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# NetIQ® Identity Manager

## Driver for ServiceNow Implementation

### Guide

February 2017

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# About NetIQ Corporation

We are a global, enterprise software company, with a focus on the three persistent challenges in your environment: Change, complexity and risk—and how we can help you control them.

## Our Viewpoint

### **Adapting to change and managing complexity and risk are nothing new**

In fact, of all the challenges you face, these are perhaps the most prominent variables that deny you the control you need to securely measure, monitor, and manage your physical, virtual, and cloud computing environments.

### **Enabling critical business services, better and faster**

We believe that providing as much control as possible to IT organizations is the only way to enable timelier and cost effective delivery of services. Persistent pressures like change and complexity will only continue to increase as organizations continue to change and the technologies needed to manage them become inherently more complex.

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### **Selling intelligent solutions, not just software**

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We place your success at the heart of how we do business. From product inception to deployment, we understand that you need IT solutions that work well and integrate seamlessly with your existing investments; you need ongoing support and training post-deployment; and you need someone that is truly easy to work with—for a change. Ultimately, when you succeed, we all succeed.

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- ◆ Access Management
- ◆ Security Management
- ◆ Systems & Application Management
- ◆ Workload Management
- ◆ Service Management

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# About This Guide

This guide explains how to install and configure the Identity Manager Driver for ServiceNow. The guide includes the following information:

## Audience

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

## Feedback

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

## Documentation Updates

For the most recent version of this document, see the [Identity Manager Drivers Documentation Web site \(http://www.netiq.com/documentation/idm45drivers/index.html\)](http://www.netiq.com/documentation/idm45drivers/index.html).

## Additional Documentation

For information on Identity Manager, see the [Identity Manager Documentation Web site \(http://www.netiq.com/documentation/idm45drivers\)](http://www.netiq.com/documentation/idm45drivers).





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# About this Book and the Library

The *Identity Manager Driver for ServiceNow Implementation Guide* explains how to install and configure the Identity Manager Driver for ServiceNow.

## Intended Audience

This book provides information for administrators implementing Identity Manager, application server developers, Web services administrators, and consultants, who also have an understanding of DSML/SPML, and HTML.

## Other Information in the Library

The library provides the following information resources:

### **Identity Manager Setup Guide**

Provides overview of Identity Manager and its components. This book also provides detailed planning and installation information for Identity Manager.

### **Designer Administration Guide**

Provides information about designing, testing, documenting, and deploying Identity Manager solutions in a highly productive environment.

### **User Application: Administration Guide**

Describes how to administer the Identity Manager User Application.

### **User Application: User Guide**

Describes the user interface of the Identity Manager User Application and how you can use the features it offers, including identity self-service, the Work Dashboard, role and resource management, and compliance management.

### **User Application: Design Guide**

Describes how to use the Designer to create User Application components, including how to work with the Provisioning view, the directory abstraction layer editor, the provisioning request definition editor, the provisioning team editor, and the role catalog.

### **Identity Reporting Module Guide**

Describes the Identity Reporting Module for Identity Manager and how you can use the features it offers, including the Reporting Module user interface and custom report definitions, as well as providing installation instructions.

### **Analyzer Administration Guide**

Describes how to administer Analyzer for Identity Manager.

### **Identity Manager Common Driver Administration Guide**

Provides information about administration tasks that are common to all Identity Manager drivers.

## **Identity Manager Driver Guides**

Provides implementation information about Identity Manager drivers.

# 1 Understanding the ServiceNow Driver

The NetIQ Identity Manager driver for ServiceNow can seamlessly provision and de-provision users to the ServiceNow cloud application. ServiceNow provides cloud based services that allow users to manage the software through a web service.

The ServiceNow driver supports the following features:

- ◆ Supports provisioning users and groups from the Identity Vault
- ◆ Supports password synchronization from the Identity Vault
- ◆ Supports the creation of user accounts based on policies and entitlements

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**IMPORTANT:** The ServiceNow driver is a Subscriber channel only driver.

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- ◆ [Section 1.1, “Supported ServiceNow Versions,” on page 11](#)
- ◆ [Section 1.2, “How the Driver Works,” on page 11](#)
- ◆ [Section 1.3, “Data Transfer Between Systems,” on page 13](#)
- ◆ [Section 1.4, “Supported Operations,” on page 13](#)
- ◆ [Section 1.5, “Planning to Install the Driver,” on page 13](#)

## 1.1 Supported ServiceNow Versions

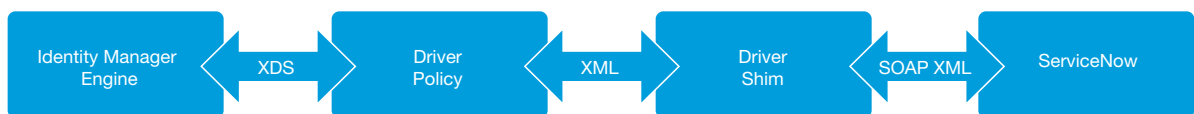
You can use the ServiceNow driver with the following ServiceNow versions:

- ◆ Istanbul
- ◆ Geneva
- ◆ Fuji

## 1.2 How the Driver Works

[Figure 1-1](#) illustrates the data flow between Identity Manager and a ServiceNow driver.

*Figure 1-1 ServiceNow Driver Data Flow*



The Identity Manager engine uses XDS, a specialized form of XML (Extensible Markup Language), to represent events in the Identity Vault. Identity Manager passes the XDS to the driver policy which can consist of basic policies, DirXML Script, and XSLT (Extensible Stylesheet Language Transformation) style sheets. The ServiceNow driver uses SOAP (Simple Object Access Protocol) protocol to handle the HTTP (Hypertext Transfer Protocol) transport of data between the Identity Vault and ServiceNow. The Subscriber channel receives XDS command documents from the Identity Manager engine, converts them to ServiceNow API (Application Program Interface) calls, and executes them.

The driver shim translates the XDS to XML payload on the Subscriber channel and then invokes the appropriate SOAP endpoints exposed by ServiceNow for Object CRUD (Create, Read, Update, and Delete) operations.

The driver uses the following Internet protocols and languages to exchange data between Identity Manager and ServiceNow.

- ♦ [Section 1.2.1, “SOAP,” on page 12](#)
- ♦ [Section 1.2.2, “HTTP,” on page 12](#)
- ♦ [Section 1.2.3, “HTTPS,” on page 12](#)

## 1.2.1 SOAP

SOAP is an XML-based protocol for exchanging messages. It defines the message exchange but not the message content. The driver supports SOAP 1.1.

SOAP documents are organized into three elements:

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

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

## 1.2.2 HTTP

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

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

## 1.2.3 HTTPS

HTTPS is the HTTP protocol over SSL (Secure Socket Layer) as a sub-layer under the regular HTTP application layering. HTTPS encrypts and decrypts user page requests as well as the pages that are returned by the Web server.

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

## 1.3 Data Transfer Between Systems

The data is transferred between the Identity Vault and the ServiceNow driver only on the Subscriber channel. Communication is one-way only.

The Subscriber channel does the following:

- ◆ Watches for additions and modifications to the Identity Vault objects.
- ◆ Makes changes to ServiceNow's internal representation of user identities that reflect those changes.

## 1.4 Supported Operations

The ServiceNow driver supports the following operations on the Subscriber channel:

| Operation                               | Supported On  |
|---|---|
| Add, Modify, Delete, Migrate, and Query | User and Group Objects<br><br><b>NOTE:</b> When a user's password is added or modified on the Subscriber channel, ServiceNow returns the user password in hashed format which is seen in the ServiceNow driver trace. For more information, see the <a href="#">ServiceNow documentation</a> website. |
| Password Synchronization                | User Objects  |
| Entitlements                            | <ul style="list-style-type: none"><li>◆ User Accounts</li><li>◆ Group Membership</li><li>◆ Roles</li><li>◆ Departments</li></ul>  |

## 1.5 Planning to Install the Driver

This section provides information for planning the installation and configuration process for the driver.

- ◆ [Section 1.5.1, "Installation Requirements," on page 13](#)
- ◆ [Section 1.5.2, "Options for Installing the Driver Shim," on page 14](#)

### 1.5.1 Installation Requirements

The ServiceNow driver requires the following applications and files:

- ◆ Identity Manager 4.5 Service Pack 2, particularly the following components:
  - ◆ Designer
  - ◆ Remote Loader (if you want to connect through the Remote Loader)
  - ◆ Role and Resource Service driver
  - ◆ User Application driver
  - ◆ Driver Set packages
    - ◆ Advanced Java Class

- ♦ Common Settings
- ♦ Identity Manager Default Universal Password Policy
- ♦ ServiceNow driver files
  - ♦ `ServicenowShim.jar`
- ♦ ServiceNow driver packages
  - ♦ ServiceNow Base
  - ♦ ServiceNow Default Configuration
  - ♦ ServiceNow Entitlements
  - ♦ ServiceNow Password Synchronization

## 1.5.2 Options for Installing the Driver Shim

You can install the driver shim on the Identity Manager server. Alternatively, you can use the Remote Loader service to run the driver on a server other than the Identity Manager server. In this case, the driver and the Remote Loader service run on the same server. The Remote Loader loads drivers and communicates with the Identity Manager engine on behalf of drivers installed on remote servers.

For more information about supported platforms for installing Identity Manager or the Remote Loader, see one of the following sections in the [NetIQ Identity Manager Setup Guide](#).

- ♦ [System Requirements for the Identity Manager Engine](#)
- ♦ [System Requirements for the Remote Loader](#)

For information about configuring the Identity Manager drivers with the Remote Loader, see [Configuring the Remote Loader and Drivers](#) in the [NetIQ Identity Manager Setup Guide](#).

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# 2 Installing the Driver Files

To create and configure the driver, you must install the driver shim. The installation and configuration process for the ServiceNow driver requires access to the ServiceNow application, Identity Manager, the Remote Loader in case of a remote installation, and Designer for Identity Manager. NetIQ supports installing the ServiceNow driver on the Identity Manager server and on a remote server using the Remote Loader.

To install the driver, you first need to install the driver files, install the driver packages, and then modify the driver configuration to suit your environment. This section describes how to install the driver files. For information on installing and configuring driver packages, see [Chapter 4, “Creating a New Driver Object,” on page 21](#).

- [Section 2.1, “Prerequisites for Installing the Driver,” on page 15](#)
- [Section 2.2, “Installing the ServiceNow Driver Files,” on page 15](#)

## 2.1 Prerequisites for Installing the Driver

Before installing the driver, your Identity Manager environment must have the following software:

- Identity Manager 4.5 Service Pack (SP) 2 or later

Download Identity Manager 4.5 SP2 as instructed in the [“NetIQ Identity Manager 4.5 Service Pack 2 Release Notes”](#).

For Identity Manager 4.6 prerequisites and installation information, see [“Considerations and Prerequisites for Installation”](#) in the [NetIQ Identity Manager Setup Guide](#).

- Designer packages - Download the required packages from the [Designer Update channel](#) and upgrade your Designer to Designer 4.5 SP 2 Hot Fix 1 or later.

## 2.2 Installing the ServiceNow Driver Files

By default, the driver files are installed on the Identity Manager server at the same time as the Identity Manager engine. The installation program extends the Identity Vault’s schema and installs the driver shim and the driver configuration file. It does not create the driver in the Identity Vault or upgrade an existing driver’s configuration.

You can install the driver on the Identity Manager server, or connect to the Identity Manager engine through a Remote Loader from a remote server. In this configuration, you install the Remote Loader and the driver files on a non-Identity Manager server where you want to run the driver. For more information, see [“Configuring the Remote Loader and Drivers”](#) in the [NetIQ Identity Manager Setup Guide](#). After the driver files are installed, create the driver. For more information, see [Chapter 3, “Creating a New Driver Object,” on page 17](#).





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# 3 Upgrading an Existing Driver

If you are running the driver on the Identity Manager server, the driver shim files are updated when you update the server unless they were not selected during custom installation. If you are running the driver on another server, the driver shim files are updated when you update the Remote Loader on the server.

The following sections provide information to help you upgrade an existing driver:

- ♦ [Section 3.1, “What’s New in Version 1.0.0.1,” on page 17](#)
- ♦ [Section 3.2, “Upgrading the Driver,” on page 17](#)

## 3.1 What’s New in Version 1.0.0.1

Version 1.0.0.1 of the driver provides support for configuring Suite B communication between the driver and the Identity Manager engine. For more information, see [Section A.1.3, “Authentication,” on page 38](#). For more information about Suite B, see [Suite B Cryptography](#).

## 3.2 Upgrading the Driver

The driver upgrade process involves upgrading the installed driver packages and updating the driver files.

This section provides general instructions for updating a driver. For information about updating the driver to a specific version, search for that driver patch in the [NetIQ Patch Finder Download Page](#) and follow the instructions from the Readme file accompanying the driver patch release.

- ♦ [Section 3.2.1, “Upgrading the Installed Packages,” on page 17](#)
- ♦ [Section 3.2.2, “Applying the Driver Patch,” on page 18](#)

### 3.2.1 Upgrading the Installed Packages

- 1 Download the latest available packages.

To configure Designer to automatically read the package updates when a new version of a package is available, click **Windows > Preferences > NetIQ > Package Manager > Online Updates** in Designer. However, if you need to add a custom package to the Package Catalog, you can import the package .jar file. For more information about creating custom packages, see [Developing Packages](#) in the *NetIQ Designer for Identity Manager Administration Guide*.

- 2 Upgrade the installed packages.

**2a** Open the project containing the driver.

**2b** Right-click the driver for which you want to upgrade an installed package, then click **Driver > Properties**.

**2c** Click **Packages**.

If there is a newer version of a package, there is check mark displayed in the Upgrades column.

- 2d Click **Select Operation** for the package that indicates there is an upgrade available.
- 2e From the drop-down list, click **Upgrade**.
- 2f Select the version that you want to upgrade to, then click **OK**.

---

**NOTE:** Designer lists all versions available for upgrade.

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- 2g Click **Apply**.
- 2h (Conditional) Fill in the fields with appropriate information to upgrade the package, then click **Next**.  
Depending on which package you selected to upgrade, you must fill in the required information to upgrade the package.
- 2i Read the summary of the packages that will be installed, then click **Finish**.
- 2j Review the upgraded package, then click **OK** to close the Package Management page.  
For detailed information, see the [Upgrading Installed Packages](#) in the *NetIQ Designer for Identity Manager Administration Guide*.

## 3.2.2 Applying the Driver Patch

The driver patch updates the driver files. You can install the patch as a `root` or `non-root` user.

### Prerequisites

Before installing the patch, complete the following steps:

- 1 Take a back-up of the current driver configuration.
- 2 (Conditional) If the driver is running with the Identity Manager engine, stop the Identity Vault and the driver instance.
- 3 (Conditional) If the driver is running with a Remote Loader instance, stop the Remote Loader instance and the driver instance.
- 4 In a browser, navigate to the [NetIQ Patch Finder Download Page](#).
- 5 Under **Patches**, click **Search Patches**.
- 6 Specify **Identity Manager *nn* ServiceNow Driver *nn*** in the search box.
- 7 Download and unzip the contents of the patch file to a temporary location on your server.  
For example, `IDM45_ServiceNow_1001.zip`.

### Applying the Patch as a Root User

In a root installation, the driver patch installs the driver files RPMs in the default locations on Linux. On Windows, you need to manually copy the files to the default locations.

- 1 Update the driver files:
  - ♦ **Linux:** Log in to your server as `root` and run the following command in a command prompt:  

```
rpm -Uvh <Driver Patch File Temporary Location>/linux/netiq-DXMLServiceNow.rpm
```

  
For example, 

```
rpm -Uvh <IDM45_ServiceNow_1001.zip>/linux/netiq-DXMLServiceNow.rpm
```

- ♦ **Windows:** Navigate to the *<Extracted Driver Patch File Temporary Location>\windows* folder and copy the *ServiceNowShim.jar* file to *<IdentityManager installation>\NDS\lib* or *<IdentityManager installation>\RemoteLoader\<architecture>\lib* folder.
- 2 (Conditional) If the driver is running locally, start the Identity Vault and the driver instance.
  - 3 (Conditional) If the driver is running with a Remote Loader instance, start the Remote Loader instance and the driver instance.

## Applying the Patch as a Non-Root User

- 1 Verify that *<non-root eDirectory location>/rpm* directory exists and contains the file, *\_db.000*.

The *\_db.000* file is created during a non-root installation of the Identity Manager engine. Absence of this file might indicate that Identity Manager is not properly installed. Reinstall Identity Manager to correctly place the file in the directory.

- 2 To set the *root* directory to non-root eDirectory location, enter the following command in the command prompt:

```
ROOTDIR=<non-root eDirectory location>
```

This will set the environmental variables to the directory where eDirectory is installed as a non-root user.

- 3 Download the patch and untar or unzip the downloaded file.
- 4 To install the driver files, run the following script in a command prompt:

```
*****
#!/bin/sh
#set -x
#© 2017 NetIQ Corporation and its affiliates. All Rights Reserved
clear
echo "=====
echo " Installing packages... "
echo "=====
if [ "$1" == "" ] ; then
    exit
fi
pkgfile=$1
ROOTDIR="/local/home/bshidm/base/bshappl/edir"
RPMDB=$ROOTDIR/rpm
if [ ! -d "$RPMDB" ] ; then
    mkdir $RPMDB
fi
# create rpm database if it doesn't exist
if [ ! -f $RPMDB/__db.000 ]
then
# mkdir -p $RPMDB
rpm --dbpath "$RPMDB" --initdb
fi
RPM_FLAGS="--dbpath $RPMDB -Uvh --relocate=/etc=$ROOTDIR/etc --relocate=/
opt=$ROOTDIR/opt --relocate=/opt/novell/eDirectory/lib64=$ROOTDIR/opt/novell/
eDirectory/lib64 --relocate=/var=$ROOTDIR/var --badreloc --nodeps --
replacefiles --force"
rpm $RPM_FLAGS $pkgfile
```



---

# 4 Creating a New Driver Object

You install the ServiceNow driver files on the server where you want to run the driver, and then proceed to create the driver in the Identity Vault. You create the ServiceNow driver by installing the driver packages or importing the basic driver configuration file and then modifying the driver configuration to suit your environment.

The following sections provide instructions to create and activate the driver:

- ♦ [Section 4.1, “Creating the Driver Object in Designer,” on page 21](#)
- ♦ [Section 4.2, “Activating the Driver,” on page 25](#)

## 4.1 Creating the Driver Object in Designer

You create the ServiceNow driver by importing the driver’s packages and then modifying the configuration to suit your environment. After you have created and configured the driver, you need to deploy and start it.

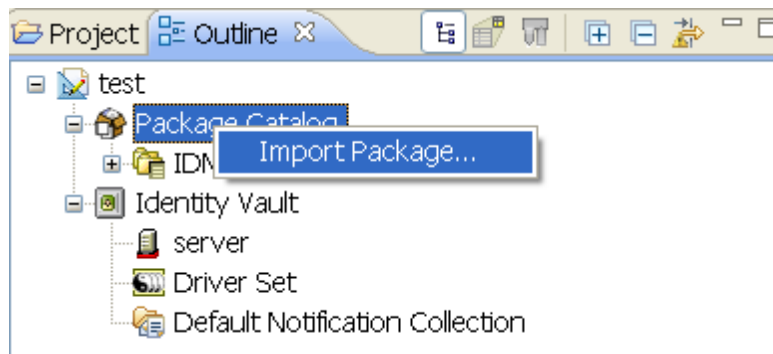
- ♦ [Section 4.1.1, “Importing the Driver Packages in Designer,” on page 21](#)
- ♦ [Section 4.1.2, “Installing the Driver Packages,” on page 22](#)
- ♦ [Section 4.1.3, “Configuring the Driver Object,” on page 24](#)
- ♦ [Section 4.1.4, “Deploying the Driver Object,” on page 24](#)
- ♦ [Section 4.1.5, “Starting the Driver,” on page 24](#)

### 4.1.1 Importing the Driver Packages in Designer

The driver packages contain the items required to create a driver, such as policies, entitlements, filters, and schema mapping policies. These packages are only available in Designer and can be updated after they are installed. You should use the most current version of the packages in the Package Catalog before you can create a new driver object.

**To verify that you have the most recent version of the driver packages in the Package Catalog:**

- 1 Open Designer.
- 2 In the toolbar, click **Help > > Check for Package Updates**.
- 3 Click **OK** to update the packages.
- 4 In the Outline view, right-click **Package Catalog**.
- 5 Click **Import Package**.



- 6 Select any ServiceNow driver packages.  
or  
Click **Select All** to import all of the packages displayed.  
By default, only the base packages are displayed. Deselect **Show Base Packages Only** to display all packages.
- 7 Click **OK** to import the selected packages, then click **OK** in the successfully imported packages message.
- 8 After the current packages are imported, continue with [Section 4.1.2, “Installing the Driver Packages,” on page 22.](#)

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**NOTE:** Designer does not display the name of the driver or the driver symbol when you import the ServiceNow driver from Identity Vault. This issue is seen in Modeler only.

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## 4.1.2 Installing the Driver Packages

- 1 In Designer, open your project.
- 2 In the Modeler, right-click the driver set where you want to create the driver, then click **New > Driver**.
- 3 Select **ServiceNow Base**, then click **Next**.
- 4 Select the optional features to be installed, then click **Next**. The options are:
  - ♦ **ServiceNow Default Configuration:** This package contains the default policies required to enable the driver to create user and group accounts. Leave this option selected.
  - ♦ **ServiceNow Password Synchronization:** This package contains the policies that enable the ServiceNow driver to synchronize passwords. To synchronize passwords, verify that this option is selected. For more information, see the [NetIQ Identity Manager Password Management Guide](#).
  - ♦ **ServiceNow Driver Entitlements:** This package contains configuration information and policies for synchronizing user accounts, group membership, roles, and departments. If you want account creation and auditing enabled through entitlements, verify that this option is selected. For more information, see the [NetIQ Identity Manager Entitlements Guide](#).
- 5 (Conditional) If there are package dependencies for the packages you selected to install, you must install these dependencies to install the selected package. Click **OK** to install the package dependencies listed.
- 6 (Conditional) The **Common Settings** page is only displayed if the Common Settings package is installed as a dependency. On the **Install Common Settings** page, fill in the following fields, then click **Next**:

**User Container:** Select the Identity Vault container where ServiceNow user accounts will be added if they do not already exist in the vault. This value becomes the default for all drivers in the driver set.

**Group Container:** Select the Identity Vault container where ServiceNow groups will be added if they do not already exist in the vault. This value becomes the default for all drivers in the driver set.

7 On the **Install ServiceNow Base** page, specify a name for the driver that is unique within the driver set, and then click **Next**.

8 On the new **Install ServiceNow Base** page, fill in the following fields, then click **Next**:

- ◆ **ServiceNow Base URL:** Specify the URL to connect to ServiceNow.
- ◆ **ServiceNow Login ID:** Specify a ServiceNow account with administrative privileges to be used by Identity Manager.
- ◆ **ServiceNow Login Password:** Provide the password for the specified ServiceNow account.
- ◆ **Always Accept Server Certificate:** This option eliminates the need for manually maintaining a truststore. If you select *No*, you must have a truststore configured with the appropriate certificates.
- ◆ **Truststore File Path:** Specify the name and path of the truststore file containing the trusted certificates. For example, `c:\security\truststore`.
- ◆ **Proxy host and port:** Specify the proxy host address and port. For example, `192.10.1.3:18180`. Otherwise, leave the field blank.
- ◆ **Set Proxy Authentication Parameters:** Select **Show** to display the proxy authentication parameters.
  - ◆ **Proxy User ID:** Specify the user name for authentication.
  - ◆ **Proxy User Password:** Specify the proxy user password.
- ◆ **Use Custom Application Schema:** To use a custom schema with the driver, select **Yes**. By default, the value is set to **No**, which allows Identity Manager to load the default schema with the driver.
  - ◆ **Custom Schema File Path:** To use a custom schema file, provide the local directory path where the entire schema file exists. For the driver to use the new schema, restart the driver. The default ServiceNow schema file is bundled with the `NIdM_Driver_4.5_ServiceNow.zip` file.

9 **Connect to Remote Loader:** Select *Yes* or *No* to determine if the driver will use the Remote Loader. If you select *No*, skip to [Step 10](#). If you select *Yes*, use the following information to complete the Remote Loader configuration, then click **Next**:

**Host Name:** Specify the host name or IP address of the server where the Remote Loader Service is installed and running for this driver.

**Port:** Specify the port number where the Remote Loader Service is installed and running for the ServiceNow driver. The default port is 8090.

**Remote Password:** Specify the Remote Loader password as defined in the Remote Loader service. The Identity Manager engine (or Remote Loader shim) requires this password to authenticate to the Remote Loader.

**Driver Password:** Specify the driver object password that is defined in the Remote Loader service. The Remote Loader requires this password to authenticate to the Identity Manager server.

10 On the **Confirm Installation Tasks** page, review the summary of tasks and click **Finish**.

The driver is now created. You can modify the configuration settings, by continuing with the next section, [Configuring the Driver Object](#). If you do not need to configure the driver, continue with [Deploying the Driver Object](#).

### 4.1.3 Configuring the Driver Object

**Configuring the Driver Parameters:** There are many settings that can help you customize and optimize the driver. The settings are divided into categories such as Driver Configuration, Engine Control Values, Global Configuration Values (GCVs), Health, Log Level, Packages, and so on. Although it is important for you to understand all of the settings, your first priority should be to review the [Driver Properties](#) located on the Driver Configuration page. The Driver Parameters and the Global Configuration Values let you configure the ServiceNow login information and other parameters associated with the driver. These settings must be configured properly for the driver to start and function correctly.

The driver requires an account with ServiceNow that is an administrator for your ServiceNow subscription. You should create a new account in your ServiceNow specifically for this purpose. Make sure that this new account is set to administer your ServiceNow application.

After completing the configuration tasks, continue with [Section 4.1.4, “Deploying the Driver Object,” on page 24](#).

### 4.1.4 Deploying the Driver Object

After the driver is created in Designer, it must be deployed into the Identity Vault.

- 1 In Designer, open your project.
- 2 In the Modeler, right-click the driver icon or the driver connection, then select **Live > Deploy**.
- 3 Read through the deployment summary, then click **Deploy**.
- 4 Read the success message, and then click **OK**.
- 5 Click **Define Security Equivalence** to assign rights to the driver.


The driver requires rights to objects within the Identity Vault. The Admin user object is most often used to supply these rights.

- 5a Click **Add**, then browse and select the object with the correct rights.
- 5b Click **OK** twice.
- 6 Click **Exclude Administrative Roles** to exclude users that should not be synchronized.
  - 6a Click **Add**, then browse to and select the user object you want to exclude, then click **OK**.
  - 6b Repeat [Step 6a](#) for each object you want to exclude, then click **OK**.
- 7 Click **OK**.

### 4.1.5 Starting the Driver

After you create the driver, you should start the driver in order to start the processing of the events. Identity Manager is an event-driven system, so after the driver is started, it won't do anything until an event occurs.

**To start the driver by using Designer:**

- 1 In Designer, open your project.
- 2 In the Modeler, right-click the driver icon  or the driver line, then select **Live > Start Driver**.




---

**NOTE:** The driver cannot initialize completely unless it successfully connects to the Remote Loader and loads the ServiceNow driver shim.

---

To start the driver using iManager:

- 1 In iManager, click  to display the Identity Manager Administration page.
- 2 Click **Identity Manager Overview**.
- 3 Browse to and select the driver set object that contains the driver you want to start.
- 4 Click the driver set name to access the **Driver Set Overview** page.
- 5 Click the upper right corner of the driver, then click **Start driver**.

For information about performing management tasks with the driver, see [Chapter 7, “Managing the Driver,”](#) on page 35.

## 4.2 Activating the Driver

The Identity Manager driver for ServiceNow is part of the Identity Manager Integration Module for ServiceNow. This integration module requires a separate activation. After purchasing the integration module, you will receive activation details in your NetIQ Customer Center.

If you create a new ServiceNow driver in a driver set that already includes an activated driver from this integration module, the new driver inherits the activation from the driver set.

If you create the driver in a driver set that has not been previously activated with this integration module, the driver will run in the evaluation mode for 90 days. You must activate the driver with this integration module during the evaluation period; otherwise, the driver will be disabled.

If driver activation has expired, `ndstrace` displays an error message indicating that you need to reactivate the driver to use it. For information on activation, refer to [Activating Identity Manager](#) in the *NetIQ Identity Manager Setup Guide*.



---

# 5 Customizing the Driver

This section explains how to use and modify policies and filters to synchronize data between the Identity Vault and ServiceNow according to your specific business rules. It is also possible to customize the driver using the entitlements shipped with the driver.

The ServiceNow driver synchronizes data and events from the Identity Vault through a series of policies. The policies in this section are examples of the many possible solutions for your company's business rules. The code segments show simple and partial solutions and do not cover all situations and conditions. In addition, the code segments only process the attributes of interest and do not handle other attributes.

You set defaults for policies and filters when you import the driver configuration.

- ♦ [Section 5.1, "Customizing the Referenced Attributes Using Policies," on page 27](#)
- ♦ [Section 5.2, "Customizing the ServiceNow Application Schema," on page 29](#)

## 5.1 Customizing the Referenced Attributes Using Policies

ServiceNow uses references to refer an attribute value from a different table. These references act like foreign keys in the ServiceNow database. If the value of an attribute does not exist in ServiceNow's table of attributes, you need to create the attribute in ServiceNow before adding a user to reference the value of that attribute.

Referenced attributes can be handled by customizing the policies in ServiceNow. Company, Location, and Building are examples of some of the referenced attributes in ServiceNow.

The following example policy (in Designer) looks at the value of the Company attribute being added to the Identity Vault and checks if an object of that name exists in ServiceNow's table of Company names. If the object is not found, it creates the object for the reference to work.

To change the reference for an attribute, change the object class of that object in Service Now and the name of the attribute in the Identity Vault.

### To add a custom policy:

- 1 In Designer, add the `Company` attribute to the ServiceNow driver filter and select **Synchronize** under the **Subscribe** settings.
- 2 Right-click the **Output Transformation Policy**, click **New**, and then click **DirXML Script**.
- 3 Add the below DirXML script to the policy you just created.

```

<rule>
  <description>Company attribute Verification</description>
  <conditions>
    <and>
      <if-class-name op="equal">sys_user</if-class-name>
      <if-attr name="company" op="available"/>
      <if-operation mode="nocase" op="equal">modify</if-operation>
    </and>
  </conditions>
  <actions>
    <do-set-local-variable name="companyName" scope="policy">
      <arg-string>
        <token-xpath expression="./modify-attr[@attr-name='company']/"
add-value/value/text()&#xd;&#xa;"/>
      </arg-string>
    </do-set-local-variable>
    <do-set-local-variable name="companyInstance" scope="policy">
      <arg-node-set>
        <token-query class-name="core_company" scope="entry">
          <arg-match-attr name="name">
            <arg-value>
              <token-local-variable name="companyName"/>
            </arg-value>
          </arg-match-attr>
        </token-query>
      </arg-node-set>
    </do-set-local-variable>
    <do-if>
      <arg-conditions>
        <and>
          <if-xpath op="not-true">${companyInstance}/../instance</if-xpath>
        </and>
      </arg-conditions>
      <arg-actions>
        <do-add-dest-object class-name="core_company" when="before">
          <arg-dn>
            <token-text xml:space="preserve">Companyattr</token-text>
          </arg-dn>
        </do-add-dest-object>
        <do-add-dest-attr-value class-name="core_company" name="name"
when="before">
          <arg-dn>
            <token-text xml:space="preserve">Companyattr</token-text>
          </arg-dn>
          <arg-value type="string">
            <token-xpath expression="./modify-attr[@attr-name='company']/"add-value/

```

```

value/text()"/>
  </arg-value>
  </do-add-dest-attr-value>
  <do-add-dest-attr-value class-name="sys_user" name="company">
    <arg-value type="string">
      <token-xpath expression="./modify-attr[@attr-name='company']/add-value/
value/text()"/>
    </arg-value>
  </do-add-dest-attr-value>
</arg-actions>
<arg-actions/>
</do-if>
</actions>
</rule>

```

#### 4 Deploy the driver along with the policy.

In the above example, when the driver is deployed to the Identity Vault, the policy checks whether the company name exists in the ServiceNow database and performs one of the following actions:

- If the company name exists, the policy links the company with the user.
- If the company name does not exist in the database, the policy updates ServiceNow with the company name and links it with the user.

## 5.2 Customizing the ServiceNow Application Schema

The Schema Mapping policy is contained in the driver object and applies to the Subscriber channel. The purpose of the Schema Mapping policy is to map schema names (particularly attribute names and class names) between the Identity Vault namespace and the ServiceNow namespace. Do not modify or remove existing entries in the Schema Mapping policy. You can, however, add entries to the Schema Mapping policy.

[Table 5-1](#) and [Table 5-2](#) list the default attributes that are supported in ServiceNow.

**Table 5-1** *sys\_user*

| Attributes           | Type                            |
|----------------------|---------------------------------|
| Accumulated roles    | String                          |
| Active               | True/False                      |
| Building             | <i>reference to Building</i>    |
| Business phone       | Phone Number                    |
| Calendar Integration | Integer                         |
| City                 | String                          |
| Class                | System Class Name               |
| Company              | <i>reference to Company</i>     |
| Cost center          | <i>reference to Cost Center</i> |
| Country code         | String                          |
| Created              | date/Time                       |

| <b>Attributes</b>         | <b>Type</b>                     |
|---------------------------|---------------------------------|
| Created by                | String                          |
| Date Format               | String                          |
| Default perspective       | <i>reference to Menu List</i>   |
| Department                | <i>reference to Department</i>  |
| Domain                    | Domain ID                       |
| EDU Status                | String                          |
| Email                     | Email                           |
| Employee number           | String                          |
| Failed login attempts     | Integer                         |
| First name                | String                          |
| Email                     | Email                           |
| Employee number           | String                          |
| Failed login attempts     | Integer                         |
| First name                | String                          |
| Gender                    | String                          |
| Home Phone                | Phone Number                    |
| internal Integration User | True/False                      |
| LDAP Server               | <i>reference to LDAP Server</i> |
| Language                  | String                          |
| Last login                | Date                            |
| Last login device         | String                          |
| Last login time           | date/Time                       |
| last name                 | String                          |
| Last password             | String                          |
| Location                  | <i>reference to Location</i>    |
| Locked out                | True/False                      |
| Manager                   | <i>reference to User</i>        |
| Middle name               | String                          |
| Mobile phone              | Phone Number                    |
| Name                      | String                          |
| Notification              | Integer                         |
| Password                  | Password (1 Way Encrypted)      |
| Password needs reset      | True/False                      |

| <b>Attributes</b>       | <b>Type</b>                  |
|-------------------------|------------------------------|
| Photo                   | Image                        |
| Prefix                  | String                       |
| Roles                   | User Roles                   |
| Schedule                | <i>reference to Schedule</i> |
| Source                  | String                       |
| State/Province          | String                       |
| Street                  | Two Line Text Area           |
| Sys ID                  | Sys ID                       |
| Time format             | String                       |
| Time zone               | String                       |
| Title                   | String                       |
| Updated                 | Date/Time                    |
| Updated by              | String                       |
| Updates                 | Integer                      |
| User ID                 | String                       |
| VIP                     | True/False                   |
| Web service access only | True/False                   |
| Zip/Postal code         | String                       |

**Table 5-2** *sys\_user\_group*

| <b>Attributes</b> | <b>Type</b>                     |
|-------------------|---------------------------------|
| Active            | True/False                      |
| Cost Center       | <i>reference to Cost Center</i> |
| Created           | Date/Time                       |
| Created by        | String                          |
| Default assignee  | <i>reference to User</i>        |
| Description       | String                          |
| Exclude manager   | True/False                      |
| Group email       | Email                           |
| Hourly rate       | Currency                        |
| Include members   | True/False                      |
| manager           | <i>reference to User</i>        |
| Name              | String                          |

| <b>Attributes</b> | <b>Type</b>               |
|-------------------|---------------------------|
| Parent            | <i>reference to Group</i> |
| Roles             | User Roles                |
| Source            | String                    |
| Sys ID            | Sys ID                    |
| Type              | List                      |
| Updated           | Date/Time                 |
| Updated by        | String                    |
| Updates           | Integer                   |

ServiceNow also supports other attributes in addition to the default attributes. The attributes are available in the custom schema file packaged in the `NIDM_Driver_4.5_ServiceNow.zip` file. For more information about using the schema file, see [Use Custom Application Schema](#).



---

# 6 Securing Driver Communication

If the remote Web service you are accessing allows HTTPS connections, you can configure the driver to take advantage of this increased security.

## 6.1 Configuring the Subscriber Channel

The Subscriber channel sends information from the Identity Vault to the Web service. To establish a secure connection for the Subscriber channel, you need a truststore containing a certificate issued by the certificate authority that signed the server's certificate.

- 1 Make sure you have a server certificate signed by a certificate authority.
- 2 Import the certificate into your truststore or create a new trust store by entering the following command at the command prompt:

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

For example:

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

- 3 Configure the Subscriber channel to use the trust store you created in [step 2](#):
  - 3a In iManager, in the **Roles and Tasks** view, click **Identity Manager > Identity Manager Overview**.
  - 3b Locate the driver set containing the ServiceNow driver, then click the driver's icon to display the **Identity Manager Driver Overview** page.
  - 3c On the **Identity Manager Driver Overview** page, click the driver's icon again, then scroll to **Driver Settings**.
  - 3d Select **No** in the **Always accept server certificate** field.
  - 3e In the **Truststore File Path**, specify the path to the trust store you created in [step 2](#).
- 4 Click **Apply**, then click **OK**.



---

# 7 Managing the Driver

As you work with the ServiceNow driver, there are a variety of management tasks you might need to perform, including the following:

- ♦ Starting, stopping, and restarting the driver
- ♦ Viewing driver version information
- ♦ Using Named Passwords to securely store passwords associated with the driver
- ♦ Monitoring the driver's health status
- ♦ Backing up the driver
- ♦ Inspecting the driver's cache files
- ♦ Viewing the driver's statistics
- ♦ Using the DirXML Command Line utility to perform management tasks through scripts
- ♦ Securing the driver and its information

Because these tasks, as well as several others, are common to all Identity Manager drivers, they are included in one reference, the [NetIQ Identity Manager Driver Administration Guide](#).



---

# A Driver Properties


This section provides information about the Driver Configuration and Global Configuration Values properties for the ServiceNow driver. These are the only unique properties for drivers. All other driver properties (Named Password, Engine Control Values, Log Level, and so forth) are common to all drivers. Refer to “[Driver Properties](#)” in the *NetIQ Identity Manager Driver Administration Guide* for information about the common properties.

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

- ♦ [Section A.1, “Driver Configuration,” on page 37](#)
- ♦ [Section A.2, “Global Configuration Values,” on page 40](#)

## A.1 Driver Configuration

### In iManager:

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

By default, the Driver Configuration page displays.

### In Designer:

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

The Driver Configuration options are divided into the following sections:

- ♦ [Section A.1.1, “Driver Module,” on page 38](#)
- ♦ [Section A.1.2, “Driver Object Password,” on page 38](#)
- ♦ [Section A.1.3, “Authentication,” on page 38](#)
- ♦ [Section A.1.4, “Startup Option,” on page 39](#)
- ♦ [Section A.1.5, “Driver Parameters,” on page 39](#)
- ♦ [Section A.1.6, “ECMA Script,” on page 40](#)
- ♦ [Section A.1.7, “Global Configuration,” on page 40](#)

## A.1.1 Driver Module

The driver module changes the driver from running locally to running remotely or the reverse.

**Java:** Use this option to specify the name of the Java class that is instantiated for the shim component of the driver. This class can be located in the `classes` directory as a class file, or in the `lib` directory as a `.jar` file. If this option is selected, the driver is running locally. Select this option to run the driver locally.

The Java class name is: `com.novell.nds.dirxml.driver.ServiceNow.ServiceNowDriverShim`

**Native:** This option is not used with the ServiceNow driver.

**Connect to Remote Loader:** Used when the driver is connecting remotely to the connected system. Designer includes two sub options:

- ♦ **Remote Loader Client Configuration for Documentation:** Includes information on the Remote Loader client configuration when Designer generates documentation for the driver.
- ♦ **Driver Object Password:** Specifies a password for the Driver object. If you are using the Remote Loader, you must enter a password on this page. Otherwise, the remote driver does not run. The Remote Loader uses this password to authenticate itself to the remote driver shim.

**Name:** Displays the java class name.

## A.1.2 Driver Object Password

Use this option to set a password for the driver object. If you are using the Remote Loader, you must enter a password on this page. This password is used by the Remote Loader to authenticate itself to the remote driver shim.

## A.1.3 Authentication

The authentication section describes the parameters required for authentication to the connected system.

**Authentication ID:** Specify a user application ID. This ID is used to pass Identity Vault subscription information to the application.

**Authentication Context:** Specify the IP address or name of the server the application shim should communicate with.

**Remote Loader Connection Parameters:** The syntax for the parameter is `hostname=xxx.xxx.xxx.xxx port=xxxx kmo=certificatename`, where the hostname is the IP address of the application server running the Remote Loader server and the port is the port the Remote Loader is listening on. The default port for the Remote Loader is 8090.

The `kmo` entry is optional. It is only used when there is an SSL connection between the Remote Loader and the Metadirectory engine.

Example: `hostname=10.0.0.1 port=8090 kmo=IDMCertificate`

**Driver Cache Limit (KB):** Specify the maximum event cache file size. If the value is set to zero, the file size is unlimited.

**Application Password:** Specify the password to connect to the application.

**Remote Loader Password:** Specify the password to connect to the application through the remote loader. The password should match with the password specified during the configuration of the Remote Loader on the connected system.

## A.1.4 Startup Option

The Startup Option section allows you to set the driver state when the Identity Manager server is started.

**Auto start:** The driver starts every time the Identity Manager server is started.

**Manual:** The driver does not start when the Identity Manager server is started. The driver must be started through Designer or iManager.

**Disabled:** The driver has a cache file that stores all of the events. When the driver is set to Disabled, this file is deleted and no new events are stored in the file until the driver state is changed to Manual or Auto Start.

## A.1.5 Driver Parameters

The Driver Parameters section lets you configure the driver-specific parameters. When you change driver parameters, you tune driver behavior to align with your network environment.

The parameters are presented by category:

- ◆ [“Driver Settings” on page 39](#)
- ◆ [“Publisher Options” on page 40](#)

### Driver Settings

**ServiceNow Base URL:** Specify the URL to connect to ServiceNow.

**ServiceNow Login ID:** Specify the login ID to connect to ServiceNow.

Select **Remove existing password** to clear the password.

**Always Accept Server Certificate:** This option eliminates the need for manually maintaining a truststore. If you select *No*, you must have a truststore configured with the appropriate certificates.

**Truststore File Path:** Specify the name and path of the truststore file containing the trusted certificates used when the remote server is configured to provide server authentication. For example, `c:\security\truststore`. Leave this field empty when server authentication is not used.

**Proxy Host and Port:** When an HTTP proxy is used, specify the host address and the host port. For example, `192.10.1.3:18180`. Otherwise, leave the field blank.

**Set Proxy Authentication Parameters:** Select **Show** to display the proxy authentication parameters:

- ◆ **Proxy User ID:** Specify the user name for authentication. Leave the field blank for anonymous authentication.
- ◆ **Proxy User Password:** Specify the password for the user.

**Use Custom Application Schema:** To use a custom schema with the driver, select **Yes**. By default, the value is set to **No**, which allows Identity Manager to load the default schema with the driver.

- ♦ **Custom Schema File Path:** To use a custom schema file, provide the local directory path where the entire schema file exists. For the driver to use the new schema, restart the driver.

## Publisher Options

**Publisher Heartbeat interval:** Specify the heartbeat interval in seconds.

Leave this field empty to turn off the heartbeat.

### A.1.6 ECMA Script

The ECMA Script section enables you to add ECMA Script resource files. The resources extend the driver's functionality when Identity Manager starts the driver.

### A.1.7 Global Configuration


Displays an ordered list of Global Configuration objects. The objects contain extension GCV definitions for the driver that Identity Manager loads when the driver is started. You can add or remove the Global Configuration objects, and you can change the order in which the objects are executed.

## A.2 Global Configuration Values

Global configuration values (GCVs) are values that can be used by the driver to control functionality. GCVs are defined on the driver or on the driver set. Driver set GCVs can be used by all drivers in the driver set. Driver GCVs can be used only by the driver on which they are defined.

The ServiceNow driver includes several predefined GCVs. You can also add your own GCVs, on a need basis, while you implement policies in the driver.


To access the driver's GCVs in iManager:

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

or

To add a GCV to the driver set, click **Driver Set**, then click **Edit Driver Set properties**.

To access the driver's GCVs in Designer:

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



or

To add a GCV to the driver set, right-click the driver set icon  then click **Properties > GCVs**.

## A.2.1 Password Synchronization

Use the following GCVs to configure the driver to synchronize passwords to ServiceNow.

**Application accepts passwords from Identity Manager:** This option is used to determine whether the application accepts passwords from Identity Manager. Selecting **True** allows the passwords to flow from the Identity Manager data store to connected system.

**Notify the user of password synchronization failure via e-mail:** Select this option if you want to notify the user through e-mail.

## A.2.2 Entitlements

There are multiple sections in the Entitlements tab. Depending on which packages you installed, different options are enabled or displayed.

- ◆ [“Entitlements Configuration” on page 41](#)
- ◆ [“Role Mapping” on page 42](#)
- ◆ [“Resource Mapping” on page 42](#)
- ◆ [“Entitlement Extensions” on page 42](#)

### Entitlements Configuration

**Use Entitlements to control ServiceNow accounts:** Select **True** to enable the driver to manage user accounts based on the driver’s defined entitlements. Select **False** to disable management of user accounts based on the entitlements.

**Enable Login Disabled Attribute Sync:** Select **True** if the changes made to the LoginDisabled attribute in the Identity Vault should be synchronized even if the User Account entitlement (Account) is enabled.

**When Account Entitlement Revoked:** Select an appropriate action when a user account entitlement is revoked. The options are **Disable User** or **Delete User**. By default, **Disable User** is selected.

**Use Group Entitlement:** Select **True** to enable the driver to manage group membership based on the driver’s defined entitlements.

**Use Role Entitlement:** Select **True** to enable the driver to manage user roles based on the driver’s defined entitlements.

**Use Department Entitlement:** Select **True** to enable the driver to manage department based on the driver’s defined entitlements.

**Advanced Settings:** Select **Show** to display the entitlement options that allow or deny additional functionality like role mapping, resource mapping and others. These settings should rarely be changed.

**Parameter Format:** Specify the parameter format the entitlement agent must use when granting this entitlement.

## Role Mapping

The Identity Manager Catalog Administrator allows you to map business roles with IT roles.

**Enable role mapping:** Select **Yes** to make this driver visible to the Role Mapping Administrator.

**Allow mapping of user accounts:** Select **Yes** if you want to allow mapping of user accounts in the Role Mapping Administrator.

**Allow mapping of groups:** Select **Yes** if you want to allow mapping of groups in the Role Mapping Administrator.

**Allow mapping of roles:** Select **Yes** if you want to allow mapping of roles in the Role Mapping Administrator.

**Allow mapping of departments:** Select **Yes** if you want to allow mapping of departments in the Role Mapping Administrator.

## Resource Mapping

The Roles Based Provisioning Module allows you to map resources to users. For more information, see the [NetIQ Identity Manager - User's Guide to the Identity Applications](#).

**Enable resource mapping:** Select **Yes** to make this driver visible to the Roles Based Provisioning Module.

**Allow mapping of user accounts:** Select **Yes** if you want to allow mapping of user accounts in the Roles Based Provisioning Module.

**Allow mapping of groups:** Select **Yes** if you want to allow mapping of groups in the Roles Based Provisioning Module.

**Allow mapping of roles:** Select **Yes** if you want to allow mapping of roles in the Roles Based Provisioning Module.

**Allow mapping of departments:** Select **Yes** if you want to allow mapping of departments in the Roles Based Provisioning Module.

## Entitlement Extensions

The Roles Based Provisioning Module allows you to map resources to users. For more information, see the [NetIQ Identity Manager - User's Guide to the Identity Applications](#).

**User account extensions:** The content of this field is added below the entitlement elements in the `EntitlementConfiguration` resource object.

**Group extensions:** The content of this field is added below the entitlement elements in the `EntitlementConfiguration` resource object.

**Role extensions:** The content of this field is added below the entitlement elements in the `EntitlementConfiguration` resource object.

**Department extensions:** The content of this field is added below the entitlement elements in the `EntitlementConfiguration` resource object.

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# B Trace Levels

The driver supports the following trace levels:

*Table B-1 Supported Trace Levels*

| Level | Description   |
|-------|---|
| 0     | No debugging  |
| 1-2   | Identity Manager messages. Higher trace levels provide more detail.   |
| 3     | Previous level plus driver parameters, Remote Loader, driver shim, and driver connection messages   |
| 4-5   | Previous level plus Remote Loader, driver, driver shim, and driver connection messages, driver parameters, driver security, driver schema, request and response XML |

