channel either polls the SAP database for changes via a file port or it receives the data via a TRFC connection.

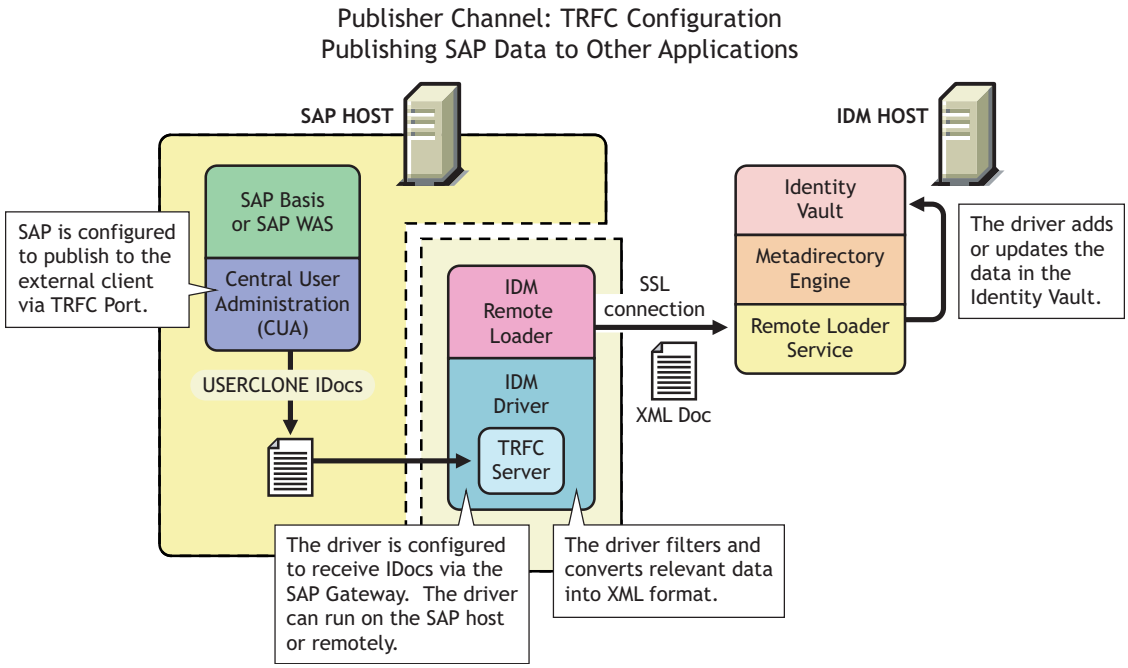
The following diagram illustrates the file port configuration. With the file port configuration, the entire IDoc is stored on the SAP host system.

Figure 1-1 *Publishing Data to the Identity Vault using the File Port Configuration*



The following diagram illustrates the TRFC port configuration. When using the TRFC configuration, a minimal “trigger” IDoc is stored on the driver host system. The driver handles the parsing of the IDoc data and uses the information to read the current User object. The driver then parses the appropriate data fields specified by the driver configuration, and provides secure transport of the data to the Identity Vault. Only data elements specifically selected by the system administrator are transported from the SAP host system to the Identity Vault.

Figure 1-2 *Publishing Data to the Identity Vault using the TRFC Configuration*



IDoc Consumption by the Driver

The driver consumes only Output IDoc files with the client number that is specified by the driver configuration, thus ensuring the privacy of other IDocs that might be generated by another driver configuration or ALE integration. Only the IDoc attributes that have been specified in the driver Publisher filter are published to the Identity Vault.

The format of a successfully published IDoc file is:

```
<(I)nput or (O)utput>_<client number>_<consecutive IDoc number>
```

For example:

```
O_300_0000000000001001
```

After the IDoc has been processed and specified attributes have been published, the filename of the IDoc file is modified to reflect the status of the publication processes. The following table lists the IDoc status and corresponding extension:

IDoc Status	Filename Extension
Processing but not published	.proc
Processed successfully and published	.done
Processed with an error or warning	.fail or .warn
Processed and retained for future-dated processing	.futr
Processed with corrupt or illegitimate data	.bad

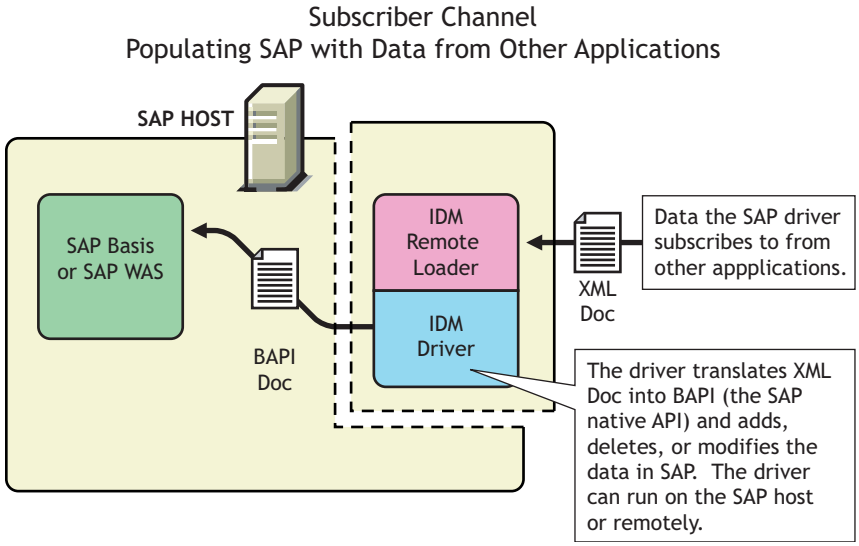
You should determine what action is required, if any, after IDoc publication is complete.

NOTE: Removing the filename extension makes the IDoc available for re-processing.

1.1.2 Subscriber Channel

The Subscriber channel receives XML-formatted Identity Vault events from the Metadirectory engine. The driver converts these documents to an appropriate data format, and updates SAP via the BAPI interface. The Identity Vault sends changes only to the applications that subscribe to receive them.

Figure 1-3 *Populating SAP with Data from other applications via the Subscriber channel*



For data to flow from the Identity Vault to the SAP system, the driver uses the SAP BAPI functions. The level of functionality is based upon the R/3 release level. By default, the driver is configured to support a SAP 4.6C system using USERCLONE03 messages. (To determine the level of USERCLONE messages available on your SAP system, run transaction WE60 and specify object name USERCLONEnn.) As a SAP administrator, you can select which attributes from the infotypes can be modified.

1.1.3 Attribute Mapping from the SAP User Management Database to the Identity Vault

Schema mapping is used by Identity Manager to translate data elements as they flow between the SAP User Management database and the Identity Vault. The SAP User object schema is based on the SAP USERCLONE message type. The schema map contains all attributes of the various data infotypes of the USERCLONE message type.

Several of the USERCLONE infotypes can be instantiated multiple times on the User records. Infotypes such as ADDTEL (Telephone Number) and ACTIVITYGROUPS (Roles) are *Table* fields and can contain multiple values. Other infotypes such as ADDRESS and LOGONDATA are *Structure* fields and are instantiated only once but have multiple fields associated with them. Still other fields are *simple* field types that contain only a single data field element.

The Identity Vault (eDirectory) system administrator can configure the driver to receive any of these various data fields, and can also configure the driver to handle the data in multiple ways. The Schema Map represents the data elements that can be synchronized in the SAP system.

The map elements have the following format:

```
<Table or Structure Name>:<Field> // Field
```

or

```
<Table Name> // Map to entire table or structure
```

Below are a few examples of maps between SAP User attributes and eDirectory attributes.

eDirectory Attribute	SAP User Attribute
Given Name	ADDRESS:FIRSTNAME
Surname	ADDRESS:LASTNAME
sapRoles	ACTIVITYGROUPS:AGR_NAME
buildingName	ADDRESS:BUILDING_P
floor	ADDRESS:FLOOR_P
Internet EMail Address	ADDSMTP:E_MAIL
OU	ADDRESS:DEPARTMENT
Pager	ADDPAG:PAGER
sapAlias	ALIAS:USERALIAS
DirXML-sapLocRoles	LOCACTIVITYGROUPS

The driver can synchronize multiple-instance data (such as TELEPHONE), but it cannot guarantee the specification of a primary value. It is also possible to specify only the Table name in a schema mapping. This is useful if you want to synchronize all data fields in a Table to the Identity Vault. You must use policies to parse desired fields from the Table data. Refer to Appendix B, “Example XML Document Received from the Driver,” on page 123 to see how various formats are represented in modify events.

1.1.4 Associations

Associations are created between SAP and Identity Vault objects during the synchronization process. For the SAP User object, a unique 12-character name (per client) must be created. However, the Identity Vault and other applications do not need to share this same unique ID. Identity Manager allows the various naming policies in an organization to be applied to objects by using the DirXML-Association attribute.

The DirXML-Association attribute is multivalued. Therefore, if Identity Manager is being used to synchronize an object among multiple applications, all of the object’s unique IDs (or associations) can be stored in this attribute on the Identity Vault object.

The unique ID association links objects in SAP to their objects in the Identity Vault. When an Add or Matching event occurs, the association is made. This association allows the driver to perform subsequent tasks on the appropriate object.

The DirXML-Associations field is stored on the Identity Vault object on the Identity Manager property page.

1.2 Understanding Driver Components

This sections contains information about the following driver components.

- “Driver Configurations” on page 16
- “Driver Shim” on page 16
- “SAP User Java Connector Test Utility” on page 16

1.2.1 Driver Configurations

After you install Identity Manager and the driver, you create one or more Driver objects. Each Driver object represents an instance of the Identity Manager Driver for User Management of SAP Software. The driver configuration file gets you up and running with a minimum of customization by letting you create a Driver object with preconfigured policies, filters, and driver parameters.

The driver configuration file is named `SAPUser-IDM3_5_0-V1.xml`.

1.2.2 Driver Shim

The driver shim, sometimes referred to as the connector, handles communication between the SAP User database and the Metadirectory engine.

1.2.3 SAP User Java Connector Test Utility

In order to use the driver, you must download the SAP JCO and install it. The SAP User Java* Connector (JCO) Test utility enables you to check for JCO installation and configuration issues prior to configuring the driver. You can use the JCO test utility to validate correct installation of the JCO client and configuration issues prior to configuring the driver.

You can use the JCO test utility to validate correct installation of the JCO client and connectivity to the SAP host system, as well as testing for accessibility of the User Management BAPIs used by the driver. For more information, refer to Chapter 7, “Using the SAP Java Connector Test Utility,” on page 41.

1.3 New Features

- Added a new appendix explaining how to set and clear granular locks. For more information, see Appendix F, “Setting and Clearing Granular Locks,” on page 137.
- Added a new appendix listings the BAPIs for the driver. For more information, see Appendix G, “Driver BAPIs,” on page 139.
- For more information about the new features of Identity Manager, refer to the *Identity Manager Installation Guide* (http://www.novell.com/documentation/idm35/).

Installing the Driver

2

As part of the driver installation and configuration, you should complete the following tasks:

- “Planning for Installation” on page 17
- “Importing the Driver” on page 18

These tasks are explained in detail in this section. After you finish installing the driver, proceed to Chapter 5, “Understanding ALE Technologies,” on page 31 to learn more about the SAP system configuration requirements.

2.1 Driver Prerequisites

The driver requires the following prerequisites. Ensure that you meet these criteria before you install the driver.

- ❑ Novell® Identity Manager 3.5.1.
- ❑ The host system where the driver shim is running must have the SAP Java Connector (JCO) client technology version 1.1*x* or 2.*x* installed to provide connectivity to the SAP system.

  This client is freely available to SAP customers and developer partners through SAP, and is provided for most popular server operating systems. You can download the JCO from the SAP Connectors site (http://service.sap.com/connectors).
- ❑ JDK*/JRE 1.3.1 or later.
- ❑ SAP R/3 version 4.5B or later.

2.2 Planning for Installation

Before you install and use the driver, you should determine which kind of installation you want to use: local or remote.

When to Use a Local Installation

A local installation installs the driver on the same host computer where you have Identity Manager installed.

When to Use a Remote Installation

A remote installation installs the driver on a different computer than the one where Identity Manager and eDirectory™ are installed, or it allows the driver to run in its own process space on the same computer. Remote installations can use SSL encryption to ensure data privacy between the driver and the Metadirectory engine. You should use this configuration when it is not possible or desirable to run the driver on the same host with eDirectory and Identity Manager.

2.3 Installing the Driver

There are two different ways to install the driver:

- Section 2.3.1, “Installing the Driver Locally,” on page 18
- Section 2.3.2, “Installing the Driver Remotely,” on page 18

2.3.1 Installing the Driver Locally

If you are going to install the driver locally, the server that runs the driver is required to have the following installed:

- eDirectory™ 8.73 SP8 or above, or 8.8 SP1 or above
- SAP R/3 version 4.5B or later.

The SAP User driver is installed during the installation of Identity Manager. See “Installing Identity Manager” in the*Identity Manager 3.5.1 Installation Guide* for the installation instructions.

2.3.2 Installing the Driver Remotely

If you do not want to install eDirectory and Identity Manager on the server that has the SAP User application installed on it, use the Remote Loader service. The Remote Loader service is installed and then connects to the server running Identity Manager. For installation instructions see, “Deciding Whether to Use the Remote Loader” in the *Novell Identity Manager 3.5.1 Administration Guide*.

2.4 Importing the Driver

After the driver is installed, it must be imported and configured. You can import the driver through Designer or iManager.

- Section 2.4.1, “Importing the Driver Configuration File in Designer,” on page 18
- Section 2.4.2, “Importing the Driver Configuration File in iManager,” on page 19
- Section 2.4.3, “Configuration Information,” on page 19
- Section 2.4.4, “Extending the Schema,” on page 22

2.4.1 Importing the Driver Configuration File in Designer

Designer allows you to import the basic driver configuration file for the SAP User application. This file creates 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. In the Modeler, right-click the driver set and select *New* > *Driver*.
2. From the drop-down list, select *SAP User Management,* then click *Run*.
3. Configure the driver by filling in the fields. Specify information for your environment. For information on the settings, see Section 2.4.3, “Configuration Information,” on page 19.

4 After specifying parameters, click *Finish* to import the driver.

5 After the driver is imported, customize and test the driver.

6 After the driver is fully tested, deploy the driver into the Identity Vault. See "Deploying a Driver to an Identity Vault" in the *Designer 2.1 for Identity Manager 3.5.1*.

2.4.2 Importing the Driver Configuration File in iManager

The Create Driver Wizard helps you import the basic driver configuration file. This file creates 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.

1 In Novell iManager, click *Identity Manager Utilities* > *Import Configurations*.

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

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

3 Select how you want the driver configurations sorted:

- All configurations
- Identity Manager 3.5 configurations
- Identity Manager 3.0 configurations
- Configurations not associated with an IDM version

4 Select *SAP User Management*, then click *Next*.

5 Specify the driver's parameters (refer to Section 2.4.3, "Configuration Information," on page 19 for details), then click *Next* to import the driver.

6 Define security equivalences using a user object that has the rights that the driver needs to have on the server, then click *OK*.

The tendency is to use the Admin user object 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.

7 Identify all objects that represent administrative roles and exclude them from replication, then click *OK*.

Exclude the security-equivalence object (for example, DriversUser) that you specified in Step 6. If you delete the security-equivalence object, you have removed the rights from the driver, and the driver can't make changes to Identity Manager.

8 Review the driver objects in the Summary page, then click *Finish*.

2.4.3 Configuration Information

As you import the driver configuration file, you will be prompted for the following information, depending on the configuration selections you made.

Parameter Name	Parameter Description
Driver name	The actual name you want to use for the driver.

Parameter Name	Parameter Description
SAP Application Server	The host name or IP address for connecting to the appropriate SAP application server. This is referred to as the “Application Server” in the SAP logon properties.
SAP System Number	The SAP system number of the SAP application server. This is referred to as the “System Number” in the SAP logon properties. The default value is 00.
SAP Client Number	The client number to be used on the SAP application server. This is referred to as the “Client” in the SAP logon screen.
SAP Session Language Code	The language code this driver will use for the SAP session. This is referred to as the “Language” in the SAP logon screen.
SAP User ID	The ID of the user this driver will use for the SAP system logon. This is referred to as the “User” in the SAP logon screen.
SAP User Password	The User password this driver will use for the SAP system logon. This is referred to as the “Password” in the SAP logon screen.
Publisher Channel Enabled	Select whether or not you want to enable the driver’s Publisher channel.
User Object Container (Conditional)	The name of the eDirectory Organizational Unit object where Users from the SAP system will be placed. This is only used if the Publisher channel is enabled.
Publisher Channel Port Type (Conditional)	Set to TRFC if the driver will instantiate a JCO Server to receive data distribution broadcasts from the SAP ALE system. Set to FILE if the driver will consume text file IDocs distributed by the SAP ALE system. This is only used if the Publisher channel is enabled.
Publisher IDoc File Directory (Conditional)	The file system location where the SAP User IDoc files are placed by the SAP ALE system (FILE port configuration) or by the driver (TRFC configuration.) This setting is only used if the Publisher channel is enabled.
SAP Gateway ID (Conditional)	If the Publisher channel port type is TRFC, this parameter specifies the gateway that distributes User data to the driver. This setting is only used if the Publisher channel port type is TRFC. The default form of this parameter is sapgw<SAP System Number>. The default value is sapgw00.
TRFC Program ID (Conditional)	If the Publisher channel port type is TRFC, this parameter identifies the JCO server program in the driver for the SAP gateway. This setting is only used if the Publisher channel port type is TRFC. The program ID is a case-sensitive text identifier.
Install Driver as Remote/Local	Configure the driver for use with the Remote Loader service by selecting the Remote option, or select Local to configure the driver for local use. If Local is selected, you can skip the remaining parameters.
Remote Host Name and Port (Conditional)	Specify the host name or IP address and port number for where the Remote Loader service has been installed and is running for this driver. The default port is 8090. This setting is only used if you are using the Remote Loader to run the driver.
Driver Password (Conditional)	The driver object password is used by the Remote Loader to authenticate itself to the Identity Manager server. It must be the same password that is specified as the driver object password on the Remote Loader. This setting is only used if you are using the Remote Loader to run the driver.

Parameter Name	Parameter Description
Remote Password (Conditional)	The Remote Loader password is used to control access to the Remote Loader instance. It must be the same password that is specified as the Remote Loader password on the Identity Manager Remote Loader. This setting is only used if you are using the Remote Loader to run the driver.

The following additional driver parameters are set to default values during the import process, but they can be modified in iManager (by clicking the Driver Configuration tab on the driver object.)

Parameter name	Parameter Description
Character Set Encoding	The code for the character set to translate IDoc byte-string data into Unicode* strings. An empty value causes the driver to use the host JVM* default.
Publish all Communication Table Values	Set this to *Publish Primary* if only the primary value of Communicate tables should be synchronized. or Set this to *Publish All* if all values should be synchronized.
Publish Company Address Data	By default, an SAP User record does not include Company Address information. That data is kept in a related table. Use this parameter to specify if you want the driver to retrieve the data from the appropriate company record. Regardless of the option you specify, Company Address information cannot be updated in SAP. Set this to *Include Company Address* to populate User Company Address information for the Publisher and Subscriber channel queries. or Set this to *Ignore Company Address* if you do not want this functionality.
Communication Table Comments	The communication table comment is a text comment the driver adds to all Communication table entries added by the Subscriber channel. This is a useful method for determining where an entry originated from when viewing values via the SAP GUI. Leaving this field blank provides no comment to the table entries.
Require User to Change Set Passwords	This parameter specifies the methodology used by the driver to set User account passwords. Passwords can be set by the driver's administrative User account or by the affected User's account (this sets a password on new accounts or modifies passwords for existing Users.) Select *Change Required* if passwords must be changed immediately at the user's next login. or Select *No Change Required* if you do not want user's to change passwords immediately at login.

Parameter name	Parameter Description
(Conditional) Password Set Method	If you select the *No Change Required* option above, you should specify a Password Set Method: *Administrator Set* or *User Set*. **Administrator Set:** Passwords are set by the driver's administrative User account. This method is depricated and does not comply with SAP security best practices. The method works only for SAP systems that are version 4.6c or older. **User Set:** Passwords are supplied by the affected users. The following parameters must be set if you select User Set: ◆ **Default Reset Password:** This parameter specifies a default password reset value. It is set during password changes if the User-supplied password is not accepted by the SAP server. There is an 8-character size limit for this value. (SAP 7.0 does not require an 8-character size limit on passwords.) ◆ **Force Passwords to Uppercase:** This option defines if passwords are forced to uppercase. Uppercase is the default value, however, SAP 7.0 allows for mixed-case passwords.
Poll Interval (seconds)	Specifies how often the Publisher channel polls for unprocessed IDocs. The default value is 10 seconds.
Future-dated Event Handling Option	The behavior of this option is based on the values of the User record's Logon Data "Valid From" date (LOGONDATA:GLTGV) when IDocs are processed by the Publisher channel. This field does not need to be in the Publisher filter for this processing to occur. There are four possible values for this parameter: 0 - Indicates that all attributes are processed by the driver when the IDoc is available. No future-dated processing is performed. 1 - Indicates that only attributes that have a current or past time stamp are processed by the driver when the IDoc is available. Future-dated infotype attributes are cached in a `.futr` file to be processed at a future date. 2 - Indicates that the driver blends options 1 and 2. All attributes are processed, with a time stamp, at the time the IDoc is available. All future-dated infotype attributes are cached in a `.futr` file to be processed at a future date. 3 - Indicates that the driver processes all events at the time the IDoc is made available. All future-dated infotype attributes are cached in a `.futr` file to be processed again on the next calendar day. This continues until the attributes are sent for a final time on the future date.
Generate TRFC Trace Files	If a TRFC port is configured for use by the Publisher channel, this option allows the driver to turn on the SAP JCO tracing capability. Enter Disable if you do not desire this functionality, or enter Enable to activate it. Trace files are generated in either the Identity Manager or Remote Loader root directory and are identified by a `.trc` extension. The default value is Disabled.

2.4.4 Extending the Schema

If you want to use the default configuration, you need to extend the eDirectory schema. This provides greater abilities to administrate the User Management functions of SAP R/3 and Enterprise

R/3 systems. We recommend applying a set of schema extensions to the eDirectory tree that will synchronize with the SAP system.

During SAP's development of their own LDAP-based User Administration utilities, a standard set of schema extensions was developed for use with Novell eDirectory. These extensions are contained in the `R3-Novell-Ldif-Schema-extension.ldif` file. This file is designed to be applied to eDirectory by using the Novell Import Conversion Export (ICE) utility.

In addition to the `ldif-format` schema extension file, the schema extensions are also available in the sapuser.sch file (the eDirectory standard).

NOTE: Starting with version 1.0.5 of the driver, the sapUsername attribute is no longer a required attribute of the sapAddOnUM auxiliary class in the `sapuser.sch` file. Because the `R3-Novell-Ldif-Schema-extension.ldif` file was created by SAP, this attribute remains a required attribute in that file. It is recommended that `sapuser.sch` should be used for all new deployments requiring schema extension.

IMPORTANT: If you are upgrading an existing driver deployment, the `sapuserupgrade.sch` or `sapuserupgrade.ldif` files contain only the updated schema for new functionality provided with driver version 1.0.5 and later.

If you want to extend the schema using the LDIF file, the following instructions help you use the ICE utility. For additional information, refer to the Import Conversion Export utility documentation (http://www.novell.com/documentation).

1. Open the NDS Import/Export Wizard.
2. Select *Import LDIF File*, then click *Next*.
3. Browse to `R3-Novell-Ldif-Schema-extension.ldif`, then click *Next*.
4. Fill in the appropriate LDAP connection information for the Novell LDAP service, then click *Next*.
5. Click *Finish* to begin the extension process.

Upgrading the Driver

3

If you have been using a previous version of the driver, follow these instructions instead of the ones in Chapter 2, “Installing the Driver,” on page 17.

Identity Manager 3.5 contains a new architecture for how policies reference one another. To take advantage of this new architecture, the driver configuration file provided for SAP must be upgraded. For more information on the new architecture, see “Upgrading Identity Manager Policies” in the *Understanding Policies for Identity Manager 3.5.1*. You can upgrade the driver in Designer or iManager.

If you are upgrading from Identity Manager 3.5.0 to Identity Manager 3.5.1, the following information does not apply.

- Section 3.1, “Upgrading the Driver in Designer,” on page 25
- Section 3.2, “Upgrading the Driver in iManager,” on page 28

3.1 Upgrading the Driver in Designer

1. Make sure you have updated your driver with all the patches for the version you are currently running.

   We recommend this step for all drivers, to help minimize upgrade issues.

2. Back up the driver. See Chapter 13, “Backing Up the Driver,” on page 105 for instruction on how to back up the driver.

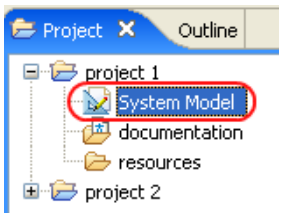
3. Install Designer version 2.0 or above, then launch Designer.

   If you had a project open in Designer when you upgraded Designer, proceed to Step 4. If you didn’t have a project open in Designer when you upgraded Designer, skip to Step 5.

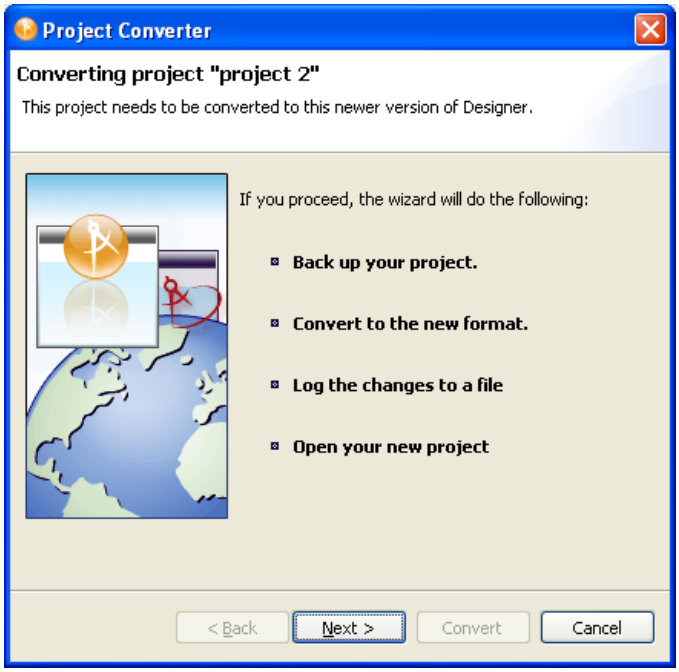
4. If you had a project open when upgrading Designer, the following warning message is displayed. Read the warning message, then click *OK*.

   Designer closes the project to preform the upgrade.

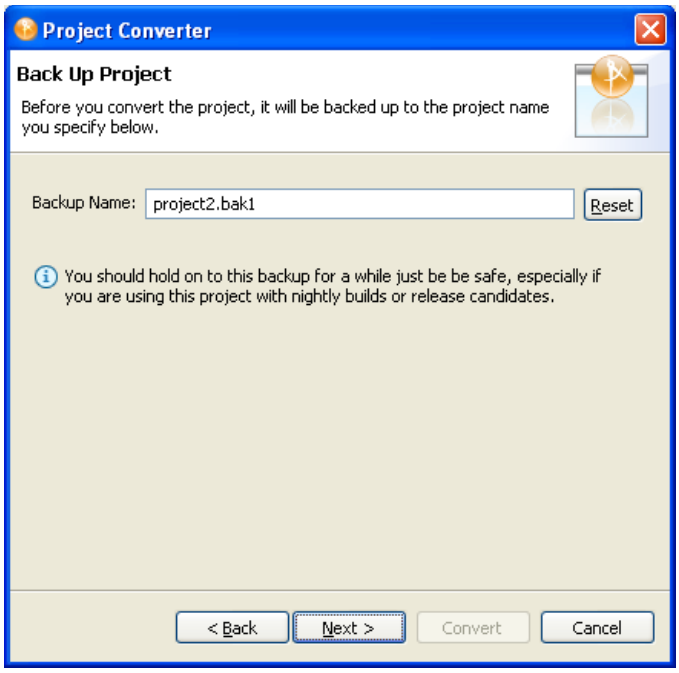
5. In the Project view, double-click *System Model* to open and convert the project.



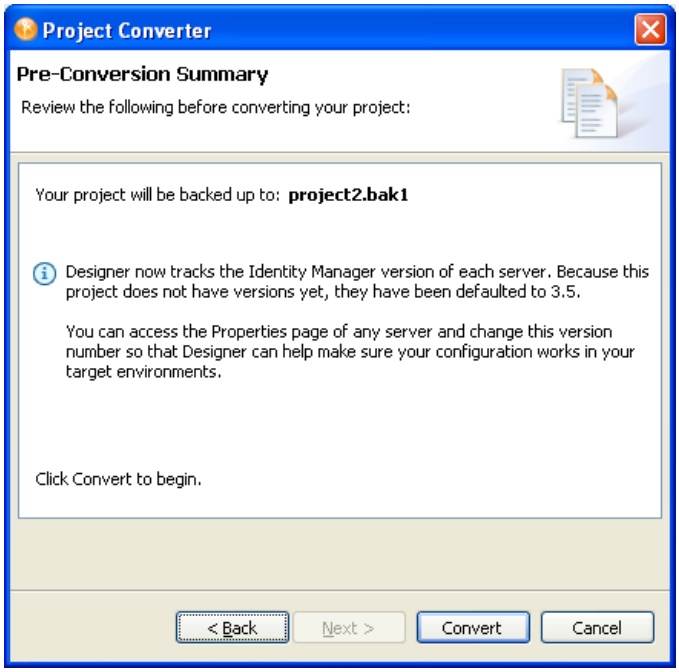
6 Read the Project Converter message explaining that the project is backed up, converted to the new format, changes logged to a file, and the new project is opened, then click *Next*.



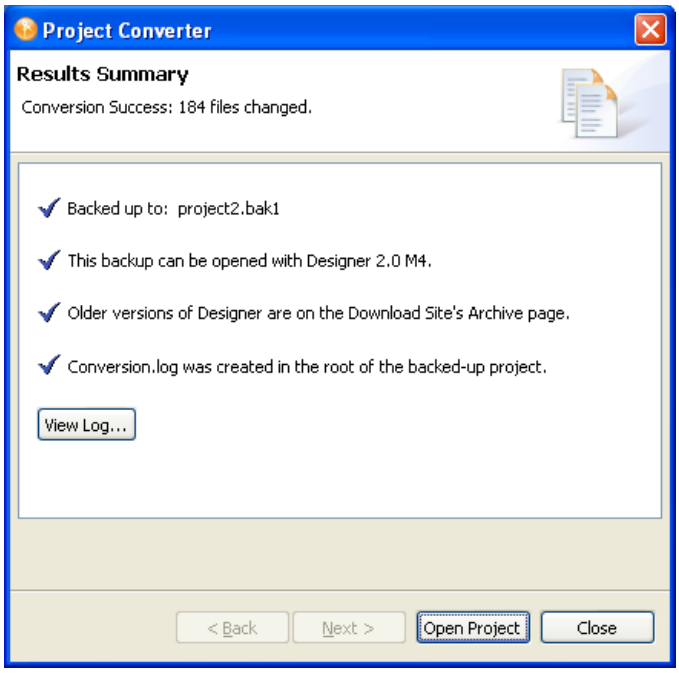
7 Specify the name of the backup project name, then click *Next*.



8 Read the project conversion summary, then click *Convert*.



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

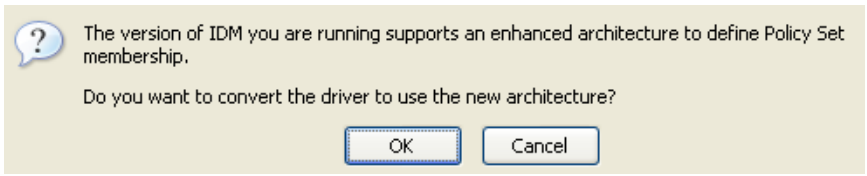


If you want to view the log file that is generated, click *View Log*.

3.2 Upgrading the Driver in iManager

1. Make sure you have updated your driver with all the patches for the version you are currently running.

   We recommend this step for all drivers, to help minimize upgrade issues.
2. Back up the driver. See Chapter 13, "Backing Up the Driver," on page 105 for instruction on how to back up the driver.
3. Verify that Identity Manager 3.5.1 has be installed and you have the current plug-ins installed, then launch iManager.
4. Click *Identity Manager* > *Identity Manager Overview*.
5. Click *Search* to find the Driver Set object, then click the driver you want to upgrade.
6. Read the message that is displayed, then click *OK*.



7. If there is more than one driver to upgrade, repeat Step 2 through Step 6.

Activating the Driver

4

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

To activate the driver, see "Activating Novell Identity Manager Products" in the *Identity Manager 3.5.1 Installation Guide*.

Understanding ALE Technologies

5

This section explains how Application Link Enabling (ALE) technology enables communication between Identity Manager and SAP systems.

5.1 Application Link Enabling Technology

Application Link Enabling (ALE) technology enables communication between SAP and external systems such as Novell® eDirectory™. ALE is comprised of various components. If you want to distribute User modification data automatically from the SAP system to eDirectory, you must configure the ALE and CUA systems. If your integration requires only reading and writing data to the SAP system, this configuration is not necessary.

When configuring the SAP system to enable the driver, you should consider the following ALE components and their relationship to the driver:

- “Clients and Logical Systems” on page 31
- “Message Type” on page 31
- “IDoc Type” on page 32
- “Distribution Model” on page 32
- “Partner Profiles” on page 32
- “Port” on page 32
- “Port Definition” on page 32
- “File Port” on page 32
- “CUA” on page 33

Refer to “Configuring the SAP System” on page 35 for instructions on how to configure these SAP system parameters.

5.1.1 Clients and Logical Systems

In the SAP configuration for the driver, a logical system is a representation of either a SAP system or an external system. The logical system is used to distribute data to and from SAP. To use ALE, every SAP system needs to have a base logical system associated with a client. There is a one-to-one relationship between the client and the logical system.

The driver uses an outbound ALE interface. In an outbound ALE interface, the base logical system becomes the *sender* for outbound messages and the *receiver* of inbound messages. A SAP user is likely logged into the base logical system/client when making changes to the database (for example, modifying User profiles or logon preferences). A logical system/client must also be defined for the receiving client. This logical system acts as the receiver of outbound messages.

5.1.2 Message Type

A message type represents the type of data that is exchanged between the two systems. For this driver, the USERCLONE message type is used. A message type characterizes data being sent across

the systems and relates to the structure of the data, also known as an IDoc type (for example, USERCLONE03).

5.1.3 IDoc Type

Intermediate Document (IDoc) Type represents the structure of the data associated with a message type. ALE technology uses IDocs to exchange data between logical systems. An IDoc is an object with the data of a specific message type in it. IDocs consist of three record types:

- The control record
- The data record
- The status record

The control record contains information about the IDoc, such as what IDoc type it is, the message type, the sending and receiving systems, or the direction.

The data record contains the application data. Data records consist of several fields that describe the content of the specific object.

The status record contains data on the state of the processing of the IDoc.

5.1.4 Distribution Model

The distribution model is a tool that stores information about the flow of message types between systems. A distribution model must be configured when setting up the driver. After the two logical systems have been defined and you have a general understanding of message types and IDocs, you can configure your distribution model.

The distribution model determines what message types can be sent from a logical system to another logical system.

5.1.5 Partner Profiles

Partner profiles specify the components used in an outbound process. Some of these components include the IDoc type, message type, IDoc size, mode, and the person to be notified in case of errors.

5.1.6 Port

A port is the communication link between the two logical systems.

5.1.7 Port Definition

A port definition is used in an outbound process to define how documents are transferred to the destination system.

5.1.8 File Port

A file port can be used in the integration solution. IDocs are transferred to a file in a specified file system location accessible by the SAP host system.

5.1.9 TRFC Port

A Transactional Remote Function Call (TRFC) can be used in the integration solution. IDocs are transferred to a specified application process (such as the driver) via the SAP Gateway.

5.1.10 CUA

Central User Administration (CUA) is a process provided by SAP to distribute and manage User object data between a Central SAP logical system and one or more Client logical systems. The client logical systems might be SAP or external systems. The base technology used for the CUA is ALE.

Configuring the SAP System

6

You must configure the SAP system parameters to enable Application Link Enabling (ALE) and Central User Administration (CUA) processing of USERCLONE IDocs if you want to publish real-time changes of SAP User data to the Identity Vault. Novell® follows SAP's general guidelines for configuring BAPI (Business Application and Programming Interface) and ALE technologies for this integration solution.

NOTE: You must ensure that the SAP system administrator has sufficient rights to configure the distribution model and distribute user data via ALE.

6.1 Configuring the SAP System

As part of configuring the SAP system, you should complete the following steps in this order:

1. "Defining Sending and Receiving Systems" on page 35
2. "Creating a Logical System" on page 36
3. "Assigning a Client to the Logical System" on page 36
4. "Creating a Distribution Model" on page 36
5. "Creating a Port Definition" on page 37
6. "Partner Profiles" on page 39
7. "Modify Port Definition" on page 39
8. "Activating Central User Administration" on page 40
9. "Create a Communication (CPIC) User" on page 40

NOTE: The following instructions are for SAP version 4.6C. If you are using a previous version of SAP, the configuration process is the same; however, the SAP interface will be different.

6.1.1 Defining Sending and Receiving Systems

The sending and receiving systems must be defined for messaging. In order to distribute data between systems you must first define both the sending and receiving systems as unique logical systems.

For this particular solution, we recommend defining two logical systems. One logical system represents the driver and acts as the *receiver* system. The other logical system represents the SAP system and acts as the *sender* system. Because only one of these clients is used as a data source (that is, the client/logical system where SAP User data is stored and "actions" occur), there is no need to assign a client to the receiving logical system.

NOTE: Depending on your current SAP environment, you might not need to create a logical system. You might only need to modify an existing Distribution Model by adding the USERCLONE message type to a previously configured Model View. For more information, see "Creating a Distribution Model" on page 36.

It is important, however, that you follow SAP's recommendations for logical systems and configuring your ALE network. The following instructions assume that you are creating new logical systems and a new model view.

Creating a Logical System

1. In SAP, type transaction code `BD54`.
2. Click *New Entries*.
3. Type an easily identifiable name to represent the SAP *sender* system. SAP recommends the following format for logical systems representing R/3 clients: *systemID*CLNT*client number* (such as ADMCLNT100).
4. Type a description for the logical system (such as Central System for SAP User Distribution).
5. Add a second logical system name to represent the Identity Manager external *receiver* system (such as DRVCLNT100).
6. Type a description for the logical system (such as IDM User Management Integration).
7. Save your entries.

Assigning a Client to the Logical System

1. In SAP, type transaction code `SCC4`.
2. Click *Table View* > *Display* > Change to switch from display to change mode.
3. Select the client from which you want User information distributed (such as 100).
4. Click *Goto* > *Details* > *Client Details*.
5. In the Logical System field, browse to the *sender* logical system you want to assign to this client (such as ADMCLNT100).
6. Save your entry.

6.1.2 Creating a Distribution Model

The distribution model contains essential information about message flow. The model view defines the systems that will communicate with each other and the messages that will flow between them. The distribution model forms the basis of distribution and controls it directly.

To create a distribution model:

1. Verify that you are logged on to the sending system/client.
2. In SAP, type transaction code `BD64`. Ensure that you are in Change mode (click *Table View* > *Display* > *Change*.)
3. Click *Edit* > *Model View* > *Create*.
4. Type the short text to describe the distribution model (such as Client 100 Distribution to IDM).
5. Type the technical name for the model (such as SAP2IDM).
6. Accept the default Start and End dates or specify valid values. Click the check mark icon to save your entry.
7. Select the view you created, then click *Add BAPI*.

8 In the Sender/Client field, type the name of the *sender* logical system (such as ADMCLNT100).

9 In the Receiver/Client field, add the name of the *receiver* logical system (such as DRVCLNT100).

10 In the *Obj. Name/Interface* field, add the USER object name.

NOTE: Ensure that you add the USER object name with all capital letters.

11 In the *Method* field, add Clone.

12 Click the check mark icon to save the BAPI.

13 Select the SAP2IDM model view.

14 Click *Add BAPI*.

15 Define the sender (logical system ADMCLNT100).

16 Define the receiver (logical system DRVCLNT100).

17 In the *Obj. Name/Interface* field, add the UserCompany object name.

18 In the *Method* field, add Clone.

19 Click the check mark icon to save your BAPI entries.

20 Save the Distribution Model entries.

6.1.3 Creating a Port Definition

The port is the communication channel to which IDocs are sent. The port describes the technical link between the sending and receiving systems.

- "TRFC Port Definition" on page 37
- "File Port Definition" on page 38

TRFC Port Definition

The driver can be configured to support a connection via a TRFC port or to consume IDocs distributed via a File port. The default driver configuration assumes that you use the TRFC port configuration.

Create RFC Destination

NOTE: If you are distributing data to multiple drivers, each driver must have a unique RFC destination and program ID.

1 In SAP, type transaction code `SM59`.

2 Click the *Create* icon.

3 Name the RFC destinations (use the driver's logical system name, for example, DRVCLNT100.)

4 Select *T* as the connection type (for a TCP/IP connection.)

5 Add a description for the destination (such as JCO Server in IDM User Driver.)

6 Save your entry.

7 Select the option for *Registration* or *Registered Server Program*. Type the program ID to be used for the driver. In the default driver configuration, this value is set to *IDMUser100*.

8 (Conditional) If the SAP server is configured to use a Unicode database, complete the following steps:

8a Select the *Special Options* tab.

8b Select *Unicode*.

9 Save your entry.

TRFC Port Definition

NOTE: If you are distributing data to multiple drivers, each driver must have a unique TRFC port.

1 In SAP, type transaction code *WE21*.

2 Select *Transactional RFC*, then click the *Create* icon.

3 Select *Own Port Option Name*.

3a Type a port name (such as IDMPORT).

3b Type a description for the port definition (such as Port to IDM User Driver).

3c Select a version (such as IDoc record types SAP release 4.X)

3d Specify the RFC destination. This is the name of the RFC destination representing the driver (such as DRVCLNT100.)

4 Save your entries.

File Port Definition

NOTE: If you are distributing data to multiple drivers, each driver must have a unique file port.

1 In SAP, type transaction code `WE21`.

2 Select *File*, then click the *Create* icon.

2a Type a port name (such as IDMFILE).

2b Type a port description (such as File Port to IDM User Driver).

2c Select a version (such as SAP release 4.X).

3 Define the outbound file:

3a Select the physical directory. This is the directory where you want IDocs placed. You might need to create this directory.

Type the directory where the outbound files are written, for example: `\\sapdev\nov\sys\global\sapndsconnector`.

3b Type the function module. This names the IDoc file in a specific format. Use the following: `EDI_PATH_CREATE_CLIENT_DOCNUM`.

4 Save your changes.

NOTE: You do not need to configure the other three tabs for the port properties (outbound:trigger, inbound file, and status file).

6.1.4 Partner Profiles

The system automatically generates a partner profile or you can manually maintain the profile.

NOTE: If you are using an existing distribution model and partner profile, you do not need to automatically generate a partner profile. Instead, you can modify it to include the USERCLONE BAPI.

---

1. In SAP, type transaction code `BD82`.
2. Select the *Model View*. This should be the Model View previously created in "Creating a Distribution Model" on page 36.
3. Ensure that the *Transfer IDoc Immediately* and *Trigger Immediately* option buttons are selected.
4. Click the *Execute* icon.

   NOTE: When the status screen appears, ignore any red error or warning messages related to the driver's logical system.

Modify Port Definition

The port definition might have been generated incorrectly. For your system to work properly, you might need to modify the port definition.

1. In SAP, type transaction code `WE20`.
2. Select *Partner Type LS*.
3. Select your *receiver* logical system (such as DRVCLNT100).
4. Click the *Create Outbound Parameter* icon, then select message type *USERCLONE*.
5. Modify the receiver port so it is the *file* or *TRFC port name* you created earlier (such as IDMPORT or IDMFILE).
6. Under *Output Mode*, select *Transfer IDoc Immediately* to send IDocs immediately after they are created.
7. In the IDoc Type section, select the *Basic type* and the appropriate *USERCLONE*:
   - For SAP 4.5, select USERCLONE01
   - For SAP 4.6a, select USERCLONE02
   - For SAP 4.6c, select USERCLONE03
   - For SAP 6.10, select USERCLONE04
   - For SAP 6.20 or greater, select USERCLONE05
8. Save your entries.

   NOTE: The following procedures are only necessary if you want to distribute company address data.

   ---

9. Click the *Create Outbound Parameter* icon, then select message type *CCLONE*.
10. Modify the receiver port so it is the *file* or *TRFC port name* you created earlier (such as IDMPORT or IDMFILE.)
11. (Conditional) If you are using a TRFC port, modify the packet size. Select Packet Size = 1.

12 Under *Output Mode*, select *Transfer IDoc Immediately* to send IDocs immediately after they are created.

13 In the *IDoc type* section, select *Basic type* and the appropriate *CCLONE*. (For all SAP versions, select *CCLONE01*.)

14 Save your entries.

6.1.5 Activating Central User Administration

Central User Administration (CUA) is the process that activates the distribution model.

1 In SAP, type transaction code `SCUA`.

2 In the *Maintain System Landscape* dialog box, select the distribution *Model View* previously created (such as SAP2IDM).

3 Save your entry.

You might see a message stating "Unable to distribute the system landscape to system IDMDRV." This is an informative message and is not an error or issue of concern.

On some versions of SAP, all systems in the distribution, including the IDM driver, must be accessible during this step. If a TRFC port is being used for the driver Publisher channel, the driver should be running to ensure connectivity and completion of the CUA configuration.

6.1.6 Create a Communication (CPIC) User

Users are client-independent. For each client that will be using the driver, a system user with CPIC access must be created.

1 In SAP, type transaction code `SU01`.

2 From *User Maintenance*, enter a username in the *User* dialog box (such as IDM_CPIC), then click the *Create* icon.

3 Click the *Address tab*, then type data in the last name fields (Last_IDM).

4 Click the *Logon Data tab*, then define the *initial password* and set the user type to *CPIC* (Communication).

5 Click the *Profiles* tab, then add the *S_A.CPIC profile*. The driver must also have sufficient rights to perform required operations, which might include *SAP_ALL* and *SAP_NEW* depending on your company's system security policy.

NOTE: We recommend using the most restrictive rights possible.

6 Click the *Systems* tab. Add the *logical name* of the *sender* system (such as ADMCLNT100). This enables the CPIC user to authenticate to the client system.

7 Click *Save*.

NOTE: Initially, you can create a dialog user to test your SAP system configuration. If there are processing problems, you can analyze the dialog user in the debugger. You should also log into the SAP system once to set this user's password. After the system is tested and works properly, you should switch to a CPIC user for security measures.

Using the SAP Java Connector Test Utility

7

The driver uses the SAP Java Connector (JCO) and Business Application Programming Interface (BAPI) technologies to connect to and integrate data with the Identity Vault. The SAP JCO is a SAP client that creates service connections to a SAP R/3 system. After the driver is connected to the R/3 system, it calls methods on business objects within the R/3 system via BAPI.

The SAP Java Connector Test utility enables you to check for JCO installation and configuration issues prior to configuring the driver. Use the JCO Test utility to validate installation and connectivity to the SAP JCO client, as well as testing for accessibility to the BAPIs used by the driver.

Ensure that you are using JDK/JRE version 1.3.1 or later.

The following instructions apply to JCO versions 1.1.*x* and 2.*x*.

In this section:

- "About the Utility" on page 41
- "Running and Evaluating the Test" on page 42
- "Understanding Test Error Messages" on page 44

7.1 About the Utility

The JCO Test utility completes the following checks:

- Ensures that the `jco.jar` or `sapjco.jar` file, which contains the exported JCO interface, is present.
- Ensures that the JCO native support libraries are properly installed.
- Ensures that connection parameters to the SAP target system are correct.
- Ensures that the authentication parameters to the SAP target system are correct.
- Ensures that the selected language code is valid.
- Ensures that the BAPIs used by the driver are present as expected for the version of the SAP target system.

7.1.1 Utility Prerequisites

Before you run the JCO Test utility, you must install the SAP JCO client for the desired platform. The JCO can only be obtained from the SAP Service Marketplace Web site (http://www.sap-ag.de/services). The download is free to any SAP software customer or development partner, but you are required to log in.

In order to configure the driver, you must first download the SAP JCO and install it. For installation instructions, refer to the documentation accompanying the SAP JCO.

Follow the installation instructions for your platform. Each installation requires you to set one or two environment variables, such as CLASSPATH for the `sapjco.jar` file location. For the UNIX* platforms, set either the LD_LIBRARY_PATH or LIBPATH variables for the location of native support libraries. Ensure that these variables are set in the shell environment to run this test and for the subsequent use of the Identity Manager Driver for User Management of SAP Software.

You must also make sure that you have your PATH environment variable set to include the path to your Java executable file. For Win32 platforms, the environment variables are set via the System configuration in the Control Panel. On UNIX systems, edit the appropriate .profile or .bash_profile to include and export these path variables.

7.1.2 Components

The JCO Test utility consists of the `UserJCOTest.class` file. The format of an execution batch or script file varies, depending on the platform on which the JCO client has been installed.

The basic content of the file includes a path to the Java executable (or just java if your PATH is appropriately configured), and the name of the `UserJCOTest.class` file. A sample UNIX script file and Win32 batch file are listed below, where `sapjco.jar` is in the executable directory of the `UserJCOTest.class` file and the batch file:

```
Win32 jcotest.bat file
java -classpath %CLASSPATH%;. UserJCOTest

Unix jcotest file
java UserJCOTest
```

You must use proper slash notation when specifying pathnames, and you must use the proper classpath delimiter for the platform. You must also remember that the name of the `sapjco.jar` file is case-sensitive on UNIX platforms and that the name of the test class, UserJCOTest, must be specified with proper case for any platform.

7.1.3 Running and Evaluating the Test

Running the Test

To run the JCO Test utility on a Win32 platform:

1. From Windows Explorer, double-click `UserJCOTest.bat`.
   or
   From a command prompt, run the `UserJCOTest.bat` script.

To run the JCO Test utility on a UNIX platform:

1. From your preferred shell, run the `userjcotest` script file.

NOTE: It is possible that when you run the test program, an error message appears before any test output is displayed. This indicates an improper installation of the JCO client components. The error messages are documented for each platform in “Understanding Test Error Messages” on page 44.

Evaluating the Test

If the JCO client is installed properly, the following output is displayed:

```
**The SAP JCO client installation has been verified to be correct.

Version of the JCO-library: version information
Input SAP Server Connection Information
---------------------------------------
```

You then receive a series of prompts for connection and authentication information. All data must be provided unless a default value, identified by [] delimiters, is provided. Failure to fill in a response value to each prompt ends the test. Enter the following when prompted:

- Application server name or IP address
- System number [00]
- Client number
- User
- User password
- Language code [EN]

The values you provide are the same values that could be used to authenticate via the SAPGUI client. Based on the validity of the input, the test either displays error messages with solution suggestions or runs to completion. At the end of the test, a status message displays. If the test indicates full functionality as required by the driver, the following status message appears (it describes valid values that can be used as the configuration parameters for the driver):

```
**All expected platform support is verified correct.
JCO Test Summary
----------------
Full JCO/BAPI Functionality has been verified.
The following parameters may be used for driver configuration

Authentication ID: Username
Authentication Context: SAP Host Name/IP Address
Application Password: User password
SAP System Number: System Number
SAP User Client Number: Client Number
SAP User Language: Language Code
```

If the test indicates that the functionality required by the driver is not available, the following status message is displayed:

```
**There are <number> required BAPI functions NOT supported on this
platform.

JCO Test Summary
----------------
JCO/BAPI functionality issues have been detected that will prevent
proper driver functionality.
```

Post-Test Procedures

After the JCO Test utility has successfully passed all tests, you can then begin to configure the driver. Make sure that the `sapjco.jar` file is copied to the location where the `sapusershim.jar` file has been installed.

On UNIX systems, ensure that the environment variables used for the successful completion of the User JCO Test are also in the environment of the driver. If these conditions are met, there should be no driver errors that are related to the JCO.

7.1.4 Understanding Test Error Messages

Use the information in this section to analyze error messages that might display during the User JCO Test. Some errors are applicable to all platforms, and other errors are platform-specific.

The test has been run on the platforms listed below. Other UNIX platforms supported by the JCO are configured in a similar manner and errors generated by improper JCO installation and configuration should be similar to the errors described below. Because of periodic modifications of the JCO, messages might not be exactly as shown.

- "General Errors" on page 44
- "Errors on Win32 Systems" on page 45
- "Errors on IBM-AIX Systems" on page 45
- "Errors on Solaris Systems" on page 46
- "Errors on HP-UX Systems" on page 46

General Errors

Error Message	Problem
Error connecting to SAP host: com.sap.mw.jco.JCO$Exception: (102) RFC_ERROR_COMMUNICATION: Connect to SAP gateway failed .... Check values of Application Server Name/IP Address and System Number	This indicates that one or both of the values entered for the Application Server Name or IP Address and System Number are incorrect. Verify that these values are consistent with the information found in the Properties page of the SAP Logon dialog box used to connect to the SAP R/3 system.
Error authenticating to SAP host: com.sap.mw.jco.JCO$Exception: (103) RFC_ERROR_LOGON_FAILURE: You are not authorized to logon to the target system (error code 1).	The authentication credentials are not valid. Verify that the values for Client Number, User, and User Password are correct.
Error connecting to SAP host: com.sap.mw.jco.JCO$Exception: (101) RFC_ERROR_PROGRAM: Language '<value>' not availableCheck value of Language Code	The language code selected is not valid or is not installed on the SAP R/3 system.

Errors on Win32 Systems

Error Message	Problem
'userjcotest' is not recognized as an internal or external command, operable program, or batch file.	The `userjcotest.bat` batch file is not present.
Exception in thread “main” java.lang.NoClassDefFoundError: com/sap/mw/jco/JCO$AbapExceptionor Exception in thread “main” java.lang.NoClassDefFoundError: com/sap/mw/jco/JCO$Exception	The `sapjco.jar` file is not in the location specified in the `userjcotest.bat` batch file.
Exception while initializing JCO client.java.lang. UnsatisfiedLinkError: no jRFC12 in java.library.path. Verify proper installation of JCO Native support libraries packaged with JCO client.	The `jRFC12.dll` file that shipped with the JCO client is not installed or is installed in an incorrect location. The default location for `jRFC12.dll` and `libRfc32.dll` is `/winnt/system32`.
Exception while initializing JCO client.java.lang. UnsatisfiedLinkError: C:\WINNT\system32\jrfc12.dll: Can’t find dependent libraries. Verify proper installation of JCO Native support libraries packaged with JCO client.	The `librfc32.dll` file shipped with the JCO client is not installed or is installed in an incorrect location. The default location for `jRFC12.dll` and `libRfc32.dll` is `/winnt/system32`.

Errors on IBM-AIX Systems

Error Message	Problem
ksh: userjcotest: not found.	The `userjcotest` script file is not present in the directory.
Exception in thread “main” java.lang.NoClassDefFoundError: com/sap/mw/jco/JCO$AbapExceptionorException in thread “main” java.lang.NoClassDefFoundError: com/sap/mw/jco/JCO$Exception	The `sapjco.jar` file is not in the location specified in the jcotest script file or the case specified for `sapjco.jar` does not match the actual filename.
Exception while initializing JCO client.java.lang.UnsatisfiedLinkError: no jRFC12 (libjRFC12.a or .so) in java.library.pathVerify proper installation of JCO Native support libraries packaged with JCO client.	The `libjRFC12.so` file that shipped with the JCO client is not installed or is installed in an incorrect location. You must configure a LIBPATH environment variable to specify the location in which the file resides.
Exception while initializing JCO client.java.lang.UnsatisfiedLinkError: <path>/libjRFC12.so: A file or directory in the path name does not exist. Verify proper installation of JCO Native support libraries packaged with JCO client.	The `librfccm.so` file shipped with the JCO client is not installed or is installed in an incorrect location. You must copy the file to the same location as `libjRFC12.so` or configure the LIBPATH environment variable to specify the location in which the file resides.

Errors on Solaris Systems

Error Message	Problem
ksh: userjcotest: not found.orbash: userjcotest: command not found	The `userjcotest` script file is not present in the directory.
Exception in thread “main” java.lang.NoClassDefFoundError: com/sap/mw/jco/JCO$AbapExceptionorException in thread “main” java.lang.NoClassDefFoundError: com/sap/mw/jco/JCO$Exception	The `sapjco.jar` file is not in the location specified in the `jcotest` script file or the case specified for `sapjco.jar` does not match the actual filename.
Exception while initializing JCO client.java.lang.UnsatisfiedLinkError: no jRFC12 in java.library.pathVerify proper installation of JCO Native support libraries packaged with JCO client.	The `libjRFC12.so` shipped with the JCO client is not installed or is installed in an incorrect location. You must configure a LD_LIBRARY_PATH environment variable to specify the location in which the file resides.
Exception while initializing JCO client.java.lang.UnsatisfiedLinkError: <path>/libjRFC12.so: ld.so.1: <search-path>: fatal: librfccm.so: open failed: No such file or directoryVerify proper installation of JCO Native support libraries packaged with JCO client.	The `librfccm.so` file shipped with the JCO client is not installed or installed in incorrect location. You must copy the file to the same location as `libjRFC12.so` or configure the LD_LIBRARY_PATH environment variable to specify the location in which the file resides.

Errors on HP-UX Systems

Error Message	Problem
ksh: userjcotest: not found.orbash: userjcotest: command not found	The `userjcotest` script file is not present in the directory.
Exception in thread “main” java.lang.NoClassDefFoundError: com/sap/mw/jco/JCO$AbapExceptionorException in thread “main” java.lang.NoClassDefFoundError: com/sap/mw/jco/JCO$Exception	The `sapjco.jar` file is not in the location specified in the `jcotest` script file or the case specified for `sapjco.jar` does not match the actual filename.
Exception while initializing JCO client.java.lang.ExceptionInInitializerError: JCO.classInitialize(): Could not load middleware layer ’com.sap.mw.jco.rfc.MiddlewareRFCno sapjcorfc in java.library.pathVerify proper installation of JCO Native support libraries packaged with JCO client.	The `libjRFC12.sl` file shipped with the JCO client is not installed or is installed in an incorrect location. You must configure a SHLIB_PATH environment variable to specify the location in which the file resides.
Exception while initializing JCO client.java.lang.ExceptionInInitializerError: JCO.classInitialize(): Could not load middleware layer ’com.sap.mw.jco.rfc.MiddlewareRFC . . .Verify proper installation of JCO Native support libraries packaged with JCO client.	The `librfccm.sl` file shipped with the JCO client is not installed or is installed in an incorrect location. You must copy the file to the same location as `libjRFC12.sl` or configure the SHLIB_PATH environment variable to specify the location in which the file resides.

Errors on Linux Systems

Error Message	Problem
ksh: userjcotest: not found.orbash: jcotest: command not found	The `userjcotest` script file is not present in the directory.
Exception in thread “main” java.lang.NoClassDefFoundError: com/sap/mw/jco/JCO$AbapExceptionorException in thread “main” java.lang.NoClassDefFoundError: com/sap/mw/jco/JCO$Exception	The `sapjco.jar` file is not in the location specified in the `jcotest` script file or the case specified for `sapjco.jar` does not match the actual filename.
Exception while initializing JCO client.java.lang.ExceptionInInitializerError: JCO.classInitialize(): Could not load middleware layer ’com.sap.mw.jco.rfc.MiddlewareRFCno jRFC12 in java.library.pathVerify proper installation of JCO Native support libraries packaged with JCO client.	The `libjRFC12.so` file shipped with the JCO client is not installed or is installed in an incorrect location. You must configure a LD_LIBRARY_PATH environment variable to specify the location in which the file resides
Exception while initializing JCO client.java.lang.ExceptionInInitializerError: JCO.classInitialize(): Could not load middleware layer ’com.sap.mw.jco.rfc.MiddlewareRFC<path>/libjRFC12.so: librfccm.so: cannot open shared object file: No such file or directoryVerify proper installation of JCO Native support libraries packaged with JCO client.	The `librfccm.so` file shipped with the JCO client is not installed or is installed in an incorrect location. You must copy the file to the same location as `libjRFC12.so` or configure the LD_LIBRARY_PATH environment variable to specify the location in which the file resides.

Understanding the Default Driver Configuration

8

This section explains how the default driver configuration uses policies and filter. You can use this overview as a basis to create your own policies and filters for specific business implementations.

8.1 Using Policies

Policies are highly configurable for use within any business environment.

The default driver is configured to be primarily a Subscriber channel driver. This means the primary purpose is to create SAP User accounts using information collected in the Identity Vault. The default configuration does allow basic bidirectional User create, delete, and modify functionality.

8.1.1 Modifying Policies and the Filter

You must modify policies and the filter to work with your specific business environment. We recommend that you make modifications in this order:

1. Modify the Filter (publish and subscribe options) to include additional attributes you want synchronized.
2. Modify the Mapping policy to include all attributes specified in the Subscriber and Publisher channel filters.
3. Modify the InputTransform policy
4. Modify the OutputTransform policy
5. Modify the Publisher policies
6. Modify the Subscriber policies

Setting the Filter: Publish Options

Setting attributes in the filter to “publish” specifies which classes and attributes are published from the SAP system to eDirectory.

The default driver configuration publishes the following User class attributes in the filter.

Class	Attributes
User	DirXML-sapLocRoles
	DirXML-sapLocProfiles
	Given Name
	Surname
	sapProfiles
	sapRoles
	sapUsername

Setting the Filter: Subscription Options

Setting attributes in the filter to “subscribe” specifies which classes and attributes are synchronized from eDirectory to the SAP system.

The default driver configuration subscribes to the following User class attributes in the filter:

Class	Attributes
User	buildingName
	costCenter
	firstPrefix
	floor
	Full Name
	Given Name
	Initials
	Internet Email Address
	Login Disabled
	OU
	pager
	sapGroups
	sapProfiles
	sapRoles
	Surname
	Telephone Number
	Title

The Schema Mapping Policy

The Schema Mapping policy is referenced by the driver object and applies to both the Subscriber and Publisher channel. The purpose of the Schema Mapping policy is to map schema names (particularly attribute names and class names) between eDirectory and the SAP User database. Any modification or removal of existing entries in the Schema Mapping policy could destroy the default configuration and policies processing behavior. Adding new attribute mappings is discretionary.

NOTE: The Application Schema definition in the default driver configuration is from a SAP R/3 version 4.7 system with Web Application Server version 6.40. If the target SAP system is a different version, the actual User object schema might be different. Refresh application schema using the iManager Schema Mapping editor to obtain the actual schema of the target server.

The following class mapping is included with the default driver configuration:

eDirectory Class	SAP Class	SAP Description
User	US	USER

The User class is configured to synchronize bidirectionally between SAP and eDirectory. A change made in one system will transfer to the other system.

All attributes in the Publisher and Subscriber filters should be mapped unless they are used only for policy processing.

SAP User field values can be arranged in three types:

- Simple fields: These values are not grouped with other fields. The syntax in the schema map is <field name>.
- Structure fields: These values are grouped with other pieces of data that describe a larger collection of single-instance data. The syntax for these fields in the schema map is <structure name>:<field name>. For example, ADDRESS:TELEPHONE.
- Table fields: These values are similar to Structure fields, but there can be multiple instances of the structured data. The syntax for these fields in the schema map is <table name>:<field name>. For example, ADDTEL:TELEPHONE.

The following table includes common attribute mappings for the User class and their descriptions, assuming that only the primary piece of structure communication data is required (such as ADDTEL:TELEPHONE). If fields of a table are to be mapped, you should specify only the Table name in the mapping (such as LOCACTIVITYGROUPS). If you do this, the driver generates all table field values in structured format. For more information, see Appendix C, “Structured Format Examples,” on page 125. On the Publisher channel, the structured data must be transformed to string format.

The Schema Mapping policy is highly dependent on the extension of the standard eDirectory schema. The extensions used by the driver come in the form of an LDIF file created by SAP for use with the SAP directory interfaces for user management. A Novell-standard `.sch` version of the file is also provided. These files are included with the driver. Refer to “Extending the Schema” on page 22 for more information.

The default mappings for the driver are as follows:

eDirectory Attribute	SAP User Field Description	SAP User Field(s)
DirXML-sapLocRoles	Role for specified CUA logical system	LOCACTIVITYGROUPS:SUBSYSTEM LOCACTIVITYGROUPS:AGR_NAME
DirXML-sapLocProfiles	Profile for specified CUA logical system	LOCPROFILES:SUBSYSTEM LOCPROFILES:PROFILE
DirXML-sapVClass	License type classification	UCLASS:LIC_TYPE
DirXML-sapLocVClass	License type classification for specified CUA Logical System	UCLASSSYS:RCVSYSTEM UCLASSSYS:LIC_TYPE
birthName	Name of person at birth	ADDRESS:BIRTH_NAME
buildingName	Building (number or code)	ADDRESS:BUILDING_P
commType	Communication type (key) (Central address management)	ADDRESS:COMM_TYPE
company	Company address, cross-system key	COMPANY:COMPANY
costCenter	Cost center	DEFAULTS:KOSTL
Facsimile Telephone Number	Fax number: dialing code+number	ADDFAX:FAX
firstPrefix	Name prefix	ADDRESS:PREFIX1
floor	Floor in building	ADDRESS:FLOOR_P
Full Name	Complete personal name	ADDRESS:FULLNAME
Given Name	First name	ADDRESS:FIRSTNAME
inHouseMail	Int. mail postal code	ADDRESS:INHOUSE_ML
Initials	Middle Initial or personal initials	ADDRESS:INITIALS
InitialsSig	Short name for correspondence	ADDRESS:INITS_SIG
Internet EMail Address	Internet mail (SMTP) address	ADDSMPT:E_MAIL
Login Disabled	Lock User account	LOCKUSER The LOCKUSER attribute does not actually exist in SAP. This pseudo-attribute is used by the driver to determine when to call USER_LOCK and USER_UNLOCK BAPI functions.
middleName	Middle name or second forename of a person	ADDRESS:MIDDLENAME
nickname	Nickname or name used	ADDRESS:NICKNAME
OU	Department	ADDRESS:DEPARTMENT
pager	Pager number	ADDPAG:PAGER
personalTitle	Title text	ADDRESS:TITLE_P

eDirectory Attribute	SAP User Field Description	SAP User Field(s)
roomNumber	Room or apartment number	ADDRESS:ROOM_NO_P
sapAlias	Internet user alias	ALIAS:USERALIAS
sapCATT	CATT: Test status	DEFAULTS:CATTKENNZ
sapClass	User group in user master maintenance	LOGONDATA:CLASS
sapDateFormat	Date format	DEFAULTS:DATFM
sapDecimalFormat	Decimal Notation	DEFAULTS:DCPFM
sapGroups	User group in user master maintenance	GROUPS:USERGROUP
sapLoginLanguage	Language	DEFAULTS:LANGU
sapParameters	Get/Set parameter ID and parameter values	PARAMETER:PAR10
sapPrintParam1	Print parameter 1	DEFAULTS:SPLG
sapPrintParam2	Print parameter 2	DEFAULTS:SPDB
sapPrintParam3	Print parameter 3	DEFAULTS:SPDA
sapProfiles	Profile name	PROFILES:BAPIPROF
sapRefUser	User name in user master record	REF_USER:REF_USER
sapRoles	Role Name	ACTIVITYGROUPS:AGR_NAME
sapSncGuiFlag	Unsecure communication permitted flag	SNC:GUIFLAG
sapSncName	Secure network communication printable name	SNC:PNAME
sapSpool	Spool: Output device	DEFAULTS:SPLD
sapStartMenu	Start Menu	DEFAULTS:START_MENU
sapTimeZone	Time zone	LOGONDATA:TZONE
sapUsername	User Name	USERNAME:BAPIBNAME
sapUserType	User Type	LOGONDATA:USTYP
sapValidFrom	User valid from	LOGONDATA:GLTGV
sapValidTo	User valid to	LOGONDATA:GLTGB
secondName	Second surname of a person	LOGONDATA: SECONDNAME
secondPrefix	Name prefix	ADDRESS:PREFIX2
Surname	Last name	ADDRESS:LASTNAME
Telephone Number	Telephone no.: dialing code+number	ADDTEL:TELEPHONE
telexNumber	Telex Number	ADDTLX:TELEX_NO

eDirectory Attribute	SAP User Field Description	SAP User Field(s)
Title	Function	ADDRESS:FUNCTION
titleAcademic1	Academic title: written form	ADDRESS:TITLE_ACA1
titleAcademic2	Academic title: written form	ADDRESS:TITLE_ACA2

Adding the Organizational Role Class

The SAP User driver can be queried for ACTIVITYGROUP objects and all other PDOBJECTS in the SAP User database so that they may be synchronized into eDirectory, and used by the administrator through a browse interface. To do this, the default class mapping must be manually changed to the following:

eDirectory Class	SAP User Field Description	SAP User Field(s)
Organizational Role	PDOBJECT	Organizational Role

The following sections explain what you need to do, to allow support for querying of the Organizational Role class:

- "Editing the Global Configuration Values" on page 54
- "Adding a New Placement Rule" on page 55
- "Modifying the XSLT" on page 56
- "Adding the Organizational Role Class to the Driver Filter" on page 56
- "Migrating Data into the Identity Vault" on page 57

Editing the Global Configuration Values

To edit the Global Configuration Values (GCV), follow these steps:

1. In iManager, browse to the driver, and click the upper right corner of the driver icon.
2. Select the *Edit Properties* link.

   The Driver Configuration window is displayed.
3. Click the *Global Config Values* tab.

   A list of the existing GCV values is displayed.
4. Click the *Edit XML* tab to open the XML Editor window.
5. Select the *Enable XML Editing* checkbox and add the following XML code:

```
<definition display-name="Organizational Role Placement"
dn-space="dirxml" dn-type="slash" name="sap-pdobject-placement"
type="dn">
    <description>
     The name of the Organizational Role object under which
published SAP Organizational Roles will be placed.
     </description>
<value> </value>
</definition>
```

6 Click *Apply* and *OK* to save the changes.

The updated GCV is now displayed in the list.

7 Browse and select the container in eDirectory you want to place Organizational Role in.

8 Click *Apply and OK*.

Adding a New Placement Rule

A new rule is required in the placement policy, to place the Organizational Role object in. Follow these steps to create the new rule:

1 In iManager, click on the driver icon.

The Identity Manager Overview screen is displayed.

2 In the publisher channel, click on the Placement Policies icon.

The Publisher Placement policy window is displayed.

3 Click the existing default publisher placement policy.

The Policy Rules screen is displayed.

4 Click the `Edit XML` tab.

The XML Editor window is displayed.

5 Select the *Enable XML Editing* checkbox and add the following XML code:

```
<rule>
   <description>Organizational Role Placement</description>
   <conditions>
      <or>
        <if-class-name op="equal">
           Organizational Role
        </if-class-name>
      </or>
      <or>
       <if-op-attr name="CN" op="available"/>
      </or>
   </conditions>
   <actions>
     <do-set-op-dest-dn>
       <arg-dn>
       <token-global-variable name="sap-pdobject-placement"/>
       <token-text xml:space="preserve">\</token-text>
       <token-escape-for-dest-dn>
       <token-op-attr name="CN"/>
       </token-escape-for-dest-dn>
       </arg-dn>
     </do-set-op-dest-dn>
    </actions>
</rule>
```

6 Click *Apply* and *OK,* to save the changes.

7 Click *Close* to close the Publisher Placement Policy window.

Modifying the XSLT

The XSLT file must be modified so that it triggers events only for the USER class. To modify the XSLT file, follow these steps:

1. From the Identity Manager Driver Overview page, click on the Creation Policies icon on the publisher channel of the driver.

   The Publisher Creation Policy window is displayed.
2. Click the *Generate User Name Style Sheet* link.

   The XML Editor window is displayed.
3. Search for the following XML code:
   ```
   <xsl:template match="add">
   ```
   Replace it with the following code:
   ```
   <xsl:template match="add[@class-name='User']">
   ```
4. Click *Apply* and *OK* to save the changes .
5. Click *Close,* to close the Publisher Placement Policy window.

Adding the Organizational Role Class to the Driver Filter

To add the Organizational Role class, and to change the default class mapping, follow these steps:

1. From the Identity Manager Driver Overview page, click the ‘Driver Filter’ icon in the publisher channel.
2. Click the *Add Class* tab.

   A pop-up window is displayed.
3. Click the *Show All Classes* link.

   A list of the available classes is displayed in alphabetical order.
4. Scroll down to the class Organizational Role, and click on it.
5. In the *Application Name* field on the right, browse and select the SAP User class PDOBJECT that will be mapped to Organizational Role.
6. Click *Apply* to confirm the mapping.
7. From the filter window, select Organizational Role, and click on the *Add Attribute* tab.

   A list of the available attributes is displayed.
8. Select the *CN* attribute and click *OK*.
9. In the*Application Name* field on the right, browse and select the SAP attribute *OBJECTS:EXT_OBJ_ID*
10. Select Organizational Role again and click the *Add Attribute* tab.
11. Select the *Description* attribute and click *OK*.
12. In the Application Name field on your right, browse and select the *OBJECTS:LONG_TEXT* attribute.
13. Click *Apply.*
14. In the Filter window, select the Organizational Role class.
15. In the text field on the right, delete PDOBJECT and replace it with AG.

16 Click *Apply* to save the changes.

17 Click *Organizational Role* and select the *Synchronize* option in the publisher channel.

18 Click the *CN* attribute and select the *Synchronize* option in the publisher channel.

19 Click the *Description* attribute and select the *Synchronize* option in the publisher channel.

20 Click *Apply* and *OK* to save the changes, and close the Filter window.

Migrating Data into the Identity Vault

To migrate ACTIVITYGROUP objects into the Identity Vault, ensure that the driver is running and follow these steps:

1 From the Identiy Manager Driver Overview window, click on *Migrate>Migrate into Identity Vault*.

The Migrate Data into the Identity Vault window is displayed.

2 To migrate a single ACTIVITYGROUP object, follow these steps:

2a Click the *Edit List* tab.

The Edit Migration Criteria dialog box is displayed.

2b Select the Organizational Role class from the list on the left side of the window.

2c Select the *CN* attribute and click *OK*.

The Attribute Value dialog box is displayed.

2d Enter a valid value for the *CN* attribute and click *OK*..

Example of a valid attribute: SAP_ESSUSER

2e Click *OK* to confirm the entered value, and close the dialog box.

2f Click *OK* again in the Migrate Data into the Identity Vault window, to start the migration.

You will see that the *Success* box is now checked, indicating that migration has started.

3 To migrate all ACTIVITYGROUP objects, follow these steps:

3a Click the *Edit List* tab.

The Edit Migration Criteria dialog box is displayed.

3b Select the Organizational Role class from the list, and click *OK*.

3c Click *OK* again in the Migrate Data into the Identity Vault window, to start the migration.

NOTE: To verify that the objects you selected have been migrated successfully, you can browse to the container that you specified in the Organizational Role placement policy. Successful migration can also be verified by looking at the DSTRACE window.

The Input Transform Policy

You modify the Input Transform policy to implement your specific business rules. The Input Transform policy is applied to affect a transformation of the data received from the driver shim.

The policy is applied as the first step of processing an XML document received from the driver shim. The Input Transform policy converts the syntax of the SAP attributes into the syntax for eDirectory.

The default driver configuration includes two rules that perform the following functions:

- Transforming LOCACTIVITYGROUPS from structured format to string format.
- Transforming LOCPROFILES from structured format to string format.

Modifying the Output Transform Policy

You modify the Output Transform policy to implement your specific business rules. The Output Transformation policy is referenced by the driver object and applies to both the Subscriber channel and to the Publisher channel. The purpose of the Output Transformation policy is to perform any final transformation necessary on XML documents sent to the driver by Identity Manager.

The default driver configuration:

- Transforms LOCACTIVITYGROUPS from string format to structured format.
- Transforms LOCPROFILES from string format to structured format.
- Adds the driver's LOCACTIVITYGROUPS attribute to Modify events with the from-merge attribute set.
- Transforms the pseudo-attribute LOCKUSER value from a true/false format to a 1/0 format.
- Transforms ADDFAX:FAX values from structured format to string format.
- Adds USERNAME:BAPIBNAME to the Queries style sheet (invokes the driver's wildcard search functionality; see Appendix E, "Using Wildcard Search Capabilities," on page 135.)

The Publisher Placement Policy

The Publisher Placement policy is applied to an Add Object event document to determine the placement of the new object in the hierarchical structure of eDirectory.

The Placement policy places all User objects in an eDirectory container that you specify during installation. You can also modify this location by using the Publisher User Placement Global Configuration Variable (GCV.)

The default driver configuration:

- Appends <remove-association> to Delete events; it's used in conjunction with the Publisher Command Transformation policy.

The Publisher Matching Policy

The Publisher Matching policy is applied to a Modify Object event document. Matching policies establish links between an existing entry in eDirectory and an existing entry in the SAP system. The Matching policy attempts to find an existing object that matches the object generating the event by the criteria specified in the policy.

The default driver checks for matches based on the sapUsername attribute. A fallback policy is also provided that checks for matches on the Given Name and Surname attributes.

The Publisher Create Policy

The Publisher Create policy is applied when a new object is to be added to eDirectory. The default driver configuration:

- Creates a User object (Surname and Given Name attributes are required)

- Generates a unique CN based on Given Name and Surname attributes
- Sets the initial account password on creation. Allows an administrator or user to reset or change passwords.

The Subscriber Matching Policy

The Subscriber Matching policy is applied to a Modify Object event document. Matching policies establish links between an existing entry in the Identity Vault and an existing entry in the SAP system. The Matching policy attempts to find an existing object that matches the object generating the event by the criteria specified in the policy.

The default driver checks for matches based on the values of the Given Name, Surname, and sapUsername attributes.

If you do not have an association in your query, the SAP system performs a full table scan of the user table. This might cause a long delay in receiving a reply from the matching query.

If the specified user name is known in SAP, adding an association value reduces the query to a single object. You can use the following Output Transformation policy to add the association.

```
<rule>
<description>Add association value to matching queries</description>
<conditions>
<and>
<if-operation op="equal">query</if-operation>
<if-xpath op="not-true">association</if-xpath>
<if-xpath
op="true">search-attr[@attr-name="USERNAME:BAPIBNAME"]/value</if-
xpath>
</and>
</conditions>
<actions>
<do-append-xml-element expression="." name="association"/>
<do-append-xml-text expression="association">
<arg-string>
<token-text xml:space="preserve">USd</token-text>
<token-upper-case>
<token-xpath
expression='search-attr[@attr-name="USERNAME:BAPIBNAME"]/value/
text()'/>
</token-upper-case>
</arg-string>
</do-append-xml-text>
</actions>
</rule>
```

The Subscriber Create Policy

The Subscriber Create policy is applied when you want to add a new object to eDirectory. The default driver configuration:

- Ensures that the Surname and Given Name attributes are present.
- Generates an unique CN based on the Given name and Surname attributes.
- Appends the sapUserType attribute with a value of A.

- Sets the initial password (the driver can also set and manage persistent passwords in the SAP system.)
- Sets a default sapRoles value of SAP_ESSUSER.
- Sets a default sapProfiles value of SAP_NEW.
- Adds the following sample DirXML-sapLocRole values: DRVCLNT100:, ADMCLNT100:SAP_EMPLOYEE, and ADMCLNT500:SAP_ESSUSER.
- Adds the following sample DirXML-sapLocProfiles values: DRVCLNT100:, ADMCLNT100:SAP_ALL, and ADMCLNT500:SAP_NEW.

8.2 Obtaining Company Address Data for User Objects

There are several attributes of the SAP User object that are associated with the Company Address object assigned to the User. These attributes, by default, are never populated in BAPI or IDoc distributions of User data from the SAP application server. These fields also cannot be read from the User object in SAP. Company Address data is maintained in a table of related records of the ADDRESSORG type. The driver can retrieve this data from the ADDRESSORG table if desired.

The driver parameter to publish Company Address data <nsap-use-addressorg> is set to 1 by default. Setting the value to 1 retrieves the data from the ADDRESSORG table if attributes in the table exist in the Publisher filter, or if the attributes are in <read-attr> elements of a query document. Although this data can be retrieved from the SAP system, ADDRESSORG data cannot be added, modified, or removed from the SAP system via the driver. If the value of this parameter is set to 0, the company address fields are retrieved from the User object itself. As previously mentioned, by default, these fields won't contain any data.

To fully implement the address retrieval functionality, you must configure the driver to receive events when the ADDRESSORG table is modified. By receiving these events, the driver obtains a list of all User objects assigned to the modified ADDRESSORG table and issues modify events with the changed data for each affected user.

To generate ADDRESSORG modify events, you need to modify the ALE distribution model on the SAP application server to include the distribution of the Company Clone (CCLONE) BAPI. Refer to "Creating a Distribution Model" on page 36 and "Modify Port Definition" on page 39 for more information.

The following User object fields might be affected by this functionality.

NAME	HOUSE_NO2
NAME_2	STR_SUPPL1
NAME_3	STR_SUPPL2
NAME_4	STR_SUPPL3
C_O_NAME	BUILDING
CITY	DISTRICT
CITY_NO	FLOOR
DISTRICT	ROOM_NO

DISTRICT_NO	COUNTRY
POSTL_COD1	COUNTRYIOS
POSTL_COD2	LOCATION
POSTL_COD3	LANGU_ISO
PO_BOX	REGION
PO_BOX_CIT	SORT1
PBOXCIT_NO	TIME_ZONE
DELIV_DIS	TAXJURCODE
TRANSPZONE	STR_ABBR
STREET	HOUSE_NO
STREET_NO	

Using the Driver in a Central User Administration Environment

9

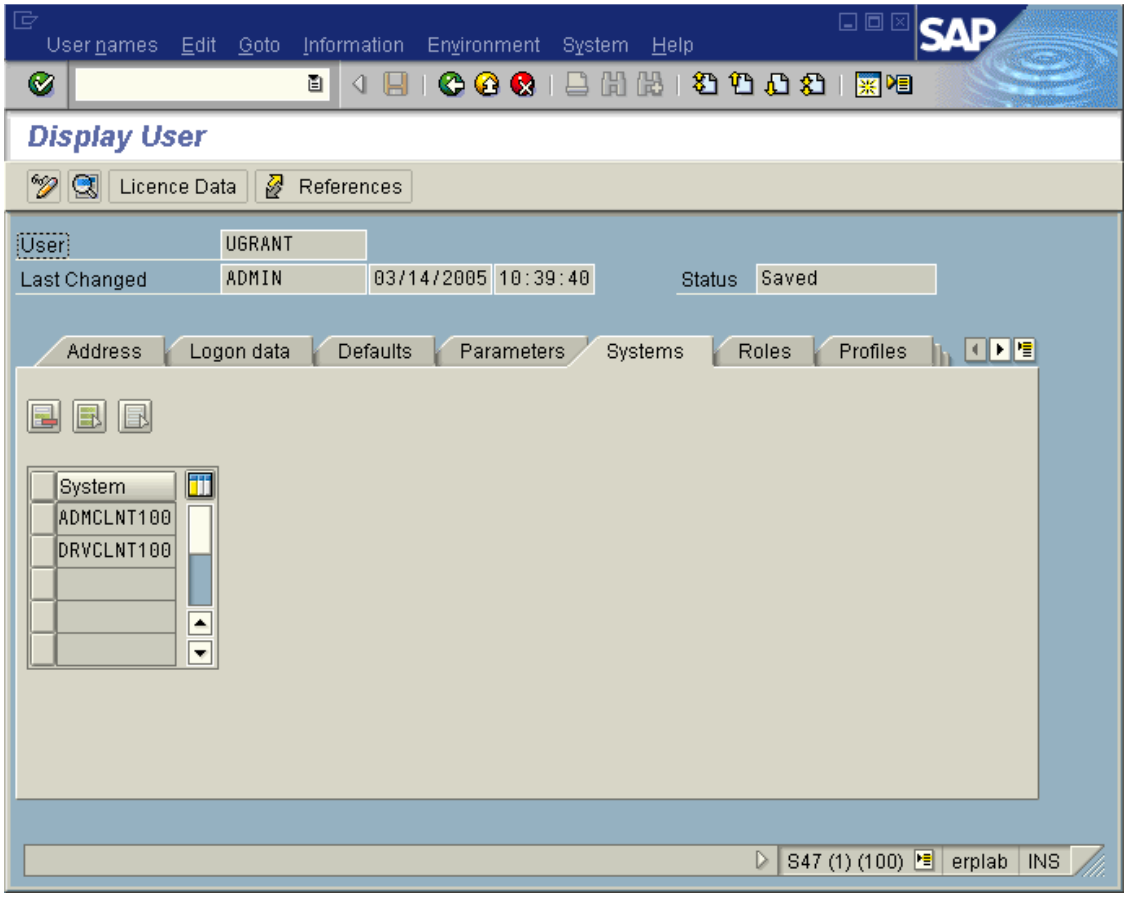
- Section 9.1, “Configuring the Driver as a CUA Child System,” on page 65
- Section 9.2, “Using the Driver to Provision a CUA Landscape,” on page 67
- Section 9.3, “User Classification Settings (Licensing),” on page 68
- Section 9.4, “Important CUA Integration Notes,” on page 69

This section provides a description of how the driver can integrate into a Central User Administration (CUA) environment. It is not intended to be a CUA configuration or administration guide. Refer to the SAP documentation and SAP help, support, and tips Web sites and journals for authoritative sources of standard CUA information.

The driver is designed to perform User management and synchronization with any SAP Application Server. However, the most value can be derived from the driver when it is used in a CUA environment. CUA is the standard User data distribution technology provided by SAP. It is used to distribute data between logical systems on one or more application servers. In a typical CUA landscape, there is one logical system designated as the “Central” system. The Central system administrator has the capability to distribute User account information and access rights to the other "Child" logical systems in the landscape. There are many variations, however, of the flow of User account information, including configurations where the Child systems can locally administrate some of the User account information and distribute it back to the Central system. This information focuses primarily on using the driver in a basic CUA landscape where User account information is distributed one-way from the Central system to the Child logical systems.

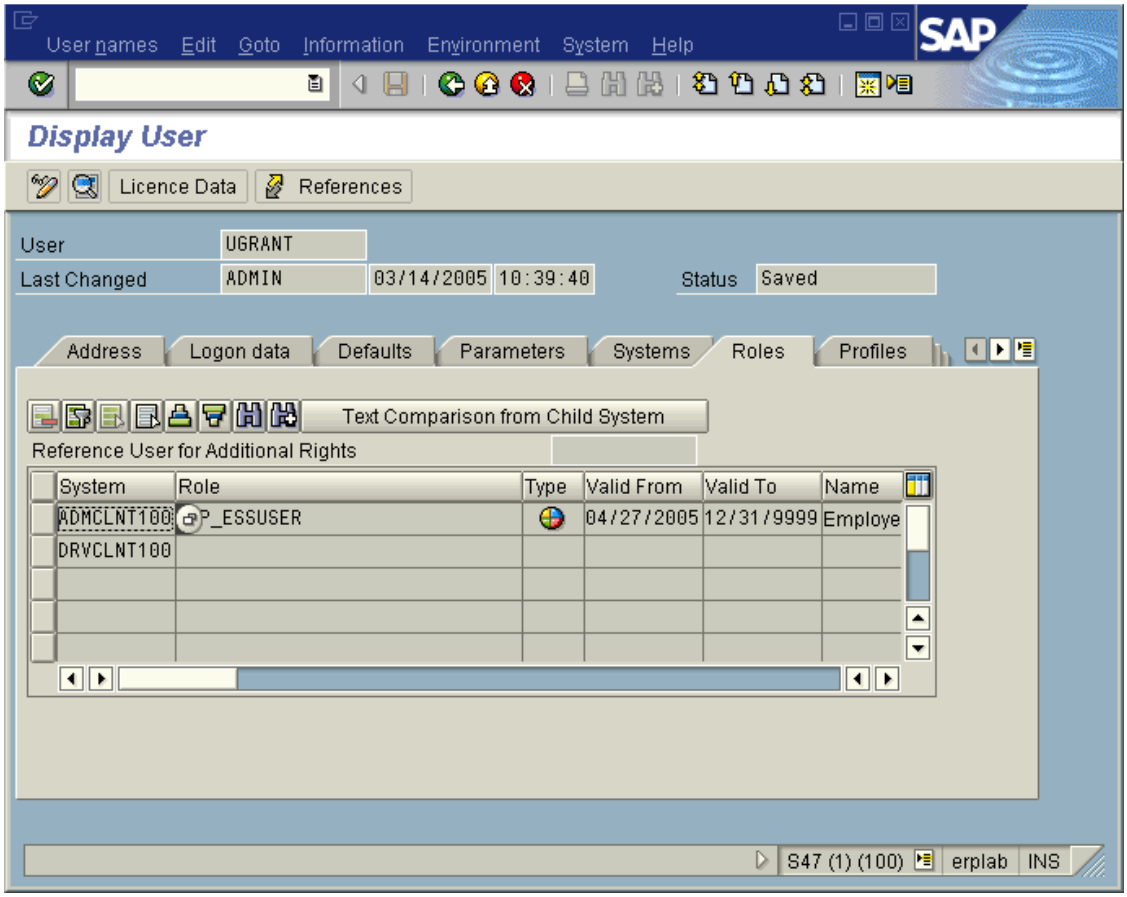
The User Maintenance transaction in SAP is SU01. The major difference between the maintenance options in a CUA environment and a non-CUA environment is the existence of the *Systems* tab. The entries under this tab indicate which logical systems to which the User account information should be distributed. The following illustration shows a User that is distributed to logical systems ADMCLNT100 and DRVCLNT100.

Figure 9-1 *User distribution to logical systems ADMCLNT100 and DRVCLNT100*



Another difference can be seen when the Central system has been configured to maintain Role and Profile information on a *Global* level, which means the Central system administrator can set Role and Profile values for all logical systems in the CUA landscape. When the Global level is selected (via transaction SCUM), the Roles and Profiles for a User account are displayed with the logical system to which they are assigned. The following illustration shows a User assigned the default SAP Employee Self-Service role on logical system ADMCLNT100.

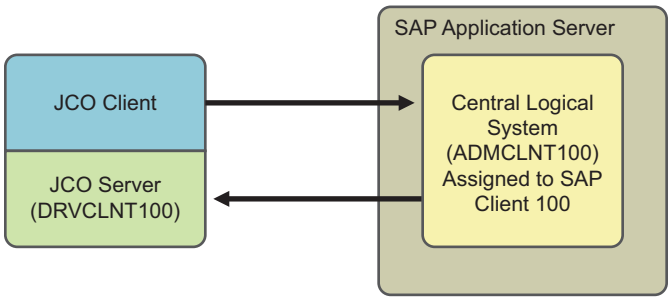
Figure 9-2 *A User with the default SAP Employee Self-Service role on logical system ADMCLNT100*



9.1 Configuring the Driver as a CUA Child System

The driver's Publisher channel functionality requires that the driver be configured as a Child logical system in a CUA environment. The configuration documentation describes a configuration as illustrated below.

Figure 9-3 *CUA child system configuration*



In this configuration, the driver acts as an administrative client to perform User administration, such as User account creation, password set, and role administration, etc., in the CUA Central logical system ADMCLNT100. The Central system is configured to distribute the User account information

to the CUA Child logical system DRVCLNT100 that represents the driver. As can be seen from the diagram, the driver acts as both a SAP Client and a Server to obtain full bidirectional synchronization functionality.

After the systems are configured for synchronization, you must set the data attributes that will trigger synchronization. In order to synchronize a User object, you must create a User in SAP Client 100, allow the user to login, and establish synchronization back to the driver.

- Surname and Password are required attributes for User creation
- Set ADMCLNT100 in the *Systems* tab to allow new User to login to Client 100.
- Set DRVCLNT100 in the *Systems* tab to establish data distribution back to the driver.

Setting attributes and passwords has been part of the driver functionality since its creation. As of version 1.0.5, you can now set the *Systems* tab on the Central system using BAPIs for setting Local ActivityGroups (Roles) and Local Profiles. These BAPIs allow the driver to set specified Roles and Profiles on specified logical systems in the CUA landscape. Because there are two component parameters required for each Local Role and Local Profile, the default configuration use a colon ":" delimited string syntax for the Identity Vault values. The form for these values is <Logical System Name>:<Role or Profile Name>. These values are transformed to and from the SAP structured syntax by the default InputTransform and OutputTransform policies.

If you want to set the *Systems* tab for a logical system without setting a Local Role or Local Profile (this should always be done for the driver where SAP Roles and Profiles have no meaning), the string value should be set without the *Role or Profile Name* component.

A new field named FORCE_SYSTEM_ASSIGNMENT is available in newer versions of SAP in the BAPI_USER_CREATE1 function. The driver tries to use this for the *Systems* tab assignment on the Connected SAP System.

The following example shows a Create style sheet template for the setting of only the *Systems* tab for logical systems ADMCLNT100 and DRVCLNT100. Note that the attr-name used is DirXML-sapLocRoles. For this purpose, the DirXML-sapLocProfiles attribute could also be used. (In Identity Manager 3, this policy is implemented through Policy Builder.)

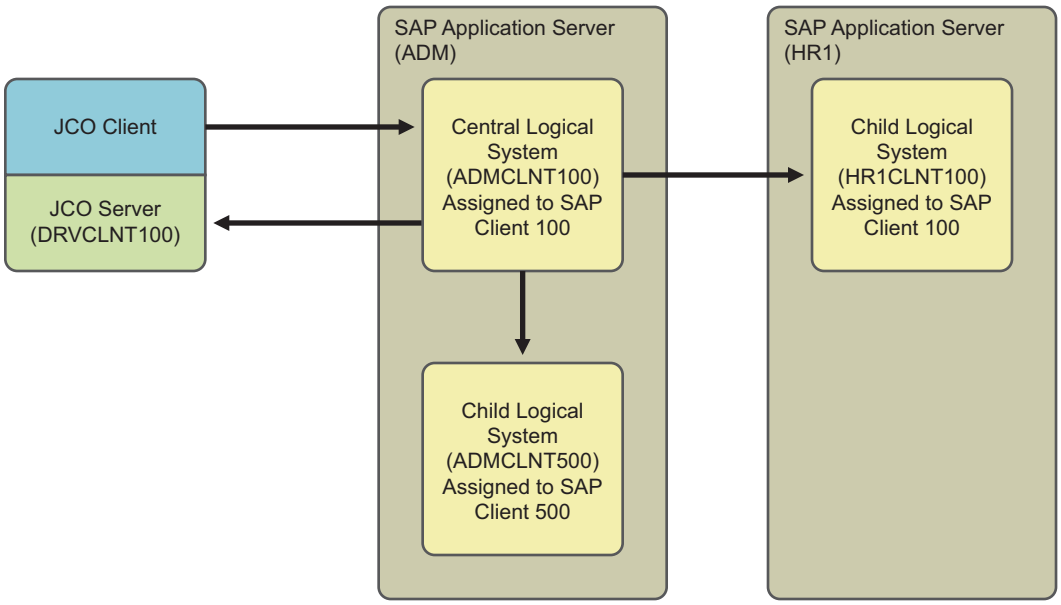
```
<xsl:template name="add-systems-tab">
<!--
      Sample CUA distribution settings.
      - Central SAP system is ADMCLNT100
      - Driver's logical system is DRVCLNT100
-->
      <add-attr attr-name="DirXML-sapLocRoles">
                <!--
      In a CUA environment, set driver's LS name with a blank role.
This allows
     the driver to receive events from SAP.
     -->
            <value>
            <xsl:value-of select="'DRVCLNT100:'"/>
            </value>
      <!--
            Setting the target LS name with a blank CUA role allows the
            User object to log on to the target child system but
receive no rights
            -->
```

```
            <value>
                  <xsl:value-of select="'ADMCLNT100:'"/>
            </value>
         </add-attr>
</xsl:template>
```

9.2 Using the Driver to Provision a CUA Landscape

The previous example showed a simple CUA environment where the Central system only distributed User data only to the driver's logical system. This is not a typical environment. In most CUA environments, a Central system distributes data to SAP Child logical systems on multiple application servers. A small example of a typical CUA landscape looks more like this:

Figure 9-4 *A central system distributing data to SAP child logical systems on multiple application servers*



As with the previous example, the driver can set the distribution of User account information to the additional CUA Child systems by setting the *Systems* tab for them. However, the real power of the driver is realized when you use access controls to the various SAP clients based on the driver's policies. For example, all employees can receive employee Self-Service rights on the HR system, but an employee identified as an HR Administrator could also be granted rights to the HR administration functions. The following example shows a Create Stylesheet template for the setting of the *Systems* tab for logical system ADMCLNT100 and DRVCLNT100, setting the SAP_ESSUSER Role on logical system HR1CLNT100, and setting the SAP_ALL Profile on logical system ADMCLNT500. (In Identity Manager 3, this policy is implemented through Policy Builder.)

```
<xsl:template name="add-cua-auths">
         <!--
         Sample CUA distribution settings.
         - Central SAP system is ADMCLNT100
         - Child SAP systems are: ADMCLNT500 and HR1CLNT100
         - Driver's logical system is DRVCLNT100
         -->
            <add-attr attr-name="DirXML-sapLocRoles">
```

```
                <!--
                 In a CUA environment, set driver's LS name with a
                 blank role. This allows the driver to receive events
                 from SAP.
                 -->
                      <value>
                     <xsl:value-of select="'DRVCLNT100:'"/>
                      </value>
                      <!--
                      Setting the target LS name with a blank CUA role
                      allows the User object to log on to the target
                      child system but receive no rights.
                      -->
               <value>
                                 <xsl:value-of select="'ADMCLNT100:'"/>
                     </value>
                     <!--
                      The third value shows how to set a 'real' CUA role
                     for a child logical system.  This causes
                     distribution from the Central system to the child
                     system and sets the Employee Self-Service role.
                     -->
                     <value>
                                <xsl:value-of
select="'HRCLNT100:SAP_ESSUSER'"/>
                     </value>
          </add-attr>
      <!--
      Example of setting a 'real' CUA profile.
      -->
      <add-attr attr-name="DirXML-sapLocProfiles">
                      <value>
                                  <xsl:value-of
select="'ADMCLNT500:SAP_ALL'"/>
                      </value>
          </add-attr>
</xsl:template>
```

9.3 User Classification Settings (Licensing)

Beginning with version SAP R/3 version 4.7, SAP added the ability to set licensing information on User records. In a CUA environment, this information is set using table UCLASSSYS. There can be a maximum of 1 license type set for each client system in the CUA landscape. The primary data field for licensing in the LIC_TYPE field. This is a two-character code indicating the type of license utilized by the SAP User. Because the license is a system dependent value, you must also set the RCVSYSTEM field to a valid logical system name. You can only set a license value for logical systems specified in the *Systems* tab of the User record. It is not necessary or possible to set license values for the driver's logical system. The following example shows a Create Stylesheet template for the setting of a sample Employee license value for a User of logical system ADMCLNT100. (In Identity Manager 3, this policy is implemented through Policy Builder.)

```
<xsl:template name="add-license">
         <!--
         - Sample Setting of User Classification (License) Table
```

```
UCLASSSYS
         - Central SAP system is ADMCLNT100, License Type = 54
         -->
   <add-attr attr-name="DirXML-sapLocUClass">
                    <value>
                   <xsl:value-of select="'ADMCLNT100:52'"/>
               </value>
         </add-attr>
</xsl:template>
```

NOTE: The data sent to the driver must be in a structured format. The default Input Transformation and Output Transformation policies handle the required syntax conversions of UCLASSSYS similar to the way they handle LOCPROFILES and LOCACTIVITYGROUPS.

9.4 Important CUA Integration Notes

- The BAPIs utilized to perform the CUA integration are documented as being available for SAP version 4.0A in the SAP system documentation. Novell® has successfully tested this functionality for SAP R/3 version 4.6C and later. This includes all versions of SAP Web Application Server. For 4.6C systems, the BAPIs are not documented by SAP in the system documentation and support might not be available.
- Password distribution to the CUA Central system can be performed for all initial set and reset operations. However, passwords provisioned to CUA Child systems from the Central system can only be initially set. Password change/reset operations cannot be distributed to Child systems. This is a SAP-designed restriction and is not a limitation of the methodology used by the driver. SAP has determined that setting a single password across systems via CUA violates client system administrative authority and security, so they recommend the use of Single Sign-On (SSO) products to perform this task. Refer to SAP's documentation related to Password Change for more explicit information on this restriction.
- User Classification (Licensing) table entries may only be made to systems listed in the *Systems* tab on the User record. If Central Licensing values are to be set while adding Users to the CUA Central System, make sure all targeted client systems are also available by setting a DirXML-sapLocRoles or DirXML-sapLocProfiles value for them in the Add event.

Managing the Driver

10

The driver can be managed through Designer, iManager, or the DirXML® Command Line utility.

- Section 10.1, “Starting, Stopping, or Restarting the Driver,” on page 71
- Section 10.2, “Using the DirXML Command Line Utility,” on page 72
- Section 10.3, “Viewing Driver Versioning Information,” on page 72
- Section 10.4, “Reassociating a Driver Set Object with a Server Object,” on page 77
- Section 10.5, “Changing the Driver Configuration,” on page 78
- Section 10.6, “Storing Driver Passwords Securely with Named Passwords,” on page 78
- Section 10.7, “Adding a Driver Heartbeat,” on page 85

10.1 Starting, Stopping, or Restarting the Driver

- Section 10.1.1, “Starting the Driver in Designer,” on page 71
- Section 10.1.2, “Starting the Driver in iManager,” on page 71
- Section 10.1.3, “Stopping the Driver in Designer,” on page 71
- Section 10.1.4, “Stopping the Driver in iManager,” on page 71
- Section 10.1.5, “Restarting the Driver in Designer,” on page 72
- Section 10.1.6, “Restarting the Driver in iManager,” on page 72

10.1.1 Starting the Driver in Designer

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

10.1.2 Starting the Driver in iManager

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

10.1.3 Stopping the Driver in Designer

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

10.1.4 Stopping the Driver in iManager

1. In iManager, click *Identity Manager* > *Identity Manager Overview*.
2. Browse to the driver set where the driver exists, then click *Search*.

3 Click the upper right corner of the driver icon, then click *Stop driver*.

10.1.5 Restarting the Driver in Designer

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

10.1.6 Restarting the Driver in iManager

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

10.2 Using the DirXML Command Line Utility

The DirXML Command Line utility provides command line access to manage the driver. This utility is not a replacement for iManager or Designer. The primary use of this utility is to allow you to create platform-specific scripts to manage the driver.

For example, you could create a shell script on Linux to check the status of the driver. See Appendix A, "DirXML Command Line Utility," on page 109 for detailed information about the DirXML Command Line utility. For daily tasks, use iManager or Designer.

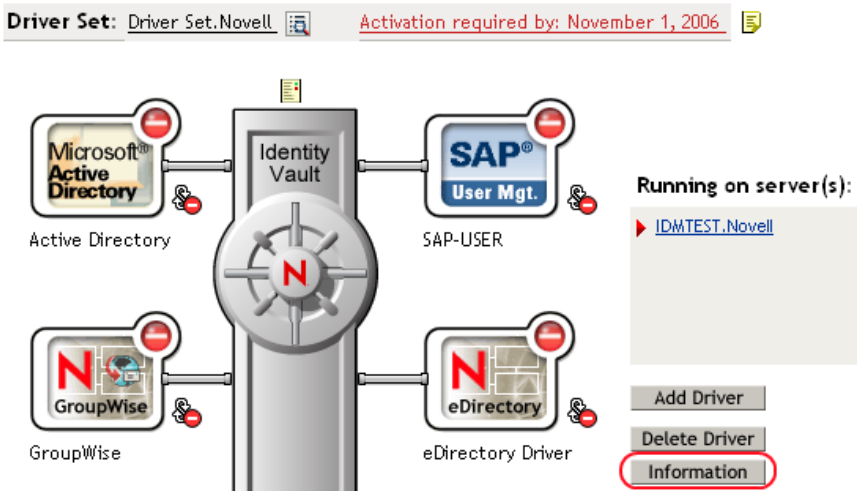
10.3 Viewing Driver Versioning Information

The Versioning Discovery tool only exists in iManager.

- Section 10.3.1, "Viewing a Hierarchical Display of Versioning Information," on page 72
- Section 10.3.2, "Viewing the Versioning Information as a Text File," on page 74
- Section 10.3.3, "Saving Versioning Information," on page 76

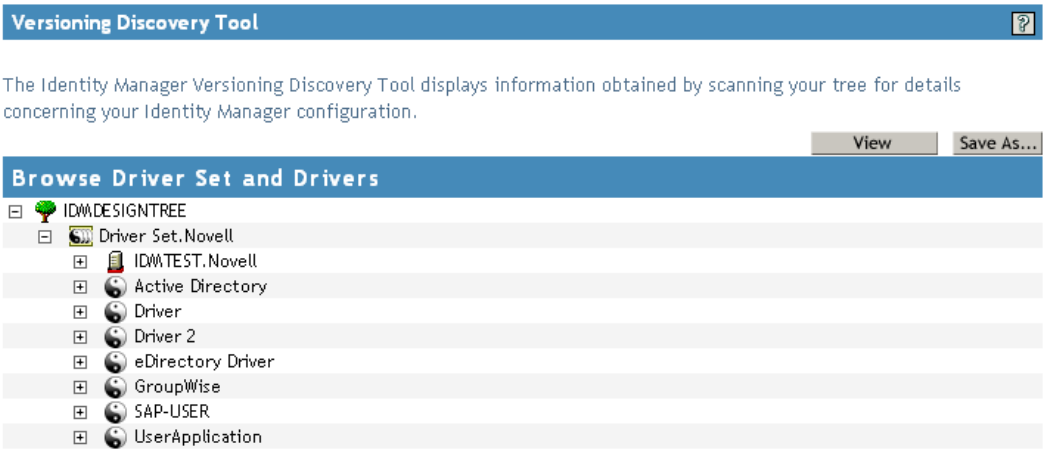
10.3.1 Viewing a Hierarchical Display of Versioning Information

1 To find your Driver Set object in iManager, click *Identity Manager* > *Identity Manager Overview*, then click *Search*.
2 In the Identity Manager Overview, click *Information*.



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

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

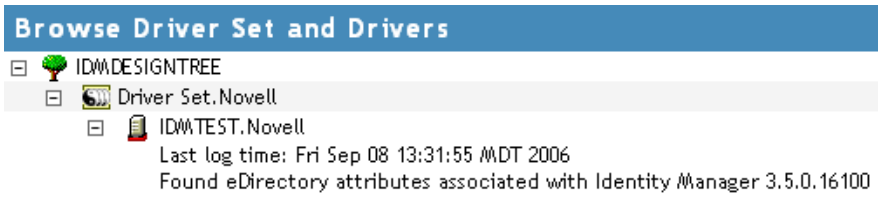


The unexpanded hierarchical view displays the following:

- The eDirectory™ tree that you are authenticated to
- The Driver Set object that you selected
- Servers that are associated with the Driver Set object

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

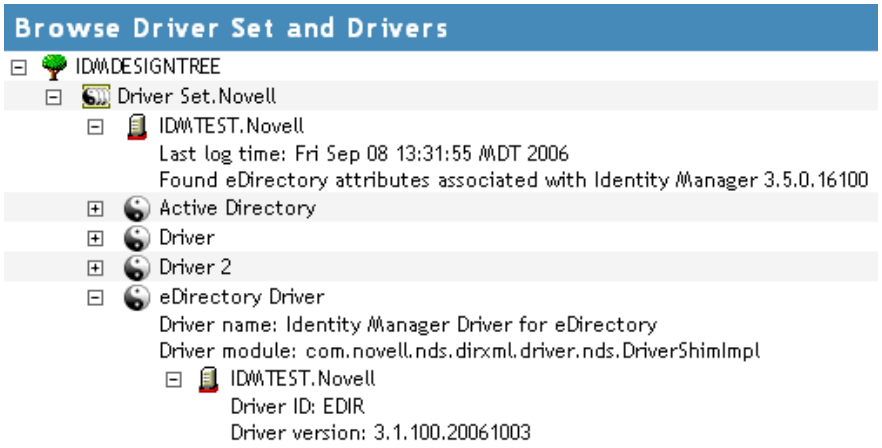
4 View versioning information related to servers by expanding the server icon.



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

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

5 View versioning information related to drivers by expanding the driver icon.



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

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

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

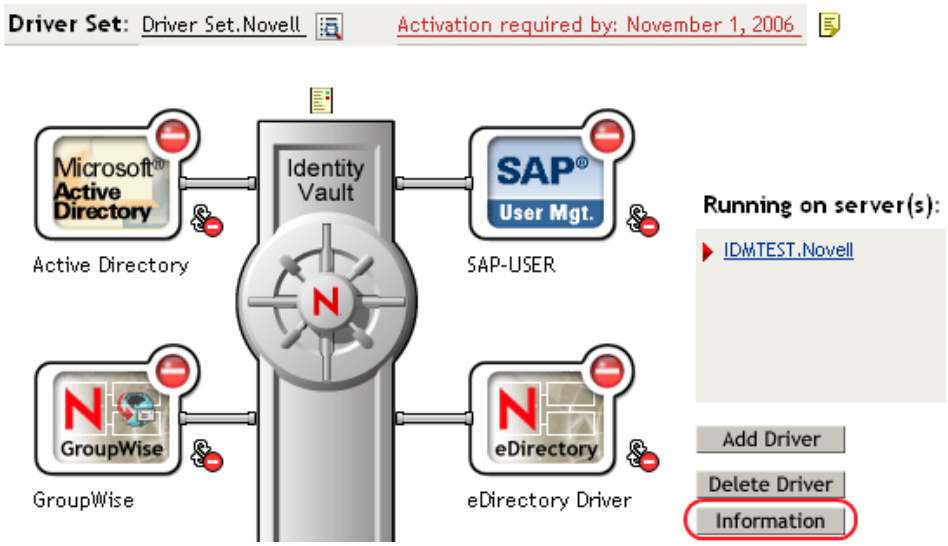
- The driver ID
- The version of the instance of the driver running on that server

10.3.2 Viewing the Versioning Information as a Text File

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

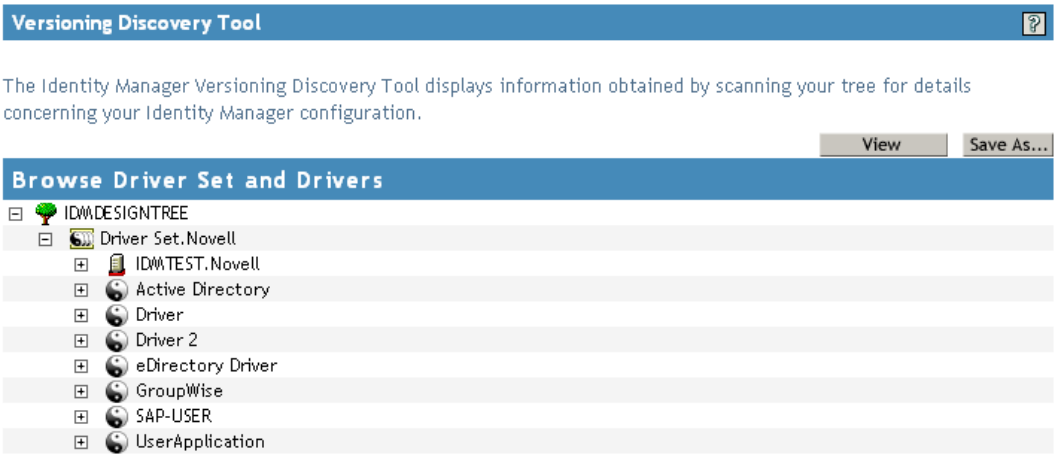
1 To find your Driver Set object in iManager, click *Identity Manager* > *Identity Manager Overview*, then click *Search*.

2 In the Identity Manager Overview, click *Information*.

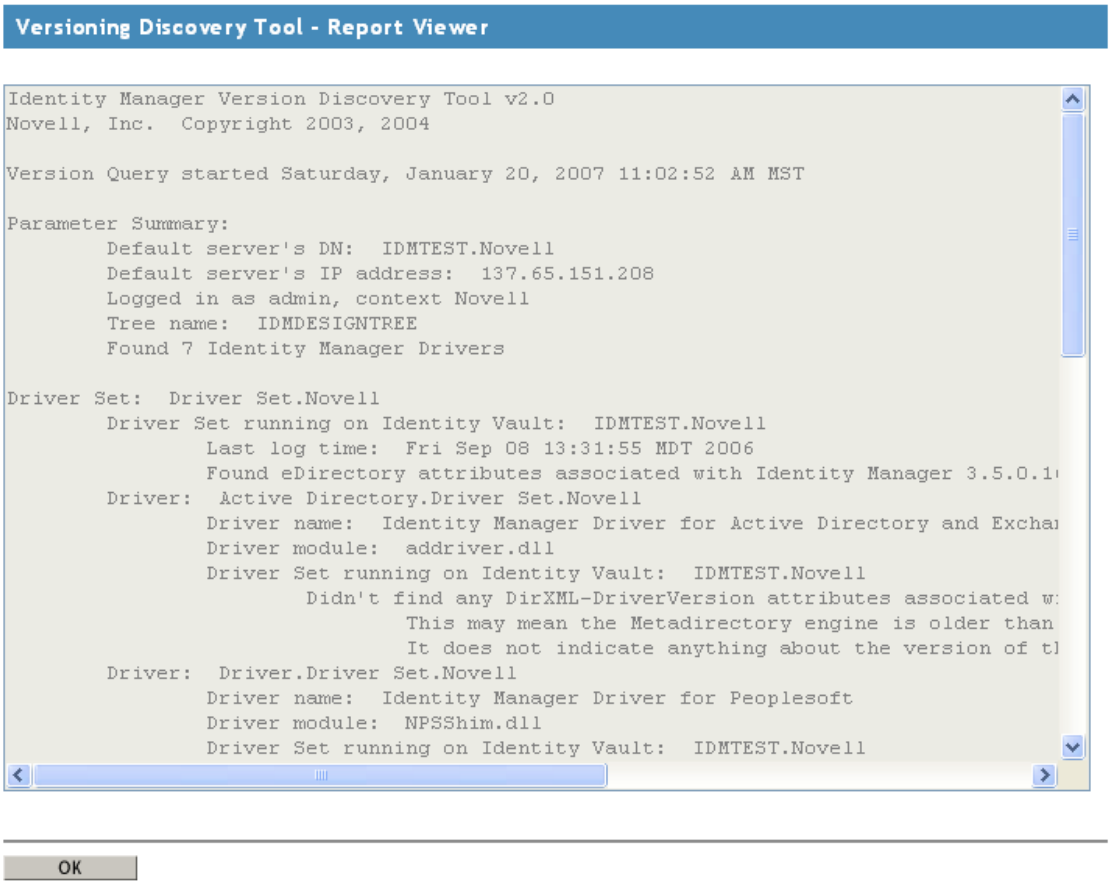


You can also select *Identity Manager Utilities* > *Versioning Discovery*, browse to and select the Driver Set object, then click *Information*.

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



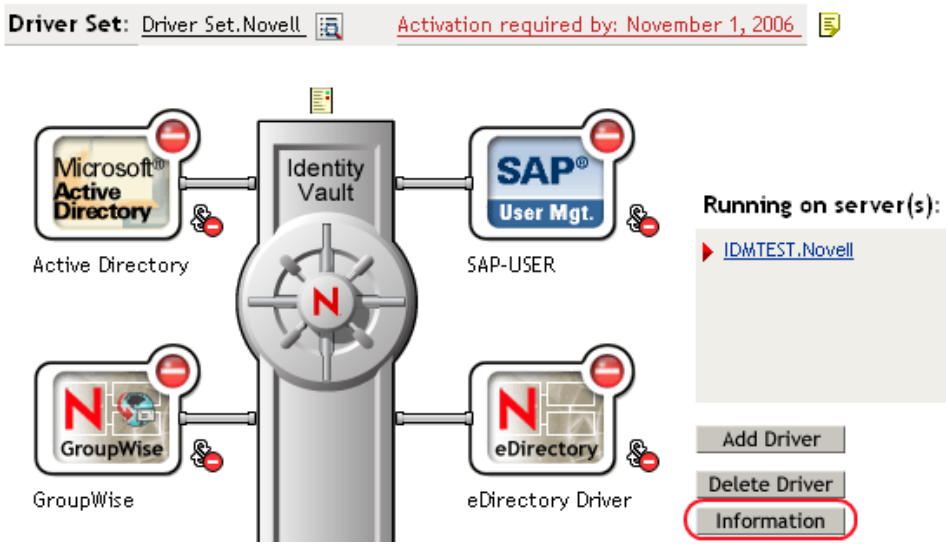
The information is displayed as a text file in the Report Viewer window.



10.3.3 Saving Versioning Information

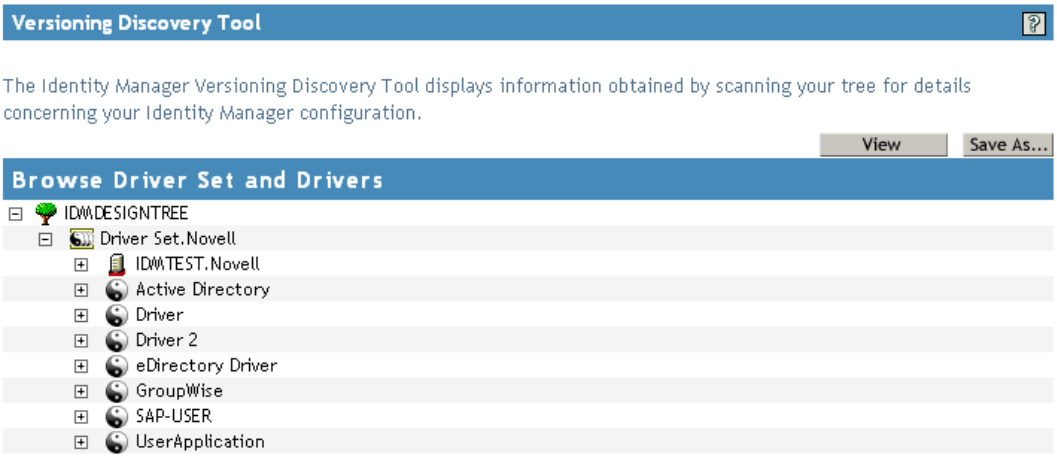
You can save versioning information to a text file on your local or network drive.

1. To find the Driver Set object in iManager, click *Identity Manager* > *Identity Manager Overview*, then click *Search*.
2. In the Identity Manager Overview, click *Information.*



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

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



4 In the File Download dialog box, click *Save*.

5 Navigate to the desired directory, type a filename, then click *Save*.

Identity Manager saves the data to a text file.

10.4 Reassociating a Driver Set Object with a Server Object

The driver set object should always be associated with a server object. If the driver set is not associated with a server object, none of the drivers in the driver set can start.

If the link between the driver set object and the server object becomes invalid, you see one of the following conditions:

- When upgrading eDirectory your Identity Manager server, you get the error UniqueSPIException error -783.
- No server is listed next to the driver set in the Identity Manager Overview window.
- A server is listed next to the driver set in the Identity Manager Overview window, but the name is garbled text.

To resolve this issue, disassociate the driver set object and the server object, then reassociate them.

1. In iManager click *Identity Manager* > *Identity Manager Overview*, then click *Search* to find the driver set object that the driver should be associated with.
2. Click the *Remove server* icon, then click *OK*.
3. Click the *Add server* icon, then browse to and select the server object.
4. Click *OK*.

10.5 Changing the Driver Configuration

If you need to change the driver configuration, Identity Manager allows you to make the change through iManager or Designer.

To change the driver configuration in iManager:

1. Click *Identity Manager* > *Identity Manager Overview*, then click *Search* to search for the driver set that is associated with the driver.
2. Browse to the driver, then click the upper right corner of the driver icon.
3. Click *Edit Properties*.

To change the driver configuration in Designer:

1. Open a project in the Modeler, then right-click the driver line and select *Properties*.

10.6 Storing Driver Passwords Securely with Named Passwords

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

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

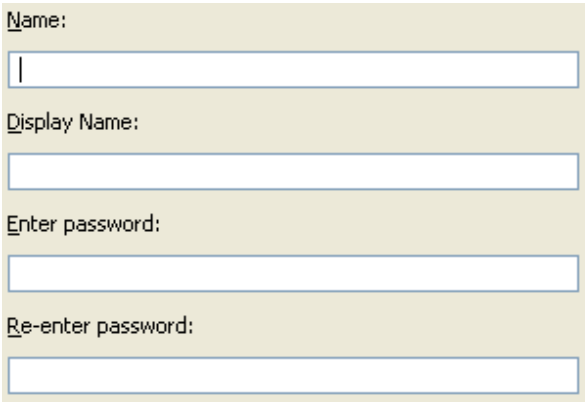
To use a Named Password in a driver policy, you refer to it by the name of the password, instead of using the actual password, and the Metadirectory engine sends the password to the driver. The method described in this section for storing and retrieving Named Passwords can be used with any driver without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

- Section 10.6.1, “Using Designer to Configure Named Passwords,” on page 79
- Section 10.6.2, “Using iManager to Configure Named Passwords,” on page 79

- Section 10.6.3, “Using Named Passwords in Driver Policies,” on page 80
- Section 10.6.4, “Using the DirXML Command Line Utility to Configure Named Passwords,” on page 81

10.6.1 Using Designer to Configure Named Passwords

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



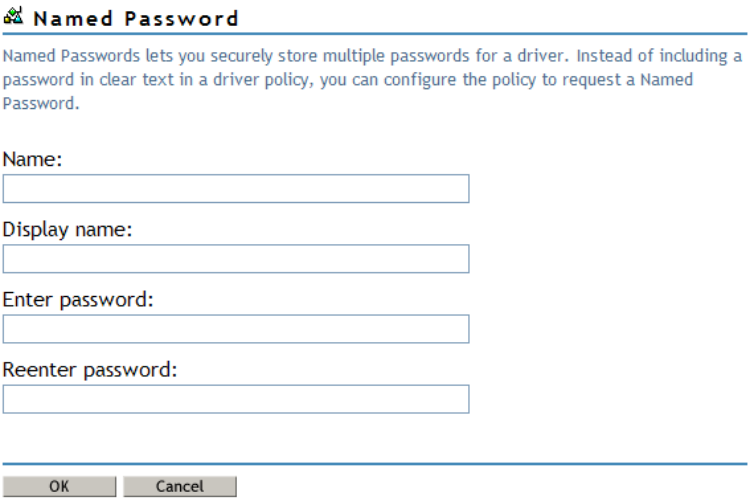
3. Specify the *Name* of the Named Password.
4. Specify the *Display name* of the Named Password.
5. Specify the Named Password, then re-enter the password.
6. Click *OK* twice.

10.6.2 Using iManager to Configure Named Passwords

1. Click *Identity Manager* > *Identity Manager Overview*, then click *Search* to search for the driver set that is associated with the driver.
2. In the Identity Manager Overview, click the upper right corner of the driver icon, then click *Edit properties*.
3. On the Modify Object page on the Identity Manager tab, click *Named Passwords*.

   The Named Passwords page appears, listing the current Named Passwords for this driver. If you have not set up any Named Passwords, the list is empty.

4 To add a Named Password, click *Add*, complete the fields, then click *OK*.



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

You can use this feature to store other kinds of information securely, such as a username.

6 Click *OK* to restart the driver and have the changes take effect.

7 To remove a Named Password, select the password name, then click *Remove*.

The password is removed without prompting you to confirm the action.

10.6.3 Using Named Passwords in Driver Policies

- “Using the Policy Builder” on page 81

- “Using XSLT” on page 81

Using the Policy Builder

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

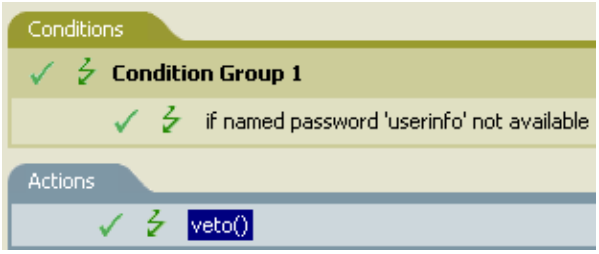
1. In Designer, launch Policy Builder, right-click, then click *New* > *Rule*.
2. Specify the name of the rule, then click *Next*.
3. Select the condition structure, then click *Next*.
4. Select *named password* for the *Condition*.
5. Browse to and select the Named Password that is stored on the driver.

   In this example, it is *userinfo*.
6. Select whether the Operator is available or not available.
7. Select an action for the *Do* field.

   In this example, the action is *veto*.

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

Figure 10-1 *A Policy Using Named Passwords*



Using XSLT

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

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

10.6.4 Using the DirXML Command Line Utility to Configure Named Passwords

- “Creating a Named Password in the DirXML Command Line Utility” on page 81
- “Using the DirXML Command Line Utility to Remove a Named Password” on page 83

Creating a Named Password in the DirXML Command Line Utility

1. Run the DirXML Command Line utility.

For information, see Appendix A, “DirXML Command Line Utility,” on page 109.

2 Enter your username and password.

The following list of options appears.

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

3 Enter `3` for driver operations.

A numbered list of drivers appears.

4 Enter the number for the driver you want to add a Named Password to.

The following list of options appears.

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

5 Enter `13` for password operations.

The following list of options appears.

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

6 Enter `5` to set a new Named Password.

The following prompt appears:

```
Enter password name:
```

7 Enter the name by which you want to refer to the Named Password.

8 Enter the actual password that you want to secure at the following prompt:

```
Enter password:
```

The characters you type for the password are not displayed.

9 Confirm the password by entering it again at the following prompt:

```
Confirm password:
```

10 After you enter and confirm the password, you are returned to the password operations menu.

11 After completing this procedure, you can use the 99 option twice to exit the menu and quit the DirXML Command Line Utility.

Using the DirXML Command Line Utility to Remove a Named Password

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

1 Run the DirXML Command Line utility.

For information, see Appendix A, “DirXML Command Line Utility,” on page 109.

2 Enter your username and password.

The following list of options appears.

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

3 Enter `3` for driver operations.

A numbered list of drivers appears.

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

The following list of options appears.

```
Select a driver operation for:
driver_name
 1: Start driver
 2: Stop driver
 3: Get driver state
 4: Get driver start option
 5: Set driver start option
 6: Resync driver
 7: Migrate from application into DirXML
 8: Submit XDS command document to driver
 9: Submit XDS event document to driver
```

```
10: Queue event for driver
11: Check object password
12: Initialize new driver object
13: Passwords operations
14: Cache operations
99: Exit
Enter choice:
```

5 Enter `13` for password operations.

The following list of options appears.

```
Select a password operation
 1: Set shim password
 2: Reset shim password
 3: Set Remote Loader password
 4: Clear Remote Loader passwor
 5: Set named password
 6: Clear named password(s)
 7: List named passwords
 8: Get passwords state
99: Exit
Enter choice:
```

6 (Optional) Enter `7` to see the list of existing Named Passwords.

The list of existing Named Passwords is displayed.

This step can help you make sure you are removing the correct password.

7 Enter `6` to remove one or more Named Passwords.

8 Enter `No` to remove a single Named Password at the following prompt:

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

9 Enter the name of the Named Password you want to remove at the following prompt:

```
Enter password name:
```

After you enter the name of the Named Password you want to remove, you are returned to the password operations menu:

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

10 (Optional) Enter `7` to see the list of existing Named Passwords.

This step lets you verify that you have removed the correct password.

11 After completing this procedure, you can use the 99 option twice to exit the menu and quit the DirXML Command Line utility.

10.7 Adding a Driver Heartbeat

The driver heartbeat is a feature of the Identity Manager drivers that ship with Identity Manager 2 and later. Its use is optional. The driver heartbeat is configured by using a driver parameter with a time interval specified. If a heartbeat parameter exists and has an interval value other than 0, the driver sends a heartbeat document to the Metadirectory engine if there is no communication on the Publisher channel for the specified interval of time.

The intent of the driver heartbeat is to give you a trigger to allow you to initiate an action at regular intervals, if the driver does not communicate on the Publisher channel as often as you want the action to occur. To take advantage of the heartbeat, you must customize your driver configuration or other tools. The Metadirectory engine accepts the heartbeat document but does not take any action because of it.

For most drivers, a driver parameter for heartbeat is not used in the sample configurations, but you can add it.

A custom driver that is not provided with Identity Manager can also provide a heartbeat document, if the driver developer has written the driver to support it.

To configure the heartbeat:

1. In iManager, click *Identity Manager* > *Identity Manager Overview*.
2. Browse to and select your driver set object, then click *Search*.
3. In the Identity Manager Overview, click the upper right corner of the driver icon, then click *Edit properties*.
4. On the *Identity Manager* tab, click *Driver Configuration*, scroll to *Driver Parameters*, then look for Heart Beat or a similar display name.

   If a driver parameter already exists for heartbeat, you can change the interval and save the changes, and configuration is then complete.

   The value of the interval cannot be less than 1. A value of 0 means the feature is turned off.

   The unit of time is usually minutes; however, some drivers might choose to implement it differently, such as using seconds.
5. If a driver parameter does not exist for heartbeat, click *Edit XML*.
6. Add a driver parameter entry like the following example, as a child of `<publisher-options>`.

   ```
   <pub-heartbeat-interval display-name="Heart Beat">10</pub-heartbeat-interval>
   ```

   If the driver does not produce a heartbeat document after being restarted, check the placement of the driver parameter in the XML.
7. Save the changes, and make sure the driver is stopped and restarted.

After you have added the driver parameter, you can edit the time interval by using the graphical view. Another option is to create a reference to a global configuration value (GCV) for the time interval. Like other global configuration values, the driver heartbeat can be set at the driver set level instead of on each individual driver object. If a driver does not have a particular global configuration value, and the driver set object does have it, the driver inherits the value from the driver set object.

Synchronizing Objects

11

This section explains driver and object synchronization in DirXML® 1.1a, Identity Manager 2.0, and Identity Manager 3.x. Driver synchronization was not available for DirXML 1.0 and DirXML 1.1.

After the driver is created, instead of waiting for objects to be modified or created, the data between the two connected systems can be sent through the synchronization process.

- Section 11.1, “What Is Synchronization?,” on page 87
- Section 11.2, “When Is Synchronization Done?,” on page 87
- Section 11.3, “How Does the Metadirectory Engine Decide Which Object to Synchronize?,” on page 88
- Section 11.4, “How Does Synchronization Work?,” on page 89

11.1 What Is Synchronization?

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

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

11.2 When Is Synchronization Done?

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

- A <sync> event element is submitted on the Subscriber or Publisher channel.
- A <sync> event element is submitted on the Subscriber channel in the following circumstances:
  - The state of the object’s association value is set to “manual” or “migrate.” (This causes an eDirectory™ event, which in turn causes the Identity Manager caching system to queue an object synchronization command in the affected driver’s cache.)
  - An object synchronization command is read from the driver’s cache.
- A <sync> event element is submitted on the Publisher channel in the following circumstances:
  - A driver submits a <sync> event element. No known driver currently does this.

- The Metadirectory engine submits a <sync> event element for each object found as the result of a migrate-into-NDS query. These <sync> events are submitted using the Subscriber thread, but are processed using the Publisher channel filter and policies.

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

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

- The user issues a manual driver synchronization request. This corresponds to the *Resync* button in the Driver Set property page in ConsoleOne®, or to the *Synchronize* button on the iManager Identity Manager Driver Overview page.
- The Metadirectory engine encounters an error with the driver's cache and cannot recover from the cache error. The driver's cache is deleted and the engine generates object synchronization commands as detailed in Section 11.3, "How Does the Metadirectory Engine Decide Which Object to Synchronize?," on page 88.

11.3 How Does the Metadirectory Engine Decide Which Object to Synchronize?

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

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

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

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

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

1. It finds all objects that:
   - Have an entry modification time stamp greater than or equal to the starting filter time and
   - Exist in the filter on the Subscriber channel.

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

11.4 How Does Synchronization Work?

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

1. Each system (the Identity Vault and the connected system) is queried for all attribute values in the appropriate filters.
   - eDirectory is queried for all values in the Subscriber filter, and for values that are marked for synchronization in Identity Manager 2.x and Identity Manager 3.x.
   - The connected system is queried for all values in the Publisher filter, and for values that are marked for synchronization in Identity Manager 2.x and Identity Manager 3.x.
2. The returned attribute values are compared and modification lists are prepared for the Identity Vault and the connected system according to Table 11-1 on page 90, Table 11-2 on page 91, and Table 11-3 on page 93.

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

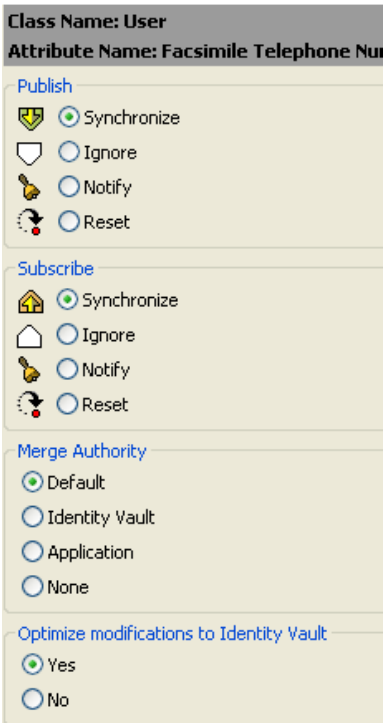
There are three different combinations of selected items in the filter, and each one creates a different output.

- Section 11.4.1, “Scenario One,” on page 89
- Section 11.4.2, “Scenario Two,” on page 91
- Section 11.4.3, “Scenario Three,” on page 92

11.4.1 Scenario One

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

Figure 11-1 *Scenario One*



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

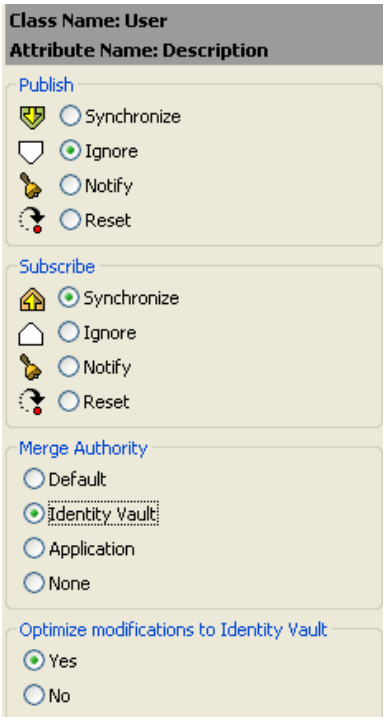
Table 11-1 *Output of Scenario One*

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

11.4.2 Scenario Two

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

Figure 11-2 *Scenario Two*



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

Table 11-2 *Output of Scenario Two*

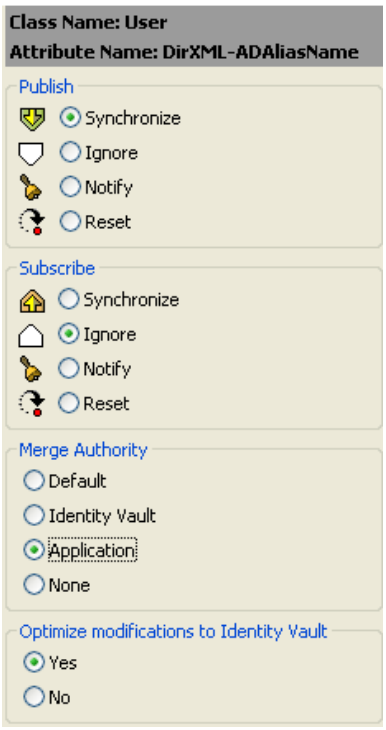
	Identity Vault single-valued empty	**Identity Vault single-valued non-empty**	**Identity Vault multi-valued empty**	**Identity Vault multi-valued non-empty**
Application single-valued empty	No change	App = Identity Vault	No change	App = Identity Vault[1]
Application single-valued empty	App = empty	App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

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

11.4.3 Scenario Three

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

Figure 11-3 *Scenario Three*



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

Table 11-3 *Output of Scenario Three*

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

Troubleshooting the Driver 12

This section contains potential problems and error codes you might encounter while configuring or using the driver.

- Section 12.1, “Troubleshooting Driver Processes,” on page 95
- Section 12.2, “Driver Load Errors,” on page 101
- Section 12.3, “Other Driver Errors,” on page 101

12.1 Troubleshooting Driver Processes

Viewing driver processes is necessary to analyze unexpected behavior. To view the driver processing events, use DSTRACE. You should only use it during testing and troubleshooting the driver. Running DSTRACE while the drivers are in production increases the utilization on the Identity Manager server and can cause events to process very slowly.

12.1.1 Viewing Driver Processes

In order to see the driver processes in DSTRACE, values are added to the driver set and the driver objects. You can do this in Designer and iManager.

- “Adding Trace Levels in Designer” on page 95
- “Adding Trace Levels in iManager” on page 97
- “Capturing Driver Processes to a File” on page 97

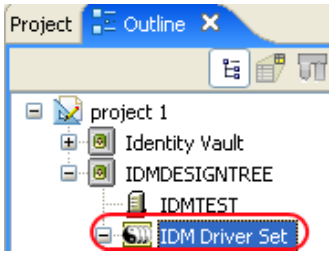
Adding Trace Levels in Designer

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

- “Driver Set” on page 95
- “Driver” on page 96

Driver Set

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



2 Right-click and select *Properties*, then click *5. Trace*.

3 Set the parameters for tracing, then click *OK*.

Parameter	Description
Driver trace level	As the driver object trace level increases, the amount of information displayed in DSTRACE increases. Trace level 1 shows errors, but not the cause of the errors. If you want to see password synchronization information, set the trace level to 5.
XSL trace level	DSTRACE displays XSL events. Set this trace level only when troubleshooting XSL style sheets. If you do not want to see XSL information, set the level to zero.
Java debug port	Allows developers to attach a Java* debugger.
Java trace file	When a value is set in this field, all Java information for the driver set object is written to a file. The value for this field is the path for that file. As long as the file is specified, Java information is written to this file. If you do not need to debug Java, leave this field blank.
Trace file size limit	Allows you to set a limit for the Java trace file. If you set the file size to *Unlimited*, the file grows in size until there is no disk space left.

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

Driver

1. In an open project in Designer, select the driver object in the *Outline* view.
2. Right-click and select *Properties*, then click *8. Trace*.
3. Set the parameters for tracing, then click *OK*.

Parameter	Description
Trace level	As the driver object trace level increases, the amount of information displayed in DSTRACE increases. Trace level 1 shows errors, but not the cause of the errors. If you want to see password synchronization information, set the trace level to 5. if you select *Use setting from Driver Set*, the value is taken from the driver set object.
Trace file	Specify a filename and location for where the Identity Manager information is written for the selected driver. if you select *Use setting from Driver Set*, the value is taken from the driver set object.
Trace file size limit	Allows you to set a limit for the Java trace file. If you set the file size to *Unlimited*, the file grows in size until there is no disk space left. If you select *Use setting from Driver Set*, the value is taken from the driver set object.
Trace name	The driver trace messages are prepended with the value entered instead of the driver name. Use this option if the driver name is very long.

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

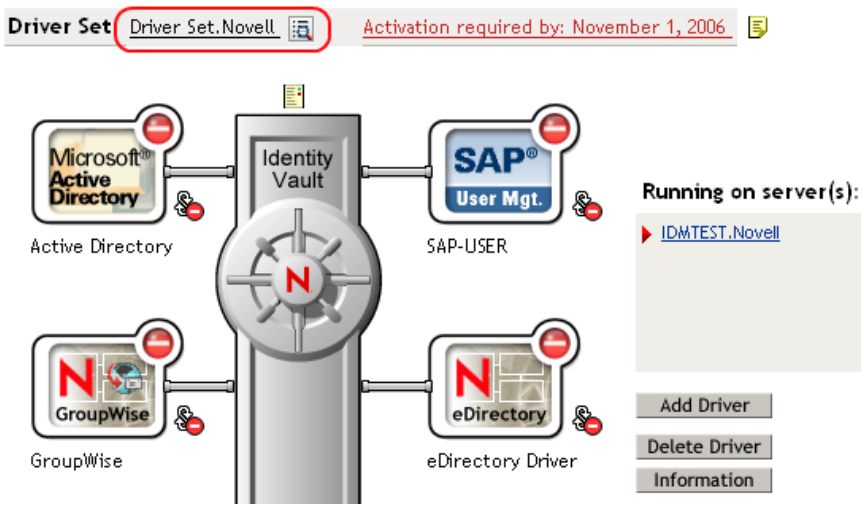
Adding Trace Levels in iManager

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

- “Driver Set” on page 97
- “Driver” on page 97

Driver Set

1. In iManager, select *Identity Manager* > *Identity Manager Overview*.
2. Browse to the driver set object, then click *Search*.
3. Click the driver set name.



4. Select the *Misc* tab for the driver set object.
5. Set the parameters for tracing, then click *OK*.

Driver

1. In iManager, select *Identity Manager* > *Identity Manager Overview*.
2. Browse to the driver set object where the driver object resides, then click *Search*.
3. Click the upper right corner of the driver object, then click *Edit properties*.
4. Select the *Misc* tab for the driver object.
5. Set the parameters for tracing, then click *OK*.

   The option *Use setting from Driver Set* does not exist in iManager.

Capturing Driver Processes to a File

You can save driver processes to a file by using the parameter on the driver object or by using DSTRACE. The parameter on the driver object is the *Trace file* parameter, under the *MISC* tab.

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

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

- "NetWare" on page 98
- "Windows" on page 98
- "UNIX" on page 99
- "iMonitor" on page 99
- "Remote Loader" on page 100

NetWare

Use `dstrace.nlm` to display trace messages on the system console or trace messages to a file (`sys:\system\dstrace.log`). Use `dstrace.nlm` to display the trace messages to a screen labeled DSTrace Console.

1. Enter `dstrace.nlm` at the server console to load `dstrace.nlm` into memory.
2. Enter `dstrace screen on` at the server console to allow trace messages to appear on the `DSTrace Console` screen.
3. Enter `dstrace file on` at the server console to capture trace messages sent to the DSTrace Console to the `dstrace.log` file.
4. (Optional) Enter `dstrace -all` at the server console to make it easier to read the trace log.
5. Enter `dstrace +dxml dstrace +dvrs` at the server console to display Identity Manager events.
6. Enter `dstrace +tags dstrace +time` at the server console to display message tags and time stamps.
7. Toggle to the DSTrace Console screen and watch for the event to pass.
8. Toggle back to the server console.
9. Enter `dstrace file off` at the server console.

   This stops capturing trace messages to the log file. It also stops logging information into the file.
10. Open the `dstrace.log` in a text editor and search for the event or the object you modified.

Windows

1. Open the *Control Panel* > *NDS Services* > `dstrace.dlm`, then click *Start* to display the NDS Server Trace utility window.
2. Click *Edit* > *Options*, then click *Clear All* to clear all of the default flags.
3. Select *DirXML* and *DirXML Drivers*.
4. Click OK.
5. Click *File* > *New*.
6. Specify the filename and location where you want the DSTRACE information saved, then click *Open*.

7 Wait for the event to occur.

8 Click *File* > *Close*.

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

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

UNIX

1 Enter `ndstrace` to start the ndstrace utility.

2 Enter `set ndstrace=nodebug` to turn off all trace flags currently set.

3 Enter `set ndstrace on` to display trace messages to the console.

4 Enter `set ndstrace file on` to capture trace messages to the `ndstrace.log` file in the directory where eDirectory is installed. By default it is `/var/nds`.

5 Enter `set ndstrace=+dxml` to display the Identity Manager events.

6 Enter `set ndstrace=+dvrs` to display the Identity Manager driver events.

7 Wait for the event to occur.

8 Enter `set ndstrace file off` to stop logging information to the file.

9 Enter `exit` to quite the ndstrace utility.

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

iMonitor

iMonitor allows you to get DSTRACE information from a Web browser. It does not matter where Identity Manager is running. The following files run iMonitor:

- `ndsimon.nlm` runs on NetWare®.
- `ndsimon.dlm` runs on Windows.
- `ndsimonitor` runs on UNIX.

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

Port 8008 is the default.

2 Specify a username and password with administrative rights, then click *Login*.

3 Select *Trace Configuration* on the left side.

4 Click *Clear All*.

5 Select *DirXML* and *DirXML Drivers*.

6 Click *Trace On*.

7 Select *Trace History* on the left side.

8 Click the document with the *Modification Time* of *Current* to see a live trace.

9 Change the *Refresh Interval* if you want to see information more often.

10 Select *Trace Configuration* on the left side, then click *Trace Off* to turn the tracing off.

11 Select *Trace History* to view the trace history.

The files are distinguished by their time stamp.

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

- NetWare: `sys:\system\ndsimon\dstrace*.htm`
- Windows: `Drive_letter:\novell\nds\ndsimon\dstrace\*.htm`
- UNIX: `/var/nds/dstrace/*.htm`

Remote Loader

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

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

You can also enable tracing from the command line by using the switches in table Table 12-1. For more information, see "Configuring the Remote Loader " in the *Novell Identity Manager 3.5.1 Administration Guide*.

Table 12-1 *Command Line Tracing Switches*

Option	Short Name	Parameter	Description
-trace	-t	integer	Specifies the trace level. This is only used when hosting an application shim. Trace levels correspond to those used on the Identity Manager server. Example: `-trace 3` or `-t3`
-tracefile	-tf	filename	Specifies a file to write trace messages to. Trace messages are written to the file if the trace level is greater than zero. Trace messages are written to the file even if the trace window is not open. Example: `-tracefile c:\temp\trace.txt` or `-tf c:\temp\trace.txt`

Option	Short Name	Parameter	Description
-tracefilemax	-tfm	size	Specifies the approximate maximum size that trace file data can occupy on disk. If you specify this option, there is a trace file with the name specified using the tracefile option and up to 9 additional “roll-over” files. The roll-over files are named using the base of the main trace filename plus “_n”, where n is 1 through 9. The size parameter is the number of bytes. Specify the size by using the suffixes K, M, or G for kilobytes, megabytes, or gigabytes. If the trace file data is larger than the specified maximum when the Remote Loader is started, the trace file data remains larger than the specified maximum until roll-over is completed through all 10 files. Example: `-tracefilemax 1000M` or `-tfm 1000M`

12.2 Driver Load Errors

If the driver does not load, check DSTrace for the following error messages:

12.2.1 java.lang.ClassNotFoundException:com.novell.nds.dirxml.driver.sapusershim.SAPDriver Shim

This is a fatal error that occurs when `sapusershim.jar` is not installed properly. Ensure that the file is in the proper location for either a local or Remote Loader configuration.

java.lang.ClassNotFoundException:com.novell.nds.dirxml.drivers.sapusershim.SAPDriver Shim

This is a fatal error that occurs when the class name for the `sapusershim.jar` is incorrect. You should ensure that the Java class name is set on the Driver Module tab in a local installation and that the -class parameter is set in a Remote Loader configuration.

The proper class name is com.novell.nds.dirxml.driver.sapusershim.SAPDriverShim

12.3 Other Driver Errors

You might see the following driver errors in the DSTrace utility. An explanation of the error is given along with recommended solutions.

12.3.1 com/sap/mw/jco/JCO

This error occurs when the SAP Java Connector `jco.jar` file or `sapjco.jar` or the JCO native support libraries are not present or are improperly located.

Make sure the proper platform version of `jco.jar` or `sapjco.jar` is located in the same directory as `sapusershim.jar`.

Also check the JCO native support libraries to make sure they are present and properly configured. Use the JCO installation instructions for the appropriate platform.

12.3.2 no jRFC12 in java.library.path

This error occurs when the SAP Java Connector (JCO) native RFC12 support library is not present or is located improperly. Make sure the JCO native support libraries are present and configured properly. Use the JCO installation instructions for the appropriate platform.

12.3.3 /usr/jdk1.3.1/lib/sparc/libjRFC12.so:<classpath info>:fatal librfccm.so:open failed: No such file or directory

This error occurs when the SAP Java Connector (JCO) native RFC support library `librfccm.so` is not present or is improperly located. This sample error is from a Solaris* system.

Make sure the JCO native support libraries are present and properly configured. Follow the JCO installation instructions for the appropriate platform.

12.3.4 com.novell.nds.dirxml.engine.VRDException

This error occurs when the SAP Java Connector (JCO) components cannot be located.This error generally occurs if the driver or Remote Loader has not been restarted after the JCO has been configured. Restart Novell® eDirectory™ if you are using a local configuration or restart the remote loader for a remote configuration.

12.3.5 Error connecting to SAP host

This error occurs when the SAP authentication or connection information is not configured properly. Ensure that the values for Authentication and Driver Parameters are correct for authentication to the SAP host system.

12.3.6 nsap-pub-directory parameter is not a directory

This error occurs when the Publisher IDoc Directory parameter in the Publisher Settings of the Driver Parameters does not specify a valid file system location. Ensure that this parameter specifies the directory on the SAP system configured in the SAP ALE subsystem for IDoc file output.

12.3.7 No connection to remote loader

This error occurs when the Remote Loader connection parameter information is incorrect. Configure the proper connection information for the remote connection to the system where the Remote Loader is running.

12.3.8 Authentication handshake failed, Remote Loader message: “Invalid loader password.”

This error occurs when the Remote Loader password configured on the remote system does not match the Remote Loader password on the Driver object.

Set matching passwords for both remote loaders. In iManager, ensure that both the application password and Remote Loader passwords are set at the same time.

12.3.9 Authentication handshake failed: Received invalid driver object password

This error occurs when the driver password configured on the remote system does not match the Driver object password on the Driver object. To correct this, you should set both Driver object passwords identically.

12.3.10 IDoc File or IDoc TRFC Documents Not Generated when a SAP User Is Created or Modified

You should ensure that the ALE and CUA processes are configured properly, and that you have correctly entered the data.

User data is distributed to the driver only if CUA has been properly configured and if the logical system representing the driver has been selected for distribution under the Systems tab in the SAP User Maintenance dialog box.

12.3.11 Users Created in SAP Cannot Log On to the SAP System (CUA in Use)

When creating users in the CUA central system, you must associate User objects with the client systems to which they authenticate. This occurs in the default policies when you set a value for the driver's logical system in the DirXML-sapLocRoles or DirXML-sapLocProfiles attribute.

12.3.12 The Driver Does Not Recognize IDocs in the Directory

You should first test the ALE and CUA interface. Refer to your SAP documentation for more information.

If the IDoc interface fails:

- Using transaction WE21, ensure that the file port is configured properly. You should validate the path to the directory and make sure the Transfer IDoc Immediately radio button is selected.
- Using transaction WE20, ensure that the appropriate file port is selected in the Partner Profile. Also, verify that it is on the outbound parameters of the receiving system.

If the IDoc interface succeeds:

- Ensure that the correct distribution model has been selected using transaction SCUA.
- Ensure that the proper User field data distribution is configured using transaction SCUM.

12.3.13 IDocs Are Not Written to the Driver (TRFC Port Configuration)

You should first test the ALE and CUA interface. Refer to your SAP documentation for more information.

If the IDoc distribution succeeds but data is not received:

- Verify that the driver is configured to receive data from the correct SAP Gateway.
- Verify that the driver Program ID is unique.
- Using transaction WE21, verify that the SAP port configuration is configured to distribute to the logical system representing the driver.

If the IDoc interface succeeds:

- Ensure that the correct distribution model has been selected using transaction SCUA.
- Ensure that the proper User field data distribution is configured using transaction SCUM.

12.3.14 The Driver Does Not Authenticate to SAP

You should first ensure that you have configured all of the driver parameters and that the proper passwords have been entered. If the SAP system is the central system of a CUA configuration, make sure the User object used for authentication is properly associated with the client logical system. See "Users Created in SAP Cannot Log On to the SAP System (CUA in Use)" on page 103.

If you are running the driver remotely, make sure that the Remote Loader has been started before you start the driver.

12.3.15 JCO Installation and Configuration Errors

For detailed instructions on using the JCO Test utility and analyzing error messages, refer to "Using the SAP Java Connector Test Utility" on page 41.

12.3.16 Error When Mapping Drives to the IDoc Directory

You might see the following error in DSTrace if the IDoc directory parameter specifies an invalid local file system container or if it specifies a mapped drive on a remote system.

```
*** NDS Trace Utility - BEGIN Logging *** Fri Sep 13 15:45:59 2005

DirXML Log Event ------------------
    Driver = \FLIBBLE_TREE\n\Driver Set\SAP-UM
    Channel = publisher
    Status = fatal
    Message = <description>SAP Document Poller initialization failed:
com.novell.nds.dirxml.driver.sapusershim.SAPDocumentPollerInitFailure:
Specified Publisher IDoc Directory is invalid.</description>

*** NDS Trace Utility - END   Logging *** Fri Sep 13 15:46:31 2005
```

This error occurs because the Windows operating system service controls the rights of the local system, not the rights of a user. Thus, the local Windows system does not have rights to access any file resources outside of its own system, including the IDoc directory.

Backing Up the Driver

13

You can use Designer or iManager to create an XML file of the driver. The file contains all of the information entered into the driver during configuration. If the driver becomes corrupted, the exported file can be imported to restore the configuration information.

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

Not all server-specific information stored on the driver is contained in the XML file. Make sure this information is documented through the Doc Gen process in Designer. See "Documenting Projects" in the *Designer 2.1 for Identity Manager 3.5.1*.

- Section 13.1, "Exporting the Driver in Designer," on page 105
- Section 13.2, "Exporting the Driver in iManager," on page 105

13.1 Exporting the Driver in Designer

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

13.2 Exporting the Driver in iManager

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

Security: Best Practices

14

For information on how to secure the driver and the information it is synchronizing, see “Security: Best Practices” in the *Novell Identity Manager 3.5.1 Administration Guide*.

DirXML Command Line Utility

A

The DirXML® Command Line utility allows you to use a command line interface to manage the driver. You can create scripts to manage the driver with the commands.

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

- Windows: `\Novell\Nds\dxcmd.bat`
- NetWare®: `sys:\system\dxcmd.ncf`
- UNIX: `/usr/bin/dxcmd`

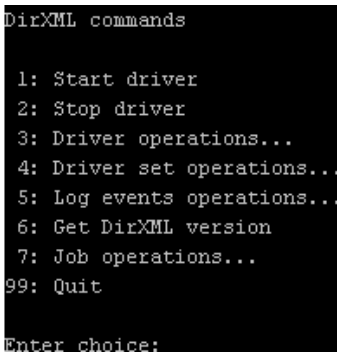
There are two different methods for using the DirXML Command Line utility:

- Section A.1, “Interactive Mode,” on page 109
- Section A.2, “Command Line Mode,” on page 118

A.1 Interactive Mode

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

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



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

   Table A-1 on page 110 contains the list of options and what functionality is available.
5. Enter 99 to quit the utility.

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

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

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

Table A-1 *Interactive Mode Options*

Option	Description
1: *Start Driver*	Starts the driver. If there is more than one driver, each driver is listed with a number. Enter the number of the driver to start the driver.
2: *Stop Driver*	Stops the driver. If there is more than one driver, each driver is listed with a number. Enter the number of the driver to stop the driver.
3: *Driver operations*	Lists the operations available for the driver. If there is more than one driver, each driver is listed with a number. Enter the number of the driver to see the operations available. See Table A-2 on page 111 for a list of operations.
4: *Driver set operations*	Lists the operations available for the driver set. ◆ 1: Associate driver set with server ◆ 2: Disassociate driver set from server ◆ 99: Exit
5: *Log events operations*	Lists the operations available for logging events through Novell® Audit. See Table A-5 on page 115 for a description of these options.
6: *Get DirXML version*	Lists the version of the Identity Manager installed.
7: *Job operations*	Manages jobs created for Identity Manager.1
99: *Quit*	Exits the DirXML Command Line utility

Figure A-1 *Driver Options*

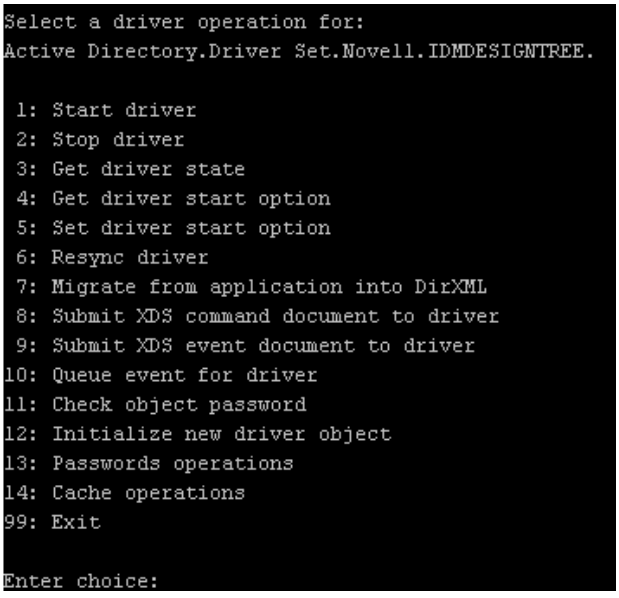


Table A-2 *Driver Options*

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

Options	Description
8: *Submit XDS command document to driver*	Processes an XDS command document: *Enter filename of XDS command document:* Examples: NetWare: `sys:\files\user.xml` Windows: `c:\files\user.xml` Linux: `/files/user.xml` *Enter name of file for response:* Examples: NetWare: `sys:\files\user.log` Windows: `c:\files\user.log` Linux: `/files/user.log`
9: Submit XDS event document to driver	Processes an XDS event document: *Enter filename of XDS event document:* Examples: NetWare: `sys:\files\add.xml` Windows: `c:\files\add.xml` Linux: `/files/add.xml`
10: Queue event for driver	Adds and event to the driver queue *Enter filename of XDS event document:* Examples: NetWare: `sys:\files\add.xml` Windows: `c:\files\add.xml` Linux: `/files/add.xml`
11: *Check object password*	Validates that an object's password in the connected system is associated with a driver. It matches the object's eDirectory password (Distribution Password, used with Universal Password). *Enter user name*:
12: *Initialize new driver object*	Performs an internal initialization of data on a new Driver object. This is only for testing purposes.
13: *Password operations*	There are nine Password options. See Table A-3 on page 113 for a description of these options.
14: *Cache operations*	There are five Cache operations. See Table A-4 on page 114 for a descriptions of these options.

Options	Description
99: *Exit*	Exits the driver options.

Figure A-2 *Password Operations*

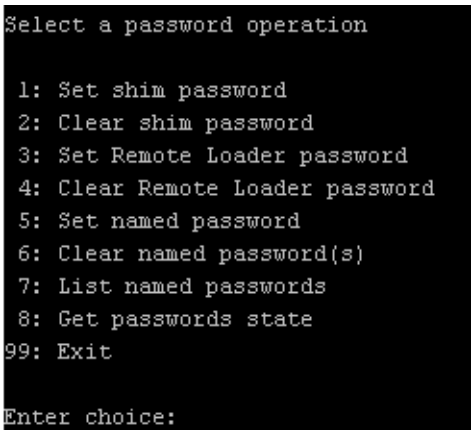


Table A-3 *Password Operations*

Operation	Description
1: *Set shim password*	Sets the application password. This is the password of the user account you are using to authenticate into the connected system with.
2: *Clear shim password*	Clears the application password.
3: *Set Remote Loader password*	The Remote Loader password is used to control access to the Remote Loader instance. Enter the Remote Loader password, then confirm the password by typing it again.
4: *Clear Remote Loader password*	Clears the Remote Loader password so no Remote Loader password is set on the Driver object.
5: *Set named password*	Allows you to store a password or other pieces of security information on the driver. See Section 10.6, “Storing Driver Passwords Securely with Named Passwords,” on page 78 for more information. There are four prompts to fill in: ◆ *Enter password name:* ◆ *Enter password description:* ◆ *Enter password:* ◆ *Confirm password:*

Operation	Description
6: *Clear named passwords*	Clears a specified Named Password or all Named Passwords that are stored on the driver object: *Do you want to clear all named passwords? (yes/no).* If you enter Yes, all Named Passwords are cleared. If you enter No, you are prompted to specify the password name that you want to clear.
7: *List named passwords*	Lists all Named Passwords that are stored on the driver object. It lists the password name and the password description.
8: *Get password state*	Lists if a password is set for: ◆ Driver Object password ◆ Application password ◆ Remote loader password The dxcmd utility allows you to set the Application password and the Remote Loader password. You cannot set the Driver Object password with this utility. It shows if the password has been set or not.
99: *Exit*	Exits the current menu and takes you back to the Driver options.

Figure A-3 *Cache Operations*

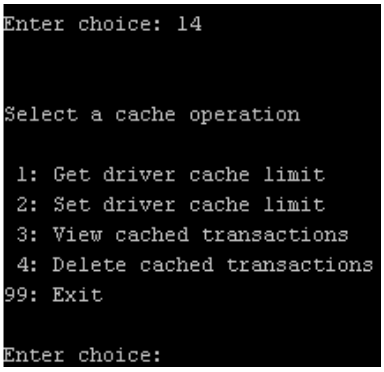


Table A-4 *Cache Operations*

Operation	Description
1: *Get driver cache limit*	Displays the current cache limit that is set for the driver.
2: *Set driver cache limit*	Sets the driver cache limit in kilobytes. A value of 0 is unlimited.

Operation	Description
3: *View cached transactions*	A text file is created with the events that are stored in cache. You can select the number of transactions to view. ◆ *Enter option token* (default=0): ◆ *Enter maximum transactions records to return* (default=1): ◆ *Enter name of file for response:*
4: *Delete cached transactions*	Deletes the transactions stored in cache. ◆ *Enter position token* (default=0): ◆ *Enter event-id value of first transaction record* to delete (optional): ◆ *Enter number of transaction records to delete* (default=1):
99: *Exit*	Exits the current menu and takes you back to the Driver options.

Figure A-4 *Log Event Operations*

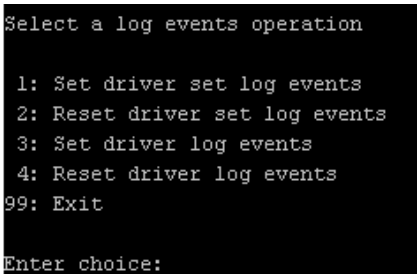


Table A-5 *Log Events Operations*

Operation	Description
1: *Set driver set log events*	Allows you to log driver set events through Novell Audit. There are 49 items you can select to log. See Table A-6 on page 116 for a list of these options. Type the number of the item you want to log. After the items are selected, enter 99 to accept the selections.
2: *Reset driver set log events*	Resets all of the log event options.
3: *Set driver log events*	Allows you to log driver events through Novell Audit. There are 49 items to select to log. See Table A-6 on page 116 for a list of these options. Type the number of the item you want to log. After the items are selected, enter 99 to accept the selections.

Operation	Description
4: *Reset driver log events*	Resets all of the log event options.
99: *Exit*	Exits the log events operations menu.

Table A-6 *Driver Set and Driver Log Events*

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

Options
28: Post matching transformation XDS document
29: Post command transformation XDS document
30: Post-filtered XDS document <Publisher>
31: User agent XDS command document
32: Driver resync request
33: Driver migrate from application
34: Driver start
35: Driver stop
36: Password sync
37: Password request
38: Engine error
39: Engine warning
40: Add attribute
41: Clear attribute
42: Add value
43: Remove value
44: Merge entire
45: Get named password
46: Reset Attributes
47: Add Value - Add Entry
48: Set SSO Credential
49: Clear SSO Credential
50: Set SSO Passphrase
51: User defined IDs
99: Accept checked items

Table A-7 *Enter Table Title Here*

Options	Description
1: *Get available job definitions*	Allows you to select an existing job. *Enter the job number:* *Do you want to filter the job definitions by containment?* Enter Yes or No *Enter name of the file for response:* Examples: NetWare: `sys:\files\user.log` Windows: `c:\files\user.log` Linux: `/files/user.log`
2: *Operations on specific job object*	Allows you to perform operations for a specific job.

A.2 Command Line Mode

The command line mode allows you to use script or batch files. Table A-8 on page 118 lists the different options that are available.

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

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

This example command starts the driver.

Table A-8 *Command Line Options*

Option	Description
Configuration	
-user *<user name>*	Specify the name of a user with administrative rights to the drivers you want to test.
-host *<name or IP address>*	Specify the IP address of the server where the driver is installed.
-password *<user password>*	Specify the password of the user specified above.
-port *<port number>*	Specify a port number, if the default port is not used.
-q *<quiet mode>*	Displays very little information when a command is executed.
-v *<verbose mode>*	Displays detailed information when a command is executed.

Option	Description
-s <*stdout*>	Writes the results of the `dxcmd` command to `stdout`.
-? <*show this message*>	Displays the help menu.
-help <*show this message*>	Displays the help menu.
Actions	
-start <*driver dn*>	Starts the driver.
-stop <*driver dn*>	Stops the driver.
-getstate <*driver dn*>	Shows the state of the driver as running or stopped.
-getstartoption <*driver dn*>	Shows the startup option of the driver.
-setstartoption <*driver dn*> <*disabled*|*manual*|*auto*> <*resync*|*noresync*>	Sets how the driver starts if the server is rebooted. Sets whether the objects are to be resynchronized when the driver restarts.
-getcachelimit <*driver dn*>	Lists the cache limit set for the driver.
-setcachelimit <*driver dn*> <*0 or positive integer*>	Sets the cache limit for the driver.
-migrateapp <*driver dn*> <*filename*>	Processes an XML document that contains a query command. Create the XML document that contains a query command by using the Novell `nds.dtd` (http://www.novell.com/documentation/idm35/index.html?page=/documentation/idm35/policy_dtd/data/dtdndsoverview.html#dtdndsoverview).
-setshimpassword <*driver dn*> <*password*>	Sets the application password. This is the password of the user account you are using to authenticate into the connected system with.
-clearshimpassword <*driver dn*> <*password*>	Clears the application password.
-setremoteloaderpassword <*driver dn*> <*password*>	Sets the Remote Loader password. The Remote Loader password is used to control access to the Remote Loader instance.
<clearremoteloaderpassword <*driver dn*>	Clears the Remote Loader password.

Option	Description
-sendcommand <*driver dn*> <*input filename*> <*output filename*>	Processes an XDS command document. Specify the XDS command document as the input file. Examples: NetWare: `sys:\files\user.xml` Windows: `c:\files\user.xml` Linux: `/files/user.log` Specify the output filename to see the results. Examples: NetWare: `sys:\files\user.log` Windows: `c:\files\user.log` Linux: `/files/user.log`
-sendevent <*driver dn*> <*input filename*>	Submits a document to the driver's Subscriber channel, bypassing the driver cache. The document is processed ahead of anything that might be in the cache at the time of the submission. It also means that the submission fails if the driver is not running.
-queueevent <*driver dn*> <*input filename*>	Submits a document to the driver's Subscriber channel by queuing the document in the driver cache. The document gets processed after anything that might be in the cache at the time of the submission. The submission won't fail if the driver isn't running.
-setlogevents <*dn*> <*integer ...*>	Sets Novell Audit log events on the driver. The integer is the option of the item to log. See Table A-6 on page 116 for the list of the integers to enter.
-clearlogevents <*dn*>	Clears all Novell Audit log events that are set on the driver.
-setdriverset <*driver set dn*>	Associates a driver set with the server.
-cleardriverset	Clears the driver set association from the server.
-getversion	Shows the version of Identity Manager that is installed.
-initdriver object <*dn*>	Performs an internal initialization of data on a new Driver object. This is only for testing purposes.
-setnamedpassword <*driver dn*> <*name*> <*password*> *[description]*	Sets Named Passwords on the driver object. You specify the name, the password, and the description of the Named Password.
-clearnamedpassword <*driver dn*> <*name*>	Clears a specified Named Password.
-startjob <*job dn*>	Starts the specified job.

Option	Description
-abortjob *<job dn>*	Aborts the specified job.
-getjobrunningstate *<job dn>*	Returns the specified job's running state.
-getjobenabledstate *<job dn>*	Returns the specified job's enabled state.
-getjobnextruntime *<job dn>*	Returns the specified job's next run time.
-updatejob *<job dn>*	Updates the specified job.
-clearallnamedpaswords *<driver dn>*	Clears all Named Passwords set on a specific driver.

If a command line is executed successfully, it returns a zero. If the command line returns anything other than zero, it is an error. For example 0 means success, and -641 means invalid operation. -641 is an eDirectory error code. Table A-9 on page 121 contains other values for specific command line options.

Table A-9 *Command Line Option Values*

Command Line Option	Values
-getstate	0- stopped
	1- starting
	2- running
	3- shutting down
	11- get schema
	Anything else that is returned is an error.
-getstartoption	0- disabled
	1- manual
	2- auto
	Anything else that is returned is an error.
-getcachelimit	0- unlimited
	Anything else that is returned is an error.
-getjobrunningstate	0- stopped
	1- running
	Anything else that is returned is an error.
-getjobenabledstate	0- disabled
	1- enabled
	2- configuration error
	Anything else that is returned is an error.

Command Line Option	Values
-getjobnextruntime	Return is the next scheduled time for the job in eDirectory time format (number of seconds since 00:00:00 Jan 1, 1970UTC).

Example XML Document Received from the Driver

B

The following example is a typical XML document received from the default driver configuration.

```
<nds dtdversion="1.0" ndsversion="8.5">
      <source>
            <product build="20050509_1030" instance="SAP-USER-REMOTE-
46C" version="1.0">Identity
     Manager Driver for User Management of SAP Software</product>
<contact>Novell, Inc.</contact>
      </source>
      <input xmlns:sapshim="http://www.novell.com/dirxml/drivers/
sapusershim">
            <modify class-name="US" event-id="O_001_0000000000216097"
src-dn="SSAMPLE"
          timestamp="20030509">
                  <association>USdJSMITH</association>
               <modify-attr attr-name="PROFILES:BAPIPROF">
                        <remove-all-values/>
                  </modify-attr>
                  <modify-attr attr-name="USERNAME:BAPIBNAME">
                        <remove-all-values/>
                  </modify-attr>
               <modify-attr attr-name="ACTIVITYGROUPS:AGR_NAME">
                        <remove-all-values/>
                  </modify-attr>
                  <modify-attr attr-name="PROFILES:BAPIPROF">
                        <add-value>
                              <value>SAP_ALL</value>
                              <value>SAP_NEW</value>
                        </add-value>
                  </modify-attr>
                        <modify-attr attr-name="USERNAME:BAPIBNAME">
                              <add-value>
                              <value>JSMITH</value>
                              </add-value>
                        </modify-attr>
                        <modify-attr attr-
name="ACTIVITYGROUPS:AGR_NAME">
                              <add-value>
                                    <value>SAP_EMPLOYEE</value>
                              </add-value>
                        </modify-attr>
                  </modify>
            </input>
</nds>
```

Some characteristics to note:

- All XML documents received from the SAP system are translated into <modify> documents. This translation occurs because it is not possible to determine whether the object described by the document has been modified or is new. Additional modification or translation of the document is accomplished through policies and the Metadirectory engine.
- The <modify> element contains the classname of the object described in the SAP namespace (that is, US=User). The event-id attribute contains the IDoc number from which the data is derived. The src-dn attribute contains the SAP Object name value. The timestamp attribute contains the date that the IDoc was processed by the driver.
- The <association> element data always contains the format "USd*SAPobjectID*". User names in SAP are always uppercase.
- The <modify-attr> element contains the attr-name described in SAP format (Structure or Table name:Attribute Name).
- Because multivalue attributes cannot be consistently mapped across systems, the <remove-all-values> element is used prior to all <add-value> tags on Publisher channel documents. This instructs the Metadirectory engine to remove all existing values for the attribute prior to assigning the new values. If this functionality is not desired, one of the policies may be used to modify the document.
- All values are in a string format.
- All values for DirXML-locSapRoles and DirXML-locSapProfiles require that you set two fields in SAP. In order to map from a single string value to a structured format, default policies use a colon ":" delimiter in the Identity Vault values (such as ADMCLNT100:SAP_ESSUSER), which are then transformed to (or from) the SAP structured format. "The Schema Mapping Policy" on page 51 indicates the structure components to set for these values.

Structured Format Examples

C

```
// Single value field
//
<modify-attr attr-name="LOCKUSER">
     <add-value>
          <value>1</value>
     </add-value>
</modify-attr>
//
// Single field from Structure
//
<modify-attr attr-name="ADDRESS:E_MAIL">
     <add-value>
          <value>UGRANT@uniongenerals.org</value>
     </add-value>
</modify-attr>
//
// Single field, multi-values from Table
//
<modify-attr attr-name="ACTIVITYGROUPS:AGR_NAME">
     <add-value>
          <value>SAP_ESSUSER</value>
          <value>SAP_EMPLOYEE</value>
     </add-value>
</modify-attr>
//
// All fields, multi-values from Table
//
<modify-attr attr-name="LOCACTIVITYGROUPS">
     <add-value>
          <value type="structured">
                 <component name="FROM_DAT">2005-04-01</component>
                 <component name="TO_DAT">9999-12-31</component>
                 <component name="ORG_FLAG"></component>
                 <component name="AGR_NAME">SAP_ESSUSER</component>
                 <component name="SUBSYSTEM">ADMCLNT500</component>
                 <component name="AGR_TEXT"></component>
          </value>
          <value type="structured">
                 <component name="FROM_DAT">2005-04-01</component>
                 <component name="TO_DAT">9999-12-31</component>
                 <component name="ORG_FLAG"></component>
                 <component name="AGR_NAME">SAP_EMPLOYEE</component>
                 <component name="SUBSYSTEM">ADMCLNT100</component>
                 <component name="AGR_TEXT"></component>
          </value>
     </add-value>
</modify-attr>
```

Configuration and Deployment Notes

D

The following information can be valuable when modifying the driver configuration or when trying to understand SAP system behavior. Many of these notes relate to data value restrictions on the User record. You should investigate the system configuration thoroughly, because some values might have been modified or extended by the SAP administrator.

D.1 SAP Object Types

The following SAP object types of interest might be referenced in <query> operations to SAP.

Table D-1 *SAP Object Types*

USER	Object Type: US
Activity Groups	Object Type: AG
Standard Roles	Object Type: AC
Company	Object Type: U
User Groups	Object Type: UG

D.2 User Types: LOGONDATA:USTYP

- A - Dialog
- C - Communication (CPIC)
- B - System (BDC)
- S - Service
- L - Reference

D.3 Output Controller Options

Table D-2 *Output Controller Options*

G - Output immediately	DEFAULTS: SPDB
H - Don’t output immediately	DEFAULTS: SPDB
D - Delete after output	DEFAULTS: SPDA
K - Don’t delete after output	DEFAULTS: SPDA

D.4 Communication Types: ADDCOMREM:COMM TYPE

- INT - EMail Address type (SMTP)
- LET - Letter (Standard Post)
- PAG - Pager
- FAX - Facsimile
- PRT - Printer
- RML - Remote Mail
- TEL - Telephone
- TLX - Telex
- TTX - Teletex
- SSF - Secure Store and Forward

D.5 Date Formats: DEFAULTS:DATAFM

1. DD.MM.YYYY
2. MM/DD/YYYY
3. MM-DD-YYYY
4. YYYY.MM.DD
5. YYYY/MM/DD
6. YYYY-MM-DD

D.6 Decimal Formats: DEFAULTS:DCPFM

- “X” - The decimal divider is a dot, and the thousands divider is a comma (NN,NNN.NN)
- “Y” - The decimal divider is a comma, and the thousands divider is a blank (NNN NNN,NN)
- “ “ - The decimal divider is a comma, and the thousands divider is a dot (NN.NNN,NN)

D.7 Computer Aided Test (CATT): DEFAULTS:CATTKENNZ

- “X” - CATT: Test status set
- “ ” - CATT: Test status not set
- “.” - CATT: CATT status set

D.8 Communication Comment Type to Table Mappings

Table D-3 *Communication Comment Type to Table Mappings*

Table: ADDTEL	Comment Type: TEL	Key Field: TELEPHONE
Table: ADDFAX	Comment Type: FAX	Key Field: FAX
Table: ADDPAG	Comment Type: PAG	Key Field: PAGER
Table: ADDSMTP	Comment Type: INT	Key Field: E_MAIL
Table: ADDTTX	Comment Type: TTX	Key Field: TELETEX
Table: ADDPRT	Comment Type: PRT	Key Field: PRINT_DEST
Table: ADDTLX	Comment Type: TLX	Key Field: TELEX_NO
Table: ADDRML	Comment Type: RML	Key Field: R_MAIL
Table: ADDURI	Comment Type: URI	Key Field: URI

D.9 Language Codes

Language	Two-Letter Code	One-Letter Code
Afrikaans	AF	a
Arabic	AR	A
Bulgarian	BG	W
Czech	CS	C
Danish	DA	K
German	DE	D
Greek	EL	G
English	EN	E
Spanish	ES	S
Estonian	ET	9
Finnish	FI	U
French	FR	F
Hebrew	HE	B
Croatian	HR	6
Hungarian	HU	H
Indonesian	ID	i
Italian	IT	I

Language	Two-Letter Code	One-Letter Code
Japanese	JA	J
Korean	KO	3
Lithuanian	LT	X
Latvian	LV	Y
Malaysian	MS	7
Dutch	NL	N
Norwegian	NO	O
Polish	PL	L
Portuguese	PT	P
Romanian	RO	4
Russian	RU	R
Slovak	SK	Q
Slovene	SL	5
Serbian	SR	0 (zero)
Swedish	SV	V
Thai	TH	2
Turkish	TR	T
Ukrainian	UK	8
Customer Reserve	Z1	Z
Chinese Traditional	ZF	M
Chinese	ZH	1

D.10 Configuration Parameters

Comment text for configuration parameters is limited to a maximum length of 50 bytes.

D.11 Design Comments and Notes

When specifying either USER or COMPANY names in BAPI calls, the name field must be in all-caps format, even if the naming field is not specified as such.

NOTE: The ADMIN_SET mode is deprecated prior to R/3 4.7. You need to USER_SET mode with SAP 4.7 and above.

In BAPI_USER_CHANGE (ADDRESS table)

- The COMM-TYPE attribute in SAP has defined, acceptable values. Invalid input generates an exception and an error message stating, “The communication type <commType> is not

defined.” Valid fields are the abbreviations for the supported communication types on the SAP Host.

- The TITLE_ACA1 and TITLE_ACA2 attributes have predefined, acceptable values. Invalid input results in the value in SAP being set to a null string (“ ”).
- The PREFIX1 and PREFIX2 attributes have predefined, acceptable values. Invalid input results in the value in SAP being set to a null string (“ ”).
- The TEL1_NUMBR is linked to the primary, or Standard, Telephone number in the Telephone communication table.

In BAPI_USER_CHANGE (ADDFAX table)

- The Facsimile Telephone Number attribute in eDirectory is a structured attribute. An output transformation converts it to a single attribute format.

In BAPI_USER_CHANGE (ADDTEL table)

- Must have a CONSNUMBER (either the number of the one you wish to change or a new, non-000 number.)
- The STD_NO field must be set to X if you are synchronizing a single field or if the number is the only number present.
- The primary data field is TELEPHONE.

In BAPI_USER_CHANGE (ADDTLX table)

- By default, this table is mapped to the Organizational Person; telexNumber attribute. This syntax is OCTET_STRING, which is encoded by Identity Manager into Base64 string encoding. A Java function is provided in the driver `sapusershim.jar` file that can decode this into the proper string format in the Output Transformation prior to submission to SAP. If you are using the driver on a remote system, place the driver shim in the same file system container with the Identity Manager library in the Input Transformation for the Publisher channel.
- The primary data field is TELEX_NO.
- Other rules apply as described for the ADDTEL table.

In BAPI_USER_CHANGE (ADDFAX table)

- The primary data field is FAX.
- Other rules apply as described for the ADDTEL table.

In BAPI_USER_CHANGE (GROUPS table)

- The USERGROUP is the only field in this table.

In BAPI_USER_CHANGE (ALIAS structure)

- The USERALIAS is the only field in this table.
- The SAP system guarantees that alias names are unique among all users. If an alias value is already assigned to another user, the modification fails.

In BAPI_USER_CHANGE (REF_USER structure)

- The REF_USER is the only field in this table.
- The value specified as REF_USER must be an existing User object on the SAP client, and the Reference User's type flag must be set to Reference (User Type L)

In BAPI_USER_CHANGE (DEFAULTS structure)

- The SPDB field can only be populated with a G (GO or Output Immediately), or an H (Hold output), or a null string " ", which sets the value to H. All other values generate an error message. This field is case sensitive.
- The SPDA field can only be populated with a D (Delete after print), or a K (Keep), or a null string " ", which sets the value to K. All other values generate an error message. This field is case sensitive.
- The KOSTL (Cost center) field is automatically truncated to 8 bytes by the SAP system.
- The SPLG field does not appear to be utilized at all. Any value is accepted but does not relate to any attribute shown in the SAP GUI.
- The START_MENU field can be set to any value up to 30 characters whether or not a valid menu exists for the value being set.
- The SPLD (Output Controller) field accepts only a null string value (" ") or a valid output device that is available via the SAP GUI drop-down list for this field. Invalid selections return an error.
- The LANGU field must be set to one of the one-letter language codes defined in Section D.9, "Language Codes," on page 129 or to a null string (" "). The null string defaults to the language of the SAP system default language. This field is case sensitive. Non-defined fields result in an error.

In BAPI_USER_CHANGE (LOGONDATA structure)

- The USTYP field only accepts the valid User Types defined in Section D.2, "User Types: LOGONDATA:USTYP," on page 127 or a null string (" "). Other input generates an exception and error message stating "Invalid user type<type>."
- The TZONE field accepts only valid, selectable fields from the SAP GUI drop-down list. Invalid input generates an exception and an error message stating "Invalid time zone." The Time Zone setting is displayed under the Defaults tab in the SAP client Display User dialog box.
- The CLASS field represents the User's User Group for Authorization Check setting. Only fields that are selectable from the SAP GUI drop-down list are accepted. Invalid input generates an exception and error message stating "User group <class> does not exist."
- The GLTGV (Validity Begin Date) and GLTGB (Validity End Date) values exist as a set of data.
- The Begin Date must always be less than the End date.
- Invalid date input generates an exception and an error message stating "Invalid time interval: Begin date after end date."

In BAPI_USER_CHANGE (GROUPS table)

- Only valid groups that exist in the SAP User Groups table can be added to a user. Invalid input generates an exception and an error message stating “User group<name> does not exist.”

In BAPI_USER_CHANGE (ADDCOMREM table)

- The LANGU and LANGU_ISO fields are set with the driver’s language parameter value.

Using Wildcard Search Capabilities

E

Releases of this driver prior to version 1.0.5 had issues related to the implementation of the default Subscriber Matching policy. This policy issues a query to the SAP server for matches of the “Given Name” and “Surname” attributes (mapped to ADDRESS:FIRSTNAME and ADDRESS:LASTNAME) prior to processing the creation of a new User object. The following XDS query illustrates the output of this policy.

```
<nds dtdversion="1.1" ndsversion="8.6">
   <source>
      <product version="1.1.2">DirXML</product>
         <contact>Novell, Inc.</contact>
   </source>
   <input>
      <query class-name="US" event-id="0">
         <search-class class-name="US"/>
         <search-attr attr-name="ADDRESS:LASTNAME">
           <value timestamp="1114621366#3" type="string">Smith</value>
         </search-attr>
         <search-attr attr-name="ADDRESS:FIRSTNAME">
            <value timestamp="1114621375#1" type="string">Joe</value>
         </search-attr>
         <read-attr/>
      </query>
   </input>
</nds>
```

This is a problem because SAP does not provide the capability to Search for a User account based on attribute values. Therefore, the driver needs to obtain a list of all User objects, then read each object, compare their FIRSTNAME and LASTNAME attributes to the search values, and return a list of matching objects. In a database with hundreds or thousands of User objects, this process takes a very long time.

To alleviate this problem, starting with version 1.0.5, the driver now has the capability to use a wildcard syntax for queries that contain the User name field (USERNAME:BAPIBNAME). This allows you to write policies that take advantage of the known account naming policies of the SAP system to reduce the number of objects that need to be read and compared during matching operations.

For example, the default Subscriber Create rule uses the first initial of the Given Name attribute value appended with the Surname attribute value to create a proposed account name. A new User with Given Name “John” and Surname “Smith” generates a proposed SAP User account name of JSMITH. Any duplicates of this proposed name are appended with numeric values (ie. JSMITH1, JSMITH2, etc.) The default Output Transformation policy now contains a template that takes advantage of the USERNAME:BAPIBNAME wildcard capabilities of the driver and appends this additional search attribute to the query. When the driver receives a query containing a USERNAME:BAPIBNAME search attribute, it determines if the value is a wildcard or a literal value. Any value that is contained within single-quote characters is evaluated for wildcard syntax. If the single quote characters do not exist, the driver attempts to read the specified User object.

The supported variations of the wildcard syntax are:

- “Starts-with” syntax (ie. JSmith*) - This restricts attribute matching to User account names starting with JSMITH.
- “Ends-with” syntax (ie. *ith) - This restricts attribute matching to User account names ending with ITH.
- “Contains” syntax (ie. *SMIT*) - This restricts attribute matching to User account names containing SMIT.

When the list of objects to be matched has been restricted, the remaining search attributes are used to determine a match.

The output from the default Output Transform policy converts the Matching Rule query shown above to the following query. It should be noted that this policy will only be applied to queries that do not already contain a USERNAME:BAPIBNAME search attribute.

```
<nds dtdversion="1.1" ndsversion="8.6">
   <source>
      <product version="1.1.2">DirXML</product>
      <contact>Novell, Inc.</contact>
   </source>
   <input>
      <query class-name="US" event-id="0">
         <search-class class-name="US"/>
         <search-attr attr-name="ADDRESS:LASTNAME">
           <value timestamp="1114621366#3" type="string">Smith</value>
         </search-attr>
         <search-attr attr-name="ADDRESS:FIRSTNAME">
            <value timestamp="1114621375#1" type="string">Joe</value>
         </search-attr>
         <read-attr/>
         <search-attr attr-name="USERNAME:BAPIBNAME">
            <value>’JSmith*’</value>
         </search-attr>
      </query>
   </input>
</nds>
```

With this query, the driver searches only User objects whose name starts with JSMITH for matching ADDRESS:LASTNAME value “Smith” and matching ADDRESS:FIRSTNAME value “Joe.”

Setting and Clearing Granular Locks

F

This functionality is available for SAP systems that support the concept of granular locks via the SUSR_BAPI_USER_LOCK and SUSR_BAPI_USER_UNLOCK functions. These locks relate to the account locking mechanisms that are available from the Central System of an SAP Central User Administration (CUA) environment.

This functionality is only available through the SAP User Management driver if the BAPI functions are configured to be a Remote-Enabled Module. This is done via an attribute setting in the SAP Function Builder transaction (SE37) and must be performed by an authorized administrator.

The driver can set or clear the supported lock types by using two pseudo-attributes called SETGRANULARLOCKS and CLEARGRANULARLOCKS.

The supported lock types for SETGRANULARLOCKS are:

- LOCK_LOCAL
- LOCK_GLOBAL

The supported lock types for CLEARGRANULARLOCKS are:

- LOCK_LOCAL
- LOCK_GLOBAL
- LOCK_WRONG_LOGON

To set or clear a particular lock, simply use a value of X or x for the desired lock type value. Any unspecified lock type sets to a value of ' ', which implies the lock type is not set or cleared.

NOTE: It is not valid to use these pseudo-attributes in a <remove-value> element.

F.1 Examples

```
//
// Example - Set Local Lock on User
//
<modify-attr attr-name="SETGRANULARLOCKS">
      <add-value>
            <value type="structured">
                  <component name="LOCK_LOCAL">X</component>
            </value>
      </add-value>
</modify-attr>

//
// Example - Set Local and Global Locks on User
```

```
//
<modify-attr attr-name="SETGRANULARLOCKS">
      <add-value>
            <value type="structured">
                  <component name="LOCK_LOCAL">X</component>
                  <component name="LOCK_GLOBAL">X</component>
            </value>
      </add-value>
</modify-attr>

//
// Example - Clear Local and Wrong Logon Locks on User
//
<modify-attr attr-name="CLEARGRANULARLOCKS">
      <add-value>
            <value type="structured">
                  <component name="LOCK_LOCAL">X</component>
                  <component name="LOCK_WRONG_LOGON">X</component>
            </value>
      </add-value>
</modify-attr>
```

Driver BAPIs

G

Table G-1 contains a list of the BAPIs used by the driver.

Table G-1 *Driver BAPIs*

BAPI Name	Description
BAPI_PDOTYPES_GET_DETAILEDLIST	Used to obtain lists and minimal detailed information for SAP USER objects and other specified business object types.
BAPI_USER_ACTGROUPS_ASSIGN	Used to assign the Activity Groups (Roles) to SAP USER objects in a non-CUA landscape.
BAPI_USER_ACTGROUPS_DELETE	Used to delete the Activity Groups (Roles) from SAP USER objects in a non-CUA landscape.
BAPI_USER_PROFILES_ASSIGN	Used to assign Profiles to SAP USER objects in a non-CUA landscape.
BAPI_USER_PROFILES_DELETE	Used to delete Profiles from SAP USER objects in a non-CUA landscape.
BAPI_USER_CHANGE	Used to modify SAP USER object attributes (fields, structures, and general tables) and non-persistent passwords.
BAPI_USER_CREATE1	Used to create a new SAP USER object.
BAPI_USER_DELETE	Used to delete an SAP USER object.
BAPI_USER_GETDETAIL	Used to read the current data field values, structures, and general table attributes of an SAP USER object.
BAPI_ADDRESSORG_GETDETAIL	Used to read the Company Address attributes of an SAP USER object.
BAPI_USER_LOCK	Used to lock an SAP USER object account. On a CUA Central system this is a global lock. On a CUA Child system or on a non-CUA system, this is a local lock.
BAPI_USER_UNLOCK	Used to unlock an SAP USER object account. On a CUA Central system this is a global lock. On a CUA Child system or on a non-CUA system this is a local lock.

BAPI Name	Description
SUSR_BAPI_USER_LOCK	Used to set granular locks on an SAP USER object account. The granular lock types available are `LOCK_LOCAL` and `LOCK_GLOBAL`. By default, this BAPI is not a Remote-Enabled Module and is thus not accessible to the driver. An ABAP developer must modify the Processing Type attribute of the BAPI on the target SAP system. This is accomplished via the SAP Function Builder (Transaction SE37).
SUSR_BAPI_USER_UNLOCK	Used to clear granular locks on an SAP USER object account. The granular lock types available are `LOCK_LOCAL`, `LOCK_GLOBAL`, and `LOCK_WRONG_LOGON`. By default, this BAPI is not a Remote-Enabled Module and is thus not accessible to the driver. An ABAP developer must modify the Processing Type attribute of the BAPI on the target SAP system. This is accomplished via the SAP Function Builder (Transaction SE37).
SUSR_USER_CHANGE_PASSWORD_RFC	Used to set a persistent password for an SAP USER object.
BAPI_USER_LOCACTGROUPS_ASSIGN	Used to assign client-specific Activity Groups (Roles) to SAP USER objects in a CUA landscape.
BAPI_USER_LOCACTGROUPS_READ	Used to read the current client-specific Activity Groups (Roles) assignments of SAP USER objects in a CUA landscape.
BAPI_USER_LOCACTGROUPS_DELETE	Used to delete the client-specific Activity Groups (Roles) assignments from SAP USER objects in a CUA landscape.
BAPI_USER_LOCPROFILES_ASSIGN	Used to assign client-specific Profiles to SAP USER objects in a CUA landscape.
BAPI_USER_LOCPROFILES_READ	Used to read the current client-specific Profile assignments of SAP USER objects in a CUA landscape.
BAPI_USER_LOCPROFILES_DELETE	Used to delete the client-specific Profile assignments from SAP USER objects in a CUA landscape.
BAPI_USER_CLONE	Sent from the SAP ALE subsystem to communicate SAP-initiated changes of USER objects to the driver Publisher channel.
BAPI_COMPANY_CLONE	Sent from the SAP ALE subsystem to communicate SAP-initiated changes of Company Address information to the driver Publisher channel.