



NetIQ® Identity Manager Driver for SCIM Implementation Guide

January 2021

Legal Notice

For information about NetIQ trademarks, see <https://www.netiq.com/company/legal/>.

Copyright (C) 2020 NetIQ Corporation. All rights reserved.

Contents

About NetIQ Corporation	5
About This Guide	7
1 Understanding the SCIM Driver	9
SCIM Driver Architecture	9
SCIM Driver Packages	10
2 Installing and Configuring SCIM Driver	13
Plan Your Installation	13
Installing the SCIM Driver	13
Installing the SCIM Driver Files	14
Installing the SCIM Driver Packages in Designer	15
Configuring the SCIM Driver for a Connected Application	15
Configuring SCIM Driver with OAuth 2.0 Authentication	16
Configuring SCIM Driver with Basic Authentication	25
Deploying, Starting and Activating the SCIM Driver	26
3 Customizing the Driver for SCIM Services	27
Creating and Configuring Java Extensions	27
Modifying the JSON/XML Payload	28
4 Managing the SCIM Driver	29
Securing the Driver	29
Upgrading the Driver	29
5 Sample Deployment of SCIM Driver for Salesforce	31
Creating a Connected App for Identity Manager in Salesforce	31
Creating SCIM Driver Object for Connecting to Salesforce in Designer	31
Global Configuration Values	41
Sample SCIM Driver Use Cases for Salesforce	41
Known Observations from Salesforce	44
Mapping Attributes for Salesforce	44
6 SCIM Schema Utility	45
Refreshing the Fetched Connected Application's Schema	45
Adding a New Resource to Schema Mapping Policy	46
SCIM JSON Attribute Representation Using SCIM Schema Utility	46
Attribute Representation Using SCIM Utility Grammar With Delimiters	46
Formatting JSON Structures to SCIM Attributes	47

A Driver Properties	49
Global Configuration Values (GCVs)	49
Configuring Entitlements	49
B Trace Levels	53
C Mapping Attributes for Identity Manager and Connected Application	55
D Troubleshooting the Driver	59
Hidden JSON Content in Output Transformation Policy Channels	59
Troubleshooting Driver Processes	59
Resource Attributes Modification Conflicts During Migration Operation	59

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.

Our Philosophy

Selling intelligent solutions, not just software

In order to provide reliable control, we first make sure we understand the real-world scenarios in which IT organizations like yours operate—day in and day out. That's the only way we can develop practical, intelligent IT solutions that successfully yield proven, measurable results. And that's so much more rewarding than simply selling software.

Driving your success is our passion

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.

Our Solutions

- ♦ Identity & Access Governance
- ♦ Access Management
- ♦ Security Management
- ♦ Systems & Application Management
- ♦ Workload Management
- ♦ Service Management

Contacting Sales Support

For questions about products, pricing, and capabilities, contact your local partner. If you cannot contact your partner, contact our Sales Support team.

Worldwide:	www.netiq.com/about_netiq/officelocations.asp
United States and Canada:	1-888-323-6768
Email:	info@netiq.com
Web Site:	www.netiq.com

Contacting Technical Support

For specific product issues, contact our Technical Support team.

Worldwide:	www.netiq.com/support/contactinfo.asp
North and South America:	1-713-418-5555
Europe, Middle East, and Africa:	+353 (0) 91-782 677
Email:	support@netiq.com
Web Site:	www.netiq.com/support

Contacting Documentation Support

Our goal is to provide documentation that meets your needs. The documentation for this product is available on the NetIQ Web site in HTML and PDF formats on a page that does not require you to log in. If you have suggestions for documentation improvements, click **Add Comment** at the bottom of any page in the HTML version of the documentation posted at www.netiq.com/documentation. You can also email Documentation-Feedback@netiq.com. We value your input and look forward to hearing from you.

Contacting the Online User Community

NetIQ Communities, the NetIQ online community, is a collaborative network connecting you to your peers and NetIQ experts. By providing more immediate information, useful links to helpful resources, and access to NetIQ experts, NetIQ Communities helps ensure you are mastering the knowledge you need to realize the full potential of IT investments upon which you rely. For more information, visit community.netiq.com.

About This Guide

This guide explains how to install and configure the Identity Manager Driver for SCIM.

- ♦ [Chapter 1, “Understanding the SCIM Driver,” on page 9](#)
- ♦ [Chapter 2, “Installing and Configuring SCIM Driver,” on page 13](#)
- ♦ [Chapter 3, “Customizing the Driver for SCIM Services,” on page 27](#)
- ♦ [Chapter 4, “Managing the SCIM Driver,” on page 29](#)
- ♦ [Chapter 5, “Sample Deployment of SCIM Driver for Salesforce,” on page 31](#)
- ♦ [Chapter 6, “SCIM Schema Utility,” on page 45](#)
- ♦ [Appendix A, “Driver Properties,” on page 49](#)
- ♦ [Appendix B, “Trace Levels,” on page 53](#)
- ♦ [Appendix C, “Mapping Attributes for Identity Manager and Connected Application,” on page 55](#)
- ♦ [Appendix D, “Troubleshooting the Driver,” on page 59](#)

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, SCIM, JSON, and HTML.

Feedback

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

Documentation Updates

For more information about the library for Identity Manager, see the following resources:

- ♦ [Identity Manager documentation website \(https://www.netiq.com/documentation/identity-manager-48/\)](https://www.netiq.com/documentation/identity-manager-48/)
- ♦ [Identity Manager drivers documentation website \(https://www.netiq.com/documentation/identity-manager-48-drivers/\)](https://www.netiq.com/documentation/identity-manager-48-drivers/)

1 Understanding the SCIM Driver

SCIM (System for Cross-domain Identity Management) protocol is designed to simplify user management operations. The SCIM driver provides a common user schema and an extension model which helps you to provision or deprovision identities to and from connected applications seamlessly. Use case based operations on resources, such as modifications, deletions, polling, querying, etc., can also be performed as required.

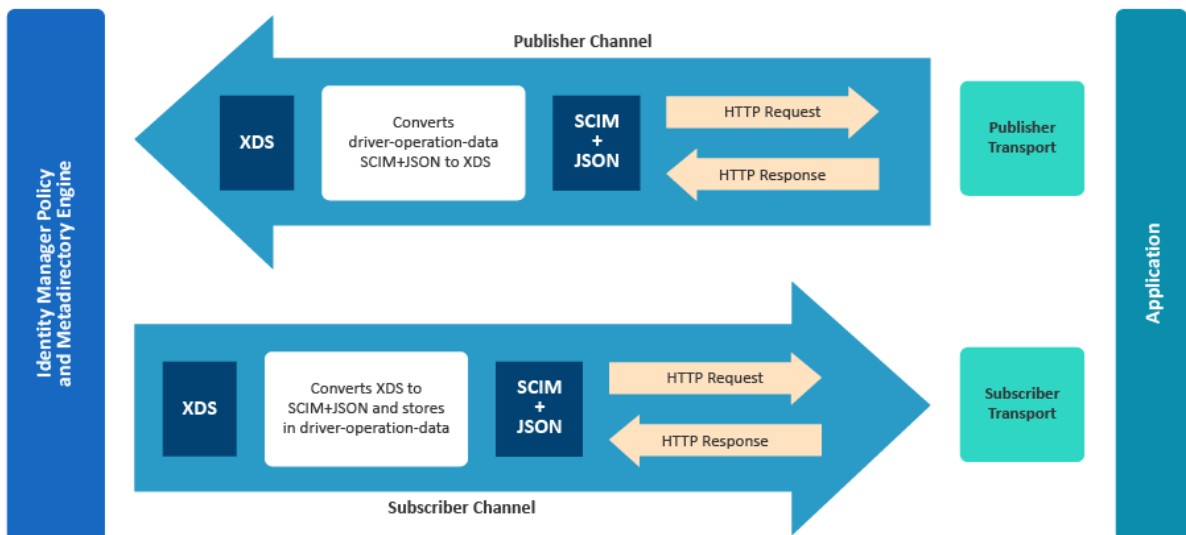
Apart from setting up and configuring the SCIM driver, this document also explains its various use cases. The use case operations that you can perform on resources such as users, groups, etc., include the following:

- ♦ Creating
- ♦ Modifying
- ♦ Deleting
- ♦ Migrating
- ♦ Polling
- ♦ Querying

SCIM Driver Architecture

The following diagram illustrates the bi-directional relationship between Identity Manager and the connected application.

Figure 1-1 Architecture of SCIM Driver



The Identity Manager engine and eDirectory reside on a single host computer. The SCIM Driver Module is Java based driver, that can execute on the same host system, or on a Remote Loader instance. The Identity Manager Engine loads the driver module dynamically.

The Identity Manager engine uses XDS (a specialized form of XML) to represent events in the Identity Manager. In the Subscriber channel, the XDS events from Identity Manager are converted to SCIM compliant JSON using policy conversions. The driver operation data in the driver shim, converts the SCIM compliant JSON to the appropriate HTTP requests or responses to communicate with the connected application.

In the Publisher channel, the driver fetches data from the connected application using the conversion policy. The connected application processes the request, and returns a HTTP response to the driver shim. The Publisher channel periodically polls for additions and modifications of the objects in the connected application.

SCIM Driver Packages

In Designer, navigate to **Help > Package Updates** to update the SCIM driver packages. When you update the required driver packages in designer, the designer updates the policies, rules and the parameters that are associated with the driver object. These rules, policies, and associated parameters are used to establish communication and synchronize data between Identity Manager and the connected application.

The SCIM driver packages and the details are:

- ◆ **SCIM Base (NETQSCIMBASE)**: Contains the mandatory basic SCIM configurations required for SCIM driver. The base configurations include:
 - ◆ Driver Authentication methods such as Basic and OAuth2.0.
 - ◆ Subscriber settings with HTTPS error codes to retry such as 307, 400 etc,.
 - ◆ Publisher settings with Polling interval, Heartbeat interval, and Polling Resource option.
 - ◆ Advanced settings with the Schema and Modifier setting options.
 - ◆ Options for Remote Loader settings.
- ◆ **SCIM Default (NETQSCIMDCFG)**: Contains the mandatory default configurations required for configuring the SCIM driver. The default configurations include the policies as shown below:
 - ◆ **Matching policy**: This policy finds the matches for objects based on attributes.
 - ◆ **Creation policy**: The creation policy defines the conditions that must be met to create a new object. The creation policy is of two types, Subscriber Creation policy and Publisher Creation policy. The policy definitions can be same or different for the respective channels.

For example, if you try to create a new user in Identity Manager by providing only the user's name and user ID, the user is created in Identity Manager but does not sync to the connected application. This happens when the definitions for creating the user are not specified completely in the creation policy. You can add templates in the creation policy to ensure that all the required definitions are specified.

The Creation Policies are commonly used to:

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

- ♦ **Placement policy:** This policy specifies the containers where objects are to be placed.
- ♦ **Command Transformation policy:** This policy is to provide the final processing commands that are sent to the Identity Manager or to the connected application.
- ♦ **Schema Mapping policy:** The Schema Mapping policies store the definition of the class and attribute mappings between the Identity Manager and the connected application.
- ♦ **Filter:** Filter allows the object and its specific attributes to synchronize between the Identity Manger and the connected application.
- ♦ **SCIM JSON (NETQSCIMJSON):** (Optional) This package contains the JSON configurations for SCIM driver to implement XDS to JSON conversion. The JSON that is created by using this package will be compatible with the connected application, to perform required operations.

2 Installing and Configuring SCIM Driver

You can install and configure a SCIM driver in Identity Manager to connect to SCIM based external applications. You must download and install the driver related files from the required driver build available in the [Micro Focus Download](#) site. You must also update the corresponding packages in Designer to install the driver.

IMPORTANT: The configuration parameters, sample values and examples mentioned in this chapter are for reference purposes only. You should modify them as required to suit your environment.

The following sections explain the details that are required to help you set up and configure the SCIM Driver.

- ♦ [“Plan Your Installation” on page 13](#)
- ♦ [“Installing the SCIM Driver” on page 13](#)
- ♦ [“Installing the SCIM Driver Files” on page 14](#)
- ♦ [“Installing the SCIM Driver Packages in Designer” on page 15](#)
- ♦ [“Configuring the SCIM Driver for a Connected Application” on page 15](#)
- ♦ [“Deploying, Starting and Activating the SCIM Driver” on page 26](#)

Plan Your Installation

Prior to installing the driver, ensure all the prerequisites and system versions are updated as shown below:

- ♦ Prerequisites:
 - ♦ Designer version: IDM 4.8.1.1
 - ♦ Install REST binaries: REST 1.1.1
- ♦ System Requirements:
 - ♦ Identity Manager 4.7.4, or later
 - ♦ Identity Manager 4.8.1, or later

Installing the SCIM Driver

To start with installation, you must first:

- ♦ Download and install the SCIM driver files, see [“Installing the SCIM Driver Files” on page 14](#).
- ♦ Import and Install the driver packages, see [“Installing the SCIM Driver Packages in Designer” on page 15](#).

Installing the SCIM Driver Files

You can install the SCIM driver files as a root user or as a non-root user in your system. The procedure to install the driver files is similar for any connected application.

You must ensure that you have the required SCIM driver files such as, **.zip**, **.rpm**, and **.jar** etc., from the required driver build available in [Micro Focus Download](#) site to install the SCIM driver in your system.

For example:

- ◆ .zip file: `SCIMDriver.zip`
- ◆ .rpm file: `<netiq-DXMLscim.rpm>`
- ◆ .jar file: `<SCIMUtils.jar>`

This section explains the common procedure to install the driver files.

- 1 Download and unzip the contents of the **SCIMDriver.zip** file to a temporary location on your computer.
- 2 Install the driver files (for IDM 4.7.4 and above) based on your user role.

To install as a:

- ◆ root user, see [“Installing Driver Files as a Root User” on page 14](#).
- ◆ non-root user, see [“Installing Driver Files as a Non-Root User” on page 14](#).

Installing Driver Files as a Root User

1. Login as a root user on the server where you want apply the driver jar file.
2. Navigate to the extracted **SCIMDriver.zip** directory and perform one of the following actions based on your platform:
 - ◆ **Linux:** Install the new **netiq-DXMLscim.rpm** in your driver installation directory by running one of the following command in a terminal window:
 - ◆ If you are installing the binary, run the command: `rpm -Ivh (binaries-path)/netiq-DXMLscim.rpm`
 - ◆ **Windows:** Copy the **SCIMShim.jar** file to the driver’s installation folder. For example, `\NetIQ\IdentityManager\NDS` (local installation) or `\Novell\RemoteLoader\64bit` (remote installation).

Installing Driver Files as a Non-Root User

1. Verify that the `/rpm` directory exists and contains the `_db.000` file.
2. The `_db.000` file is created during a non-root installation of the Identity Manager engine. The absence of this file indicates that the Identity Manager is not installed properly. In such a case, reinstall the Identity Manager to correctly place the file in the mentioned directory.
3. To set the root directory to the location of non-root in Identity Manager, enter the following command in the command prompt:

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

This will set the environmental variables to the directory where Identity Manager is installed as a non-root user.
4. For example, to install the SCIM driver rpm, use this command:

```
rpm --dbpath $ROOTDIR/rpm -Ivh --relocate=/usr=$ROOTDIR/opt/novell/  
eDirectory --relocate=/etc=$ROOTDIR/etc --relocate=/opt/novell/  
eDirectory=$ROOTDIR/opt/novell/eDirectory --relocate=/opt/novell/  
dirxml=$ROOTDIR/opt/novell/dirxml --relocate=/var=$ROOTDIR/var --  
badreloc --nodeps --replacefiles /home/user/netiq-DXMLscim.rpm
```

NOTE: In the above command `/opt/novell/eDirectory` is the location where non-root Identity Manager is installed, and `/home/user/` is the home directory of the non-root user.

- 3 (Conditional) If the driver is running locally, start the Identity Manager and the driver instance.
- 4 (Conditional) If the driver is running with a Remote Loader instance, start the Remote Loader instance and the driver instance.

Installing the SCIM Driver Packages in Designer

Once the driver files are installed, you must ensure to import and install the latest versions of the following SCIM driver packages:

- ♦ **SCIM Base Package** (Mandatory)
- ♦ **SCIM Default Package** (Mandatory)
- ♦ **SCIM JSON Package** (Optional)
- ♦ **SCIM Entitlements** (Mandatory)

For the generic steps to:

- ♦ importing the driver packages, see [Importing the Current Driver Packages](#) in the “*NetIQ Identity Manager Driver Administration Guide*”.
- ♦ installing the driver packages, see [Installing the Driver Files](#) in the “*NetIQ Identity Manager Driver Administration Guide*”.

For more information on what is included in the SCIM driver package, see “[SCIM Driver Packages](#)” on [page 10](#).

Configuring the SCIM Driver for a Connected Application

To begin with the configuration, you need to set up the SCIM driver object in the designer and configure the SCIM driver with the specific parameters to connect to an external SCIM based application.

- ♦ If you do not have the driver set and Identity Vault created in Designer, see [Setting Up a New Driver Object](#) in “*NetIQ Identity Manager Driver Administration Guide*”.
- ♦ If you already have the driver set and Identity Vault in Designer, proceed with the following sections to configure the SCIM driver with a connected application.

You can configure a SCIM driver with authentication methods such as, Basic or OAuth2.0, as shown below:

- ◆ **OAuth 2.0:** The OAuth 2.0 authentication method uses query options and secret options that require token values to be configured for authentication. If the connected application supports OAuth2.0 authentication method, it is recommended to configure the SCIM driver with OAuth 2.0. For more information, see [“Configuring SCIM Driver with OAuth 2.0 Authentication” on page 16](#).
- ◆ **Basic:** The basic authentication method uses a simple user name, a user password, and the connected application’s login URL to authenticate a user to login to the application. Basic Authentication requires the password to be stored in the application itself, and this is can be accessed by other applications that are associated with it. To configure SCIM driver with basic authentication, see [“Configuring SCIM Driver with Basic Authentication” on page 25](#).

Configuring SCIM Driver with OAuth 2.0 Authentication

The OAuth 2.0 authentication method is used for authenticating the driver with enhanced security to connect to an application. OAuth 2.0 authentication can be established using Bearer tokens or JWT’s.

The following steps explain the procedure to configure the SCIM driver:

- 1 In the **Authentication Method** field select **OAuth 2.0**.
- 2 In the **OAuth2.0 Token Management** field, select the option as required. The available options are:
 - ◆ **Bearer:** A bearer token is a lightweight security token (a short string of hexadecimal characters) that grants the bearer access to a protected resource. The Bearer token is created for you by the connected application’s authentication server. By selecting the **Bearer** option, you can generate a new bearer token to authorize the SCIM driver with connected application.
To configure SCIM Driver using bearer token, see [“Configure SCIM Driver with Bearer Token” on page 16](#).
 - ◆ **JWT:** A JSON Web Token (JWT) is part of OAuth authorization and authentication framework. A JWT securely authenticates the driver to connect to an external application to perform operations as required. By selecting the **JWT** option, you can generate a new JWT to authorize the SCIM driver with connected application.
To configure SCIM Driver using JWT, see [“Configuring SCIM Driver with JWT” on page 19](#).
 - ◆ **Manual:** Select **Manual** if you already have a token available or created by an external application.
To configure SCIM Driver using an available bearer token, see [“Configuring SCIM Driver with an Available Token” on page 21](#).

NOTE: Configuring a JWT is preferred as it is more secured with a digital server certificate.

Configure SCIM Driver with Bearer Token

Bearer is an access token issued by connected application to achieve multi-server authentication.

Connection Parameters

Authentication Method OAuth2.0

OAuth2.0 Authorization Token Bearer

Access Token URL

User Name

Password

Query Options

grant_type client_id issuer	<div style="border: 1px solid #ccc; padding: 5px;"> <div style="display: flex; justify-content: space-between; align-items: center;"> Name ✕ </div> <input style="width: 90%;" type="text" value="grant_type"/> <input type="button" value="ⓘ"/> </div> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 5px;"> <div style="display: flex; justify-content: space-between; align-items: center;"> Value ✕ </div> <input style="width: 90%;" type="text"/> <input type="button" value="ⓘ"/> </div>
-----------------------------------	--

Secret Query Options

refresh_token client_secret	<div style="border: 1px solid #ccc; padding: 5px;"> <div style="display: flex; justify-content: space-between; align-items: center;"> Name ✕ </div> <input style="width: 90%;" type="text" value="refresh_token"/> <input type="button" value="ⓘ"/> </div>
--------------------------------	--

If you select **Bearer**, the following fields appear. The sample values are shown in the following table, however you must enter values as applicable for your environment.

IMPORTANT: For any operation performed on the connected application using OAuth 2.0, an access token is sent for authorization of the user from the connected application. The access token expires post the session idle time set by the connected application, or in case of a system restart. The connected application displays the Unauthorized Access error or an Invalid Session error for any request initiated with an expired access token. The presence of a refresh token helps to re-establish the failed session internally by generating a new access token without user’s intervention.

Field	Sample Field Value
Access Token URL	<i><https://login.salesforce.com/services/oauth2/token></i>
User Name	The user name to login to the connected application.
Password	The password to login to connected application.

Field	Sample Field Value
<p>Query Options: The following fields appear:</p> <ul style="list-style-type: none"> ♦ grant_type: It is the method used by the application to procure an access token. ♦ client_id: The <code>client_id</code> is a public identifier for connected application. ♦ issuer: The authorization server's URL that uses the https protocol. 	<ul style="list-style-type: none"> ♦ grant_type: password ♦ client_id: <3MVG97quAmFZJfVwk3ylU.8elhRYBqG9h25m3TWewozjKnFIY0HrhOEJ17LMET9HHoc aHnTB1k04kophr1CgW> ♦ issuer: <https://login.Salesforce.com> <p>NOTE: In case of a driver upgrade, the issuer field does not auto populate the earlier configured value. You must enter the issuer field value manually.</p>
<p>Secret Query Options: The values specified in these options are hidden for security purposes.</p> <ul style="list-style-type: none"> ♦ refresh_token: Refresh Token is a web token which is used to acquire new access tokens when current access tokens expire or become invalid. The authorization server provides refresh tokens to Identity Manager to obtain new access token without user's interaction in the backend. ♦ client_secret: The client secret is used to establish the ownership of the <code>client_id</code>. 	<ul style="list-style-type: none"> ♦ refresh_token: 5Aep861Xq7VoDavIt6UxKW62EAmfy0hKFv1T_X8yhb9PRQWtsOCrr97CYDrVasefykdl_f.DTVaJGKxjzmz50XjQ ♦ client_secret: E734505442694ECD0156D83F965B42C0F07601BB8BFDCA9879420C1FF23C8A87
<p><i>Common fields in Connection Parameters</i></p> <p>NOTE: The fields mentioned in the below rows are common for OAuth2.0 and Basic authentication methods.</p> <p>Application Truststore File: The path and the name of the keystore file that contains the trusted certificates for the remote server to achieve SSL handshake.</p> <p>IMPORTANT: For Bearer, add the public certificate to <code>cacerts</code>, present in the path <code>/opt/netiq/common/jre/lib/security</code>.</p> <p>Mutual Authentication: Enable and specify this field if the authentication is supported by the connected application. You must ensure to have both the server certificates stored in Identity Manager and the connected applications.</p> <p>Defaults to Hide. Select Show if you want to set mutual authentication information.</p>	<pre></root/scim_configuration/ trustSalesforce/Salesforce></pre> <p>NOTE: Create the truststore file in <code>.jks</code> format for the connected application. For more information on how to create the truststore file, see Configuring the Subscriber Channel in "<i>NetIQ Identity Manager Driver Administration Guide</i>".</p> <ul style="list-style-type: none"> ♦ IDM Keystore file: Specify the path and the name of the keystore file that contains the trusted certificates for the connected application server to provide mutual authentication. For example, <code>C:\security\keystore</code>. ♦ IDM Keystore password: Specify the password for the keystore file.

Field	Sample Field Value
<p>Proxy Authentication: Defaults to Hide. Select Show if you want to set proxy authentication parameters.</p> <p>Specify the proxy host address and proxy host port in this field.</p>	<ul style="list-style-type: none"> ◆ Proxy host name and port: <192.168.0.0:port>. Choose an unused port number on the proxy server. ◆ Username: <user name for proxy authentication> ◆ Password: <password for proxy authentication> ◆ Re-enter Password: <password for proxy authentication>
<p>HTTPS Connection Timeout: Specify the HTTPS connection time out value.</p>	<p>The timeout value must be greater than 0.</p> <p>NOTE: The driver waits for the time specified (in minutes) and terminates the HTTPS connection displaying the error code. The error codes are configured in the Subscriber Options > HTTPS error codes for retry field.</p>
<p>SCIM 2.0 URL: Enter the URL for the connected application. SCIM Resources like User, Group etc., will be appended to this URL.</p>	<p><https://salesforce.com/api/rest/scim/v2/339216517038085></p>

Configuring SCIM Driver with JWT

This is a secured and digitally signed access token in the JWT format. A JWT is an encrypted data string consisting of a header, payload, and a signature, and is used to transfer authorization data in client-server applications to authenticate the identity of the resource.

If you select **JWT**, the following fields appear:

Field	Sample Field Value
<p>Query Options: The following fields appear:</p> <ul style="list-style-type: none"> ♦ client_id: The <code>client_id</code> is a public identifier for the connected application. ♦ subject: The user's unique identity for which the access token is being requested. ♦ issuer: The authorization server's URL that uses the https protocol. ♦ client_auth_type: The client's authorization types configured for granting access to the application. ♦ recipient_keystore: The keystore file that is used to search for the digital signature that contains the public key in the connected application. <p>The following steps explain how to create the <code>recipient_keystore</code>.</p> <ol style="list-style-type: none"> 1. Create the digital signature. For more information, see Create a Private Key and Self-Signed Digital Certificate. 2. Create the PKCS12 file by combining the server key and the server certificate, as shown below: <pre>openssl pkcs12 -inkey <server key> -in <server certificate> -export -out <filename>.pkcs12</pre> 3. Import the PKCS12 file into the <code>recipient_keystore</code>, as shown below: <pre>/opt/netiq/common/jre/bin/ keytool -importkeystore - srckeystore <filename>.pkcs12 - srcstoretype pkcs12 - destkeystore <recipient keystore></pre> 	<ul style="list-style-type: none"> ♦ client_id: <pre><3MVG97quAmFZJfVwk3y1U.8e1hRYBqG9h25m 3TWewozjKnFIY0HrhOEJ17LMET9HHocaHnTB1 k04kophr1CgW></pre> ♦ subject: <code><username@microfocus.com></code> ♦ issuer: <code><https://login.salesforce.com></code> ♦ client_auth_type: <code>private_key_jwt</code> ♦ recipient_keystore: <code></Soft/Certs/recipient.jks></code>

Field	Sample Field Value
<p>Secret Query Options: The values specified in these options are hidden for security purposes.</p> <ul style="list-style-type: none"> ♦ recipient_storepass: Password for the recipient_keystore file that is mentioned above. ♦ recipient_keypass: Password for the server certificate that is available in the recipient_keystore file. ♦ refresh_token: Refresh Token is a web token which is used to acquire new access tokens when current access tokens expire or become invalid. The authorization server provides refresh tokens to Identity Manager to obtain new access token without user's intervention. ♦ client_secret: The client secret is used to establish the ownership of the client_id. 	<ul style="list-style-type: none"> ♦ recipient_storepass: <novell> ♦ recipient_keypass: <novell> ♦ refresh_token: 5Aep861Xq7VoDavIt6UxKW62EAmfy0hKFv1T_X8yhb9PRQWtsOCrr97CYDrVasefykdl_f.DTVaJGKxjnz50XjQ ♦ client_secret: E734505442694ECD0156D83F965B42C0F07601BB8BFDCA9879420C1FF23C8A87
<p>For the other common fields such as Application Truststore File, Mutual Authentication, Proxy Authentication, HTTPS Connection Timeout, and SCIM 2.0 URL, see “Common fields in Connection Parameters” on page 18</p>	

Configuring SCIM Driver with an Available Token

Select **Manual** if you already have an access token available or created by an external application.

Connection Parameters

Authentication Method: OAuth2.0

OAuth2.0 Authorization Token: Manual

Token: [Empty]

Query Options:

- client_id (Name: client_id, Value: [Empty])
- issuer


Secret Query Options:

- refresh_token (Name: refresh_token, Value: Set Password...)
- client_secret

Field	Sample Field Value
<p>Token: Specify access token value that is generated using API calls. For example, call REST API using Postman and specify the Bearer Token.</p> <p>Query Options: The following fields appear.</p> <ul style="list-style-type: none"> ♦ client_id: The <code>client_id</code> is a public identifier for the connected application. ♦ issuer: The authorization server's URL that uses the https protocol. <p>Secret Query Options: The values specified in these options are hidden for security purposes.</p> <ul style="list-style-type: none"> ♦ refresh_token: Refresh Token is a web token to acquire new access tokens when current access tokens expire or become invalid. The authorization server provides refresh tokens to the Identity Manager to obtain new access token without user's intervention. ♦ client_secret: The client secret is used to establish the ownership of the <code>client_id</code>. <p>For the other common fields such as Application Truststore File, Mutual Authentication, Proxy Authentication, HTTPS Connection Timeout, and SCIM 2.0 URL, see "Common fields in Connection Parameters" on page 18</p>	<pre><00D2v000002mBdQ!ARQAQAZAXhpgi1DpcvN3RDg Ckrfh4pyzCOv2G1Iq5kEMh0TRi></pre> <ul style="list-style-type: none"> ♦ client_id: <pre><3MVG97quAmFZJfVwk3y1U.8e1hRYBqG9h25m 3TWewozjKnFIY0HrhOEJ17LMET9HHocaHnTB1 k04kophr1CgW></pre> ♦ issuer: <pre><https://login.Salesforce.com></pre> <p>NOTE: In case of a driver upgrade, the issuer field does not auto populate the earlier configured value. You must enter the issuer field value manually.</p> <ul style="list-style-type: none"> ♦ refresh_token: <pre>5Aep861Xq7VoDavIt6UxKW62EAmfy0hKFv1T_ X8yhb9PRQWtsOCrr97CYDrVasefykdl_f.DTV aJGKxjnz50XjQ</pre> ♦ client_secret: <pre>E734505442694ECD0156D83F965B42C0F0760 1BB8BFDCA9879420C1FF23C8A87</pre>

3 In the **Install SCIM Base** page, specify the **Subscriber Options** and **Publisher Options**, and click **Next**.

Field	Description with Sample values
Subscriber Options	<p>HTTPS error codes for retry: Specify the HTTPS errors that must return a retry status. Error codes must be a list of integers separated by spaces. For example: <code><307 408 503 504></code></p> <p>NOTE: The operation is retried if these error codes are encountered.</p>

Field	Description with Sample values
Publisher Options	<ul style="list-style-type: none"> ◆ Enable Publisher Channel: Select Yes to enable the Publisher channel. ◆ Polling interval in minutes: Specify the polling interval in minutes For example: <10> ◆ Heartbeat interval in minutes: This option is used to configure the time interval for which the driver shim sends a periodic status message on the Publisher channel. By default, this is set to 10 minutes. <p>IMPORTANT: Polling Resource Options: This field does not appear in this page when you are setting up the driver for the first time. These options are to be specified once the driver is configured. After configuring the driver, double click the connector line in the modeler window and navigate to Driver Configuration > Publisher Options tab to specify the polling resource options.</p> <ul style="list-style-type: none"> ◆ Select the Configured Resources option to poll on all resources that are configured as part of the schema settings. ◆ Select the Custom Resources option and click  to configure customized polling Resource ID and Resource URL. <ul style="list-style-type: none"> ◆ For User: <ul style="list-style-type: none"> ◆ Resource ID: Example, urn:ietf:params:scim:schemas:core:2.0:User ◆ Resource URL: Example, https://apl6.salesforce.com/services/scim/v2/Users?startIndex=1&count=100 <p>NOTE: In the above URL's, the <code>startIndex</code> refers to the resource from where the poll must start and <code>count</code> refers to the number of resources from the <code>startIndex</code> for polling.</p> ◆ For Group: <ul style="list-style-type: none"> ◆ Resource ID: Example, urn:ietf:params:scim:schemas:core:2.0:Group ◆ Resource URL: Example, https://apl6.salesforce.com/services/scim/v2/Groups?startIndex=1&count=100

4 In the **Install SCIM Base** page, specify the parameters as shown in the following table, and click **Next**.

Table 2-1 Schema Settings

Field	Description with Sample Values
Refresh Schema on Driver Startup	<p>Defaults to No, specify Yes if you want to refresh the schema.</p> <p>IMPORTANT: Select this option as Yes to load the connected application's schema for the first time, or if the connected application's schema has changed. It is recommended to change this field to No once the schema is fetched successfully. If this field remains selected as Yes, the driver will fetch the schema from the connected application every time the driver restarts and might cause mapping issues.</p> <p>For more information on schema, see Chapter 6, "SCIM Schema Utility," on page 45.</p>
Schema Options	<p>Select required method to fetch the connected application's schema.</p> <p>The available options are:</p> <ul style="list-style-type: none">◆ SCIM 2.0: SCIM 2.0 Schema for User and Group, as defined in RFC 7643.◆ Application URL: The application's end point for SCIM schema. Example, https://ap17.salesforce.com/services/scim/v2/Schemas.◆ Import JSON File: Import the user defined schema JSON file from the local file system. This file must comply to SCIM JSON format as per RFC 7643.
Resource Type	<p>Specify the Resource ID and Resource Endpoint's of the resources in Uniform Resource Name (URN) Format. For example, Users, Groups, Roles, Entitlements etc.</p> <ul style="list-style-type: none">◆ Resource ID: Resource ID in URN Format. For example, <code>urn:ietf:params:scim:schemas:core:2.0:Users</code>◆ Resource Endpoint: The resource endpoint of the Resource ID. For example, <code>Users</code>.◆ Modify Method Operation: Specify the method of operation to be performed on the resources. Select the option as supported by the connected application. <p>The available options are:</p> <ul style="list-style-type: none">◆ PUT: This option is used to modify an entire resource which is already a part of the collection of resources in the connected application.◆ PATCH: This option is used to make partial updates to resources in the connected application. <p>Similarly for Groups:</p> <ul style="list-style-type: none">◆ Resource ID: Example, <code>urn:ietf:params:scim:schemas:core:2.0:Group</code>◆ Resource Endpoint: <code>Groups</code>◆ Modify Method Operation: Select the option as required.

Table 2-2 Modifier Settings

Field	Description
Custom Java Class	The custom Java classes that are used to extend the driver's functionality. Defaults to Hide , select Show to configure document modifiers.
Document Handling:	Select this option to customize the Java classes for processing the data as JSON objects. Defaults to No , select Yes . The Class and Init Parameter fields appear. <ul style="list-style-type: none"> ◆ Class: Specify the class using a full package identifier. For example, <code>com.example.MyNewClass</code> ◆ Init Parameter: Specify the parameters in string format that you want to pass to the <code>init()</code> method of your class. The <code>init</code> method of your class is responsible for parsing the information contained in this string. Leave this field blank if your class does not require a configuration string to be passed to the <code>init</code> method.


5 In the **Remote Loader** page, if you are configuring the driver with a remote loader instance select **yes**, else select **no**. Click **Next**.

For more information about configuring the driver with Remote Loader, see [Deciding Whether to Use the Remote Loader](#) in “*NetIQ Identity Manager Driver Administration Guide*”.

6 Review the summary of tasks and click **Finish**. The configured driver appears in the designer screen.

Configuring SCIM Driver with Basic Authentication

The basic authentication method uses a simple user name, a user password, and the connected application’s login URL, to authenticate a user to login to an application. If you select **Basic** in the **Authentication Method** field, the following fields appear:

Field	Description
User Name	Specify the name of the user.
Password	Specify the password.
Application URL	Specify the URL of the connected application.
Header Fields: Click the  icon to create the header fields. Enter the required header fields and supported values for the selected authentication method.	<ul style="list-style-type: none"> ◆ Name: Content-Type ◆ Value: <code>application/scim+json</code>

For the other common fields such as Application Truststore File, Mutual Authentication, Proxy Authentication, HTTPS Connection Timeout, and SCIM 2.0 URL, see “*Common fields in Connection Parameters*” on page 18

After you have specified the fields that are required for **Basic** authentication, continue with [Step 3 on page 22](#).

Deploying, Starting and Activating the SCIM Driver

After installing and configuring the driver you must deploy, start and activate it. To perform the respective operations see:

- ♦ [Deploying the Driver](#) in *“NetIQ Identity Manager Driver Administration Guide”*
- ♦ [Starting the Driver](#) in *“NetIQ Identity Manager Driver Administration Guide”*
- ♦ [Activating Drivers](#) in *“NetIQ Identity Manager Driver Administration Guide”*

3 Customizing the Driver for SCIM Services

The SCIM driver customizations enable you to create and configure Java extensions, or modify the JSON/XML payload in the publisher and subscriber channels. The following sections explain the customizations that are available to establish seamless communication with the connected application.

Creating and Configuring Java Extensions

In some cases, the connected application could implement the SCIM interface to exchange information in a method that might deviate from the RFC standards. To create Java extensions, the modifier class file, for example `<SFDocModifier.jar>` must be available in the path `/opt/novell/eDirectory/lib/dirxml/classes`.

You can modify the following requests and responses using Java extensions:

- ◆ Subscriber request document to the connected application.
- ◆ Subscriber response document for Identity Manager.
- ◆ Publisher request document sent through the Publisher channel to the connected application.
- ◆ Publisher response document received through the publisher channel to Identity Manager.

You should name your modifier class using any Java package and a class name that is convenient for your environment.

For example, if you are writing your own class that implements the `DocumentModifiers` interface, and you named your class as `MyDocumentModifiers` within a package called `com.microfocus.idm`, then you perform the following steps to compile `.jar`, and deploy your class:

1 Prepare your environment.

Make sure that you have a current Java Development Kit (JDK) installed on your computer. Visit the [Java Web Site](#) if you need to download one.

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

In the above example, navigate to `com > microfocus > idm > MyDocumentModifiers.java` to find the source code file.

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

At a minimum, you need `SCIMUtils.jar`, available in:

- ◆ Linux path: `/opt/novell/eDirectory/lib/dirxml/classes`
- ◆ Windows path: `C:\NetIQ\IDM\NDS\lib`

Also, if you are using XML documents within your class, you also need `nxsl.jar`, that is available in `/opt/novell/eDirectory/lib/dirxml/classes`.

4 Place the `.jar` file in the root directory. For example, out of the `com` directory.

5 Execute the command prompt or shell prompt with the above path.

- 6 Compile your class by entering one of the following commands:
 - ♦ **For Windows:** `javac -classpath SCIMUtils.jar:nxsl.jar com\novell\idm*.java`
 - ♦ **For Linux or UNIX:** `javac -classpath SCIMUtils.jar:nxsl.jar com/novell/idm/*.java`
- 7 Create a Java archive file containing your class by entering one of the following commands:
 - ♦ **For Windows:** `jar cvf mydriverextensions.jar com\microfocus\idm*.class`
 - ♦ **For Linux:** `jar cvf mydriverextensions.jar com/microfocus/idm/*.class`
- 8 Place the jar file you created in [Step 7](#) into the same directory that contains the SCIMShim.jar.
 - ♦ **In Windows:** `C:\NetIQ\IDM\NDS\lib.`
 - ♦ **In Linux:** `/opt/novell/eDirectory/lib/dirxml/classes`
- 9 In iManager, edit the driver settings:
 - 9a Select **Custom Java Extension to Show**.
 - 9b Select **Document Handling to Implemented**.
 - 9c Specify `com.microfocus.idm.MyDocumentModifiers` as the value for Class and a relevant string value for Init Parameter.

NOTE: The init parameter is the string that is passed to the init method of your class. You can add all the required information for class initialization in this file.

- 10 Restart the driver. You can now use your custom class.

Modifying the JSON/XML Payload

You can also customize the JSON/XML payload received in the Subscriber and Publisher channels through conversion policies. The conversion policies modify the format of the request and response documents for compatibility.

The conversion can be done using any of the following three methods:

- ♦ Use the default XDS to JSON conversion policy to transform the payload generated in the `<driver-operation-data>` to a format supported by your SCIM service.
- ♦ Create your own XDS to JSON conversion policy, and ensure to keep the payload in `<driver-operation-data>` so that the driver transfers the same to the connected application.
- ♦ Driver shim automatically performs the conversion without any conversion policies.

4 Managing the SCIM Driver

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

- ◆ Starting, and stopping 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

The above mentioned tasks along with several others, are common to all Identity Manager drivers, they are included in one reference guide, the "[NetIQ Identity Manager Driver Administration Guide](#)".

Securing the Driver

The procedure to secure the communication between Identity Manager and the connected application is common for all drivers. For more information, see [Securing Driver Communication through HTTPS](#) in the "[NetIQ Identity Manager Driver Administration Guide](#)".

Upgrading the Driver

This is the initial release of the driver so the upgrade path is not available.

5 Sample Deployment of SCIM Driver for Salesforce

You can configure a SCIM driver in Identity Manager to connect to external applications complying to SCIM. The following section explains how to setup and configure the SCIM Driver for Salesforce.

NOTE: Ideally, the driver must connect with the SCIM-connected systems as long as they follow the SCIM standards. If any connected system has differences or deviations with respect to the SCIM RFC standards, then whoever is trying to connect to that specific system has to take care of any required customizations. These customizations can be done in Designer using Custom Policies or Document Modifier as required.

IMPORTANT: All the field values shown in this chapter are just sample values. You must ensure not to use them directly when configuring the driver.

- ♦ [“Creating a Connected App for Identity Manager in Salesforce” on page 31](#)
- ♦ [“Creating SCIM Driver Object for Connecting to Salesforce in Designer” on page 31](#)
- ♦ [“Global Configuration Values” on page 41](#)
- ♦ [“Sample SCIM Driver Use Cases for Salesforce” on page 41](#)
- ♦ [“Mapping Attributes for Salesforce” on page 44](#)

Creating a Connected App for Identity Manager in Salesforce

Salesforce can be integrated with Identity Manager using API's and standard OAuth2.0 protocols. For more information to create a connected app in Salesforce, see [Connected Apps](#) section in Salesforce help pages.

Creating SCIM Driver Object for Connecting to Salesforce in Designer

To begin with the configuration, you need to set up the SCIM driver object in the designer, and configure the SCIM driver with the specific parameters to connect to Salesforce application.

The generic steps to set up a driver object and the configuration parameters is shown below. If you already have the driver object setup in designer, you can skip to [Step 20 on page 33](#) to proceed with Salesforce specific configuration.

- 1 Open Designer.
- 2 In the toolbar, click **Help > Check for Package Updates**.

- 3 Select the required versions of the SCIM Base and SCIM Default packages as mentioned below:
 - ♦ **SCIM Base Package:**
 - ♦ **Package Name:** NETQSCIMBASE
 - ♦ **Version:** 1.0.0
 - ♦ **Build Date:** 20201117
 - ♦ **Build Number:** 124957
 - ♦ **SCIM Default Package:**
 - ♦ **Package Name:** NETQSCIMDCFG
 - ♦ **Version:** 1.0.0
 - ♦ **Build Date:** 20201113
 - ♦ **Build Number:** 132234
 - ♦ **SCIM JSON Package (Optional):**
 - ♦ **Package Name:** NETQSCIMJSON
 - ♦ **Version:** 1.0.0
 - ♦ **Build Date:** 20200721
 - ♦ **Build Number:** 184051
 - ♦ **SCIM Entitlements (Mandatory)**
 - ♦ **Package Name:** NETQSCIMENT
 - ♦ **Version:** 1.0.0
 - ♦ **Build Date:** 20201113
 - ♦ **Build Number:** 141225
- 4 Click **OK** to update the packages.
- 5 In the Outline view, right-click the **Package Catalog**.
- 6 Click **Import Package** and scroll to find the **SCIM Salesforce Configuration** package.
 - ♦ **SCIM Salesforce Configuration Package (Mandatory):**
 - ♦ **Package Name:** NETQSCIMSFCEG
 - ♦ **Version:** 1.0.0
 - ♦ **Build Date:** 20200721
 - ♦ **Build Number:** 184139
- 7 Click **OK** to import the selected packages, then click **OK** in the successfully imported packages message. The designer is now updated with the selected package.
- 8 In **Designer > Outline** view, open your project.
- 9 Right click project > **New > Identity Vault**, or drag and drop **Identity Vault** from the **Palette** to **Modeler** window.
- 10 In the **Add Server Association** screen, select the following field values and click **OK**.
 - ♦ Server DN
 - ♦ Identity Manager Version
 - ♦ Identity Manager Edition

The Identity Vault Credentials window appears.

11 In Identity Vault Credentials window, enter:

Field	Description
Host	The IP address of the Identity Vault's host machine.
Username	The name of the user.
Password	The password of the user to login to the identity vault.

12 Select **Save Password**, if you want to save your password for easy logins in the future.

13 Click **OK**.

The Identity Vault with the Driver Set appears in the **Modeler** window.

14 In the right pane, drag and drop the **SCIM** driver icon from the **Tools** tab in the **Modeler** window, to the Identity Vault.

15 In the **Driver Configuration Wizard**, select **SCIM Base Package** (Contains the base functionality for a driver. You must install a driver base configuration package first), and click **Next**.

NOTE: You can only select one base package.

16 In the **Select Mandatory Features** page, select the **SCIM Default Package**, and click **Next**.

17 (Optional) In the **Select Optional Features** page, select **SCIM JSON Package**, and click **Next**.

18 Verify if the required **Important Note** items are met, and click **Next**.

19 On the **Driver Information** page, specify a name for the driver, then click **Next**.

20 Select **OAuth 2.0** in the Authentication Method field, as the SCIM driver should be configured to connect to Salesforce with **OAuth 2.0** as the authentication method.

21 In the **OAuth2.0 Authorization Token** field, select the option as required. The available options are:

- ◆ **Bearer:** To configure SCIM Driver with new bearer token, see [“Configuring SCIM Driver with Bearer Token” on page 33](#).
- ◆ **JWT:** To configure SCIM Driver using JWT, see [“Configuring SCIM Driver with JWT” on page 36](#)
- ◆ **Manual:** To configure SCIM Driver using an available bearer token, see [“Configuring SCIM Driver Manually with an Available Token” on page 37](#)

NOTE: Configuring a **JWT** is recommended as it is more secured with a digital server certificate.

Configuring SCIM Driver with Bearer Token

Bearer is an access token issued by servers (Salesforce) to achieve multi-server authentication.

Connection Parameters

Authentication Method OAuth2.0 ▾ ⓘ

OAuth2.0 Authorization Token Bearer ▾ ⓘ

Access Token URL ⓘ

User Name ⓘ

Password Set Password... ⓘ ⓘ

Query Options + ⓘ

grant_type client_id issuer	<div style="border: 1px solid #ccc; padding: 5px;"> ✖ <p>Name <input style="width: 80%;" type="text" value="grant_type"/> ⓘ</p> <p>Value <input style="width: 80%;" type="text"/> ⓘ</p> </div>
-----------------------------------	---

Secret Query Options + ⓘ

refresh_token client_secret	<div style="border: 1px solid #ccc; padding: 5px;"> ✖ <p>Name <input style="width: 80%;" type="text" value="refresh_token"/> ⓘ</p> </div>
--------------------------------	--

If you select **Bearer**, the following fields appear. Enter the values as shown in the following table.

IMPORTANT: For any operation performed on the Salesforce application using OAuth 2.0, an access token is sent for authorization of the user from Salesforce. The access token expires post the session idle time set for Salesforce, or in case of a system restart. Salesforce displays Unauthorized Access error or an Invalid Session error for any request initiated with an expired access token. The presence of a refresh token helps to re-establish the failed session internally by generating a new access token without user's intervention.

Field	Sample Field Value
Access Token URL	<code><https://login.salesforce.com/services/oauth2/token></code>
User Name	The user name to login to Salesforce.
Password	The password to login to Salesforce.

Field	Sample Field Value
<p>Query Options: The following fields appear.</p> <ul style="list-style-type: none"> ♦ grant_type ♦ client_id ♦ issuer 	<ul style="list-style-type: none"> ♦ grant_type: password ♦ client_id: <3MVG97quAmFZJfVwk3ylU.8elhRYBqG9h25m3TWewozjKnFIY0HrhOEJl7LMET9HHoc aHnTB1k04kophr1CgW> ♦ issuer: <https://login.Salesforce.com> ♦ username: <username to login to Salesforce> <p>NOTE: In case of a driver upgrade, the issuer field does not auto populate the earlier configured value. You must enter the issuer field manually.</p>
<p>Secret Query Options: The values specified in these options are hidden for security purposes.</p> <ul style="list-style-type: none"> ♦ refresh_token ♦ client_secret 	<ul style="list-style-type: none"> ♦ refresh_token: 5Aep861Xq7VoDavIt6UxKW62EAmfy0hKfV1T_X8yhb9PRQWtsOCrr97CYDrVasefykdl_f.DTVaJGKxjnz50XjQ ♦ client_secret: E734505442694ECD0156D83F965B42C0F07601BB8BFDCA9879420C1FF23C8A87 ♦ password: <password to login to Salesforce>
<p>Header Fields</p>	<ul style="list-style-type: none"> ♦ Name: Content-Type ♦ Value: application/x-www-form-urlencoded
<p>Common fields in Connection Parameters</p> <p>NOTE: The fields mentioned in the below rows are common for OAuth2.0 and Basic Authentication.</p> <p>Application Truststore File: The path and the name of the keystore file that contains the trusted certificates for the remote server to achieve SSL handshake.</p> <p>IMPORTANT: For Bearer, add the public certificate to cacerts, present in the path /opt/netiq/common/jre/lib/security.</p>	<p></root/scim_configuration/trustSalesforce/Salesforce></p> <p>NOTE: Create the truststore file in .jks format for the connected application. For more information on how to create the truststore file, see Configuring the Subscriber Channel in "NetIQ Identity Manager Driver Administration Guide".</p>
<p>Mutual Authentication</p>	<p>Not supported in Salesforce</p>
<p>Proxy Authentication</p>	<ul style="list-style-type: none"> ♦ Proxy host name and port: <192.168.0.0:port>. Choose an unused port number on the proxy server. ♦ Username ♦ Password ♦ Re-enter Password

Field	Sample Field Value
HTTPS Connection Timeout	The timeout value must be greater than 0. NOTE: The driver waits for the time specified (in minutes) and terminates the HTTPS connection displaying the error codes that are configured in the Subscriber Options > HTTPS error codes for retry field.
SCIM 2.0 URL	<code><https://salesforce.com/api/rest/scim/v2/339216517038085></code>

Configuring SCIM Driver with JWT

The JSON Web token is an access request token in the JSON Web Token (JWT) format. It is an encrypted data string consisting of a header, payload, and a signature, and is used to transfer authorization data in client-server applications to authenticate the identity of the resource.

Connection Parameters

Authentication Method OAuth2.0

OAuth2.0 Authorization Token JWT

Query Options + ⓘ

client_id
 subject
 issuer
 client_auth_type
 recipient_keystore

Name ⓘ

Value ⓘ

Secret Query Options + ⓘ

recipient_storepass
 recipient_keypass
 refresh_token
 client_secret

Name ⓘ

Value ⓘ

If you select **JWT**, the following fields appear:

Field	Sample Field Value
<p>Query Options: The following fields appear:</p> <ul style="list-style-type: none"> ◆ client_id ◆ subject ◆ issuer ◆ client_auth_type ◆ recipient_keystore 	<ul style="list-style-type: none"> ◆ client_id: <3MVG97quAmFZJfVwk3y1U.8elhRYBqG9h25m3TWewozjKnFIY0HrhOEJ17LMET9HHocaHnTB1k04kophr1CgW> ◆ subject:<username@microfocus.com> ◆ issuer: <https://login.salesforce.com> ◆ client_auth_type: private_key_jwt ◆ recipient_keystore: </Soft/Certs/recipient.jks>
<p>Secret Query Options: The values specified in these options are hidden for security purposes.</p> <ul style="list-style-type: none"> ◆ recipient_storepass ◆ recipient_keypass ◆ refresh_token ◆ client_secret 	<ul style="list-style-type: none"> ◆ recipient_storepass: <novell> ◆ recipient_keypass: <novell> ◆ refresh_token: 5Aep861Xq7VoDavIt6UxKW62EAmfy0hKFv1T_X8yhb9PRQWtsOCrr97CYDrVasefykdl_f.DTVaJGKxjnz50XjQ ◆ client_secret: E734505442694ECD0156D83F965B42C0F07601BB8BFDCA9879420C1FF23C8A87
<p>For the other common fields such as Application Truststore File, Mutual Authentication, Proxy Authentication, HTTPS connection Timeout, and SCIM 2.0 URL, see “Common fields in Connection Parameters” on page 35</p>	

Configuring SCIM Driver Manually with an Available Token

Select **Manual** if you already have an access token available or created by an external application.

Connection Parameters

Authentication Method: OAuth2.0

OAuth2.0 Authorization Token: Manual

Token:

Query Options


- client_id
- issuer

Secret Query Options

- refresh_token
- client_secret

Field	Sample Field Value
Token	<00D2v000002mBdQ!ARQAQAzAXhpgilDpcvN3RDgCkrfh4pyzCOv2G1Iq5kEMh0TRi>
Query Options: The following fields appear. <ul style="list-style-type: none"> ♦ client_id ♦ issuer 	<ul style="list-style-type: none"> ♦ client_id: <3MVG97quAmFZJfVwk3y1U.8elhRYBqG9h25m3TWewozjKnFIY0HrhOEJl7LMET9HHocaHnTB1k04kophr1CgW> ♦ issuer: <https://login.Salesforce.com>
Secret Query Options: The values specified in these options are hidden for security purposes. <ul style="list-style-type: none"> ♦ refresh_token ♦ client_secret 	<ul style="list-style-type: none"> ♦ refresh_token: 5Aep861Xq7VoDavIt6UxKW62EAmfy0hKFv1T_X8yhb9PRQWtsOCrr97CYDrVasefykd1_f.DTVaJGKxjnz50XjQ ♦ client_secret: E734505442694ECD0156D83F965B42C0F07601BB8BFDC9879420C1FF23C8A87
<p>For the other common fields such as Application Truststore File, Mutual Authentication, Proxy Authentication, HTTPS connection Timeout, and SCIM 2.0 URL, see “Common fields in Connection Parameters” on page 35</p>	

22 In the **Install SCIM Base** page, specify the **Subscriber Options** and **Publisher Options**, and click **Next**.

Field	Sample Field Value
Subscriber Options	<p>HTTPS error codes for retry: <307 408 503 504></p> <p>NOTE: The operation is retried if these errors are encountered.</p>
Publisher Options	<ul style="list-style-type: none"> ◆ Enable Publisher Channel: Select Yes to enable the Publisher channel. ◆ Polling interval in minutes: <10> ◆ Heartbeat interval in minutes: <10> <p>IMPORTANT: Polling Resource Options: After configuring the driver, double click the connector line in the modeler window and navigate to Driver Configuration > Publisher Options tab to specify the polling resource options. Select the option as required:</p> <ul style="list-style-type: none"> ◆ Configured Resources: to poll all resources that are configured as part of the schema settings. ◆ Custom Resources: Click  to configure customized polling Resource ID and Resource URL, as shown below: <ul style="list-style-type: none"> ◆ For User: <ul style="list-style-type: none"> ◆ Resource ID: Example, urn:iETF:params:scim:schemas:core:2.0:User ◆ Resource URL: Example, https://ap16.salesforce.com/services/scim/v2/Users?startIndex=1&count=100 ◆ For Group: <ul style="list-style-type: none"> ◆ Resource ID: Example, urn:iETF:params:scim:schemas:core:2.0:Group ◆ Resource URL: Example, https://ap16.salesforce.com/services/scim/v2/Groups?startIndex=1&count=100

23 In the **Install SCIM Base** page, specify the parameters as shown in the following table, and click **Next**.

Table 5-1 Schema Settings

Field	Sample Field Value
Refresh Schema on Driver Startup	<p>Defaults to No, specify Yes if you want to refresh the schema.</p> <p>For more information on schema, see Chapter 6, “SCIM Schema Utility,” on page 45.</p>

Field	Sample Field Value
Schema Options	<p>Select the option as required, the default value is SCIM 2.0.</p> <p>The available options are:</p> <ul style="list-style-type: none"> ◆ SCIM 2.0 ◆ Application URL: <code><https://ap17.salesforce.com/services/scim/v2/Schemas></code> ◆ Import JSON File: Import the user defined schema JSON file from the local file system.
Resource Type	<ul style="list-style-type: none"> ◆ Resource ID: Resource ID in URN Format. For example, <code>urn:ietf:params:scim:schemas:core:2.0:Users</code> ◆ Resource Endpoint: The resource endpoint for the Resource ID. For example, <code>Users</code>. ◆ Modify Method Operation: Select PUT when you want to modify a resource in Salesforce. <p>Similarly for Groups:</p> <ul style="list-style-type: none"> ◆ Resource ID: Example, <code>urn:ietf:params:scim:schemas:core:2.0:Group</code> ◆ Resource Endpoint: <code>Groups</code> ◆ Modify Method Operation: Select PUT.

Table 5-2 Modifier Settings

Field	Sample Field Value
Custom Java Class	Defaults to Hide , select Show to configure Modifiers.
Document Handling: Defaults to No , select Yes .	<ul style="list-style-type: none"> ◆ Class: <code>com.example.MyNewClass</code> ◆ Init Parameter: Specify the parameters in string format that you want to pass to the <code>init()</code> method of your class.

24 In the **Remote Loader** page, if you are configuring the driver with a remote loader select **yes**, else select **no**. Click **Next**.

For more information about installing Remote Loader, see [Deciding Whether to Use the Remote Loader](#) in “*NetIQ Identity Manager Driver Administration Guide*”.

25 Review the summary of tasks, and click **Finish**. The configured driver appears in the designer screen.

Global Configuration Values

After configuring the SCIM driver, you can set the Global Configuration Values (GCVs) as required. For more information, see [“Global Configuration Values \(GCVs\)” on page 49](#).

The SCIM driver includes the predefined GCV as shown below:

- ♦ **Validate Resource with Required Attributes:** Select as `true`, to validate resources and the required attributes that are available in the schema.

For more information on GCVs, see [When and How to Use Global Configuration Values](#) in *“NetIQ Identity Manager Driver Administration Guide”*.

Sample SCIM Driver Use Cases for Salesforce

This section explains the sample use cases that you can perform in Identity Manager to execute the required operation on resources available in Salesforce.

IMPORTANT: All the field values shown in this section are just sample values. You must ensure not use them directly to perform the use case operations.

The following operations can be performed on the subscriber channel:

NOTE: You must replace the variable values in the SCIM end point URL as per Salesforce specifications. These are just sample values, replace them as applicable for the SCIM end point examples mentioned in other sections.

- ♦ `<tenant name>` with `ap16`, `ap17`, etc.
 - ♦ `<current version>` with `v2`, etc.
 - ♦ `<association>` with `salesforce-userid`, `salesforce-groupid`, etc.
-

- ♦ **Operations performed on a user**

Operation	Sample SCIM endpoint	Method
<p>Adding a user: A user is added in Identity Manager and synchronized to Salesforce through the SCIM driver. For example, the details of the user such as, user's first name, last name, contact details, email ID, location, department, user name, initial login password are added and synchronized with Salesforce.</p> <p>IMPORTANT: Ensure to add the auxiliary class <code>scim-User</code> to the object class attribute. In case the auxiliary class is not added, the scim related attributes such as, <code>scim-Entitlementsvalue</code>, <code>scim-Address</code> will not be displayed, and the user created in iManager will not sync to Salesforce. To sync the created user to Salesforce, you must mandatorily provide the <code>scim-Entitlementsvalue</code> attribute value. For example, <code><00e2x00000K4Yv></code>.</p>	<pre>https:// <tenantname>.salesforce.com/ services/scim/<current version>/Users</pre>	POST
<p>Deleting a user: Deleting a user in Identity Manager disables the user in Salesforce.</p>	<pre>https:// <tenantname>.salesforce.com/ services/scim/<current version>/Users/<salesforce- userid></pre>	DELETE
<p>Modifying a user: If there are any changes made to the user details such as, contact details, email ID etc, they will be synchronized with Salesforce.</p> <p>NOTE: Salesforce does not support renaming a user.</p>	<pre>https:// <tenantname>.salesforce.com/ services/scim/<current version>/Users/<salesforce- userid></pre>	PUT
<p>Migrating a user: You can migrate an individual or multiple users from Identity Manager to Salesforce and vice-versa.</p>	<pre>https:// <tenantname>.salesforce.com/ services/scim/<current version>/Users</pre>	GET/PUT
<p>Polling a user: You can poll a user or multiple users from Salesforce to Identity Manager.</p>	<pre>https:// <tenantname>.salesforce.com/ services/scim/<current version>/Users/</pre>	GET

Operation	Sample SCIM endpoint	Method
Querying a User: You can query the synced attributes of resource such as user from Salesforce through iManager. Also, you can query through dxcmnd utility to fetch required resources or attributes using specific conditions.	https:// <tenantname>.salesforce.com/ services/scim/<current version>/Users/<salesforce- userid>	GET NOTE: Complex JSON attributes cannot be queried from SCIM compliant applications through dxcmnd utility.

♦ Operations performed on public groups

Operation	Sample SCIM endpoint	Method
Adding a group: A group is added in Identity Manager to manage multiple users with same set of access permissions, rather than managing them individually.	The SCIM end point for Salesforce to add a group: https:// <tenantname>.salesforce.com/ services/scim/<current version>/Groups	POST
Adding member to a group: A member is added to a group based on the user's role, department and access permissions that the user qualifies for, so that the access permissions for that designated user role are provisioned accordingly.	The SCIM end point for Salesforce to add a member to a group: https:// <tenantname>.salesforce.com/ services/scim/<current version>/Groups	PUT
Removing member from a group: A user can be removed from a group if the user's role or designation, or access permissions provided do not qualify a user to belong to that group. This happens in case of a role or designation change of the user, or separation or termination of the user.	The SCIM end point for Salesforce to remove a member from a group: https:// <tenantname>.salesforce.com/ services/scim/<current version>/Groups/<salesforce- groupid>	PUT
Renaming group object: The group name can be renamed as required.	The SCIM end point for Salesforce to renaming a group: https:// <tenantname>.salesforce.com/ services/scim/<current version>/Groups/<salesforce- groupid>	PUT
Deleting a group: Duplicate groups, redundant groups, empty groups or groups that are not required can be deleted, and the group members will be moved to another group as required.	The SCIM end point for Salesforce to delete a group: https:// <tenantname>.salesforce.com/ services/scim/<current version>/Groups/<salesforce- groupid>	DELETE

Operation	Sample SCIM endpoint	Method
Migrating a Group: You can migrate an individual or multiple groups from Identity Manager to Salesforce and vice-versa.	The SCIM end point for Salesforce to add a member to a group: <code>https://<tenantname>.salesforce.com/services/scim/<currentversion>/Groups</code>	PUT/GET
Polling a Group: You can poll groups from Salesforce to Identity Manager.	The SCIM end point for Salesforce to poll groups: <code>https://<tenantname>.salesforce.com/services/scim/<currentversion>/Groups</code>	GET
Querying a Group: You can query the synced attributes of resource such as group from Salesforce through iManager. Also, you can query through dxcm utility to fetch required resources or attributes using specific conditions.	The SCIM end point for Salesforce to query groups: <code>https://<tenantname>.salesforce.com/services/scim/<currentversion>/Groups</code>	GET NOTE: Complex JSON attributes cannot be queried from SCIM compliant applications through dxcm utility.

Known Observations from Salesforce

The following are a few observations when some specific operations are performed in Salesforce:

- ♦ If you try to modify an email ID in Identity Manager and sync with Salesforce, the email ID does not get updated in Salesforce. The success code 200 is returned which appears in the driver log when this operation is performed.
- ♦ Salesforce does not support renaming a user from Identity Manager.
- ♦ Salesforce does not support the canonical type attribute for the phone number.
- ♦ Renaming a group in Identity Manager changes only the label attribute and not the name attribute.
- ♦ By default, you can poll only up to 10 users from Salesforce using the GET method.

Mapping Attributes for Salesforce

The attributes of Identity Manager and Salesforce must be mapped as per the schema mapping policy. After fetching the schema from Salesforce, the attributes of Identity Manager and Salesforce are mapped in the backend by default. You can modify the attributes if any changes are required.

For the procedure to modify or change any attribute mapping, see [“Refreshing the Fetched Connected Application’s Schema”](#) on page 45.

You can also refer to [Appendix C, “Mapping Attributes for Identity Manager and Connected Application,”](#) on page 55 for the list of attributes that are available for mapping.

For more information on the terminologies and conventions of Salesforce, see [Connected App and OAuth Terminology](#).

6 SCIM Schema Utility

The SCIM schema utility is used to fetch the connected application's schema. Using the schema mapping policy, the resource attributes of connected application are mapped with the respective resource attributes of Identity Manager.

You can fetch schema of the connected application using one of the following methods:

- ♦ **SCIM 2.0:** The default schema for Users and Groups as defined in [RFC 7643](#), which holds core users and group along with extended user schema definition.
- ♦ **Application URL:** This utility fetches the schema by querying an application URL. For example, `<https://ap17.salesforce.com/services/scim/v2/Schemas>`
- ♦ **Import JSON:** If the schema endpoint of a connected application is not available, you can provide a user defined schema file from your local file system. For example, `<NIDM_Driver_SCIM\schema\scim_default_schemas>`

After the schema is fetched successfully, the connected application's resources and its attributes are available in the schema mapping policy. You can now use the new schema for mapping the resources and its attributes accordingly.

Refreshing the Fetched Connected Application's Schema

When you configure the driver for the first time, you must set the **Refresh Schema on Driver Startup** to **Yes** and specify the **Schema Options** for fetching the connected application's schema. Once these parameters are set and you start the driver, the driver fetches the connected applications schema and stores it in the driver storage (DirXML-DriverStorage:), which is available in **iManager > Driver Properties > General** tab.

In iManager, the procedure to refresh the schema, or fetch a new schema for mapping is shown below:

- 1 Login to iManager.
- 2 Select **Identity Manager Overview**.
- 3 Click **Driver Sets** tab, all the configured drivers appear.

NOTE: 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.

- 4 Click the driver name, the **Driver Set Overview** page appears.
- 5 Select **Schema Mapping Policies** in the SCIM driver diagram.
- 6 Open the schema mapping policy that is available.
- 7 Click **Refresh Application Schema** button, and click **OK** to confirm. A confirmation message appears displaying the successful schema refresh action.
- 8 Select fetched schema's resource type with the corresponding Identity Manager's resource and click **Add**. Perform this step for all the resource types that are to be mapped.

- 9 After mapping all the resource types, Select the **Resource Type** and click **Attribute** button.
- 10 In the **Identity Manager Schema Mapping Policy Editor** window, select the corresponding attribute value for the resource type and click **Add > OK**.
Similarly, map all the resource types with their corresponding attributes. For more information on mapping attributes see, [Appendix C, “Mapping Attributes for Identity Manager and Connected Application,”](#) on page 55.
- 11 Click **Apply > OK**.
- 12 Now, click the **Driver Filter** in the SCIM driver diagram.
- 13 In the **Filter** window, scroll to find the mapped attribute and select it. The fields associated with the selected attribute appears in the right pane.
- 14 Select the **Synchronize** radio button in the **Publish** and **Subscribe** options.
- 15 Click **Apply > OK**.

Adding a New Resource to Schema Mapping Policy

You can add resources and map the corresponding attributes to Identity Manager in the schema mapping policy.

The procedure to add a resource and map the attributes is shown below:

- 1 Ensure that the schema definition is available for the required resource and attributes either in the application schema or in the specified JSON schema file.
- 2 Add the resource/entry in the resource type.
- 3 Refresh the connected application’s schema in schema mapping policy.
- 4 Map the resources and attributes.
- 5 Modify the filter for the resource and attribute.

SCIM JSON Attribute Representation Using SCIM Schema Utility

The schema mapping policy comprises all the resource attributes. The attributes are represented with their sub-attributes, or their canonical types, or both. These attributes are modified to the required format as explained in the following sections.

Attribute Representation Using SCIM Utility Grammar With Delimiters

The resource attributes in the Identity Manager are in the JSON format. These attributes are of singular, complex, complex multivalued types. For schema mapping, the resource attributes can be from a core class or from an extension. The SCIM driver modifies the JSON format to a linear SCIM format using delimiters, as shown below:

- ◆ + as the urn(Resource) delimiter
- ◆ : as the attribute-Sub attributes delimiter

The delimiters as mentioned earlier are used to represent the SCIM attributes as shown below:

- ◆ Core attributes: The core attributes are of three types and are delimited by `:`, as shown below:
 - ◆ Singular: `<attribute>`
 - ◆ Complex Singular: `<attribute>:<subattribute>`
 - ◆ Complex Multi-valued: `<attribute>:<canonicalType>:<subattribute>`
- ◆ Extensions attributes: The extension attributes are associated to the URN with a `+`, as shown below:
 - ◆ Singular: `<urn>+<attribute>`
 - ◆ Complex Singular: `<urn>+<attribute>:<subattribute>`
 - ◆ Complex Multi-valued: `<urn>+<attribute>:<canonicalType>:<subattribute>`

Formatting JSON Structures to SCIM Attributes

The SCIM driver formats the JSON structure into a linear format SCIM attribute using delimiters. The following table shows how the JSON structures are transformed into linear SCIM attributes using utility grammar.

JSON Structure	SCIM Attributes	Grammar
Singular Attribute <pre>"userName": "johndoe@microfocus.com"</pre>	username	<code><attribute></code>
Complex Attribute <pre>"phoneNumbers": [{ "type": "work", "value": "09663502443" },]</pre>	<ul style="list-style-type: none"> ◆ phoneNumbers ◆ phoneNumbers:work ◆ phoneNumbers:value ◆ phoneNumbers:work:value 	<ul style="list-style-type: none"> ◆ <code><attribute></code> ◆ <code><attribute>:<canonicalType></code> ◆ <code><attribute>:<subattribute></code> ◆ <code><attribute>:<canonicalType>:<subattribute></code>
Extension Attribute <pre>"urn:ietf:params:scim:schemas:extension:enterprise:2.0:User": { "organization": "00D2v000002mBdQEAU", "employeeNumber": "21212" }</pre>	<ul style="list-style-type: none"> ◆ urn:ietf:params:scim:schemas:extension:enterprise:2.0:User+Organization ◆ urn:ietf:params:scim:schemas:extension:enterprise:2.0:User+employeeNumber 	<ul style="list-style-type: none"> ◆ <code><urn>+<attribute></code>

JSON Structure	SCIM Attributes	Grammar
Complex Values in Extension Attribute <pre>"urn:ietf:params:scim:schemas:extension:enterprise:2.0:User": { "manager": [{ "displayName": "John Doe" },], }</pre>	<pre>urn:ietf:params:scim:schemas:extension:enterprise:2.0:User +Manager:displayName</pre>	<ul style="list-style-type: none"> ◆ <urn>+<attribute>:<canonical Type>:<subattribute> ◆ <urn>+<attribute>:<subattribute>

A Driver Properties

This section provides information about the Driver Configuration and Global Configuration Values properties for the SCIM 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.

For more information, see [Driver Properties](#) in the “*NetIQ Identity Manager Driver Administration Guide*”.

Global Configuration Values (GCVs)

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, and Global Configuration Values (GCVs). Although it is important for you to understand all of the settings, you must review the Driver Parameters and the Global Configuration Values, in the Driver Configuration page. These settings must be configured properly for the driver to start and function correctly. You can configure the driver with entitlements enabled or disabled.

GCVs are the values that can be used by the driver to control its functionality. GCVs are defined in the driver or in the driver set. Driver set GCVs can be used by all drivers in the driver set.

The SCIM driver includes predefined GCVs. You can also add your own GCVs as required for the additional policy implementation in the driver. The configured SCIM driver's GCV is:

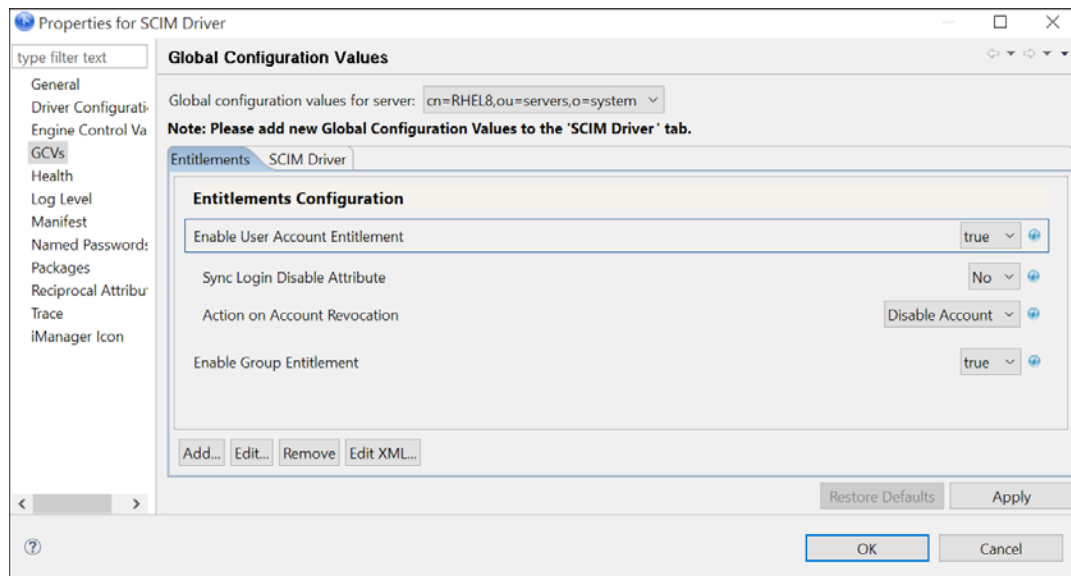
- ♦ **Validate Resource with Required Attributes:** This field validates resources and the required attributes that are available in the schema. Select as **false**.
- ♦ **Connecting to SAP Cloud:** Set this to **true** if you are connecting to SAP Cloud. Defaults to **false**.
- ♦ **Connected Application's Name:** Enter the name of the connected application. This name appears in the entitlements.
- ♦ **SCIM 2.0 URL:** Auto-populates the **SCIM 2.0 URL** value as provided while creating the driver object.

For more information on GCVs, see [When and How to Use Global Configuration Values](#) in “*NetIQ Identity Manager Driver Administration Guide*”.

Configuring Entitlements

You can configure the driver with entitlements enabled or disabled. To configure entitlements, perform the following steps:

- 1 In the modeler window, right-click the driver icon or the driver line, then select **Properties**.
- 2 Click **GCVs > Entitlements** and review the following settings:



NOTE: These settings are only displayed if you have installed the **SCIM Entitlements** package. The entitlements are supported based on the connected application’s capabilities.

- ◆ **Enable User Account Entitlement:** This field enables the driver to manage user account permissions using the User Account entitlement. Ensure that the value of this parameter is set to **true**. By default, the value is set to **False**. Specify the values as shown in the following table to set User Account Entitlements.

Field	Description/Value
Sync Login Disabled attribute	<p>This field is used to control the Login Disabled attribute for a particular user:</p> <p>Select:</p> <ul style="list-style-type: none"> ◆ Yes, to sync the changes made to the Login Disabled attribute in the Identity Manager, to SAP Cloud. ◆ No, to restricts syncing the changes of Login Disabled attribute in the Identity Manager to SAP Cloud.
Action on Account Revocation	<p>Select the action to be performed in SAP Cloud when the user account entitlement is revoked.</p> <p>The available options are:</p> <ul style="list-style-type: none"> ◆ Disable Account ◆ Delete Account

- ◆ **Enable Group Entitlement:** This option enables the driver to manage group memberships using the Group entitlement. Ensure that the value of this parameter is set to **true**. By default, the value is set to **false**.

IMPORTANT: If the values for **Enable User Account Entitlement** and **Enable Group Entitlement** parameter is set to **False**, the user and group membership synchronization will be managed using the non-entitlement configuration method.

- 3 Click **Apply**.
- 4 Click **OK** when finished.

B Trace Levels

The driver supports the following trace levels:

Table B-1 *Supported Trace Levels*

Level	Description
0	Driver status messages. All warnings and failure status is captured.
1	Driver status and Driver initialization messages. The success, warnings and failure status are captured.
2	Previous levels plus all other error details.
3 and 4	Previous levels plus XDS to JSON parser processing details.
5	Previous level plus all configured debug messages.
6	Previous levels plus HTTPS request documents.
7	Previous levels plus HTTPS response documents.

For information about setting driver trace levels, see [“Viewing Identity Manager Processes”](#) in the *NetIQ Identity Manager Driver Administration Guide*.

C Mapping Attributes for Identity Manager and Connected Application

The following table shows the default mapping of the User class and Group class SCIM attributes between the SCIM compliant connected application and the Identity Manager.

Table C-1 Mapping of User Attributes

Identity Manager Attribute	SCIM Attribute	Description
User	urn:ietf:params:scim:schemas:core:2.0:User	User class
city	addresses:worklocality	The work city of the user.
CN	userName	The user's name.
co	addresses:workcountry	The user's country of work.
costCenter	urn:ietf:params:scim:schemas:extension:enterprise:2.0:User+costCenter	The cost center to which the user belongs.
displayName	displayName	The name of the user that is displayed in the application.
employeeType	userType	The user's employment type.
Full Name	name:formatted	User's full name. For example, the full name Ms. Barbara J Jensen, III.
Generational Qualifier	name:honorificSuffix	The user's honorific suffix. For example, III, given the full name Ms. Barbara J Jensen, III.
Given Name	name:givenName	User's first name or given name. For example, Barbara, given the full name Ms. Barbara J Jensen, III.
Group Membership	groups:value	The group identification value of the user.
homeCity	addresses:home:locality	The user's city.
homeEmailAddress	emails:home:value	The user's home email address.
homeState	addresses:home:region	The user's home state.
homeZipCode	addresses:home:postalCode	The home postal zip code of the user.

Identity Manager Attribute	SCIM Attribute	Description
Initials	name:middleName	The user's initials. For example, J, given the full name Ms. Barbara J Jensen, III.
Internet EMail Address	emails:work:value	The user's work email address.
Login Disabled	active	A boolean value indicating the user's administrative status.
managerWorkforceID	urn:ietf:params:scim:schemas:extension:enterprise:2.0:User+manager:value	The manager's employee identification number.
OU	urn:ietf:params:scim:schemas:extension:enterprise:2.0:User+department	Organization detail of the user.
personalTitle	name:honorificPrefix	The user's honorific prefixes. For example, Ms, in the name Ms. Barbara J Jensen, III.
Postal Code	addresses:work:postalCode	The work postal zip code of the user.
preferredName	nickName	The user's preferred name.
S	addresses:work:region	The user's regional state of work location.
SA	addresses:work:streetAddress	The user's street address of work location.
Surname	name:familyName	User's last name or family name. For example, Jensen, given the full name Ms. Barbara J Jensen, III.
Telephone Number	phoneNumbers:work:value	The user's phone number.
Title	title	The user's designation.
workforceID	urn:ietf:params:scim:schemas:extension:enterprise:2.0:User+employeeNumber	The user's employee identification number.

Table C-2 Mapping of Group Attributes

Identity Manager Attribute	SCIM Attribute	Description
Group	urn:ietf:params:scim:schemas:core:2.0:Group	Group class
CN	displayName	The name of the group displayed in the application.
Member	members:value	The name of the member displayed in the application.

IMPORTANT: The above tables show the default attributes that are available as a part of [SCIM 2.0 RFC](#). If these default values are not applicable for your business environment, you can change the attribute mapping in the schema mapping policy.

D Troubleshooting the Driver

Hidden JSON Content in Output Transformation Policy Channels

For security reasons, the content of JSON in the traces are hidden by default. This is done as there may be sensitive information and sensitive attribute values present in the JSON traces. This occurs due to the presence of `Is_sensitive` attribute in the output transformation policy channel which suppresses the JSON content.

To troubleshoot and see the hidden JSON content, you must remove the `Is_sensitive` attribute.

Troubleshooting Driver Processes

Viewing driver processes is necessary to analyze unexpected behavior. To view the driver processing events, use `DSTrace`. You should only use it during testing and troubleshooting the driver. Running `DSTrace` while the drivers are in production increases the utilization on the Identity Manager server and can cause events to process very slowly. For more information, see “[Viewing Identity Manager Processes](#)” in the *NetIQ Identity Manager Driver Administration Guide*.

Resource Attributes Modification Conflicts During Migration Operation

According to the migration rule, during the migration operation the driver merges the attribute values of resources which results in a conflict. This happens if the Merge Authority value is set to default in the driver filter.

Workaround: Set the Merge Authority value to `IDV`.

