Novell Identity Manager Driver for User Management of SAP* Software

1.0.2

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IMPLEMENTATION GUIDE

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Novell®

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Nsure Identity Manager Driver for User Management of SAP Software Implementation Guide
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Contents

About This Guide

This manual is for Novell® Nsure 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:

Documentation Updates

For the most recent version of the *Identity Manager Driver for User Management of SAP Software Implementation Guide*, see the Nsure™ Identity Manager 2 Drivers Documentation Web site (http://www.novell.com/documentation/lg/dirxmldrivers).

Documentation Conventions

The term *driver* refers to all components of Identity Manager Driver for User Management of SAP Software and not to any one particular component.

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

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User Comments

We want to hear your comments and suggestions about this guide and the other documentation included with the driver. To contact us, send e-mail to proddoc@novell.com.

1 Introducing the Identity Manager Driver for User Management of SAP Software

The Identity Manager Driver 1.0 for User Management of SAP Software, subsequently referred to as the driver, creates an automated link between Novell® eDirectory™ 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 eDirectory, 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:

Understanding Driver Concepts

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

eDirectory acts as a hub, with other applications and directories publishing their changes to it. eDirectory 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.

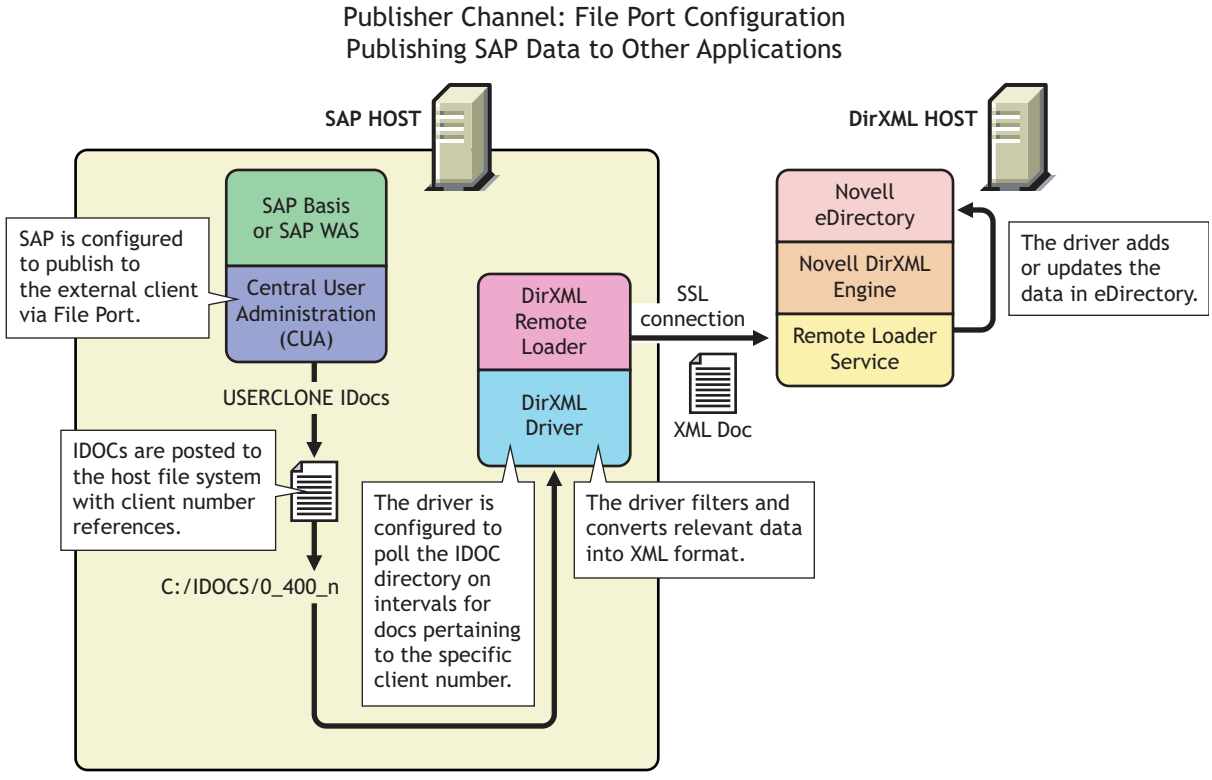
Publisher Channel

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 eDirectory. 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 11.

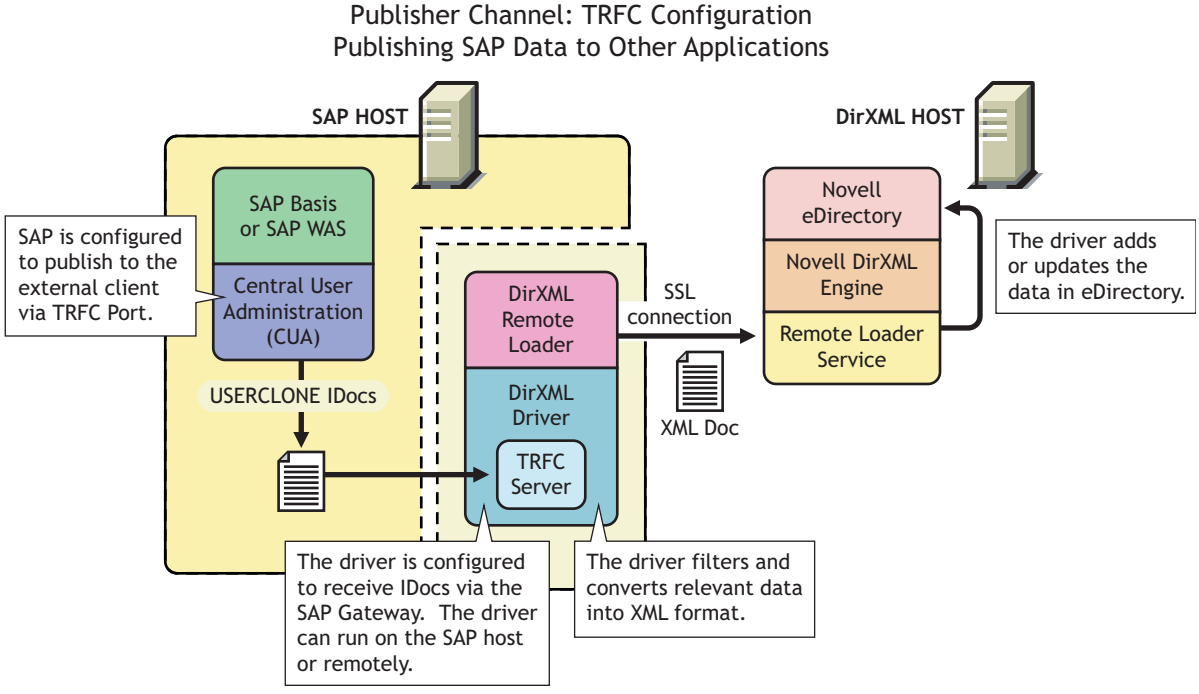
The Publisher channel then submits XML-formatted documents to the DirXML engine for publication into eDirectory. Using eDirectory and other drivers, the data can be shared with other business applications and directories. These other applications can add additional data, which in turn can be transferred 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.



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 eDirectory. Only data elements specifically selected by the system administrator are transported from the SAP host system to eDirectory.



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 eDirectory.

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

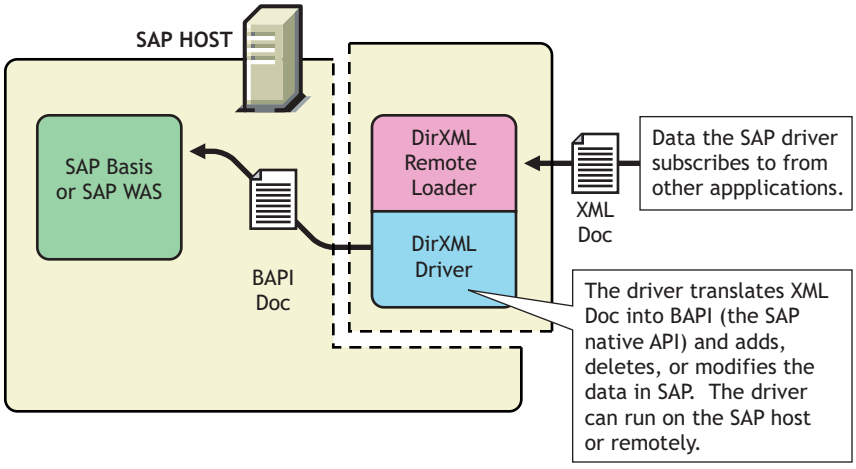
You should determine what action is required, if any, after IDoc publication is complete.

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

Subscriber Channel

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

Subscriber Channel
Populating SAP with Data from Other Applications



For data to flow from eDirectory 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.

Attribute Mapping from the SAP User Management Database to eDirectory

Schema mapping is used by Identity Manager to translate data elements as they flow between the SAP User Management database and eDirectory. 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 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:

```
<Segment Infotype Name>:<Infotype Field>// Table/Structure
```

or

```
<Segment Infotype Name>:<Infotype Field>// Simple data
```

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

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 or Structure name in a schema mapping. This is useful if only one data field exists in the structure or if you want to synchronize all data fields in a Table or Structure to eDirectory. In these instances, the driver uses a semicolon (;) delimiter between field data values.

Associations

Associations are created between SAP and eDirectory objects during the synchronization process. For the SAP User object, a unique 12-character name (per client) must be created. However, eDirectory 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 eDirectory object.

The unique ID association links objects in SAP to their objects in eDirectory. 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 eDirectory object on the DirXML property page.

Understanding Driver Components

This sections contains information about the following driver components.

- "Driver Configurations" on page 14
- "Driver Shim" on page 14
- "SAP User Java Connector Test Utility" on page 14

Driver Configurations

After you install Nsure™ Identity Manager 2 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.xml.

Driver Shim

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

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 5, “Using the SAP Java Connector Test Utility,” on page 31.

New Features

For more information about the new features of Identity Manager 2, refer to the *Nsure Identity Manager 2 Administration Guide* (http://www.novell.com/documentation/lg/dirxml20/admin/data/alxnk27.html).

2 Installing the Driver

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

- “Planning for Installation” on page 15
- “Configuration Information” on page 16
- “Installing the Driver” on page 16
- “Extending the Schema” on page 19
- “Activating the Driver” on page 19

These tasks are explained in detail in this section. After you finish installing the driver, proceed to Chapter 3, “Understanding ALE Technologies,” on page 21 to learn more about the SAP system configuration requirements.

Driver Prerequisites

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

- ❑ Novell® Nsure™ Identity Manager 2.
- ❑ 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).

  NOTE: Because the driver can be configured to use a Remote Loader interface for both the Publisher and Subscriber Channels, there is no requirement to install the driver on the SAP host system or the eDirectory host system.
- ❑ JDK*/JRE 1.3.1 or later.
- ❑ SAP Server revision level 4.5B or later.

  The driver operates with any SAP R/3 or Enterprise R/3 host system.

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 DirXML® 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.

Installing the Driver

You install the driver as part of the Novell Nsure Identity Manager 2 installation program. For installation instructions, refer to the *Novell Nsure Identity Manager 2 Administration Guide* (http://www.novell.com/documentation/lg/dirxml20/index.html).

This section explains how to import the driver configuration for the Identity Manager Driver for User Management of SAP Software. After you have imported the configuration, you can use iManager to configure and manage the driver.

In this section, you will find information for:

- "Configuration Information" on page 16
- "Importing the Driver Configuration" on page 18
- "Activating the Driver" on page 19

Configuration Information

As you import the driver configuration file, you will be prompted for the following information.

Parameter Name	Parameter Description
Driver name	The actual name you want to use for the driver.
User Object Container	The name of the eDirectory Organizational Unit object where Users from the SAP system will be placed.
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 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 Port Type	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. Any other value will disable the Publisher channel functionality.
SAP System Number	The SAP system number on the SAP application server. This is referred to as the "System Number" in the SAP logon properties.
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.

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 to 0 if only the primary value of Communication tables should be synchronized. Set to 1 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 to 1 to populate User Company Address information for the Publisher channel and for Subscriber channel queries. Set to 0 if you do not want this functionality.
Require User to Change Set Passwords	The Subscriber channel can be configured to handle a User password set operation in two methods. Enter 1 if passwords must be changed immediately by Users at their next login, or enter 0 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 comments to the table entries.
SAP Gateway ID	If the Publisher channel port type is TRFC, this parameter specifies the gateway that distributes User data to the driver. If you are not using TRFC, this parameter is ignored.
TRFC Program ID	If the Publisher channel port type is TRFC, this parameter identifies the JCO server program in the driver for the SAP gateway. If you are not using TRFC, this parameter is ignored. Note that the program ID is a case-sensitive text identifier.
Publisher IDoc File Directory	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.)
Configure Data Flow	Data flow can be configured to one of the following options: ◆ Bidirectional: SAP HR and eDirectory are both authoritative sources of the data synchronized between them. ◆ SAP-to-eDirectory: SAP is the authoritative source. ◆ eDirectory-to-SAP: eDirectory is the authoritative source.
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	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.
Driver Password	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.
Remote Password	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.

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
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. 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 0 if you do not desire this functionality. Enter 1 to activate it. Trace files are generated in either the DirXML or Remote Loader root directory and are identified by a '.trc' extension. The default value is 0.
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 0 if you do not desire this functionality. Enter 1 to activate it. Trace files are generated in either the DirXML or Remote Loader root directory and are identified by a '.trc' extension. The default value is 0.

Importing the Driver Configuration

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 DirXML Utilities > Create Driver.
2. Select a driver set.

   If you place this driver in a new driver set, you must specify a driver set name, context, and associated server.
3. Select Import a Driver Configuration from the Server, then select SAPUser.xml.

   The driver configuration files are installed on the Web server when you install Identity Manager. During the import, you are prompted for the driver's parameters and other information. Refer to "Configuration Information" on page 16 for more information.
4. Specify the driver's parameters, then click OK to import the driver.

When the import is finished, you can define security equivalences and exclude administrative roles from replication.

The driver object must be granted sufficient eDirectory rights to any object it reads or writes. You can do this by granting Security Equivalence to the driver object. The driver must have Read/Write access to users, post offices, resources, and distribution lists, and Create, Read, and Write rights to the post office container. Normally, the driver should be given security equal to Admin.

5 Review the driver objects in the Summary screen, then click Finish.

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).

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.

Activating the Driver

Activation must be completed within 90 days of installation or the driver will not run.

For activation information, refer to "Activating Novell Identity Manager Products" in the *Novell Nsure Identity Manager 2 Administration Guide*.

3 Understanding ALE Technologies

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

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 21
- “Message Type” on page 22
- “IDoc Type” on page 22
- “Distribution Model” on page 22
- “Partner Profiles” on page 22
- “Port” on page 22
- “Port Definition” on page 22
- “File Port” on page 23
- “CUA” on page 23

Refer to “Configuring the SAP System” on page 25 for instructions on how to configure these SAP system parameters.

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.

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).

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:

1. The control record
2. The data record
3. 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.

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.

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.

Port

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

Port Definition

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

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.

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.

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.

4 Configuring the SAP System

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 eDirectory. Novell® follows SAP's general guidelines for configuring BAPI (Business Application and Programming Interface) and ALE technologies for this integration solution.

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 25
2. "Creating a Logical System" on page 26
3. "Assigning a Client to the Logical System" on page 26
4. "Creating a Distribution Model" on page 26
5. "Creating a Port Definition" on page 27
6. "Partner Profiles" on page 28
7. "Modify Port Definition" on page 28
8. "Activating Central User Administration" on page 29
9. "Set Field Distribution Parameters" on page 29
10. "Create a Communication (CPIC) User" on page 30

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.

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 26.

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 DirXML external *receiver* system (such as DIRXMLDRV).
6. Type a description for the logical system (such as DirXML 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.

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 DirXML).
5. Type the technical name for the model (such as SAP2DIRXML).
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 DIRXMLDRV).

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 SAP2DIRXML model view.

14 Click Add BAPI.

15 Define the sender (logical system ADMCLNT100).

16 Define the receiver (logical system DIRXMLDRV).

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.

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.

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.

TRFC Port Definition

Prior to creating a TRFC port definition, you must create an RFC destination. To create an RFC destination:

1 In SAP, type transaction code SM59.

2 Click the Create icon.

3 Name the RFC destinations (such as DIRXML USER DRIVER).

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

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

6 Save your entry.

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

8 Save your entry.

The TRFC port is used to determine the RFC program to which IDocs are sent.

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 DIRXMLPORT).

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

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

3d Enter the RFC destination. This is the name of the RFC destination representing the driver (such as DIRXML USER DRIVER.)

4 Save your entries.

File Port Definition

1 In SAP, type transaction code WE21.

2 Select File, then click the Create icon.

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

2b Type a port description (such as File Port to DIRXML 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. For example: 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).

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 26.

3 Ensure that the Transfer IDoc Immediately and Trigger Immediately option buttons are selected.

4 Click the Execute icon.

NOTE: Ignore any red error or warning messages when the status screen appears. These issues will be resolved when you modify the port definition in the next section.

Modify Port Definition

When you generated a partner profile, the port definition might have been entered incorrectly. For your system to work properly, you need to modify the port definition.

1 In SAP, type transaction code WE20.

2 Select Partner Type LS.

3 Select your *receiver* partner profile (such as DIRXMLDRV).

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 DIRXMLPORT or DIRXMLFILE).
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 or greater, select USERCLONE04
8. Save your entries.
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 DIRXMLPORT or DIRXMLFILE.)
11. Under Output Mode, select Transfer IDoc Immediately to send IDocs immediately after they are created.
12. In the IDoc type section, select Basic type and the appropriate CCLONE. (For all SAP versions, select CCLONE01.)
13. Save your entries.

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 SAP2DIRXML).
3. Save your entry.

   You will see a message stating “Unable to distribute the system landscape to system DIRXMLDRV.” This is an informative message and is not an error or issue of concern.

Set Field Distribution Parameters

By default, all data fields of the User object will be configured for global control. This means that changes can only be made on the central system (the *sender* client) and distributed to child systems. This is acceptable unless you want to distribute Roles and Profiles information to the driver. If you want this distribution, you must modify the field distribution parameters.

1. In SAP, type transaction code SCUM.
2. Click the Roles tab.
3. Select the Local option for the Role Assignment and Reference User fields.
4. Click the Profiles tab.
5. Select the Local option for the Auth Profiles file.

6 Save your entries.

Once again, you will receive the “Unable to distribute . . .” message. This is not an error or issue of concern.

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 DIRXML_CPIC), then click the Create icon.

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

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 sample values of SAP_ALL, SAP_NEW and S_A.CPIC profiles. You can use other profiles.

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.

5 Using the SAP Java Connector Test Utility

The driver uses the SAP Java Connector (JCO) and Business Application Programming Interface (BAPI) technologies to connect to and integrate data with Novell® eDirectory™. 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

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.

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 jco.jar or 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.

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 jco.jar or 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 jco.jar or 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.

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 34.

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 jco.jar or 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.

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

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 available Check 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.

Error Message	Problem
Exception in thread “main” java.lang.NoClassDefFoundError: com/sap/mw/jco/JCO$AbapException or Exception in thread “main” java.lang.NoClassDefFoundError: com/sap/mw/jco/JCO$Exception	The jco.jar or 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$AbapException or Exception in thread “main” java.lang.NoClassDefFoundError: com/sap/mw/jco/JCO$Exception	The jco.jar or sapjco.jar file is not in the location specified in the jcotest script file or the case specified for jco.jar or 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.path Verify 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.o 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. or bash: 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$AbapException or Exception in thread “main” java.lang.NoClassDefFoundError: com/sap/mw/jco/JCO$Exception	The jco.jar or sapjoc.jar file is not in the location specified in the jcotest script file or the case specified for jco.jar or sapjco.jar does not match the actual filename.
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 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 directory 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 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. or bash: 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$AbapException or Exception in thread “main” java.lang.NoClassDefFoundError: com/sap/mw/jco/JCO$Exception	The jco.jar or sapjco.jar file is not in the location specified in the jcotest script file or the case specified for jco.jar or 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.MiddlewareRFC no sapjcorfc in java.library.path Verify 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.

Error Message	Problem
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. or bash: 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$AbapException or Exception in thread “main” java.lang.NoClassDefFoundError: com/sap/mw/jco/JCO$Exception	The jco.jar or sapjco.jar file is not in the location specified in the jcotest script file or the case specified for jco.jar or 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.MiddlewareRFC no jRFC12 in java.library.path Verify 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 directory 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 LD_LIBRARY_PATH environment variable to specify the location in which the file resides.

6 Understanding the Default Driver Configuration

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

Using Policies

Policies are highly configurable for use within any business environment. Although each business is different, the default driver configuration assumes the existence of the SAP-Users Organization in its Novell® eDirectory™ tree.

The default driver is also configured to be primarily a Subscriber channel driver. This means the primary purpose is to create SAP User accounts using information collected in eDirectory.

Modifying Policies and Filters

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

- Modify the Publisher and Subscriber channel filters to include additional attributes to be synchronized.
- Modify the Mapping policy to include all attributes specified in the Subscriber and Publisher channel filters.
- Modify the InputTransform policy
- Modify the OutputTransform policy
- Modify the Publisher Placement policy
- Modify the Publisher Matching policy
- Modify the Publisher Create policy
- Modify the Publisher Command Transform policy
- Modify the Subscriber Matching policy

The Publisher Channel Filter

The Publisher Channel filter contains the set of classes and attributes whose updates publish from the SAP system to eDirectory.

NOTE: To use the default driver configuration, you shouldn't filter out any of the CommExec, Organizational Role, or Organizational Unit attributes. Also, do not remove the following attributes from the User class object: Given Name, Surname, and workforceID.

The following table includes some examples of classes and attributes found on the Publisher Channel filter:

Classes	Attributes
User	Login Disabled
	sapProfiles
	sapRoles
	sapUsername

The Subscriber Channel Filter

The Subscriber Channel filter contains the set of classes and attributes that the SAP system receives from eDirectory. You modify the Subscriber Channel filter by adding all the attributes to the filter that you want synchronized.

NOTE: Do not remove the workforceID attribute from the Subscriber Channel filter. It is the attribute the driver uses to locate and modify users.

The default driver configuration allows the following User class attributes on the Subscriber Channel filter:

birthName	OU	sapRoles
buildingName	pager	sapSncGuiFlag
commType	roomNumber	sapSncName
company	sapAlias	sapSpool
costCenter	sapCATT	sapStartMenu
Facsimile Telephone Number	sapClass	sapTimeZone
firstPrefix	sapCompanyKey	sapUsername
floor	sapDateFormat	sapUserType
Full Name	sapDecimalFormat	sapValidFrom
Given Name	sapGroups	sapValidTo
inHouseMail	sapLanguage	secondName
Initials	sapLoginLanguage	secondPrefix
initialsSlg	sapParameters	Surname
Internet Email Address	sapPrintParam1	Telephone Number
Login Disabled	sapPrintParam2	telexNumber
middleName	sapPrintParam3	Title
mobile	sapProfiles	titleAcademic1
nickname	sapRefUser	titleAcademic2

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. The following attribute mappings are 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:

1. Simple fields: These values are not grouped with other fields. The syntax in the schema map is <field name>.
2. 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.
3. 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 ADD:TELEPHONE). If all fields of a structure are to be mapped, you should specify only the Structure or Table name in the mapping (such as ADDTEL). If you do this, the driver assumes synchronization of the primary data field (in this instance, TELEPHONE) on the Subscriber channel, and will synchronize all data fields with a semicolon (";") delimiter on the Publisher channel.

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. This file is included with the driver. Refer to "Extending the Schema" on page 19 for more information.

The default mappings for the driver are as follows:

eDirectory Attribute	SAP User Field Description	SAP User Field
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

eDirectory Attribute	SAP User Field Description	SAP User Field
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 1
middleName	Middle name or second forename of a person	ADDRESS:MIDDLEWARE
nickname	Nickname or name used	ADDRESS:NICKNAME
OU	Department	ADDRESS:DEPARTMENT
pager	Pager number	ADDPAG:PAGER
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
sapCompanyKey	Company address, cross-system key	COMPANY:COMPANY
sapDateFormat	Date format	DEFAULTS:DATFM
sapDecimalFormat	Decimal Notation	DEFAULTS:DCPFM
sapGroups	User group in user master maintenance	GROUPS:USERGROUP
sapLanguage	Language key	ADDRESS:LANGU_P
sapLoginLanguage	Language	DEFAULTS:LANGU
sapParameters	Get/Set parameter ID and parameter values	PARAMETER
sapPrintParam1	Print parameter 1	DEFAULTS:SPLG
sapPrintParam2	Print parameter 2	DEFAULTS:SPDB
sapPrintParam3	Print parameter 3	DEFAULTS:SPDA
sapProfiles	Profile name	PROFILES:BAPIPROF

eDirectory Attribute	SAP User Field Description	SAP User Field
sapRefUser	User name in user master record	REF_USER:REF_USER
sapRoles	Role Name	ACTIVITYGROUPS:AGR_NAME
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
Title	Function	ADDRESS:FUNCTION
titleAcademic1	Academic title: written form	ADDRESS:TITLE_ACA1
titleAcademic2	Academic title: written form	ADDRESS:TITLE_ACA2

1 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.

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 include a single template that completes the following action:

- After successful creation of a User object in SAP, the sapUsername attribute with the new username is written back into the associated eDirectory User object.

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 and returned to the driver by Identity Manager.

The default driver configuration includes templates that complete the following actions:

- Decoding the base-64 octet string syntax of the eDirectory telexNumber attribute value into a Java String format using the driver's configured Character Set encoding parameter.
- Transforming the pseudo-attribute LOCKUSER value from a true/false format to a 1/0 format.
- Transforming the structured format of the eDirectory Facsimile Telephone Number attribute into the String format used in the ADDFAX:FAX table field.

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.

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 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 has Create policies for the following:

- Creating a User object (Surname and Given Name attributes are required)
- Generating an object name (CN) based on Given Name and Surname attributes
- Setting the initial password to the value of a user's Surname.

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 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 values of the Given Name and Surname attributes. (The proper schema names for SAP are mapped prior to submission to the driver.)

The Subscriber Create Policy

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

- Generating an object name (sapUsername) based on the Given name and Surname attributes.
- Setting the initial password to the value PASSWORD.
- Setting a default sapRoles value of SAP_ESSUSER.

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 26 and "Modify Port Definition" on page 28 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	

7 Troubleshooting the Driver

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

Using the DSTrace Utility

You can troubleshoot the driver using the DSTrace utility. You will want to configure the utility's options by selecting Edit > Properties > DirXML Drivers.

For each event or operation received, the driver returns an XML document containing a status report. If the operation or event is not successful, the status report also contains a reason, a text message describing the error condition. If the result is fatal, the driver shuts down.

After you have configured the DSTrace Utility, you can monitor your system for errors.

Driver Load Errors

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

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

Driver Initialization Errors

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

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.

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.

/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.

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.

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.

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.

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.

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 ConsoleOne® or iManager, ensure that both the application password and Remote Loader passwords are set at the same time.

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.

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.

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

When creating users in the CUA central system, you must manually associate User objects with the client systems to which they authenticate. You do this by editing the User object from the SAP User Maintenance dialog box, then adding an appropriate client logical system under the Systems tab. This problem should not occur when creating users in non-central CUA systems.

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.

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.

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 49.

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

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 31.

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 2002

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 2002
```

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.

A Example XML Document Received from the Driver

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

```
<nds dtdversion="1.0" ndsversion="8.5">
     <source>
         <product build="20030509_1030" instance="SAP-USER-REMOTE-46C" version="1.0">DirXML
         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>JWriter</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>JWriter</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 DirXML® 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 SAP Object ID.
- The <modify-attr> element contains the attr-name described in SAP format (Structure or Table name:Attribute Name).
- Because multivalued attributes cannot be consistently mapped across systems, the <remove-all-values> element is used prior to all <add-value> tags. This instructs the DirXML 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.
- The <value> element contains a timestamp attribute with the BEGIN VALIDITY-END VALIDITY time stamp of the attribute's data segment (for example, Segment P001 data has a time stamp of 20011018-99991231). This means the data became valid on October 18, 2001 and remains valid to the SAP maximum date. All data segments might have different and or future-dated validity time stamps.
- All values are in a string format.

B Configuration and Deployment Notes

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.

SAP Object Types

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

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

User Types: LOGONDATA:USTYP

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

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

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

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

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)

Computer Aided Test (CATT): DEFAULTS:CATTKENNZ

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

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

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

Configuration Parameters

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

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.

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. Phone numbers are always mapped to ADDTELEPHONE if no field is specified in the attribute mapping.

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 DirXML 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)

- There is only one field in this table, USERGROUP. This is the primary field if it is not specified in the mapping.
- The primary data field is FAX.
- Other rules apply as described for the ADDTEL table.

In BAPI_USER_CHANGE (GROUPS table)

- There is only one field in this table, USERGROUP. This is the primary field if it is not specified in the mapping.

In BAPI_USER_CHANGE (ALIAS structure)

- There is only one field in this table, USERALIAS. This is the primary field if it is not specified in the mapping.
- The BAPIALIAS field of the ALIASX structure must be set to X if any modification is done to the ALIAS structure.

- 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)

- There is only one field in this table, REF_USER. This is the primary field if it is not specified in the mapping.
- 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 “Language Codes” on page 55 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 “User Types: LOGONDATA:USTYP” on page 53 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 dropdown 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.
- If the Begin Date is set alone, the BAPI must also set an imitation, higher value End Data (GLTGB), but the LOGONDATAX structure should not be checked for GLTGB.
- 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.
- The CONSNUMBER field must match the associated communication data elements' CONSNUMBER field.