



# Red Hat Enterprise Linux 8

## Configuring and managing Identity Management

Logging in to IdM and managing services, users, hosts, groups, access control rules, and certificates.



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## Abstract

The main feature of Red Hat Identity Management (IdM) is the management of users, groups, hosts, access control rules, and certificates. However, before you can perform administration tasks in IdM, you must log in to the service. You can use Kerberos and one time passwords as authentication methods in IdM when you log in by using the command line or the IdM Web UI. You can manage certificates in IdM by using the integrated or an external Certificate Authority (CA). You can request, renew, and replace certificates using many tools, for example, Ansible Playbooks. To replace the web server and LDAP server certificates of IdM servers, you must perform manual actions.



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## MAKING OPEN SOURCE MORE INCLUSIVE

Red Hat is committed to replacing problematic language in our code, documentation, and web properties. We are beginning with these four terms: master, slave, blacklist, and whitelist. Because of the enormity of this endeavor, these changes will be implemented gradually over several upcoming releases. For more details, see [our CTO Chris Wright's message](#).

In Identity Management, planned terminology replacements include:

- ***block list*** replaces *blacklist*
- ***allow list*** replaces *whitelist*
- ***secondary*** replaces *slave*
- The word *master* is being replaced with more precise language, depending on the context:
  - ***IdM server*** replaces *IdM master*
  - ***CA renewal server*** replaces *CA renewal master*
  - ***CRL publisher server*** replaces *CRL master*
  - ***multi-supplier*** replaces *multi-master*

# PROVIDING FEEDBACK ON RED HAT DOCUMENTATION

We appreciate your feedback on our documentation. Let us know how we can improve it.

## Submitting comments on specific passages

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2. Click **Create** in the top navigation bar
3. Enter a descriptive title in the **Summary** field.
4. Enter your suggestion for improvement in the **Description** field. Include links to the relevant parts of the documentation.
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# CHAPTER 1. LOGGING IN TO IDENTITY MANAGEMENT FROM THE COMMAND LINE

Identity Management (IdM) uses the Kerberos protocol to support single sign-on. Single sign-on means that the user enters the correct user name and password only once, and then accesses IdM services without the system prompting for the credentials again.



## IMPORTANT

In IdM, the System Security Services Daemon (SSSD) automatically obtains a ticket-granting ticket (TGT) for a user after the user successfully logs in to the desktop environment on an IdM client machine with the corresponding Kerberos principal name. This means that after logging in, the user is not required to use the **kinit** utility to access IdM resources.

If you have cleared your Kerberos credential cache or your Kerberos TGT has expired, you need to request a Kerberos ticket manually to access IdM resources. The following sections present basic user operations when using Kerberos in IdM.

## 1.1. USING KINIT TO LOG IN TO IDM MANUALLY

Follow this procedure to use the **kinit** utility to authenticate to an Identity Management (IdM) environment manually. The **kinit** utility obtains and caches a Kerberos ticket-granting ticket (TGT) on behalf of an IdM user.



## NOTE

Only use this procedure if you have destroyed your initial Kerberos TGT or if it has expired. As an IdM user, when logging onto your local machine you are also automatically logging in to IdM. This means that after logging in, you are not required to use the **kinit** utility to access IdM resources.

## Procedure

### 1. To log in to IdM

- under the user name of the user who is currently logged in on the local system, use **kinit** without specifying a user name. For example, if you are logged in as **example\_user** on the local system:

```
[example_user@server ~]$ kinit
Password for example_user@EXAMPLE.COM:
[example_user@server ~]$
```

If the user name of the local user does not match any user entry in IdM, the authentication attempt fails:

```
[example_user@server ~]$ kinit
kinit: Client 'example_user@EXAMPLE.COM' not found in Kerberos database while
getting initial credentials
```

- using a Kerberos principal that does not correspond to your local user name, pass the required user name to the **kinit** utility. For example, to log in as the **admin** user:



```
[example_user@server ~]$ kinit admin
Password for admin@EXAMPLE.COM:
[example_user@server ~]$
```

2. Optionally, to verify that the login was successful, use the **klist** utility to display the cached TGT. In the following example, the cache contains a ticket for the **example\_user** principal, which means that on this particular host, only **example\_user** is currently allowed to access IdM services:

```
$ klist
Ticket cache: KEYRING:persistent:0:0
Default principal: example_user@EXAMPLE.COM

Valid starting    Expires          Service principal
11/10/2019 08:35:45  11/10/2019 18:35:45  krbtgt/EXAMPLE.COM@EXAMPLE.COM
```

## 1.2. DESTROYING A USER'S ACTIVE KERBEROS TICKET

Follow this procedure to clear the credentials cache that contains the user's active Kerberos ticket.

### Procedure

1. To destroy your Kerberos ticket:

```
[example_user@server ~]$ kdestroy
```

2. Optionally, to check that the Kerberos ticket has been destroyed:

```
[example_user@server ~]$ klist
klist: Credentials cache keyring 'persistent:0:0' not found
```

## 1.3. CONFIGURING AN EXTERNAL SYSTEM FOR KERBEROS AUTHENTICATION

Follow this procedure to configure an external system so that Identity Management (IdM) users can log in to IdM from the external system using their Kerberos credentials.

Enabling Kerberos authentication on external systems is especially useful when your infrastructure includes multiple realms or overlapping domains. It is also useful if the system has not been enrolled into any IdM domain through **ipa-client-install**.

To enable Kerberos authentication to IdM from a system that is not a member of the IdM domain, define an IdM-specific Kerberos configuration file on the external system.

### Prerequisites

- The **krb5-workstation** package is installed on the external system.  
To find out whether the package is installed, use the following CLI command:

```
# yum list installed krb5-workstation
Installed Packages
krb5-workstation.x86_64 1.16.1-19.el8 @BaseOS
```

## Procedure

1. Copy the **/etc/krb5.conf** file from the IdM server to the external system. For example:

```
# scp /etc/krb5.conf root@externalsystem.example.com:/etc/krb5_ipa.conf
```



### WARNING

Do not overwrite the existing **krb5.conf** file on the external system.

2. On the external system, set the terminal session to use the copied IdM Kerberos configuration file:

```
$ export KRB5_CONFIG=/etc/krb5_ipa.conf
```

The **KRB5\_CONFIG** variable exists only temporarily until you log out. To prevent this loss, export the variable with a different file name.

3. Copy the Kerberos configuration snippets from the **/etc/krb5.conf.d/** directory to the external system.

Users on the external system can now use the **kinit** utility to authenticate against the IdM server.

## 1.4. ADDITIONAL RESOURCES

- The **krb5.conf(5)** man page.
- The **kinit(1)** man page.
- The **klist(1)** man page.
- The **kdestroy(1)** man page.

## CHAPTER 2. VIEWING, STARTING AND STOPPING THE IDENTITY MANAGEMENT SERVICES

Identity Management (IdM) servers are Red Hat Enterprise Linux systems that work as domain controllers (DCs). A number of different services are running on IdM servers, most notably the Directory Server, Certificate Authority (CA), DNS, and Kerberos.

### 2.1. THE IDM SERVICES

There are many different services that can be installed and run on the IdM servers and clients.

#### List of services hosted by IdM servers

Most of the following services are not strictly required to be installed on the IdM server. For example, you can install services such as a certificate authority (CA) or DNS server on an external server outside the IdM domain.

#### Kerberos

the **krb5kdc** and **kadmin** services

IdM uses the **Kerberos** protocol to support single sign-on. With Kerberos, users only need to present the correct username and password once and can access IdM services without the system prompting for credentials again.

Kerberos is divided into two parts:

- The **krb5kdc** service is the Kerberos Authentication service and Key Distribution Center (KDC) daemon.
- The **kadmin** service is the Kerberos database administration program.

For information about how to authenticate using Kerberos in IdM, see [Logging in to Identity Management from the command line](#) and [Logging in to IdM in the Web UI: Using a Kerberos ticket](#) .

#### LDAP directory server

the **dirsrv** service

The IdM **LDAP directory server** instance stores all IdM information, such as information related to Kerberos, user accounts, host entries, services, policies, DNS, and others. The LDAP directory server instance is based on the same technology as [Red Hat Directory Server](#) . However, it is tuned to IdM-specific tasks.

#### Certificate Authority

the **pki-tomcatd** service

The integrated **certificate authority (CA)** is based on the same technology as [Red Hat Certificate System](#). **pki** is the command-line interface for accessing Certificate System services.

You can also install the server without the integrated CA if you create and provide all required certificates independently.

For more information, see [Planning your CA services](#) .

#### Domain Name System (DNS)

the **named** service

IdM uses **DNS** for dynamic service discovery. The IdM client installation utility can use information from DNS to automatically configure the client machine. After the client is enrolled in the IdM domain, it uses DNS to locate IdM servers and services within the domain. The **BIND** (Berkeley Internet Name Domain) implementation of the DNS (Domain Name System) protocols in Red Hat Enterprise Linux includes the **named** DNS server. **named-pkcs11** is a version of the BIND DNS server built with native support for the PKCS#11 cryptographic standard.

For information, see [Planning your DNS services and host names](#) .

### Apache HTTP Server

the **httpd** service

The **Apache HTTP web server** provides the IdM Web UI, and also manages communication between the Certificate Authority and other IdM services.

### Samba / Winbind

**smb** and **winbind** services

Samba implements the Server Message Block (SMB) protocol, also known as the Common Internet File System (CIFS) protocol, in Red Hat Enterprise Linux. Via the **smb** service, the SMB protocol enables you to access resources on a server, such as file shares and shared printers. If you have configured a Trust with an Active Directory (AD) environment, the **Winbind** service manages communication between IdM servers and AD servers.

### One-time password (OTP) authentication

the **ipa-otpd** services

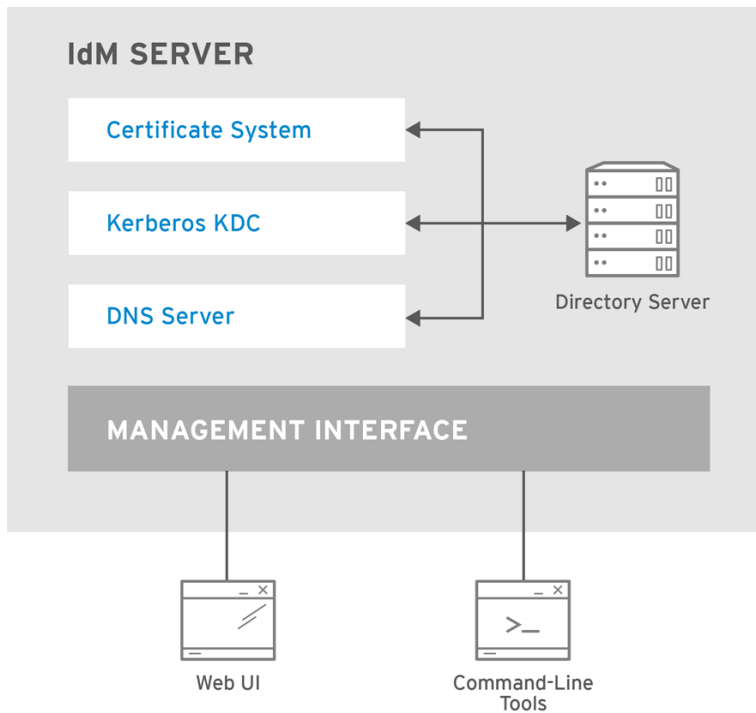
One-time passwords (OTP) are passwords that are generated by an authentication token for only one session, as part of two-factor authentication. OTP authentication is implemented in Red Hat Enterprise Linux via the **ipa-otpd** service.

For more information, see [Logging in to the Identity Management Web UI using one time passwords](#) .

### OpenDNSSEC

the **ipa-dnskeysyncd** service

**OpenDNSSEC** is a DNS manager that automates the process of keeping track of DNS security extensions (DNSSEC) keys and the signing of zones. The **ipa-dnskeysyncd** service manages synchronization between the IdM Directory Server and OpenDNSSEC.



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### List of services hosted by IdM clients

- **System Security Services Daemon:** the **sssd** service

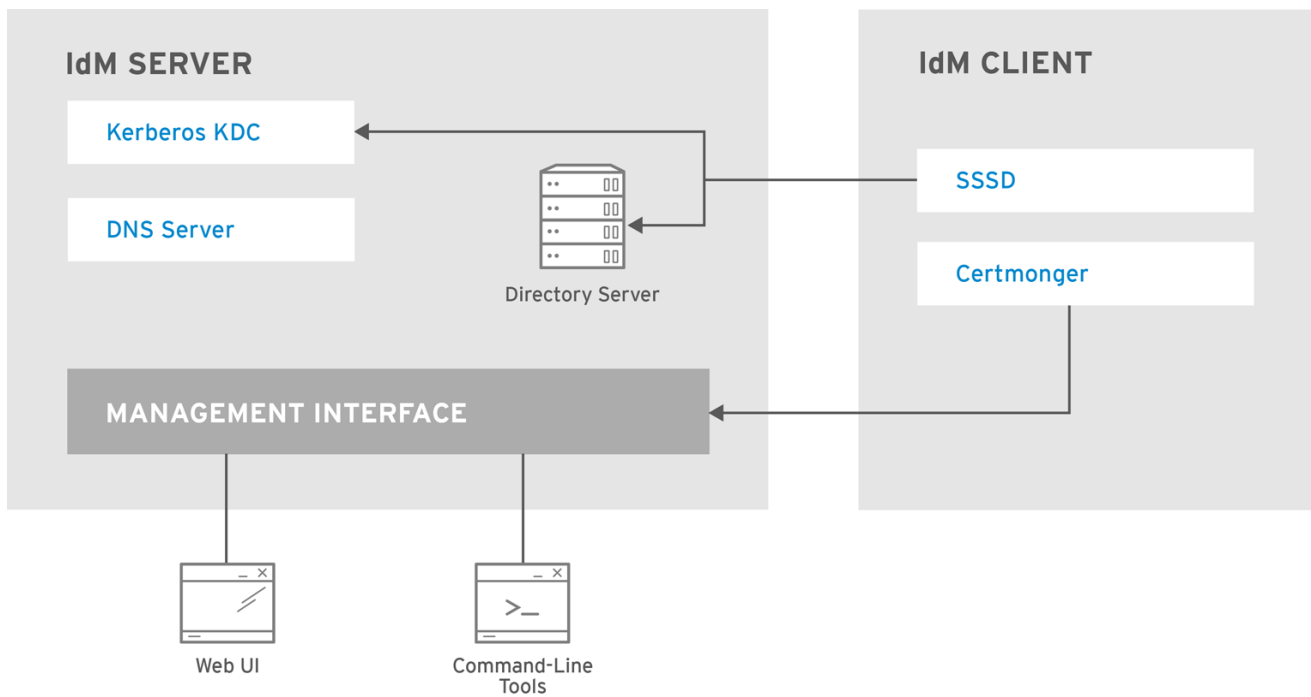
The **System Security Services Daemon** (SSSD) is the client-side application that manages user authentication and caching credentials. Caching enables the local system to continue normal authentication operations if the IdM server becomes unavailable or if the client goes offline.

For more information, see [Understanding SSSD and its benefits](#) .

- **Certmonger:** the **certmonger** service

The **certmonger** service monitors and renews the certificates on the client. It can request new certificates for the services on the system.

For more information, see [Obtaining an IdM certificate for a service using certmonger](#) .



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## 2.2. VIEWING THE STATUS OF IDM SERVICES

To view the status of the IdM services that are configured on your IdM server, run the **ipactl status** command:

```
[root@server ~]# ipactl status
Directory Service: RUNNING
krb5kdc Service: RUNNING
kadmin Service: RUNNING
named Service: RUNNING
httpd Service: RUNNING
pki-tomcatd Service: RUNNING
smb Service: RUNNING
winbind Service: RUNNING
ipa-otpd Service: RUNNING
ipa-dnskeysyncd Service: RUNNING
ipa: INFO: The ipactl command was successful
```

The output of the **ipactl status** command on your server depends on your IdM configuration. For example, if an IdM deployment does not include a DNS server, the **named** service is not present in the list.



### NOTE

You cannot use the IdM web UI to view the status of all the IdM services running on a particular IdM server. Kerberized services running on different servers can be viewed in the **Identity** → **Services** tab of the IdM web UI.

You can start or stop the entire server, or an individual service only.

To start, stop, or restart the entire IdM server, see:

- [Starting and stopping the entire Identity Management server](#)

To start, stop, or restart an individual IdM service, see:

- [Starting and stopping an individual Identity Management service](#)

To display the version of IdM software, see:

- [Methods for displaying IdM software version](#)

## 2.3. STARTING AND STOPPING THE ENTIRE IDENTITY MANAGEMENT SERVER

Use the **ipa** systemd service to stop, start, or restart the entire IdM server along with all the installed services. Using the **systemctl** utility to control the **ipa** systemd service ensures all services are stopped, started, or restarted in the appropriate order. The **ipa** systemd service also upgrades the RHEL IdM configuration before starting the IdM services, and it uses the proper SELinux contexts when administrating with IdM services. You do not need to have a valid Kerberos ticket to run the **systemctl ipa** commands.

### ipa systemd service commands

To start the entire IdM server:

```
# systemctl start ipa
```

To stop the entire IdM server:

```
# systemctl stop ipa
```

To restart the entire IdM server:

```
# systemctl restart ipa
```

To show the status of all the services that make up IdM, use the **ipactl** utility:

```
# ipactl status
```



### IMPORTANT

- Do not directly use the **ipactl** utility to start, stop, or restart IdM services. Use the **systemctl ipa** commands instead, which call the **ipactl** utility in a predictable environment.
- You cannot use the IdM web UI to perform the **ipactl** commands.

## 2.4. STARTING AND STOPPING AN INDIVIDUAL IDENTITY MANAGEMENT SERVICE

Changing IdM configuration files manually is generally not recommended. However, certain situations require that an administrator performs a manual configuration of specific services. In such situations, use the **systemctl** utility to stop, start, or restart an individual IdM service.

For example, use **systemctl** after customizing the Directory Server behavior, without modifying the other IdM services:

```
# systemctl restart dirsrv@REALM-NAME.service
```

Also, when initially deploying an IdM trust with Active Directory, modify the `/etc/sss/sss.conf` file, adding:

- specific parameters to tune the timeout configuration options in an environment where remote servers have a high latency
- specific parameters to tune the Active Directory site affinity
- overrides for certain configuration options that are not provided by the global IdM settings

To apply the changes you have made in the `/etc/sss/sss.conf` file:

```
# systemctl restart sssd.service
```

Running **`systemctl restart sssd.service`** is required because the System Security Services Daemon (SSSD) does not automatically re-read or re-apply its configuration.

Note that for changes that affect IdM identity ranges, a complete server reboot is recommended.



### IMPORTANT

To restart multiple IdM domain services, always use **`systemctl restart ipa`**. Because of dependencies between the services installed with the IdM server, the order in which they are started and stopped is critical. The **`ipa`** systemd service ensures that the services are started and stopped in the appropriate order.

## Useful `systemctl` commands

To start a particular IdM service:

```
# systemctl start name.service
```

To stop a particular IdM service:

```
# systemctl stop name.service
```

To restart a particular IdM service:

```
# systemctl restart name.service
```

To view the status of a particular IdM service:

```
# systemctl status name.service
```



### IMPORTANT

You cannot use the IdM web UI to start or stop the individual services running on IdM servers. You can only use the web UI to modify the settings of a Kerberized service by navigating to **Identity** → **Services** and selecting the service.



### Additional resources

- [Starting and stopping the entire Identity Management server](#)

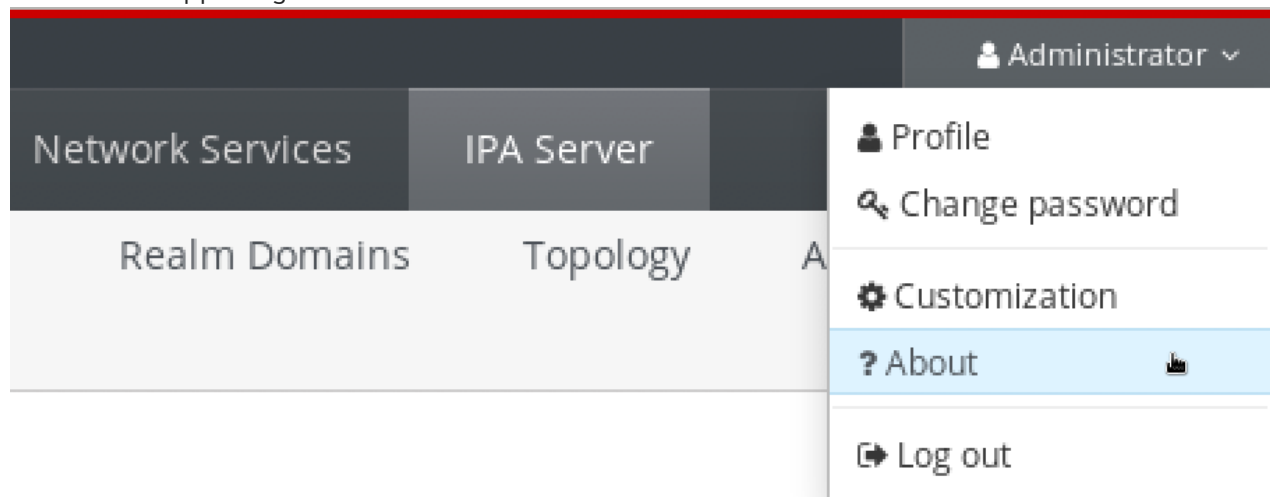
## 2.5. METHODS FOR DISPLAYING IDM SOFTWARE VERSION

You can display the IdM version number with:

- the IdM WebUI
- **ipa** commands
- **rpm** commands

### Displaying version through the WebUI

In the IdM WebUI, the software version can be displayed by choosing **About** from the username menu at the upper-right.



### Displaying version with **ipa** commands

From the command line, use the **ipa --version** command.

```
[root@server ~]# ipa --version
VERSION: 4.8.0, API_VERSION: 2.233
```

### Displaying version with **rpm** commands

If IdM services are not operating properly, you can use the **rpm** utility to determine the version number of the **ipa-server** package that is currently installed.

```
[root@server ~]# rpm -q ipa-server
ipa-server-4.8.0-11.module+el8.1.0+4247+9f3fd721.x86_64
```

## CHAPTER 3. INTRODUCTION TO THE IDM COMMAND-LINE UTILITIES

Learn more about the basics of using the Identity Management (IdM) command-line utilities.

### Prerequisites

- Installed and accessible IdM server.  
For details, see [Installing Identity Management](#).
- To use the IPA command-line interface, authenticate to IdM with a valid Kerberos ticket.  
For details about obtaining a valid Kerberos ticket, see [Logging in to Identity Management from the command line](#).

### 3.1. WHAT IS THE IPA COMMAND LINE INTERFACE

The IPA command-line interface (CLI) is the basic command-line interface for Identity Management (IdM) administration.

It supports a lot of subcommands for managing IdM, such as the **ipa user-add** command to add a new user.

IPA CLI allows you to:

- Add, manage, or remove users, groups, hosts and other objects in the network.
- Manage certificates.
- Search entries.
- Display and list objects.
- Set access rights.
- Get help with the correct command syntax.

### 3.2. WHAT IS THE IPA HELP

The IPA help is a built-in documentation system for the IdM server.

The IPA command-line interface (CLI) generates available help topics from loaded IdM plugin modules. To use the IPA help utility, you must:

- Have an IdM server installed and running.
- Be authenticated with a valid Kerberos ticket.

Entering the **ipa help** command without options displays information about basic help usage and the most common command examples.

You can use the following options for different **ipa help** use cases:

```
$ ipa help [TOPIC | COMMAND | topics | commands]
```

- **[]** – Brackets mean that all parameters are optional and you can write just **ipa help** and the command will be executed.
- **|** – The pipe character means **or**. Therefore, you can specify a **TOPIC**, a **COMMAND**, or **topics**, or **commands**, with the basic **ipa help** command:
  - **topics** – You can run the command **ipa help topics** to display a list of topics that are covered by the IPA help, such as **user**, **cert**, **server** and many others.
  - **TOPIC** – The **TOPIC** with capital letters is a variable. Therefore, you can specify a particular topic, for example, **ipa help user**.
  - **commands** – You can enter the command **ipa help commands** to display a list of commands which are covered by the IPA help, for example, **user-add**, **ca-enable**, **server-show** and many others.
  - **COMMAND** – The **COMMAND** with capital letters is a variable. Therefore, you can specify a particular command, for example, **ipa help user-add**.

### 3.3. USING IPA HELP TOPICS

The following procedure describes how to use the IPA help in the command-line interface.

#### Procedure

1. Open a terminal and connect to the IdM server.
2. Enter **ipa help topics** to display a list of topics covered by help.

```
$ ipa help topics
```

3. Select one of the topics and create a command according to the following pattern: **ipa help [topic\_name]**. Instead of the **topic\_name** string, add one of the topics you listed in the previous step.  
In the example, we use the following topic: **user**

```
$ ipa help user
```

4. If the IPA help output is too long and you cannot see the whole text, use the following syntax:

```
$ ipa help user | less
```

You can then scroll down and read the whole help.

The IPA CLI displays a help page for the **user** topic. After reading the overview, you can see many examples with patterns for working with topic commands.

### 3.4. USING IPA HELP COMMANDS

The following procedure describes how to create IPA help commands in the command-line interface.

#### Procedure

1. Open a terminal and connect to the IdM server.

2. Enter **ipa help commands** to display a list of commands covered by help.

```
$ ipa help commands
```

3. Select one of the commands and create a help command according to the following pattern: **ipa help <COMMAND>**. Instead of the **<COMMAND>** string, add one of the commands you listed in the previous step.

```
$ ipa help user-add
```

#### Additional resources

- The **ipa** man page.

## 3.5. STRUCTURE OF IPA COMMANDS

The IPA CLI distinguishes the following types of commands:

- **Built-in commands** – Built-in commands are all available in the IdM server.
- **Plug-in provided commands**

The structure of IPA commands allows you to manage various types of objects. For example:

- Users,
- Hosts,
- DNS records,
- Certificates,

and many others.

For most of these objects, the IPA CLI includes commands to:

- Add (**add**)
- Modify (**mod**)
- Delete (**del**)
- Search (**find**)
- Display (**show**)

Commands have the following structure:

**ipa user-add, ipa user-mod, ipa user-del, ipa user-find, ipa user-show**

**ipa host-add, ipa host-mod, ipa host-del, ipa host-find, ipa host-show**

**ipa dnsrecord-add, ipa dnsrecord-mod, ipa dnsrecord-del, ipa dnsrecord-find, ipa dnrecord-show**

You can create a user with the **ipa user-add [options]**, where **[options]** are optional. If you use just the **ipa user-add** command, the script asks you for details one by one.

To change an existing object, you need to define the object, therefore the command also includes an object: **ipa user-mod USER\_NAME [options]**.

### 3.6. USING AN IPA COMMAND TO ADD A USER ACCOUNT TO IDM

The following procedure describes how to add a new user to the Identity Management (IdM) database using the command line.

#### Prerequisites

- You need to have administrator privileges to add user accounts to the IdM server.

#### Procedure

1. Open a terminal and connect to the IdM server.
2. Enter the command for adding a new user:

```
$ ipa user-add
```

The command runs a script that prompts you to provide basic data necessary for creating a user account.

3. In the **First name:** field, enter the first name of the new user and press the **Enter** key.
4. In the **Last name:** field, enter the last name of the new user and press the **Enter** key.
5. In the **User login [suggested user name]:** enter the user name, or just press the **Enter** key to accept the suggested user name.

The user name must be unique for the whole IdM database. If an error occurs because that user name already exists, repeat the process with the **ipa user-add** command and use a different, unique user name.

After you add the user name, the user account is added to the IdM database and the IPA command line interface (CLI) prints the following output:

```
-----
Added user "euser"
-----
User login: euser
First name: Example
Last name: User
Full name: Example User
Display name: Example User
Initials: EU
Home directory: /home/euser
GECOS: Example User
Login shell: /bin/sh
Principal name: euser@IDM.EXAMPLE.COM
Principal alias: euser@IDM.EXAMPLE.COM
Email address: euser@idm.example.com
UID: 427200006
GID: 427200006
```

**Password: False**

Member of groups: ipausers

**Kerberos keys available: False****NOTE**

By default, a user password is not set for the user account. To add a password while creating a user account, use the **ipa user-add** command with the following syntax:

```
$ ipa user-add --first=Example --last=User --password
```

The IPA CLI then prompts you to add or confirm a user name and password.

If the user has been created already, you can add the password with the **ipa user-mod** command.

**Additional resources**

- Run the **ipa help user-add** command for more information about parameters.

**3.7. USING AN IPA COMMAND TO MODIFY A USER ACCOUNT IN IDM**

You can change many parameters for each user account. For example, you can add a new password to the user.

Basic command syntax is different from the **user-add** syntax because you need to define the existing user account for which you want to perform changes, for example, add a password.

**Prerequisites**

- You need to have administrator privileges to modify user accounts.

**Procedure**

1. Open a terminal and connect to the IdM server.
2. Enter the **ipa user-mod** command, specify the user to modify, and any options, such as **--password** for adding a password:

```
$ ipa user-mod euser --password
```

The command runs a script where you can add the new password.

3. Enter the new password and press the **Enter** key.

The IPA CLI prints the following output:

```
-----
Modified user "euser"
-----
```

```
User login: euser
```

```
First name: Example
```

```
Last name: User
```

```
Home directory: /home/euser
```

```
Principal name: euser@IDM.EXAMPLE.COM
Principal alias: euser@IDM.EXAMPLE.COM
Email address: euser@idm.example.com
UID: 427200006
GID: 427200006
Password: True
Member of groups: ipausers
Kerberos keys available: True
```

The user password is now set for the account and the user can log into IdM.

#### Additional resources

- Run the **ipa help user-mod** command for more information about parameters.

## 3.8. HOW TO SUPPLY A LIST OF VALUES TO THE IDM UTILITIES

Identity Management (IdM) stores values for multi-valued attributes in lists.

IdM supports the following methods of supplying multi-valued lists:

- Using the same command-line argument multiple times within the same command invocation:

```
$ ipa permission-add --right=read --permissions=write --permissions=delete ...
```

- Alternatively, you can enclose the list in curly braces, in which case the shell performs the expansion:

```
$ ipa permission-add --right={read,write,delete} ...
```

The examples above show a command **permission-add** which adds permissions to an object. The object is not mentioned in the example. Instead of ... you need to add the object for which you want to add permissions.

When you update such multi-valued attributes from the command line, IdM completely overwrites the previous list of values with a new list. Therefore, when updating a multi-valued attribute, you must specify the whole new list, not just a single value you want to add.

For example, in the command above, the list of permissions includes reading, writing and deleting. When you decide to update the list with the **permission-mod** command, you must add all values, otherwise those not mentioned will be deleted.

**Example 1:** – The **ipa permission-mod** command updates all previously added permissions.

```
$ ipa permission-mod --right=read --right=write --right=delete ...
```

or

```
$ ipa permission-mod --right={read,write,delete} ...
```

**Example 2** – The **ipa permission-mod** command deletes the **--right=delete** argument because it is not included in the command:

```
$ ipa permission-mod --right=read --right=write ...
```

■

or

```
$ ipa permission-mod --right={read,write} ...
```

### 3.9. HOW TO USE SPECIAL CHARACTERS WITH THE IDM UTILITIES

When passing command-line arguments that include special characters to the **ipa** commands, escape these characters with a backslash (\). For example, common special characters include angle brackets (< and >), ampersand (&), asterisk (\*), or vertical bar (|).

For example, to escape an asterisk (\*):

```
$ ipa certprofile-show certificate_profile --out=exported\*profile.cfg
```

Commands containing unescaped special characters do not work as expected because the shell cannot properly parse such characters.



## CHAPTER 4. SEARCHING IDENTITY MANAGEMENT ENTRIES FROM THE COMMAND LINE

The following sections describe how to use IPA commands, which helps you to find or show objects.

### 4.1. OVERVIEW OF LISTING IDM ENTRIES

You can use the **ipa \*-find** commands to help you to search for particular types of IdM entries.

To list all the **find** commands, use the following ipa help command:

```
$ ipa help commands | grep find
```

You may need to check if a particular user is included in the IdM database. You can then list all users with the following command:

```
$ ipa user-find
```

To list user groups whose specified attributes contain a keyword:

```
$ ipa group-find keyword
```

For example the **ipa group-find admin** command lists all groups whose names or descriptions include string **admin**:

```
-----
3 groups matched
-----
Group name: admins
Description: Account administrators group
GID: 427200002

Group name: editors
Description: Limited admins who can edit other users
GID: 427200002

Group name: trust admins
Description: Trusts administrators group
```

When searching user groups, you can also limit the search results to groups that contain a particular user:

```
$ ipa group-find --user=user_name
```

To search for groups that do not contain a particular user:

```
$ ipa group-find --no-user=user_name
```

### 4.2. SHOWING DETAILS FOR A PARTICULAR ENTRY

Use the **ipa \*-show** command to display details about a particular IdM entry.

## Procedure

- To display details about a host named `server.example.com`:

```
$ ipa host-show server.example.com
```

```
Host name: server.example.com
```

```
Principal name: host/server.example.com@EXAMPLE.COM
```

```
...
```

## 4.3. ADJUSTING THE SEARCH SIZE AND TIME LIMIT

Some queries, such as requesting a list of IdM users, can return a very large number of entries. By tuning these search operations, you can improve the overall server performance when running the **ipa \*-find** commands, such as **ipa user-find**, and when displaying corresponding lists in the Web UI.

### Search size limit

Defines the maximum number of entries returned for a request sent to the server from a client's CLI or from a browser accessing the IdM Web UI.

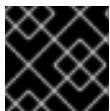
Default: 100 entries.

### Search time limit

Defines the maximum time (in seconds) that the server waits for searches to run. Once the search reaches this limit, the server stops the search and returns the entries discovered in that time.

Default: 2 seconds.

If you set the values to **-1**, IdM will not apply any limits when searching.



### IMPORTANT

Setting search size or time limits too high can negatively affect server performance.

### 4.3.1. Adjusting the search size and time limit in the command line

The following procedure describes adjusting search size and time limits in the command line:

- Globally
- For a specific entry

## Procedure

1. To display current search time and size limits in CLI, use the **ipa config-show** command:

```
$ ipa config-show
```

```
Search time limit: 2
```

```
Search size limit: 100
```

2. To adjust the limits **globally** for all queries, use the **ipa config-mod** command and add the **--searchrecordslimit** and **--searchtimelimit** options. For example:

```
$ ipa config-mod --searchrecordslimit=500 --searchtimelimit=5
```

- To **temporarily** adjust the limits only for a specific query, add the **--sizelimit** or **--timelimit** options to the command. For example:

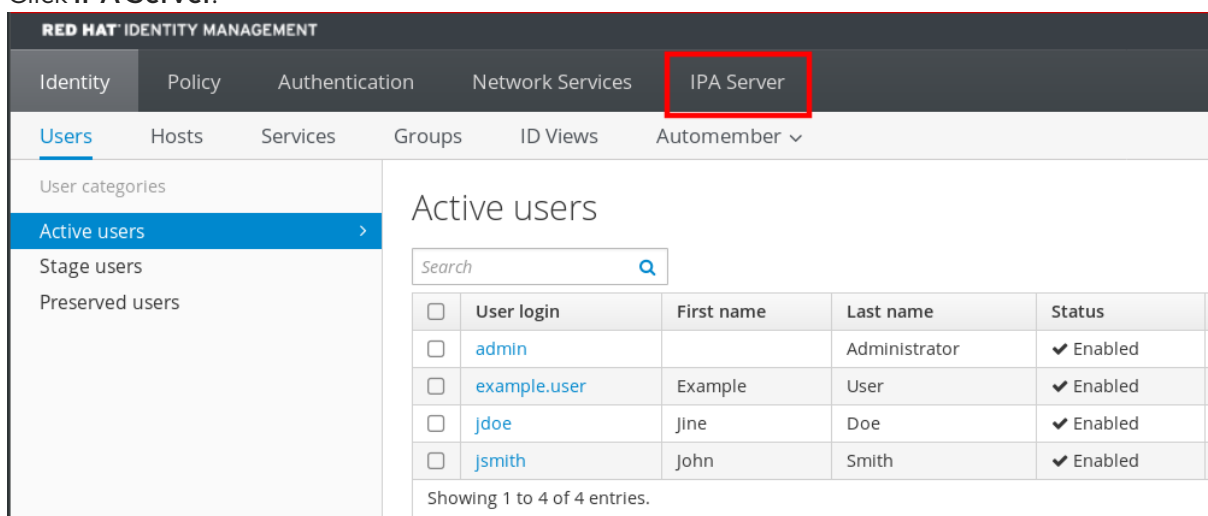
```
$ ipa user-find --sizelimit=200 --timelimit=120
```

### 4.3.2. Adjusting the search size and time limit in the Web UI

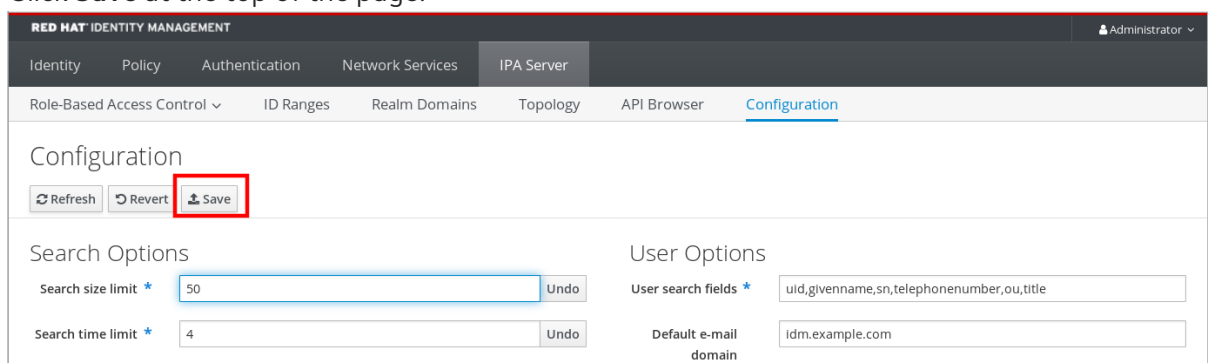
The following procedure describes adjusting global search size and time limits in the IdM Web UI.

#### Procedure

- Log in to the IdM Web UI.
- Click **IPA Server**.



- On the **IPA Server** tab, click **Configuration**.
- Set the required values in the **Search Options** area.  
Default values are:
  - Search size limit: 100 entries
  - Search time limit: 2 seconds
- Click **Save** at the top of the page.



## CHAPTER 5. ACCESSING THE IDM WEB UI IN A WEB BROWSER

The IdM (Identity Management) Web UI is a web application for IdM administration, a graphical alternative to the IdM command line interface (CLI)

### 5.1. WHAT IS THE IDM WEB UI

The IdM (Identity Management) Web UI is a web application for IdM administration. You can access the IdM Web UI as:

- **IdM users:** A limited set of operations depending on permissions granted to the user in the IdM server. Basically, active IdM users can log in to the IdM server and configure their own account. They cannot change settings of other users or the IdM server settings.
- **Administrators:** Full access rights to the IdM server.
- **Active Directory users:** A set of operations depending on permissions granted to the user. Active Directory users can now be administrators for Identity Management. For details, see [Enabling AD users to administer IdM](#).

### 5.2. WEB BROWSERS SUPPORTED FOR ACCESSING THE WEB UI

Identity Management (IdM) supports the following browsers for connecting to the Web UI:

- Mozilla Firefox 38 and later
- Google Chrome 46 and later

## NOTE

You might experience problems accessing the IdM Web UI with a smart card if your browser attempts to use TLS v1.3:

```
[ssl:error] [pid 125757:tid 140436077168384] [client 999.999.999.999:99999] AH:
verify client post handshake
[ssl:error] [pid 125757:tid 140436077168384] [client 999.999.999.999:99999]
AH10158: cannot perform post-handshake authentication
[ssl:error] [pid 125757:tid 140436077168384] SSL Library Error: error:14268117:SSL
routines:SSL_verify_client_post_handshake:extension not received
```

This is because the most recent versions of browsers do not have TLS Post-Handshake Authentication (PHA) enabled by default, or they do not support PHA. PHA is necessary to require a TLS client certificate for only a part of a web site, such as when accessing the IdM Web UI with smart card authentication.

To resolve this issue for Mozilla Firefox 68 and later, enable TLS PHA:

1. Enter **about:config** in the address bar to access the Mozilla Firefox preferences menu.
2. Enter **security.tls.enable\_post\_handshake\_auth** in the search bar.
3. Click the toggle button to set the parameter to true.

To resolve this issue for Chrome, which currently does not support PHA, disable TLS v1.3:

1. Open the **/etc/httpd/conf.d/ssl.conf** configuration file.
2. Add **-TLSv1.3** to the **SSLProtocol** option:

```
SSLProtocol all -TLSv1 -TLSv1.1 -TLSv1.3
```

3. Restart the **httpd** service:

```
service httpd restart
```

Note that IdM manages the **ssl.conf** file and might overwrite its contents during package updates. Verify custom settings after updating IdM packages.

## 5.3. ACCESSING THE WEB UI

The following procedure describes the first logging in to the IdM (Identity Management) Web UI with a password.

After the first login you can configure your IdM server to authenticate with:

- Kerberos ticket  
For details, see [Kerberos authentication in Identity Management](#).
- Smart card  
For details, see [Configuring the IdM server for smart card authentication](#).
- One time password (OTP) – this can be combined with password and Kerberos authentication.

For details, see [One time password \(OTP\) authentication in Identity Management](#).

## Procedure

1. Type an IdM server URL into the browser address bar. The name will look similarly to the following example:

`https://server.example.com`

You just need to change **server.example.com** with a DNS name of your IdM server.

This opens the IdM Web UI login screen in your browser.

- If the server does not respond or the login screen does not open, check the DNS settings on the IdM server to which you are connecting.
  - If you use a self-signed certificate, the browser issues a warning. Check the certificate and accept the security exception to proceed with the login.  
To avoid security exceptions, install a certificate signed by a certificate authority.
2. On the Web UI login screen, enter the administrator account credentials you added during the IdM server installation.  
For details, see [Installing an Identity Management server: With integrated DNS, with an integrated CA](#).

You can enter your personal account credentials as well if they are already entered in the IdM server.

3. Click **Log in**.

After the successful login, you can start configuring the IdM server.

RED HAT IDENTITY MANAGEMENT

Administrator

Identity

Policy

Authentication

Network Services

IPA Server

Users

Hosts

Services

Groups

ID Views

Automember

User categories

Active users

Stage users

Preserved users

Active users

Search

Refresh

Delete

Add

Disable

Enable

Actions

|                          | User login | First name | Last name     | Status  | UID       | Email address | Telephone Number | Job Title |
|--------------------------|------------|------------|---------------|---------|-----------|---------------|------------------|-----------|
| <input type="checkbox"/> | admin      |            | Administrator | Enabled | 427200000 |               |                  |           |

Showing 1 to 1 of 1 entries.

## CHAPTER 6. LOGGING IN TO IDM IN THE WEB UI: USING A KERBEROS TICKET

Learn more about how to configure your environment to enable Kerberos login to the IdM Web UI and accessing IdM using Kerberos authentication.

### Prerequisites

- Installed IdM server in your network environment  
For details, see [Installing Identity Management in Red Hat Enterprise Linux 8](#)

### 6.1. KERBEROS AUTHENTICATION IN IDENTITY MANAGEMENT

Identity Management (IdM) uses the Kerberos protocol to support single sign-on. Single sign-on authentication allows you to provide the correct user name and password only once, and you can then access Identity Management services without the system prompting for credentials again.

The IdM server provides Kerberos authentication immediately after the installation if the DNS and certificate settings have been configured properly. For details, see [Installing Identity Management](#).

To use Kerberos authentication on hosts, install:

- the IdM client  
For details, see [Preparing the system for Identity Management client installation](#).
- the krb5conf package

### 6.2. USING KINIT TO LOG IN TO IDM MANUALLY

Follow this procedure to use the **kinit** utility to authenticate to an Identity Management (IdM) environment manually. The **kinit** utility obtains and caches a Kerberos ticket-granting ticket (TGT) on behalf of an IdM user.



#### NOTE

Only use this procedure if you have destroyed your initial Kerberos TGT or if it has expired. As an IdM user, when logging onto your local machine you are also automatically logging in to IdM. This means that after logging in, you are not required to use the **kinit** utility to access IdM resources.

#### Procedure

1. To log in to IdM
  - under the user name of the user who is currently logged in on the local system, use **kinit** without specifying a user name. For example, if you are logged in as **example\_user** on the local system:

```
[example_user@server ~]$ kinit
Password for example_user@EXAMPLE.COM:
[example_user@server ~]$
```



If the user name of the local user does not match any user entry in IdM, the authentication attempt fails:

```
[example_user@server ~]$ kinit
kinit: Client 'example_user@EXAMPLE.COM' not found in Kerberos database while
getting initial credentials
```

- using a Kerberos principal that does not correspond to your local user name, pass the required user name to the **kinit** utility. For example, to log in as the **admin** user:

```
[example_user@server ~]$ kinit admin
Password for admin@EXAMPLE.COM:
[example_user@server ~]$
```

2. Optionally, to verify that the login was successful, use the **klist** utility to display the cached TGT. In the following example, the cache contains a ticket for the **example\_user** principal, which means that on this particular host, only **example\_user** is currently allowed to access IdM services:

```
$ klist
Ticket cache: KEYRING:persistent:0:0
Default principal: example_user@EXAMPLE.COM

Valid starting    Expires          Service principal
11/10/2019 08:35:45  11/10/2019 18:35:45  krbtgt/EXAMPLE.COM@EXAMPLE.COM
```

## 6.3. CONFIGURING THE BROWSER FOR KERBEROS AUTHENTICATION

To enable authentication with a Kerberos ticket, you may need a browser configuration.

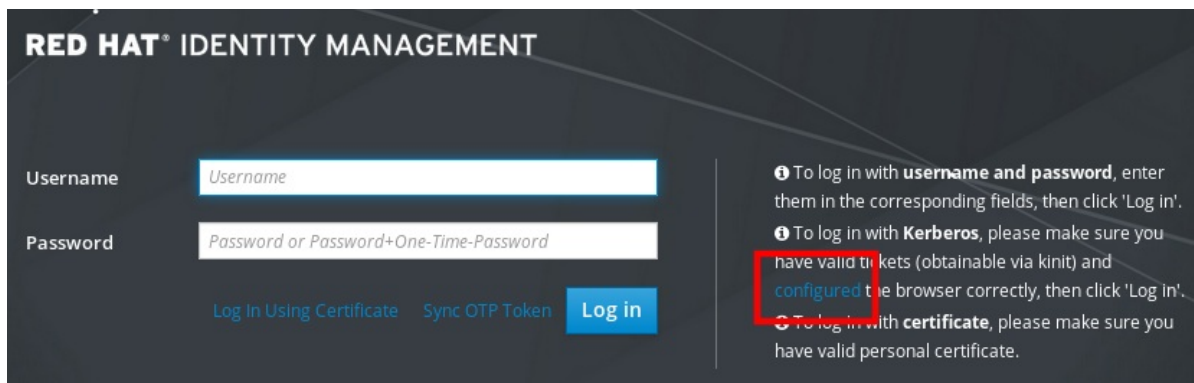
The following steps help you to support Kerberos negotiation for accessing the IdM domain.

Each browser supports Kerberos in a different way and needs different set up. The IdM Web UI includes guidelines for the following browsers:

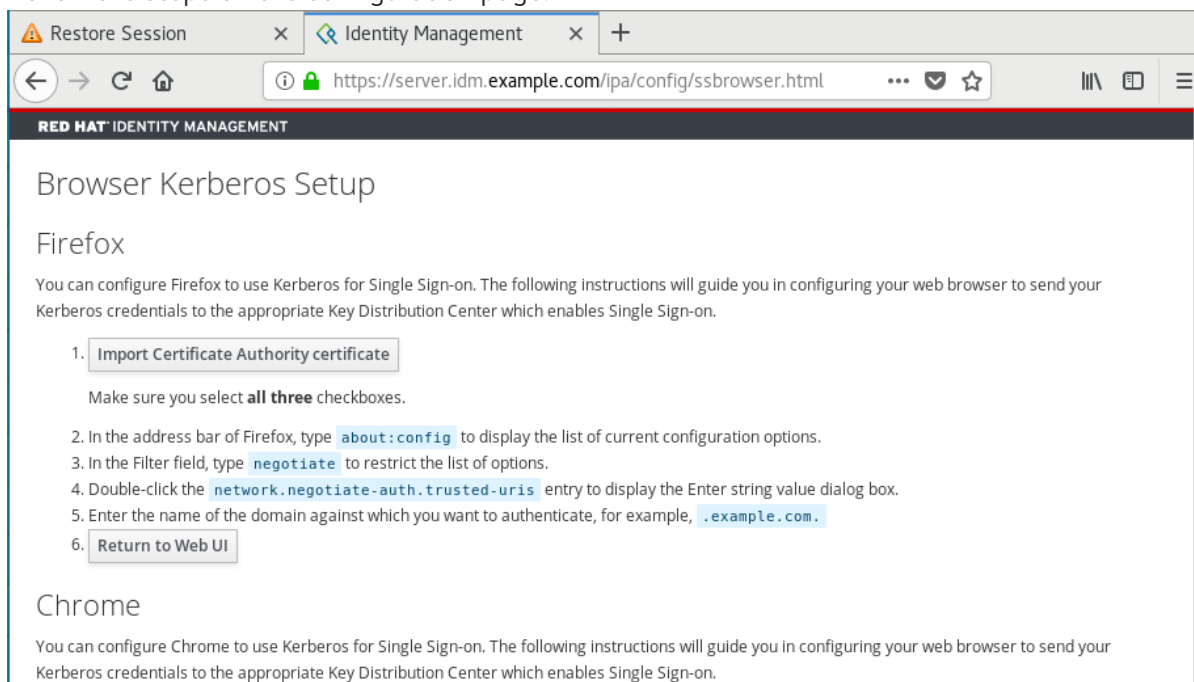
- Firefox
- Chrome

### Procedure

1. Open the IdM Web UI login dialog in your web browser.
2. Click the link for browser configuration on the Web UI login screen.



3. Follow the steps on the configuration page.



After the setup, turn back to the IdM Web UI and click **Log in**.

## 6.4. LOGGING IN TO THE WEB UI USING A KERBEROS TICKET

Follow this procedure to log in to the IdM Web UI using a Kerberos ticket-granting ticket (TGT).

The TGT expires at a predefined time. The default time interval is 24 hours and you can change it in the IdM Web UI.

After the time interval expires, you need to renew the ticket:

- Using the kinit command.
- Using IdM login credentials in the Web UI login dialog.

### Procedure

- Open the IdM Web UI.  
If Kerberos authentication works correctly and you have a valid ticket, you will be automatically authenticated and the Web UI opens.

If the ticket is expired, it is necessary to authenticate yourself with credentials first. However, next time the IdM Web UI will open automatically without opening the login dialog.

If you see an error message **Authentication with Kerberos failed**, verify that your browser is configured for Kerberos authentication. See [Configuring the browser for Kerberos authentication](#).

The screenshot shows the IdM web UI login interface. At the top, a red-bordered box contains an error message: "Authentication with Kerberos failed". Below this, there are two input fields: "Username" with the placeholder text "Username" and "Password" with the placeholder text "Password or Password+One-Time-Password". At the bottom right, there is a blue button labeled "Login" and a link labeled "Sync OTP Token".

## 6.5. CONFIGURING AN EXTERNAL SYSTEM FOR KERBEROS AUTHENTICATION

Follow this procedure to configure an external system so that Identity Management (IdM) users can log in to IdM from the external system using their Kerberos credentials.

Enabling Kerberos authentication on external systems is especially useful when your infrastructure includes multiple realms or overlapping domains. It is also useful if the system has not been enrolled into any IdM domain through **ipa-client-install**.

To enable Kerberos authentication to IdM from a system that is not a member of the IdM domain, define an IdM-specific Kerberos configuration file on the external system.

### Prerequisites

- The **krb5-workstation** package is installed on the external system.  
To find out whether the package is installed, use the following CLI command:

```
# yum list installed krb5-workstation
Installed Packages
krb5-workstation.x86_64 1.16.1-19.el8 @BaseOS
```

### Procedure

1. Copy the **/etc/krb5.conf** file from the IdM server to the external system. For example:

```
# scp /etc/krb5.conf root@externalsystem.example.com:/etc/krb5_ipa.conf
```

**WARNING**

Do not overwrite the existing **krb5.conf** file on the external system.

2. On the external system, set the terminal session to use the copied IdM Kerberos configuration file:

```
$ export KRB5_CONFIG=/etc/krb5_ipa.conf
```

The **KRB5\_CONFIG** variable exists only temporarily until you log out. To prevent this loss, export the variable with a different file name.

3. Copy the Kerberos configuration snippets from the **/etc/krb5.conf.d/** directory to the external system.
4. Configure the browser on the external system, as described in [Configuring the browser for Kerberos authentication](#).

Users on the external system can now use the **kinit** utility to authenticate against the IdM server.

## 6.6. WEB UI LOGIN FOR ACTIVE DIRECTORY USERS

To enable Web UI login for Active Directory users, define an ID override for each Active Directory user in the **Default Trust View**. For example:

```
[admin@server ~]$ ipa idoverrideuser-add 'Default Trust View' ad_user@ad.example.com
```

### Additional resources

- [Using ID views for Active Directory users](#)

## CHAPTER 7. LOGGING IN TO THE IDENTITY MANAGEMENT WEB UI USING ONE TIME PASSWORDS

Access to IdM Web UI can be secured using several methods. The basic one is password authentication.

To increase the security of password authentication, you can add a second step and require automatically generated one-time passwords (OTPs). The most common usage is to combine password connected with the user account and a time limited one time password generated by a hardware or software token.

The following sections help you to:

- Understand how the OTP authentication works in IdM.
- Configure OTP authentication on the IdM server.
- Create OTP tokens and synchronize them with the FreeOTP app in your phone.
- Authenticate to the IdM Web UI with the combination of user password and one time password.
- Re-synchronize tokens in the Web UI.

### 7.1. PREREQUISITES

- [Accessing the IdM Web UI in a web browser](#)

### 7.2. ONE TIME PASSWORD (OTP) AUTHENTICATION IN IDENTITY MANAGEMENT

One-time passwords bring an additional step to your authentication security. The authentication uses your password + an automatically generated one time password.

To generate one time passwords, you can use a hardware or software token. IdM supports both software and hardware tokens.

Identity Management supports the following two standard OTP mechanisms:

- The HMAC-Based One-Time Password (HOTP) algorithm is based on a counter. HMAC stands for Hashed Message Authentication Code.
- The Time-Based One-Time Password (TOTP) algorithm is an extension of HOTP to support time-based moving factor.



#### IMPORTANT

IdM does not support OTP logins for Active Directory trust users.

### 7.3. ENABLING THE ONE TIME PASSWORD IN THE WEB UI

The IdM Web UI allows you to configure hardware or software device to generate one-time passwords.

The one time password is entered just after the usual password in the dedicated field in the login dialog.

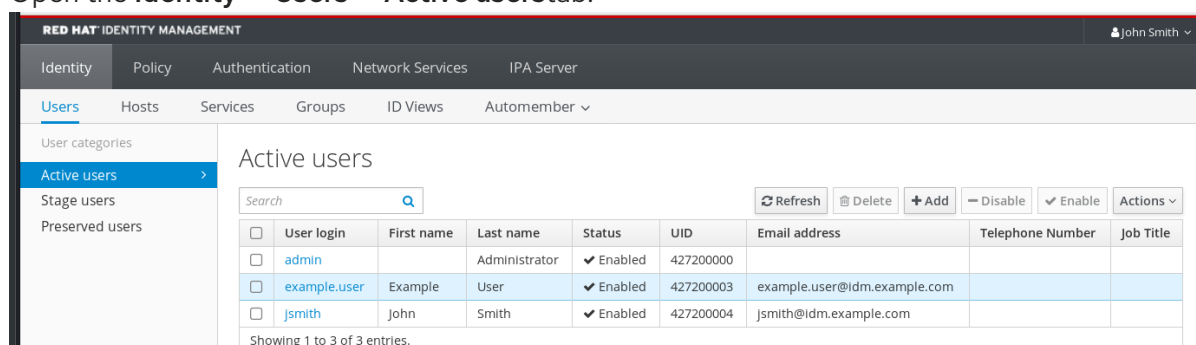
Only administrators can enable OTP authentication in the user settings.

## Prerequisites

- Administration privileges

## Procedure

1. Log in to the IdM Web UI with your username and password.
2. Open the **Identity → Users → Active users** tab.



3. Click your username to open the user settings.
4. In the **User authentication types**, select **Two factor authentication (password + OTP)**.
5. Click **Save**.

At this point, the OTP authentication is enabled on the IdM server.

Now you or users themselves need to assign a new token ID to the user account.

## 7.4. ADDING OTP TOKENS IN THE WEB UI

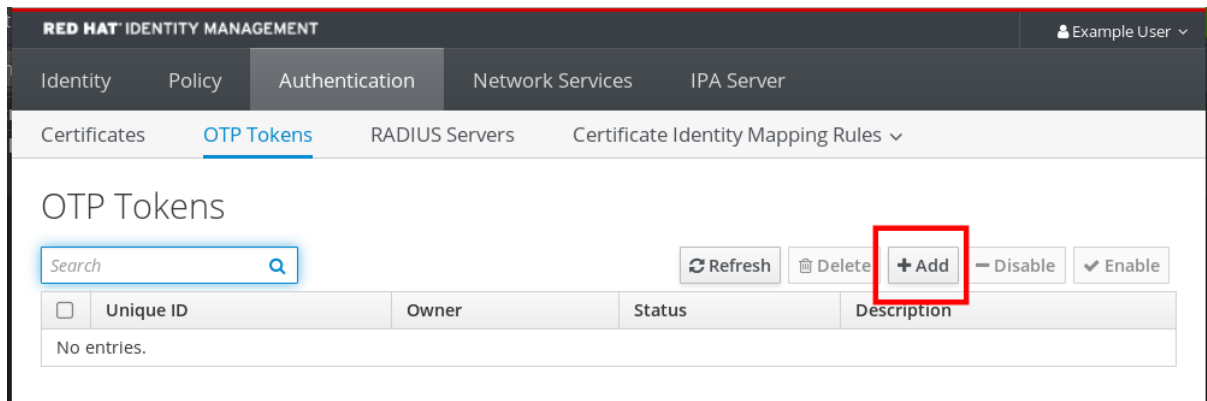
The following section helps you to add token to the IdM Web UI and to your software token generator.

## Prerequisites

- Active user account on the IdM server.
- Administrator has enabled OTP for the particular user account in the IdM Web UI.
- A software device generating OTP tokens, for example FreeOTP.

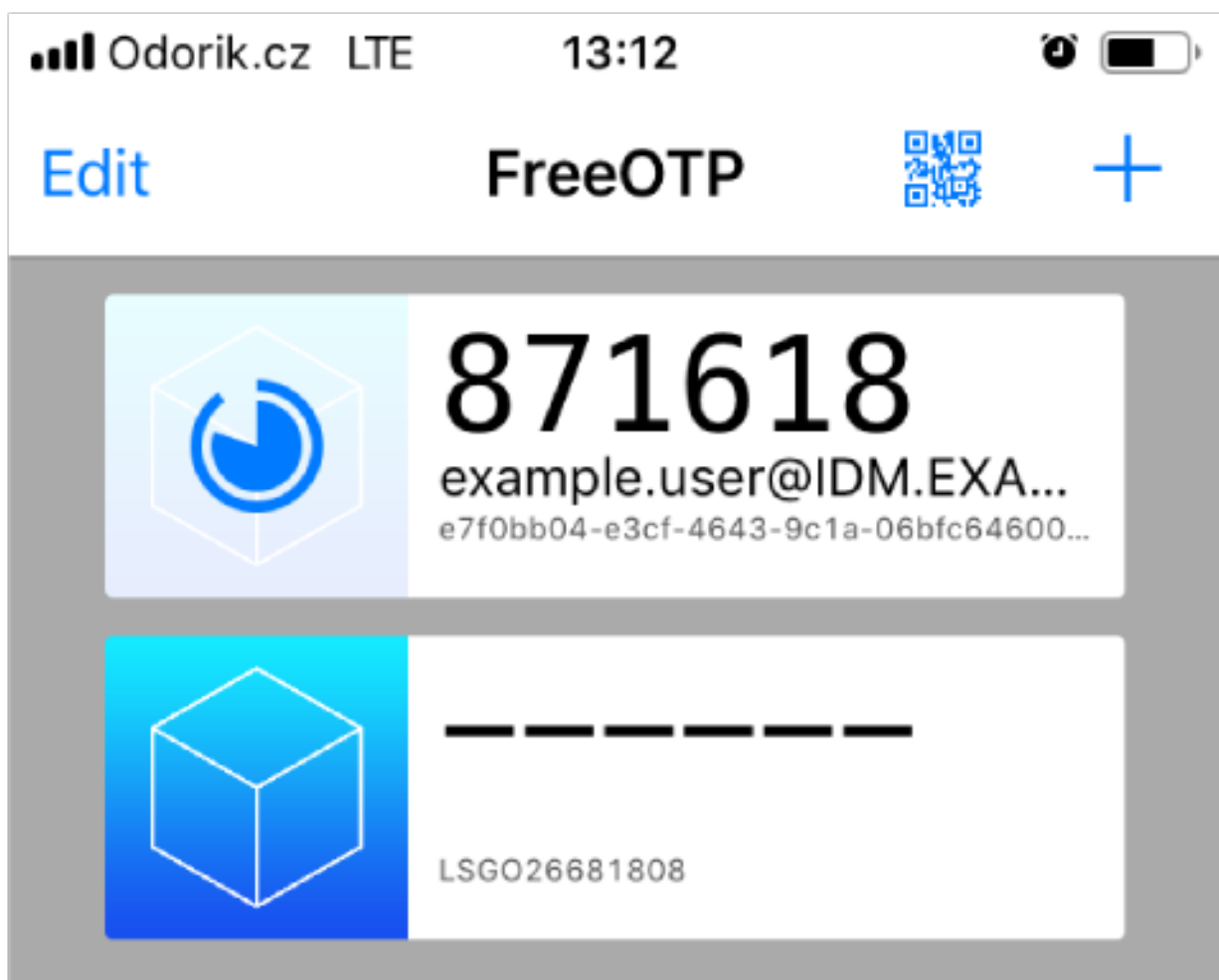
## Procedure

1. Log in to the IdM Web UI with your user name and password.
2. To create the token in your mobile phone, open the **Authentication → OTP Token** tab.
3. Click **Add**.



4. In the **Add OTP token** dialog box, leave everything unfilled and click **Add**.  
At this stage, the IdM server creates a token with default parameters at the server and opens a page with a QR code.
5. Copy the QR code into your mobile phone.
6. Click **OK** to close the QR code.

Now you can generate one time passwords and log in with them to the IdM Web UI.



## 7.5. LOGGING INTO THE WEB UI WITH A ONE TIME PASSWORD

Follow this procedure to login for the first time into the IdM Web UI using a one time password (OTP).

### Prerequisites

## Prerequisites

- OTP configuration enabled on the Identity Management server for the user account you are using for the OTP authentication. Administrators as well as users themselves can enable OTP. To enable the OTP configuration, see [Enabling the one time password in the Web UI](#).
- A hardware or software device generating OTP tokens configured.

## Procedure

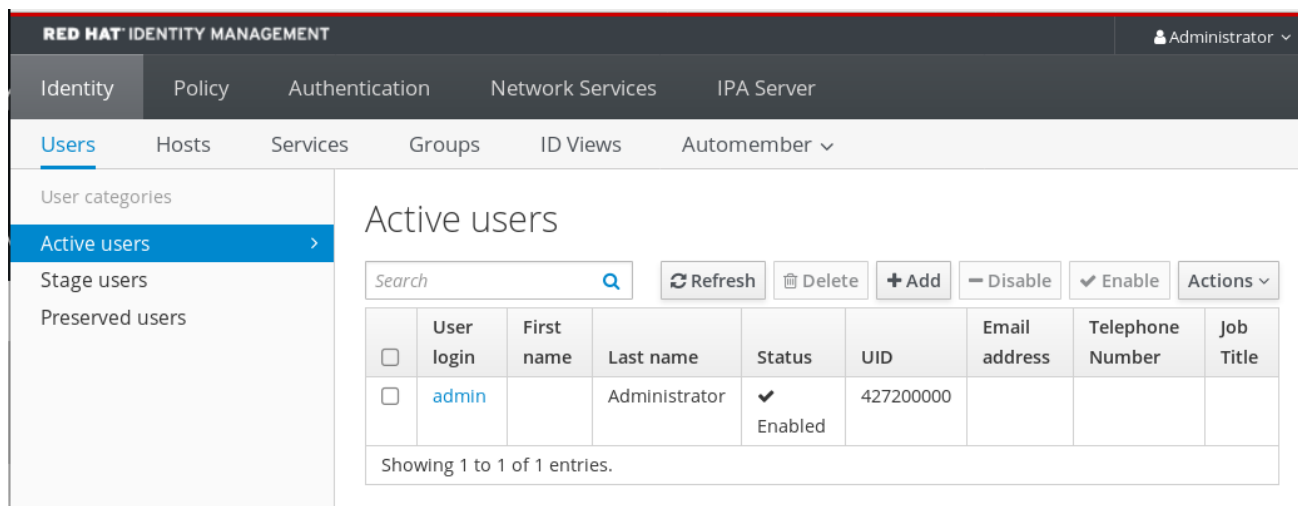
1. In the Identity Management login screen, enter your user name or a user name of the IdM server administrator account.
2. Add the password for the user name entered above.
3. Generate a one time password on your device.
4. Enter the one time password right after the password (without space).
5. Click **Log in**.

If the authentication fails, synchronize OTP tokens.

If your CA uses a self-signed certificate, the browser issues a warning. Check the certificate and accept the security exception to proceed with the login.

If the IdM Web UI does not open, verify the DNS configuration of your Identity Management server.

After successful login, the IdM Web UI appears.



The screenshot shows the Red Hat Identity Management Web UI. The top navigation bar includes 'Identity', 'Policy', 'Authentication', 'Network Services', and 'IPA Server'. The 'Users' section is active, showing 'Active users'. A table lists the active users:

|                          | User login | First name | Last name     | Status    | UID       | Email address | Telephone Number | Job Title |
|--------------------------|------------|------------|---------------|-----------|-----------|---------------|------------------|-----------|
| <input type="checkbox"/> | admin      |            | Administrator | ✓ Enabled | 427200000 |               |                  |           |

Showing 1 to 1 of 1 entries.

## 7.6. SYNCHRONIZING OTP TOKENS USING THE WEB UI

If the login with OTP (One Time Password) fails, OTP tokens are not synchronized correctly.

The following text describes token re-synchronization.

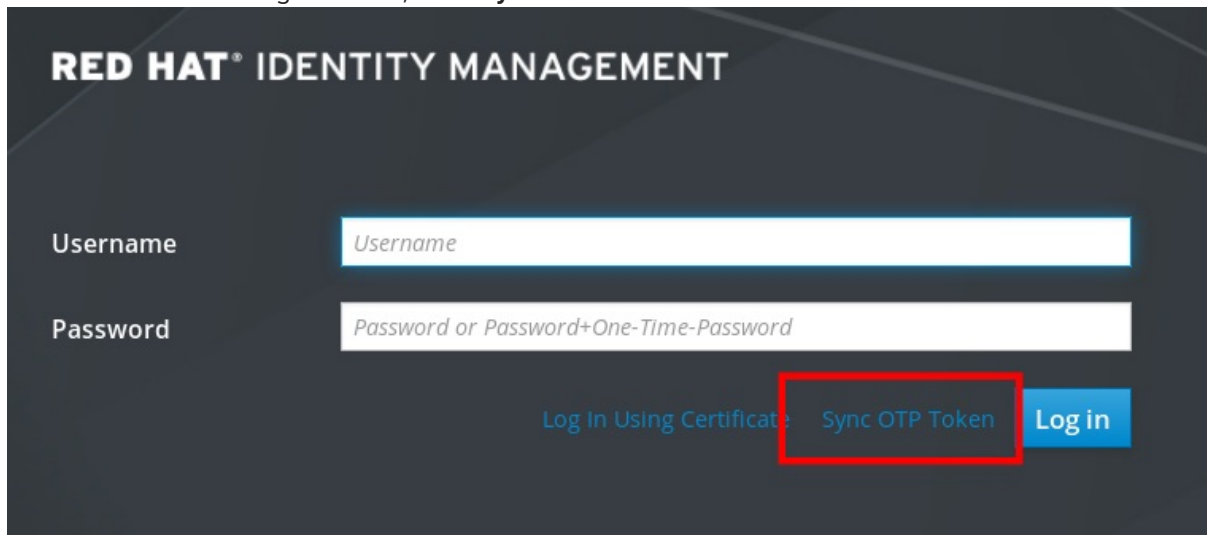
### Prerequisites

- A login screen opened.
- A device generating OTP tokens configured.

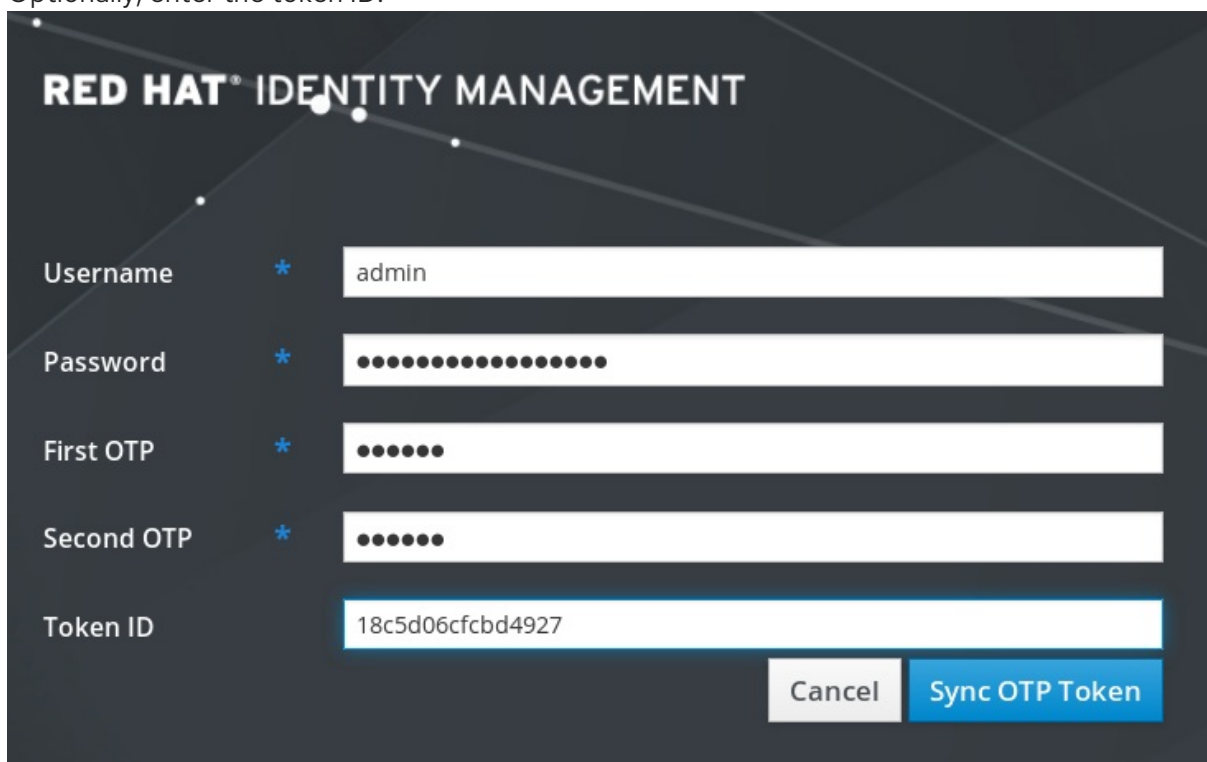


## Procedure

1. On the IdM Web UI login screen, click **Sync OTP Token**



2. In the login screen, enter your username and the Identity Management password.
3. Generate one time password and enter it in the **First OTP** field.
4. Generate another one time password and enter it in the **Second OTP** field.
5. Optionally, enter the token ID.



6. Click **Sync OTP Token**

After the successful synchronization, you can log in to the IdM server.

## 7.7. CHANGING EXPIRED PASSWORDS

Administrators of Identity Management can enforce you having to change your password at the next login. It means that you cannot successfully log in to the IdM Web UI until you change the password.

Password expiration can happen during your first login to the Web UI.

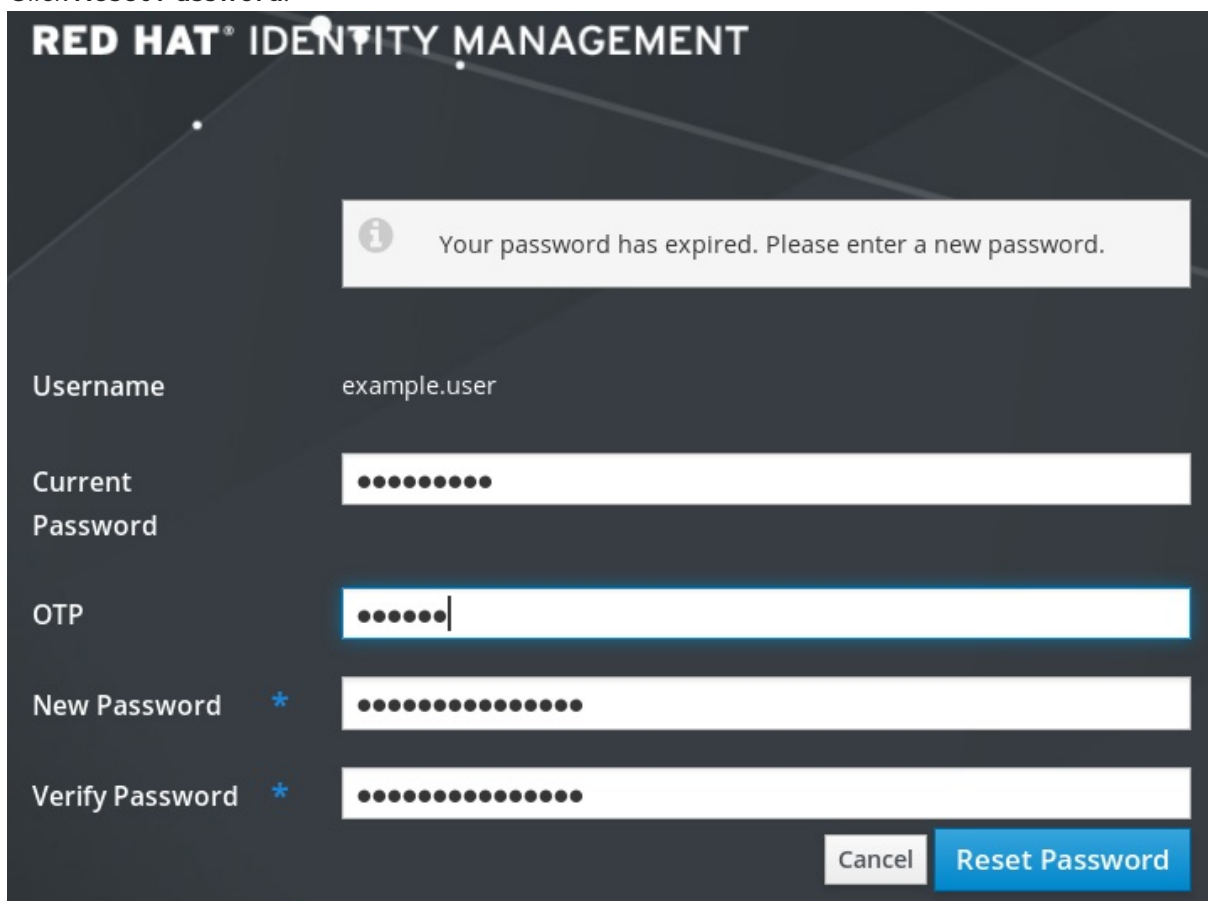
If the expiration password dialog appears, follow the instructions in the procedure.

### Prerequisites

- A login screen opened.
- Active account to the IdM server.

### Procedure

1. In the password expiration login screen, enter the user name.
2. Add the password for the user name entered above.
3. In the OTP field, generate a one time password, if you use the one time password authentication.  
If you do not have enabled the OTP authentication, leave the field empty.
4. Enter the new password twice for verification.
5. Click **Reset Password**.



The screenshot shows the 'RED HAT® IDENTITY MANAGEMENT' password expiration dialog. At the top, a message box states: 'Your password has expired. Please enter a new password.' Below this, the form includes fields for 'Username' (containing 'example.user'), 'Current Password' (masked with dots), 'OTP' (masked with dots and a cursor), 'New Password' (marked with a blue asterisk and masked with dots), and 'Verify Password' (marked with a blue asterisk and masked with dots). At the bottom right, there are two buttons: 'Cancel' and 'Reset Password'.

After the successful password change, the usual login dialog displays. Log in with the new password.

## CHAPTER 8. TROUBLESHOOTING AUTHENTICATION WITH SSSD IN IDM

Authentication in an Identity Management (IdM) environment involves many components:

### On the IdM client:

- The SSSD service.
- The Name Services Switch (NSS).
- Pluggable Authentication Modules (PAM).

### On the IdM server:

- The SSSD service.
- The IdM Directory Server.
- The IdM Kerberos Key Distribution Center (KDC).

### If you are authenticating as an Active Directory (AD) user:

- The Directory Server on an AD Domain Controller.
- The Kerberos server on an AD Domain Controller.

To authenticate users, you must be able to perform the following functions with the SSSD service:

- Retrieve user information from the authentication server.
- Prompt the user for their credentials, pass those credentials to the authentication server, and process the outcome.

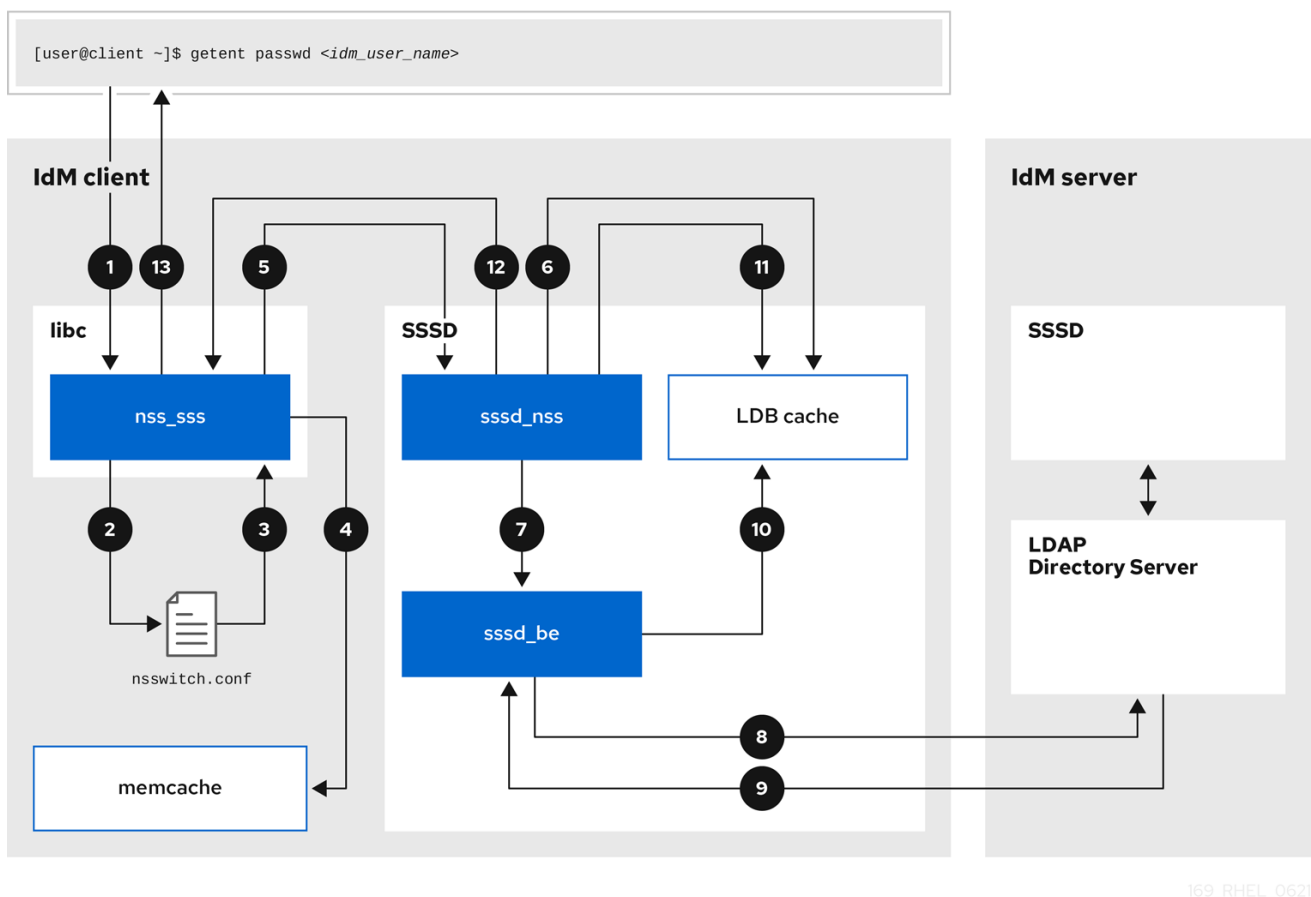
To learn more about how information flows between the SSSD service and servers that store user information, so you can troubleshoot failing authentication attempts in your environment, see the following:

1. [Data flow when retrieving IdM user information with SSSD](#)
2. [Data flow when retrieving AD user information with SSSD](#)
3. [Data flow when authenticating as a user with SSSD in IdM](#)
4. [Narrowing the scope of authentication issues](#)
5. [SSSD log files and logging levels](#)
6. [Enabling detailed logging for SSSD in the sssd.conf file](#)
7. [Enabling detailed logging for SSSD with the sssctl command](#)
8. [Gathering debugging logs from the SSSD service to troubleshoot authentication issues with an IdM server](#)

9. [Gathering debugging logs from the SSSD service to troubleshoot authentication issues with an IdM client](#)
10. [Tracking client requests in the SSSD backend](#)
11. [Tracking client requests using the log analyzer tool](#)

## 8.1. DATA FLOW WHEN RETRIEVING IDM USER INFORMATION WITH SSSD

The following diagram is a simplification of the information flow between an IdM client and an IdM server during a request for IdM user information with the command **getent passwd <idm\_user\_name>**.



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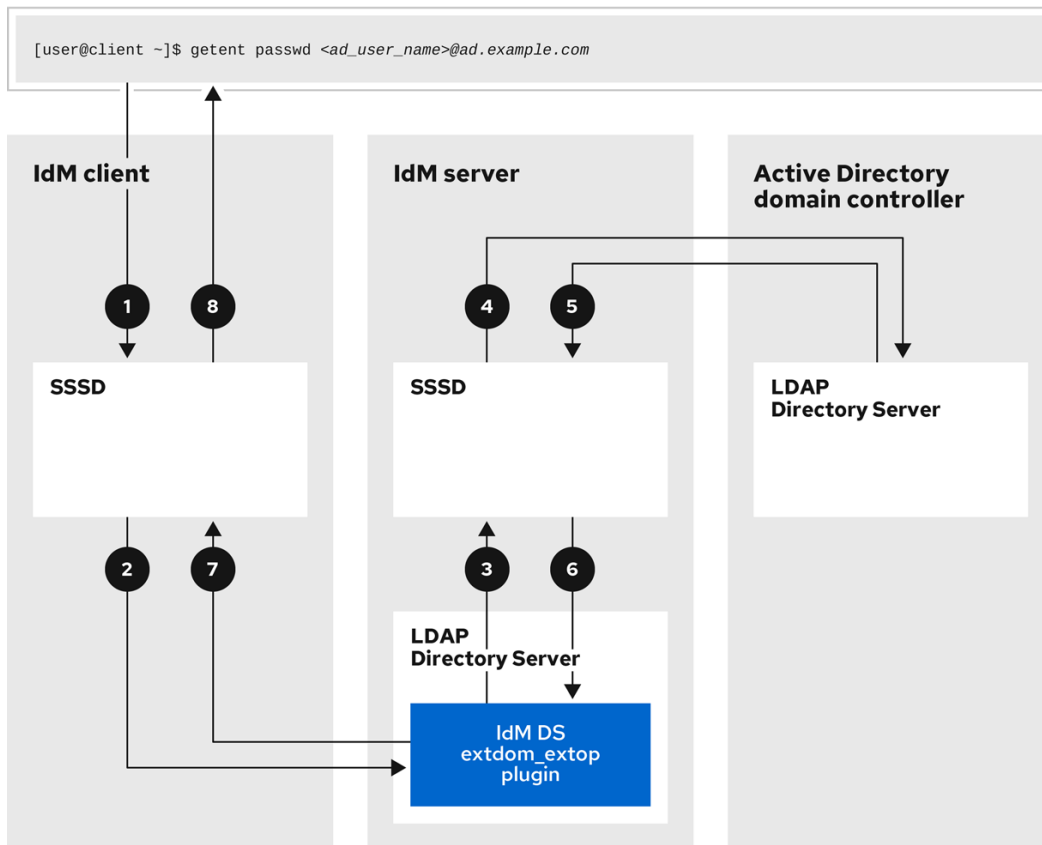
1. The **getent** command triggers the **getpwnam** call from the **libc** library.
2. The **libc** library references the **/etc/nsswitch.conf** configuration file to check which service is responsible for providing user information, and discovers the entry **sss** for the SSSD service.
3. The **libc** library opens the **nss\_sss** module.
4. The **nss\_sss** module checks the memory-mapped cache for the user information. If the data is present in the cache, the **nss\_sss** module returns it.
5. If the user information is not in the memory-mapped cache, the request is passed to the SSSD **sssd\_nss** responder process.

6. The SSSD service checks its cache. If the data is present in the cache and valid, the **sssd\_nss** responder reads the data from the cache and returns it to the application.
7. If the data is not present in the cache or it is expired, the **sssd\_nss** responder queries the appropriate back-end process and waits for a reply. The SSSD service uses the IPA backend in an IdM environment, enabled by the setting **id\_provider=ipa** in the **sssd.conf** configuration file.
8. The **sssd\_be** back-end process connects to the IdM server and requests the information from the IdM LDAP Directory Server.
9. The SSSD back-end on the IdM server responds to the SSSD back-end process on the IdM client.
10. The SSSD back-end on the client stores the resulting data in the SSSD cache and alerts the responder process that the cache has been updated.
11. The **sssd\_nss** front-end responder process retrieves the information from the SSSD cache.
12. The **sssd\_nss** responder sends the user information to the **nss\_sss** responder, completing the request.
13. The **libc** library returns the user information to the application that requested it.

## 8.2. DATA FLOW WHEN RETRIEVING AD USER INFORMATION WITH SSSD

If you have established a cross-forest trust between your IdM environment and an Active Directory (AD) domain, the information flow when retrieving AD user information about an IdM client is very similar to the information flow when retrieving IdM user information, with the additional step of contacting the AD user database.

The following diagram is a simplification of the information flow when a user requests information about an AD user with the command **getent passwd <ad\_user\_name@ad.example.com>**. This diagram does not include the internal details discussed in the [Data flow when retrieving IdM user information with SSSD](#) section. It focuses on the communication between the SSSD service on an IdM client, the SSSD service on an IdM server, and the LDAP database on an AD Domain Controller.



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1. The IdM client looks to its local SSSD cache for AD user information.
2. If the IdM client does not have the user information, or the information is stale, the SSSD service on the client contacts the **extdom\_extop** plugin on the IdM server to perform an LDAP extended operation and requests the information.
3. The SSSD service on the IdM server looks for the AD user information in its local cache.
4. If the IdM server does not have the user information in its SSSD cache, or its information is stale, it performs an LDAP search to request the user information from an AD Domain Controller.
5. The SSSD service on the IdM server receives the AD user information from the AD domain controller and stores it in its cache.
6. The **extdom\_extop** plugin receives the information from the SSSD service on the IdM server, which completes the LDAP extended operation.
7. The SSSD service on the IdM client receives the AD user information from the LDAP extended operation.
8. The IdM client stores the AD user information in its SSSD cache and returns the information to the application that requested it.

### 8.3. DATA FLOW WHEN AUTHENTICATING AS A USER WITH SSSD IN IDM

Authenticating as a user on an IdM server or client involves the following components:

- The service that initiates the authentication request, such as the sshd service.



**auth sufficient pam\_sss.so**

3. To determine which authentication methods are available, the **libpam** library opens the **pam\_sss** module and sends an **SSS\_PAM\_PREAUTH** request to the **sssd\_pam** PAM responder of the SSSD service.
4. If smart card authentication is configured, the SSSD service spawns a temporary **p11\_child** process to check for a smart card and retrieve certificates from it.
5. If smart card authentication is configured for the user, the **sssd\_pam** responder attempts to match the certificate from the smart card with the user. The **sssd\_pam** responder also performs a search for the groups that the user belongs to, since group membership might affect access control.
6. The **sssd\_pam** responder sends an **SSS\_PAM\_PREAUTH** request to the **sssd\_be** back-end responder to see which authentication methods the server supports, such as passwords or 2-factor authentication. In an IdM environment, where the SSSD service uses the IPA responder, the default authentication method is Kerberos. For this example, the user authenticates with a simple Kerberos password.
7. The **sssd\_be** responder spawns a temporary **krb5\_child** process.
8. The **krb5\_child** process contacts the KDC on the IdM server and checks for available authentication methods.
9. The KDC responds to the request:
  - a. The **krb5\_child** process evaluates the reply and sends the results back to the **sssd\_be** backend process.
  - b. The **sssd\_be** backend process receives the result.
  - c. The **sssd\_pam** responder receives the result.
  - d. The **pam\_sss** module receives the result.
10. If password authentication is configured for the user, the **pam\_sss** module prompts the user for their password. If smart card authentication is configured, the **pam\_sss** module prompts the user for their smart card PIN.
11. The module sends an **SSS\_PAM\_AUTHENTICATE** request with the user name and password, which travels to:
  - a. The **sssd\_pam** responder.
  - b. The **sssd\_be** back-end process.
12. The **sssd\_be** process spawns a temporary **krb5\_child** process to contact the KDC.
13. The **krb5\_child** process attempts to retrieve a Kerberos Ticket Granting Ticket (TGT) from the KDC with the user name and password the user provided.
14. The **krb5\_child** process receives the result of the authentication attempt.
15. The **krb5\_child** process:
  - a. Stores the TGT in a credential cache.



- b. Returns the authentication result to the **sssd\_be** back-end process.
- 16. The authentication result travels from the **sssd\_be** process to:
  - a. The **sssd\_pam** responder.
  - b. The **pam\_sss** module.
- 17. The **pam\_sss** module sets an environment variable with the location of the user's TGT so other applications can reference it.

## 8.4. NARROWING THE SCOPE OF AUTHENTICATION ISSUES

To successfully authenticate a user, you must be able to retrieve user information with the SSSD service from the database that stores user information. The following procedure describes steps to test different components of the authentication process so you can narrow the scope of authentication issues when a user is unable to log in.

### Procedure

1. Verify that the SSSD service and its processes are running.

```
[root@client ~]# pstree -a | grep sssd
|-sssd -i --logger=files
|  |-sssd_be --domain implicit_files --uid 0 --gid 0 --logger=files
|  |-sssd_be --domain example.com --uid 0 --gid 0 --logger=files
|  |-sssd_ifp --uid 0 --gid 0 --logger=files
|  |-sssd_nss --uid 0 --gid 0 --logger=files
|  |-sssd_pac --uid 0 --gid 0 --logger=files
|  |-sssd_pam --uid 0 --gid 0 --logger=files
|  |-sssd_ssh --uid 0 --gid 0 --logger=files
|  `--sssd_sudo --uid 0 --gid 0 --logger=files
|-sssd_kcm --uid 0 --gid 0 --logger=files
```

2. Verify that the client can contact the user database server via the IP address.

```
[user@client ~]$ ping <IP_address_of_the_database_server>
```

If this step fails, check that your network and firewall settings allow direct communication between IdM clients and servers. See [Using and configuring firewalld](#).

3. Verify that the client can discover and contact the IdM LDAP server (for IdM users) or AD domain controller (for AD users) via the fully qualified host name.

```
[user@client ~]$ dig -t SRV _ldap._tcp.example.com @<name_server>
[user@client ~]$ ping <fully_qualified_host_name_of_the_server>
```

If this step fails, check your Dynamic Name Service (DNS) settings, including the **/etc/resolv.conf** file. See [Configuring the order of DNS servers](#).



## NOTE

By default, the SSSD service attempts to automatically discover LDAP servers and AD DCs through DNS service (SRV) records. Alternatively, you can restrict the SSSD service to use specific servers by setting the following options in the **sssd.conf** configuration file:

- **ipa\_server** = *<fully\_qualified\_host\_name\_of\_the\_server>*
- **ad\_server** = *<fully\_qualified\_host\_name\_of\_the\_server>*
- **ldap\_uri** = *<fully\_qualified\_host\_name\_of\_the\_server>*

If you use these options, verify you can contact the servers listed in them.

4. Verify that the client can authenticate to the LDAP server and retrieve user information with **ldapsearch** commands.

- a. If your LDAP server is an IdM server, like **server.example.com**, retrieve a Kerberos ticket for the host and perform the database search authenticating with the host Kerberos principal:

```
[user@client ~]$ kinit -k 'host/client.example.com@EXAMPLE.COM'
[user@client ~]$ ldapsearch -LLL -Y GSSAPI -h server.example.com -b
"dc=example,dc=com" uid=<user_name>
```

- b. If your LDAP server is an Active Directory (AD) Domain Controller (DC), like **server.ad.example.com**, retrieve a Kerberos ticket for the host and perform the database search authenticating with the host Kerberos principal:

```
[user@client ~]$ kinit -k 'CLIENT$@AD.EXAMPLE.COM'
[user@client ~]$ ldapsearch -LLL -Y GSSAPI -h server.ad.example.com -b
"dc=example,dc=com" sAMAccountname=<user_name>
```

- c. If your LDAP server is a plain LDAP server, and you have set the **ldap\_default\_bind\_dn** and **ldap\_default\_authtok** options in the **sssd.conf** file, authenticate as the same **ldap\_default\_bind\_dn** account:

```
[user@client ~]$ ldapsearch -xLLL -D "cn=ldap_default_bind_dn_value" -W -h
ldapserver.example.com -b "dc=example,dc=com" uid=<user_name>
```

If this step fails, verify that your database settings allow your host to search the LDAP server.

5. Since the SSSD service uses Kerberos encryption, verify you can obtain a Kerberos ticket as the user that is unable to log in.

- a. If your LDAP server is an IdM server:

```
[user@client ~]$ kinit <user_name>
```

- b. If LDAP server database is an AD server:

```
[user@client ~]$ kinit <user_name@AD.EXAMPLE.COM>
```

If this step fails, verify that your Kerberos server is operating properly, all servers have their times synchronized, and that the user account is not locked.

6. Verify you can retrieve user information about the command line.

```
[user@client ~]$ getent passwd <user_name>
[user@client ~]$ id <user_name>
```

If this step fails, verify that the SSSD service on the client can receive information from the user database:

- a. Review errors in the **/var/log/messages** log file.
  - b. Enable detailed logging in the SSSD service, collect debugging logs, and review the logs for indications to the source of the issue.
  - c. *(Optional)* Open a Red Hat Technical Support case and provide the troubleshooting information you have gathered.
7. If you are allowed to run **sudo** on the host, use the **sssctl** utility to verify the user is allowed to log in.

```
[user@client ~]$ sudo sssctl user-checks -a auth -s ssh <user_name>
```

If this step fails, verify your authorization settings, such as your PAM configuration, IdM HBAC rules, and IdM RBAC rules:

- a. Ensure that the user's UID is equal to or higher than **UID\_MIN**, which is defined in the **/etc/login.defs** file.
- b. Review authorization errors in the **/var/log/secure** and **/var/log/messages** log files.
- c. Enable detailed logging in the SSSD service, collect debugging logs, and review the logs for indications to the source of the issue.
- d. *(Optional)* Open a Red Hat Technical Support case and provide the troubleshooting information you have gathered.

### Additional resources

- [Enabling detailed logging for SSSD in the sssd.conf file](#)
- [Enabling detailed logging for SSSD with the sssctl command](#)
- [Gathering debugging logs from the SSSD service to troubleshoot authentication issues with an IdM server](#)
- [Gathering debugging logs from the SSSD service to troubleshoot authentication issues with an IdM client](#)

## 8.5. SSSD LOG FILES AND LOGGING LEVELS

Each SSSD service logs into its own log file in the **/var/log/sss/** directory. For an IdM server in the **example.com** IdM domain, its log files might look like this:

```
[root@server ~]# ls -l /var/log/sss/
```

```
total 620
-rw-----. 1 root root    0 Mar 29 09:21 krb5_child.log
-rw-----. 1 root root 14324 Mar 29 09:50 ldap_child.log
-rw-----. 1 root root 212870 Mar 29 09:50 sssd_example.com.log
-rw-----. 1 root root    0 Mar 29 09:21 sssd_ifp.log
-rw-----. 1 root root    0 Mar 29 09:21 sssd_implicit_files.log
-rw-----. 1 root root    0 Mar 29 09:21 sssd.log
-rw-----. 1 root root 219873 Mar 29 10:03 sssd_nss.log
-rw-----. 1 root root    0 Mar 29 09:21 sssd_pac.log
-rw-----. 1 root root 13105 Mar 29 09:21 sssd_pam.log
-rw-----. 1 root root  9390 Mar 29 09:21 sssd_ssh.log
-rw-----. 1 root root    0 Mar 29 09:21 sssd_sudo.log
```

### 8.5.1. SSSD log file purposes

#### **krb5\_child.log**

Log file for the short-lived helper process involved in Kerberos authentication.

#### **ldap\_child.log**

Log file for the short-lived helper process involved in getting a Kerberos ticket for the communication with the LDAP server.

#### **sssd\_<example.com>.log**

For each domain section in the **sssd.conf** file, the SSSD service logs information about communication with the LDAP server to a separate log file. For example, in an environment with an IdM domain named **example.com**, the SSSD service logs its information in a file named **sssd\_example.com.log**. If a host is directly integrated with an AD domain named **ad.example.com**, information is logged to a file named **sssd\_ad.example.com.log**.



#### **NOTE**

If you have an IdM environment and a cross-forest trust with an AD domain, information about the AD domain is still logged to the log file for the IdM domain.

Similarly, if a host is directly integrated to an AD domain, information about any child domains is written in the log file for the primary domain.

#### **selinux\_child.log**

Log file for the short-lived helper process that retrieves and sets SELinux information.

#### **sssd.log**

Log file for SSSD monitoring and communicating with its responder and backend processes.

#### **sssd\_ifp.log**

Log file for the InfoPipe responder, which provides a public D-Bus interface accessible over the system bus.

#### **sssd\_nss.log**

Log file for the Name Services Switch (NSS) responder that retrieves user and group information.

#### **sssd\_pac.log**

Log file for the Microsoft Privilege Attribute Certificate (PAC) responder, which collects the PAC from AD Kerberos tickets and derives information about AD users from the PAC, which avoids requesting it directly from AD.

#### **sssd\_pam.log**

Log file for the Pluggable Authentication Module (PAM) responder.

#### **sssd\_ssh.log**

Log file for the SSH responder process.

### 8.5.2. SSSD logging levels

Setting a debug level also enables all debug levels below it. For example, setting the debug level at 6 also enables debug levels 0 through 5.

**Table 8.1. SSSD logging levels**

| Level | Description  |
|-------|--|
| 0     | <b>Fatal failures.</b> Errors that prevent the SSSD service from starting up or cause it to terminate. This is the default debug log level for RHEL 8.3 and earlier. |
| 1     | <b>Critical failures.</b> Errors that do not terminate the SSSD service, but at least one major feature is not working properly.                                     |
| 2     | <b>Serious failures.</b> Errors announcing that a particular request or operation has failed. This is the default debug log level for RHEL 8.4 and later.            |
| 3     | <b>Minor failures.</b> Errors that cause the operation failures captured at level 2.   |
| 4     | <b>Configuration</b> settings.   |
| 5     | <b>Function</b> data.  |
| 6     | Trace messages for <b>operation</b> functions.   |
| 7     | Trace messages for <b>internal control</b> functions.  |
| 8     | Contents of <b>function-internal</b> variables.  |
| 9     | Extremely <b>low-level tracing</b> information.  |

## 8.6. ENABLING DETAILED LOGGING FOR SSSD IN THE SSSD.CONF FILE

By default, the SSSD service in RHEL 8.4 and later only logs serious failures (debug level 2), but it does not log at the level of detail necessary to troubleshoot authentication issues.

To enable detailed logging persistently across SSSD service restarts, add the option **debug\_level=<integer>** in each section of the **/etc/sss/sss.conf** configuration file, where the **<integer>** value is a number between 0 and 9. Debug levels up to 3 log larger failures, and levels 8 and

higher provide a large number of detailed log messages. **Level 6** is a good starting point for debugging authentication issues.

### Prerequisites

- You need the root password to edit the **sssd.conf** configuration file and restart the SSSD service.

### Procedure

1. Open the **/etc/sss/sss.conf** file in a text editor.
2. Add the **debug\_level** option to every section of the file, and set the debug level to the verbosity of your choice.

```
[domain/example.com]
debug_level = 6
id_provider = ipa
...

[sss]
debug_level = 6
services = nss, pam, ifp, ssh, sudo
domains = example.com

[nss]
debug_level = 6

[pam]
debug_level = 6

[sudo]
debug_level = 6

[ssh]
debug_level = 6

[pac]
debug_level = 6

[ifp]
debug_level = 6
```

3. Save and close the **sss.conf** file.
4. Restart the SSSD service to load the new configuration settings.

```
[root@server ~]# systemctl restart sssd
```

### Additional resources

- [SSSD log files and logging levels](#)

## 8.7. ENABLING DETAILED LOGGING FOR SSSD WITH THE SSSCTL COMMAND

By default, the SSSD service in RHEL 8.4 and later only logs serious failures (debug level 2), but it does not log at the level of detail necessary to troubleshoot authentication issues.

You can change the debug level of the SSSD service on the command line with the **sssctl debug-level <integer>** command, where the **<integer>** value is a number between 0 and 9. Debug levels up to 3 log larger failures, and levels 8 and higher provide a large number of detailed log messages. Level 6 is a good starting point for debugging authentication issues.

### Prerequisites

- You need the root password to run the **sssctl** command.

### Procedure

- Use the **sssctl debug-level** command to set the debug level of your choice to your desired verbosity.

```
[root@server ~]# sssctl debug-level 6
```

### Additional resources

- [SSSD log files and logging levels](#)

## 8.8. GATHERING DEBUGGING LOGS FROM THE SSSD SERVICE TO TROUBLESHOOT AUTHENTICATION ISSUES WITH AN IDM SERVER

If you experience issues when attempting to authenticate as an IdM user to an IdM server, enable detailed debug logging in the SSSD service on the server and gather logs of an attempt to retrieve information about the user.

### Prerequisites

- You need the root password to run the **sssctl** command and restart the SSSD service.

### Procedure

1. Enable detailed SSSD debug logging on the IdM server.

```
[root@server ~]# sssctl debug-level 6
```

2. Invalidate objects in the SSSD cache for the user that is experiencing authentication issues, so you do not bypass the LDAP server and retrieve information SSSD has already cached.

```
[root@server ~]# sssctl cache-expire -u idmuser
```

3. Minimize the troubleshooting dataset by removing older SSSD logs.

```
[root@server ~]# sssctl logs-remove
```

4. Attempt to switch to the user experiencing authentication problems, while gathering timestamps before and after the attempt. These timestamps further narrow the scope of the dataset.

```
[root@server sssd]# date; su idmuser; date
Mon Mar 29 15:33:48 EDT 2021
su: user idmuser does not exist
Mon Mar 29 15:33:49 EDT 2021
```

5. (Optional) Lower the debug level if you do not wish to continue gathering detailed SSSD logs.

```
[root@server ~]# sssctl debug-level 2
```

6. Review SSSD logs for information about the failed request. For example, reviewing the `/var/log/sss/sss_example.com.log` file shows that the SSSD service did not find the user in the `cn=accounts,dc=example,dc=com` LDAP subtree. This might indicate that the user does not exist, or exists in another location.

```
(Mon Mar 29 15:33:48 2021) [sssdb[be[example.com]]] [dp_get_account_info_send] (0x0200):
Got request for [0x1][BE_REQ_USER][name=idmuser@example.com]
...
(Mon Mar 29 15:33:48 2021) [sssdb[be[example.com]]] [sdap_get_generic_ext_step] (0x0400):
calling ldap_search_ext with [(&(uid=idmuser)(objectclass=posixAccount)(uid=)(&
(uidNumber=)(!(uidNumber=0))))][cn=accounts,dc=example,dc=com].
(Mon Mar 29 15:33:48 2021) [sssdb[be[example.com]]] [sdap_get_generic_op_finished]
(0x0400): Search result: Success(0), no errmsg set
(Mon Mar 29 15:33:48 2021) [sssdb[be[example.com]]] [sdap_search_user_process] (0x0400):
Search for users, returned 0 results.
(Mon Mar 29 15:33:48 2021) [sssdb[be[example.com]]] [sysdb_search_by_name] (0x0400):
No such entry
(Mon Mar 29 15:33:48 2021) [sssdb[be[example.com]]] [sysdb_delete_user] (0x0400): Error: 2
(No such file or directory)
(Mon Mar 29 15:33:48 2021) [sssdb[be[example.com]]] [sysdb_search_by_name] (0x0400):
No such entry
(Mon Mar 29 15:33:49 2021) [sssdb[be[example.com]]]
[ipa_id_get_account_info_orig_done] (0x0080): Object not found, ending request
```

7. If you are unable to determine the cause of the authentication issue:

- a. Collect the SSSD logs you recently generated.

```
[root@server ~]# sssctl logs-fetch sssd-logs-Mar29.tar
```

- b. Open a Red Hat Technical Support case and provide:

- i. The SSSD logs: **sssdb-logs-Mar29.tar**
- ii. The console output, including the time stamps and user name, of the request that corresponds to the logs:

```
[root@server sssd]# date; id idmuser; date
Mon Mar 29 15:33:48 EDT 2021
id: 'idmuser': no such user
Mon Mar 29 15:33:49 EDT 2021
```



## 8.9. GATHERING DEBUGGING LOGS FROM THE SSSD SERVICE TO TROUBLESHOOT AUTHENTICATION ISSUES WITH AN IDM CLIENT

If you experience issues when attempting to authenticate as an IdM user to an IdM client, verify that you can retrieve user information about the IdM server. If you cannot retrieve the user information about an IdM server, you will not be able to retrieve it on an IdM client (which retrieves information from the IdM server).

After you have confirmed that authentication issues do not originate from the IdM server, gather SSSD debugging logs from both the IdM server and IdM client.

### Prerequisites

- The user only has authentication issues on IdM clients, not IdM servers.
- You need the root password to run the **sssctl** command and restart the SSSD service.

### Procedure

1. **On the client:** Open the `/etc/sss/sss.conf` file in a text editor.
2. **On the client:** Add the `ipa_server` option to the **[domain]** section of the file and set it to an IdM server. This avoids the IdM client autodiscovering other IdM servers, thus limiting this test to just one client and one server.

```
[domain/example.com]
ipa_server = server.example.com
...
```

3. **On the client:** Save and close the **sss.conf** file.
4. **On the client:** Restart the SSSD service to load the configuration changes.

```
[root@client ~]# systemctl restart sssd
```

5. **On the server and client:** Enable detailed SSSD debug logging.

```
[root@server ~]# sssctl debug-level 6
```

```
[root@client ~]# sssctl debug-level 6
```

6. **On the server and client:** Invalidate objects in the SSSD cache for the user experiencing authentication issues, so you do not bypass the LDAP database and retrieve information SSSD has already cached.

```
[root@server ~]# sssctl cache-expire -u idmuser
```

```
[root@client ~]# sssctl cache-expire -u idmuser
```

7. **On the server and client:** Minimize the troubleshooting dataset by removing older SSSD logs.

```
[root@server ~]# sssctl logs-remove
```

```
[root@server ~]# sssctl logs-remove
```

8. **On the client:** Attempt to switch to the user experiencing authentication problems while gathering timestamps before and after the attempt. These timestamps further narrow the scope of the dataset.

```
[root@client sssd]# date; su idmuser; date
Mon Mar 29 16:20:13 EDT 2021
su: user idmuser does not exist
Mon Mar 29 16:20:14 EDT 2021
```

9. *(Optional)* **On the server and client:** Lower the debug level if you do not wish to continue gathering detailed SSSD logs.

```
[root@server ~]# sssctl debug-level 0
```

```
[root@client ~]# sssctl debug-level 0
```

10. **On the server and client:** Review SSSD logs for information about the failed request.
  - a. Review the request from the client in the client logs.
  - b. Review the request from the client in the server logs.
  - c. Review the result of the request in the server logs.
  - d. Review the outcome of the client receiving the results of the request from the server.
11. If you are unable to determine the cause of the authentication issue:
  - a. Collect the SSSD logs you recently generated on the IdM server and IdM client. Label them according to their hostname or role.

```
[root@server ~]# sssctl logs-fetch sssd-logs-server-Mar29.tar
```

```
[root@client ~]# sssctl logs-fetch sssd-logs-client-Mar29.tar
```

- b. Open a Red Hat Technical Support case and provide:
  - i. The SSSD debug logs:
    - A. **sssd-logs-server-Mar29.tar** from the server
    - B. **sssd-logs-client-Mar29.tar** from the client
  - ii. The console output, including the time stamps and user name, of the request that corresponds to the logs:

```
[root@client sssd]# date; su idmuser; date
Mon Mar 29 16:20:13 EDT 2021
su: user idmuser does not exist
Mon Mar 29 16:20:14 EDT 2021
```

## 8.10. TRACKING CLIENT REQUESTS IN THE SSSD BACKEND

SSSD processes requests asynchronously and as messages from different requests are added to the same log file, you can use the unique request identifier and client ID to track client requests in the back-end logs. The unique request identifier is added to the debug logs in the form of **RID#<integer>** and the client ID in the form **[CID #<integer>]**. This allows you to isolate logs pertaining to an individual request, and you can track requests from start to finish across log files from multiple SSSD components.

### Prerequisites

- You have enabled debug logging and a request has been submitted from an IdM client.
- You must have root privileges to display the contents of the SSSD log files.

### Procedure

1. To review your SSSD log file, open the log file using the **less** utility. For example, to view the **/var/log/sssds/sssds\_example.com.log**:

```
[root@server ~]# less /var/log/sssds/sssds_example.com.log
```

2. Review the SSSD logs for information about the client request.

```
(2021-07-26 18:26:37): [be[testidm.com]] [dp_req_destructor] (0x0400): [RID#3] Number of
active DP request: 0
(2021-07-26 18:26:37): [be[testidm.com]] [dp_req_reply_std] (0x1000): [RID#3] DP Request
AccountDomain #3: Returning [Internal Error]: 3,1432158301,GetAccountDomain() not
supported
(2021-07-26 18:26:37): [be[testidm.com]] [dp_attach_req] (0x0400): [RID#4] DP Request
Account #4: REQ_TRACE: New request. [sssds.nss CID #1] Flags [0x0001].
(2021-07-26 18:26:37): [be[testidm.com]] [dp_attach_req] (0x0400): [RID#4] Number of
active DP request: 1
```

This sample output from an SSSD log file shows the unique identifiers **RID#3** and **RID#4** for two different requests.

However, a single client request to the SSSD client interface often triggers multiple requests in the backend and as a result it is not a 1-to-1 correlation between client request and requests in the backend. Though the multiple requests in the backend have different RID numbers, each initial backend request includes the unique client ID so an administrator can track the multiple RID numbers to the single client request.

The following example shows one client request **[sssds.nss CID #1]** and the multiple requests generated in the backend, **[RID#5]** to **[RID#13]**:

```
(2021-10-29 13:24:16): [be[ad.vm]] [dp_attach_req] (0x0400): [RID#5] DP Request [Account #5]:
REQ_TRACE: New request. [sssds.nss CID #1] Flags [0x0001].
(2021-10-29 13:24:16): [be[ad.vm]] [dp_attach_req] (0x0400): [RID#6] DP Request [AccountDomain
#6]: REQ_TRACE: New request. [sssds.nss CID #1] Flags [0x0001].
(2021-10-29 13:24:16): [be[ad.vm]] [dp_attach_req] (0x0400): [RID#7] DP Request [Account #7]:
REQ_TRACE: New request. [sssds.nss CID #1] Flags [0x0001].
(2021-10-29 13:24:17): [be[ad.vm]] [dp_attach_req] (0x0400): [RID#8] DP Request [Initgroups #8]:
REQ_TRACE: New request. [sssds.nss CID #1] Flags [0x0001].
(2021-10-29 13:24:17): [be[ad.vm]] [dp_attach_req] (0x0400): [RID#9] DP Request [Account #9]:
REQ_TRACE: New request. [sssds.nss CID #1] Flags [0x0001].
```

```
(2021-10-29 13:24:17): [be[ad.vm]] [dp_attach_req] (0x0400): [RID#10] DP Request [Account #10]:
REQ_TRACE: New request. [sssd.nss CID #1] Flags [0x0001].
(2021-10-29 13:24:17): [be[ad.vm]] [dp_attach_req] (0x0400): [RID#11] DP Request [Account #11]:
REQ_TRACE: New request. [sssd.nss CID #1] Flags [0x0001].
(2021-10-29 13:24:17): [be[ad.vm]] [dp_attach_req] (0x0400): [RID#12] DP Request [Account #12]:
REQ_TRACE: New request. [sssd.nss CID #1] Flags [0x0001].
(2021-10-29 13:24:17): [be[ad.vm]] [dp_attach_req] (0x0400): [RID#13] DP Request [Account #13]:
REQ_TRACE: New request. [sssd.nss CID #1] Flags [0x0001].
```

## 8.11. TRACKING CLIENT REQUESTS USING THE LOG ANALYZER TOOL

The System Security Services Daemon (SSSD) includes a log parsing tool that can be used to track requests from start to finish across log files from multiple SSSD components.

### 8.11.1. How the log analyzer tool works

Using the log parsing tool, you can track SSSD requests from start to finish across log files from multiple SSSD components. You run the analyzer tool using the **sssctl analyze** command.

The log analyzer tool helps you to troubleshoot NSS and PAM issues in SSSD and more easily review SSSD debug logs. You can extract and print SSSD logs related only to certain client requests across SSSD processes.

SSSD tracks user and group identity information (**id**, **getent**) separately from user authentication (**su**, **ssh**) information. The client ID (CID) in the NSS responder is independent of the CID in the PAM responder and you see overlapping numbers when analyzing NSS and PAM requests. Use the **--pam** option with the **sssctl analyze** command to review PAM requests.



#### NOTE

Requests returned from the SSSD memory cache are not logged and cannot be tracked by the log analyzer tool.

#### Additional resources

- **sudo sssctl analyze request --help**
- **sudo sssctl analyze --help**
- **sssd.conf** man page
- **sssctl** man page

### 8.11.2. Running the log analyzer tool

Follow this procedure to use the log analyzer tool to track client requests in SSSD.

#### Prerequisites

- You must set **debug\_level** to at least 7 in the [**\$responder**] section, and [**domain/\$domain**] section of the **/etc/sss/sss.conf** file to enable log parsing functionality.
- Logs to analyze must be from a compatible version of SSSD built with **libtevent** chain ID support, that is SSSD in RHEL 8.5 and later.

## Procedure

1. Run the log analyzer tool in **list** mode to determine the client ID of the request you are tracking, adding the **-v** option to display verbose output:

```
# sssctl analyze request list -v
```

A verbose list of recent client requests made to SSSD is displayed.



### NOTE

If analyzing PAM requests, run the **sssctl analyze request list** command with the **--pam** option.

2. Run the log analyzer tool with the **show [unique client ID]** option to display logs pertaining to the specified client ID number:

```
# sssctl analyze request show 20
```

3. If required, you can run the log analyzer tool against log files, for example:

```
# sssctl analyze request --logdir=/tmp/var/log/sss
```

## Additional resources

- **sssctl analyze request list --help**
- **sssctl analyze request show --help**
- **sssctl** man page.

## 8.12. ADDITIONAL RESOURCES

- [General SSSD Debugging Procedures](#)

## CHAPTER 9. PREPARING YOUR ENVIRONMENT FOR MANAGING IDM USING ANSIBLE PLAYBOOKS

As a system administrator managing Identity Management (IdM), when working with Red Hat Ansible Engine, it is good practice to do the following:

- Create a subdirectory dedicated to Ansible playbooks in your home directory, for example `~/MyPlaybooks`.
- Copy and adapt sample Ansible playbooks from the `/usr/share/doc/ansible-freeipa/*` and `/usr/share/doc/rhel-system-roles/*` directories and subdirectories into your `~/MyPlaybooks` directory.
- Include your inventory file in your `~/MyPlaybooks` directory.

Using this practice, you can find all your playbooks in one place.



### NOTE

You can run your **ansible-freeipa** playbooks without invoking **root** privileges on the managed nodes. Exceptions include playbooks that use the **ipaserver**, **ipareplica**, **ipaclient**, **ipasmartcard\_server**, **ipasmartcard\_client** and **ipabackup ansible-freeipa** roles. These roles require privileged access to directories and the **dnf** software package manager.

The playbooks in the Red Hat Enterprise Linux IdM documentation assume the following [security configuration](#):

- The IdM **admin** is your remote Ansible user on the managed nodes.
- You store the IdM **admin** password encrypted in an Ansible vault.
- You have placed the password that protects the Ansible vault in a password file.
- You block access to the vault password file to everyone except your local ansible user.
- You regularly remove and re-create the vault password file.

Consider also [alternative security configurations](#).

### 9.1. PREPARING A CONTROL NODE AND MANAGED NODES FOR MANAGING IDM USING ANSIBLE PLAYBOOKS

Follow this procedure to create the `~/MyPlaybooks` directory and configure it so that you can use it to store and run Ansible playbooks.

#### Prerequisites

- You have installed an IdM server on your managed nodes, **server.idm.example.com** and **replica.idm.example.com**.
- You have configured DNS and networking so you can log in to the managed nodes, **server.idm.example.com** and **replica.idm.example.com**, directly from the control node.

- You know the IdM **admin** password.

## Procedure

1. Create a directory for your Ansible configuration and playbooks in your home directory:

```
$ mkdir ~/MyPlaybooks/
```

2. Change into the `~/MyPlaybooks/` directory:

```
$ cd ~/MyPlaybooks
```

3. Create the `~/MyPlaybooks/ansible.cfg` file with the following content:

```
[defaults]
inventory = /home/your_username/MyPlaybooks/inventory
remote_user = admin
```

4. Create the `~/MyPlaybooks/inventory` file with the following content:

```
[eu]
server.idm.example.com

[us]
replica.idm.example.com

[ipaserver:children]
eu
us
```

This configuration defines two host groups, **eu** and **us**, for hosts in these locations. Additionally, this configuration defines the **ipaserver** host group, which contains all hosts from the **eu** and **us** groups.

5. [Optional] Create an SSH public and private key. To simplify access in your test environment, do not set a password on the private key:

```
$ ssh-keygen
```

6. Copy the SSH public key to the IdM **admin** account on each managed node:

```
$ ssh-copy-id admin@server.idm.example.com
$ ssh-copy-id admin@replica.idm.example.com
```

These commands require that you enter the IdM **admin** password.

7. Create a `password_file` file that contains the vault password:

```
redhat
```

8. Change the permissions to modify the file:

```
$ chmod 0600 password_file
```

9. Create a **secret.yml** Ansible vault to store the IdM **admin** password:

a. Configure **password\_file** to store the vault password:

```
$ ansible-vault create --vault-password-file=password_file secret.yml
```

b. When prompted, enter the content of the **secret.yml** file:

```
ipaadmin_password: Secret123
```

## NOTE

To use the encrypted **ipaadmin\_password** in a playbook, you must use the **vars\_file** directive. For example, a simple playbook to delete an IdM user can look as follows:

```
---
- name: Playbook to handle users
  hosts: ipaserver

  vars_files:
    - /home/user_name/MyPlaybooks/secret.yml

  tasks:
    - name: Delete user robot
      ipauser:
        ipaadmin_password: "{{ ipaadmin_password }}"
        name: robot
        state: absent
```

When executing a playbook, instruct Ansible use the vault password to decrypt **ipaadmin\_password** by adding the **--vault-password-file=password\_file** option. For example:

```
ansible-playbook -i inventory --vault-password-file=password_file del-user.yml
```



## WARNING

For security reasons, remove the vault password file at the end of each session, and repeat steps 7-9 at the start of each new session.

## Additional resources

- [Different methods to provide the credentials required for ansible-freeipa playbooks](#)
- [Installing an Identity Management server using an Ansible playbook](#)
- [How to build your inventory](#)



## 9.2. DIFFERENT METHODS TO PROVIDE THE CREDENTIALS REQUIRED FOR ANSIBLE-FREEIPA PLAYBOOKS

There are advantages and disadvantages in the different methods for providing the credentials required for running playbooks that use **ansible-freeipa** roles and modules.

### Storing passwords in plain text in a playbook

#### Benefits:

- Not being prompted all the time you run the playbook.
- Easy to implement.

#### Drawbacks:

- Everyone with access to the file can read the password. Setting wrong permissions and sharing the file, for example in an internal or external repository, can compromise security.
- High maintenance work: if the password is changed, it needs to be changed in all playbooks.

### Entering passwords interactively when you execute a playbook

#### Benefits:

- No-one can steal the password as it is not stored anywhere.
- You can update the password easily.
- Easy to implement.

#### Drawbacks:

- If you are using Ansible playbooks in scripts, the requirement to enter the password interactively can be inconvenient.

### Storing passwords in an Ansible vault and the vault password in a file:

#### Benefits:

- The user password is stored encrypted.
- You can update the user password easily, by creating a new Ansible vault.
- You can update the password file that protects the ansible vault easily, by using the **ansible-vault rekey --new-vault-password-file=NEW\_VAULT\_PASSWORD\_FILE secret.yml** command.
- If you are using Ansible playbooks in scripts, it is convenient not to have to enter the password protecting the Ansible vault interactively.

#### Drawbacks:

- It is vital that the file that contains the sensitive plain text password be protected through file permissions and other security measures.

### Storing passwords in an Ansible vault and entering the vault password interactively

#### Benefits:

- The user password is stored encrypted.
- No-one can steal the vault password as it is not stored anywhere.
- You can update the user password easily, by creating a new Ansible vault.
- You can update the vault password easily too, by using the **ansible-vault rekey *file\_name*** command.

**Drawbacks:**

- If you are using Ansible playbooks in scripts, the need to enter the vault password interactively can be inconvenient.

**Additional resources**

- [Preparing a control node and managed nodes for managing IdM using Ansible playbooks](#)
- [What is Zero trust?](#)
- [Protecting sensitive data with Ansible vault](#)

## CHAPTER 10. CONFIGURING GLOBAL IDM SETTINGS USING ANSIBLE PLAYBOOKS

Using the Ansible **config** module, you can retrieve and set global configuration parameters for Identity Management (IdM).

- [Retrieving IdM configuration using an Ansible playbook](#)
- [Configuring the IdM CA renewal server using an Ansible playbook](#)
- [Configuring the default shell for IdM users using an Ansible playbook](#)
- [Configuring a NETBIOS name for an IdM domain by using Ansible](#)
- [Ensuring that IdM users and groups have SIDs by using Ansible](#)

### 10.1. RETRIEVING IDM CONFIGURATION USING AN ANSIBLE PLAYBOOK

The following procedure describes how you can use an Ansible playbook to retrieve information about the current global IdM configuration.

#### Prerequisites

- You know the IdM administrator password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the `secret.yml` Ansible vault stores your `ipaadmin_password`.

#### Procedure

1. Open the `/usr/share/doc/ansible-freeipa/playbooks/config/retrieve-config.yml` Ansible playbook file for editing:

```
---
- name: Playbook to handle global IdM configuration
  hosts: ipaserver
  become: no
  gather_facts: no

  vars_files:
    - /home/user_name/MyPlaybooks/secret.yml
  tasks:
    - name: Query IPA global configuration
      ipaconfig:
        ipaadmin_password: "{{ ipaadmin_password }}"
      register: serverconfig
```

```
- debug:
  msg: "{{ serverconfig }}"
```

2. Adapt the file by changing the following:
  - The password of IdM administrator.
  - Other values, if necessary.
3. Save the file.
4. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the **secret.yml** file, and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i
path_to_inventory_directory/inventory.file /usr/share/doc/ansible-
freeipa/playbooks/config/retrieve-config.yml
[...]
TASK [debug]
ok: [server.idm.example.com] => {
  "msg": {
    "ansible_facts": {
      "discovered_interpreter_"
    },
    "changed": false,
    "config": {
      "ca_renewal_master_server": "server.idm.example.com",
      "configstring": [
        "AllowNThash",
        "KDC:Disable Last Success"
      ],
      "defaultgroup": "ipausers",
      "defaultshell": "/bin/bash",
      "emaildomain": "idm.example.com",
      "enable_migration": false,
      "groupsearch": [
        "cn",
        "description"
      ],
      "homedirectory": "/home",
      "maxhostname": "64",
      "maxusername": "64",
      "pac_type": [
        "MS-PAC",
        "nfs:NONE"
      ],
      "pwdexpnotify": "4",
      "searchrecordslimit": "100",
      "searchtimelimit": "2",
      "selinuxusermapdefault": "unconfined_u:s0-s0:c0.c1023",
      "selinuxusermaporder": [
        "guest_u:s0$guest_u:s0$user_"
      ],
      "usersearch": [
        "uid",
```

```

        "givenname",
        "sn",
        "telephonenumber",
        "ou",
        "title"
    ]
},
"failed": false
}
}

```

## 10.2. CONFIGURING THE IDM CA RENEWAL SERVER USING AN ANSIBLE PLAYBOOK

In an Identity Management (IdM) deployment that uses an embedded certificate authority (CA), the CA renewal server maintains and renews IdM system certificates. It ensures robust IdM deployments.

For more details on the role of the IdM CA renewal server, see [Using IdM CA renewal server](#).

The following procedure describes how you can use an Ansible playbook to configure the IdM CA renewal server.

### Prerequisites

- You know the IdM administrator password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the `secret.yml` Ansible vault stores your `ipaadmin_password`.

### Procedure

1. Optional: Identify the current IdM CA renewal server:

```

$ ipa config-show | grep 'CA renewal'
IPA CA renewal master: server.idm.example.com

```

2. Create an inventory file, for example `inventory.file`, and define `ipaserver` in it:

```

[ipaserver]
server.idm.example.com

```

3. Open the `/usr/share/doc/ansible-freeipa/playbooks/config/set-ca-renewal-master-server.yml` Ansible playbook file for editing:

```

---
- name: Playbook to handle global DNS configuration

```

```

hosts: ipaserver
become: no
gather_facts: no
vars_files:
- /home/user_name/MyPlaybooks/secret.yml

tasks:
- name: set ca_renewal_master_server
  ipaconfig:
    ipaadmin_password: "{{ ipaadmin_password }}"
    ca_renewal_master_server: carenewal.idm.example.com

```

4. Adapt the file by changing:

- The password of IdM administrator set by the **ipaadmin\_password** variable.
- The name of the CA renewal server set by the **ca\_renewal\_master\_server** variable.

5. Save the file.

6. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the **secret.yml** file, and the inventory file:

```

$ ansible-playbook --vault-password-file=password_file -v -i
path_to_inventory_directory/inventory.file /usr/share/doc/ansible-
freeipa/playbooks/config/set-ca-renewal-master-server.yml

```

## Verification steps

You can verify that the CA renewal server has been changed:

1. Log into **ipaserver** as IdM administrator:

```

$ ssh admin@server.idm.example.com
Password:
[admin@server ~]$

```

2. Request the identity of the IdM CA renewal server:

```

$ ipa config-show | grep 'CA renewal'
IPA CA renewal master: carenewal.idm.example.com

```

The output shows the **carenewal.idm.example.com** server is the new CA renewal server.

## 10.3. CONFIGURING THE DEFAULT SHELL FOR IDM USERS USING AN ANSIBLE PLAYBOOK

The shell is a program that accepts and interprets commands. Several shells are available in Red Hat Enterprise Linux (RHEL), such as **bash**, **sh**, **ksh**, **zsh**, **fish**, and others. **Bash**, or **/bin/bash**, is a popular shell on most Linux systems, and it is normally the default shell for user accounts on RHEL.

The following procedure describes how you can use an Ansible playbook to configure **sh**, an alternative shell, as the default shell for IdM users.

## Prerequisites

- You know the IdM administrator password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the `secret.yml` Ansible vault stores your `ipaadmin_password`.

## Procedure

1. Optional: Use the `retrieve-config.yml` Ansible playbook to identify the current shell for IdM users. See [Retrieving IdM configuration using an Ansible playbook](#) for details.
2. Create an inventory file, for example `inventory.file`, and define `ipaserver` in it:

```
[ipaserver]
server.idm.example.com
```

3. Open the `/usr/share/doc/ansible-freeipa/playbooks/config/ensure-config-options-are-set.yml` Ansible playbook file for editing:

```
---
- name: Playbook to ensure some config options are set
  hosts: ipaserver
  vars_files:
    - /home/user_name/MyPlaybooks/secret.yml

  tasks:
    # Set defaultlogin and maxusername
    - ipaconfig:
        ipaadmin_password: "{{ ipaadmin_password }}"
        defaultshell: /bin/bash
        maxusername: 64
```

4. Adapt the file by changing the following:
  - The password of IdM administrator set by the `ipaadmin_password` variable.
  - The default shell of the IdM users set by the `defaultshell` variable into `/bin/sh`.
5. Save the file.
6. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the `secret.yml` file, and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i
path_to_inventory_directory/inventory.file /usr/share/doc/ansible-
freeipa/playbooks/config/ensure-config-options-are-set.yml
```

## Verification steps

You can verify that the default user shell has been changed by starting a new session in IdM:

1. Log into **ipaserver** as IdM administrator:

```
$ ssh admin@server.idm.example.com
Password:
[admin@server /]$
```

2. Display the current shell:

```
[admin@server /]$ echo "$SHELL"
/bin/sh
```

The logged-in user is using the **sh** shell.

## 10.4. CONFIGURING A NETBIOS NAME FOR AN IDM DOMAIN BY USING ANSIBLE

The NetBIOS name is used for Microsoft Windows' (SMB) type of sharing and messaging. You can use NetBIOS names to map a drive or connect to a printer.

Follow this procedure to use an Ansible playbook to configure a NetBIOS name for your Identity Management (IdM) domain.

### Prerequisites

- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - The [ansible-freeipa](#) package is installed.

### Assumptions

- The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
- The example assumes that the `secret.yml` Ansible vault stores your `ipaadmin_password` and that you know the vault file password.

### Procedure

1. Navigate to your `~/MyPlaybooks/` directory:

```
$ cd ~/MyPlaybooks/
```

2. Create a `netbios-domain-name-present.yml` Ansible playbook file.
3. Add the following content to the file:

```
---
- name: Playbook to change IdM domain netbios name
```



```

hosts: ipaserver
become: no
gather_facts: no

vars_files:
- /home/user_name/MyPlaybooks/secret.yml

tasks:
- name: Set IdM domain netbios name
  ipaconfig:
    ipaadmin_password: "{{ ipaadmin_password }}"
    netbios_name: IPADOM

```

4. Save the file.
5. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the **secret.yml** file, and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory netbios-domain-name-present.yml
```

When prompted, provide the vault file password.

#### Additional resources

- [Guidelines for configuring NetBIOS names](#)

## 10.5. ENSURING THAT IDM USERS AND GROUPS HAVE SIDS BY USING ANSIBLE

The Identity Management (IdM) server can assign unique security identifiers (SIDs) to IdM users and groups internally, based on the data from the ID ranges of the local domain. The SIDs are stored in the user and group objects.

The goal of ensuring that IdM users and groups have SIDs is to allow the generation of the Privileged Attribute Certificate (PAC), which is the first step towards IdM-IdM trusts. If IdM users and groups have SIDs, IdM is able to issue Kerberos tickets with PAC data.

Follow this procedure to achieve the following goals:

- Generate SIDs for already existing IdM users and user groups.
- Enable the generation of SIDs for IdM new users and groups.

#### Prerequisites

- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - The [ansible-freeipa](#) package is installed.

#### Assumptions

- The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
- The example assumes that the `secret.yml` Ansible vault stores your `ipaadmin_password` and that you know the vault file password.

## Procedure

1. Navigate to your `~/MyPlaybooks/` directory:

```
$ cd ~/MyPlaybooks/
```

2. Create a `sids-for-users-and-groups-present.yml` Ansible playbook file.
3. Add the following content to the file:

```
---
- name: Playbook to ensure SIDs are enabled and users and groups have SIDs
  hosts: ipaserver
  become: no
  gather_facts: no

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml

  tasks:
  - name: Enable SID and generate users and groups SIDS
    ipaconfig:
      ipaadmin_password: "{{ ipaadmin_password }}"
      enable_sid: true
      add_sids: true
```

The **enable\_sid** variable enables SID generation for future IdM users and groups. The **add\_sids** variable generates SIDs for existing IdM users and groups.



### NOTE

When using **add\_sids: true**, you must also set the **enable\_sid** variable to **true**.

4. Save the file.
5. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the `secret.yml` file, and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory sids-for-users-and-groups-present.yml
```

When prompted, provide the vault file password.

## Additional resources

- [The role of security and relative identifiers in IdM ID ranges](#) .

## 10.6. ADDITIONAL RESOURCES

- See **README-config.md** in the `/usr/share/doc/ansible-freeipa/` directory.
- See sample playbooks in the `/usr/share/doc/ansible-freeipa/playbooks/config` directory.

## CHAPTER 11. MANAGING USER ACCOUNTS USING THE COMMAND LINE

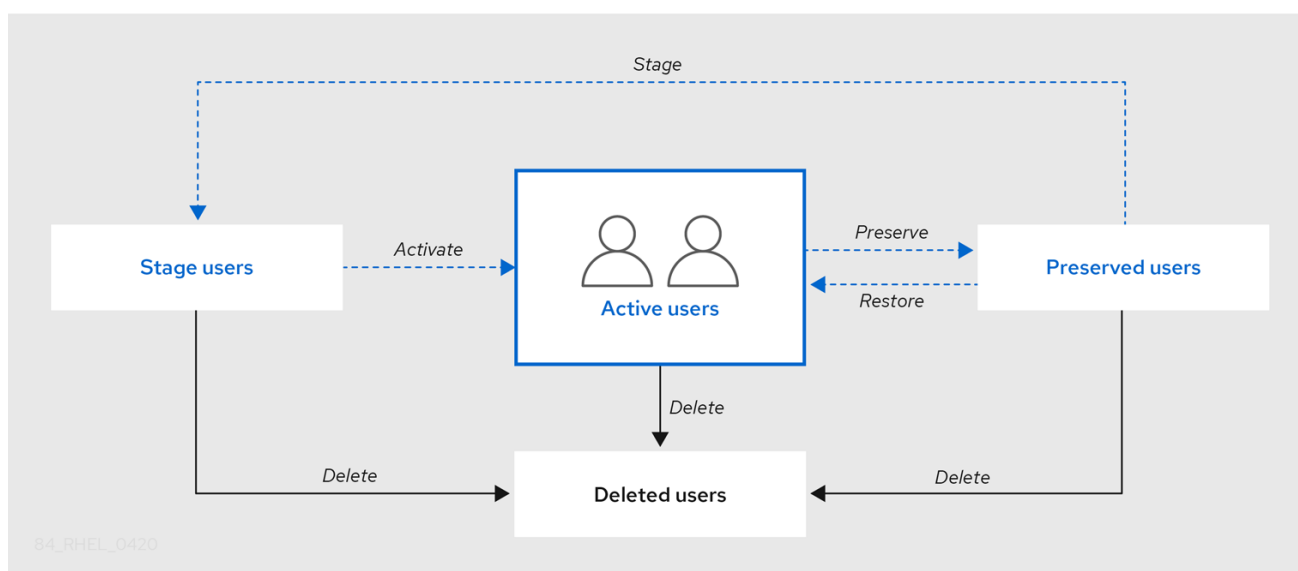
There are several stages in the user life cycle in IdM (Identity Management), including the following:

- Create user accounts
- Activate stage user accounts
- Preserve user accounts
- Delete active, stage, or preserved user accounts
- Restore preserved user accounts

### 11.1. USER LIFE CYCLE

Identity Management (IdM) supports three user account states:

- **Stage** users are not allowed to authenticate. This is an initial state. Some of the user account properties required for active users cannot be set, for example, group membership.
- **Active** users are allowed to authenticate. All required user account properties must be set in this state.
- **Preserved** users are former active users that are considered inactive and cannot authenticate to IdM. Preserved users retain most of the account properties they had as active users, but they are not part of any user groups.



You can delete user entries permanently from the IdM database.



#### IMPORTANT

Deleted user accounts cannot be restored. When you delete a user account, all the information associated with the account is permanently lost.

A new administrator can only be created by a user with administrator rights, such as the default admin user. If you accidentally delete all administrator accounts, the Directory Manager must create a new administrator manually in the Directory Server.



### WARNING

Do not delete the **admin** user. As **admin** is a pre-defined user required by IdM, this operation causes problems with certain commands. If you want to define and use an alternative admin user, disable the pre-defined **admin** user with **ipa user-disable admin** after you granted admin permissions to at least one different user.



### WARNING

Do not add local users to IdM. The Name Service Switch (NSS) always resolves IdM users and groups before resolving local users and groups. This means that, for example, IdM group membership does not work for local users.

## 11.2. ADDING USERS USING THE COMMAND LINE

You can add user as:

- **Active** – user accounts which can be actively used by their users.
- **Stage** – users cannot use these accounts. Use it if you want to prepare new user accounts. When users are ready to use their accounts, then you can activate them.

The following procedure describes adding active users to the IdM server with the **ipa user-add** command.

Similarly, you can create stage user accounts with the **ipa stageuser-add** command.



### NOTE

IdM automatically assigns a unique user ID (UID) to the new user accounts. You can also do this manually, however, the server does not validate whether the UID number is unique. Due to this, multiple user entries might have the same ID number assigned. Red Hat recommends to prevent having multiple entries with the same UID.

### Prerequisites

- Administrator privileges for managing IdM or User Administrator role.
- Obtained a Kerberos ticket. For details, see [Using kinit to log in to IdM manually](#).

### Procedure

1. Open terminal and connect to the IdM server.
2. Add user login, user's first name, last name and optionally, you can also add their email address.

```
$ ipa user-add user_login --first=first_name --last=last_name --email=email_address
```

IdM supports user names that can be described by the following regular expression:

```
[a-zA-Z0-9_][a-zA-Z0-9_-]{0,252}[a-zA-Z0-9_.$-]?
```



#### NOTE

User names ending with the trailing dollar sign (\$) are supported to enable Samba 3.x machine support.

If you add a user name containing uppercase characters, IdM automatically converts the name to lowercase when saving it. Therefore, IdM always requires to enter user names in lowercase when logging in. Additionally, it is not possible to add user names which differ only in letter casing, such as **user** and **User**.

The default maximum length for user names is 32 characters. To change it, use the **ipa config-mod --maxusername** command. For example, to increase the maximum user name length to 64 characters:

```
$ ipa config-mod --maxusername=64
Maximum username length: 64
...
```

The **ipa user-add** command includes a lot of parameters. To list them all, use the **ipa help** command:

```
$ ipa help user-add
```

For details about **ipa help** command, see [What is the IPA help](#).

You can verify if the new user account is successfully created by listing all IdM user accounts:

```
$ ipa user-find
```

This command lists all user accounts with details.

## 11.3. ACTIVATING USERS USING THE COMMAND LINE

To activate a user account by moving it from stage to active, use the **ipa stageuser-activate** command.

### Prerequisites

- Administrator privileges for managing IdM or User Administrator role.
- Obtained a Kerberos ticket. For details, see [Using kinit to log in to IdM manually](#).

### Procedure

1. Open terminal and connect to the IdM server.
2. Activate the user account with the following command:

```
$ ipa stageuser-activate user_login
-----
Stage user user_login activated
-----
...
```

You can verify if the new user account is successfully created by listing all IdM user accounts:

```
$ ipa user-find
```

This command lists all user accounts with details.

## 11.4. PRESERVING USERS USING THE COMMAND LINE

You can preserve a user account if you want to remove it, but keep the option to restore it later. To preserve a user account, use the **--preserve** option with the **ipa user-del** or **ipa stageuser-del** commands.

### Prerequisites

- Administrator privileges for managing IdM or User Administrator role.
- Obtained a Kerberos ticket. For details, see [Using kinit to log in to IdM manually](#) .

### Procedure

1. Open terminal and connect to the IdM server.
2. Preserve the user account with the following command:

```
$ ipa user-del --preserve user_login
-----
Deleted user "user_login"
-----
```



### NOTE

Despite the output saying the user account was deleted, it has been preserved.

## 11.5. DELETING USERS USING THE COMMAND LINE

IdM (Identity Management) enables you to delete users permanently. You can delete:

- Active users with the following command: **ipa user-del**
- Stage users with the following command: **ipa stageuser-del**
- Preserved users with the following command: **ipa user-del**

When deleting multiple users, use the **--continue** option to force the command to continue regardless of errors. A summary of the successful and failed operations is printed to the **stdout** standard output stream when the command completes.

```
$ ipa user-del --continue user1 user2 user3
```

If you do not use **--continue**, the command proceeds with deleting users until it encounters an error, after which it stops and exits.

### Prerequisites

- Administrator privileges for managing IdM or User Administrator role.
- Obtained a Kerberos ticket. For details, see [Using kinit to log in to IdM manually](#) .

### Procedure

1. Open terminal and connect to the IdM server.
2. Delete the user account with the following command:

```
$ ipa user-del user_login
-----
Deleted user "user_login"
-----
```

The user account has been permanently deleted from IdM.

## 11.6. RESTORING USERS USING THE COMMAND LINE

You can restore a preserved users to:

- Active users: **ipa user-undel**
- Stage users: **ipa user-stage**

Restoring a user account does not restore all of the account's previous attributes. For example, the user's password is not restored and must be set again.

### Prerequisites

- Administrator privileges for managing IdM or User Administrator role.
- Obtained a Kerberos ticket. For details, see [Using kinit to log in to IdM manually](#) .

### Procedure

1. Open terminal and connect to the IdM server.
2. Activate the user account with the following command:

```
$ ipa user-undel user_login
-----
Undeleted user account "user_login"
```



```
| -----
```

Alternatively, you can restore user accounts as staged:

```
| $ ipa user-stage user_login  
| -----  
| Staged user account "user_login"  
| -----
```

### Verification steps

- You can verify if the new user account is successfully created by listing all IdM user accounts:

```
| $ ipa user-find
```

This command lists all user accounts with details.

## CHAPTER 12. MANAGING USER ACCOUNTS USING THE IDM WEB UI

Identity Management (IdM) provides [several stages](#) that can help you to manage various user life cycle situations:

### Creating a user account

[Creating a stage user account](#) before an employee starts their career in your company and be prepared in advance for the day when the employee appears in the office and want to activate the account.

You can omit this step and create the active user account directly. The procedure is similar to creating a stage user account.

### Activating a user account

[Activating the account](#) the first working day of the employee.

### Disabling a user account

If the user go to a parental leave for couple of months, you will need [to disable the account temporarily](#).

### Enabling a user account

When the user returns, you will need [to re-enable the account](#).

### Preserving a user account

If the user wants to leave the company, you will need [to delete the account with a possibility to restore it](#) because people can return to the company after some time.

### Restoring a user account

Two years later, the user is back and you need [to restore the preserved account](#).

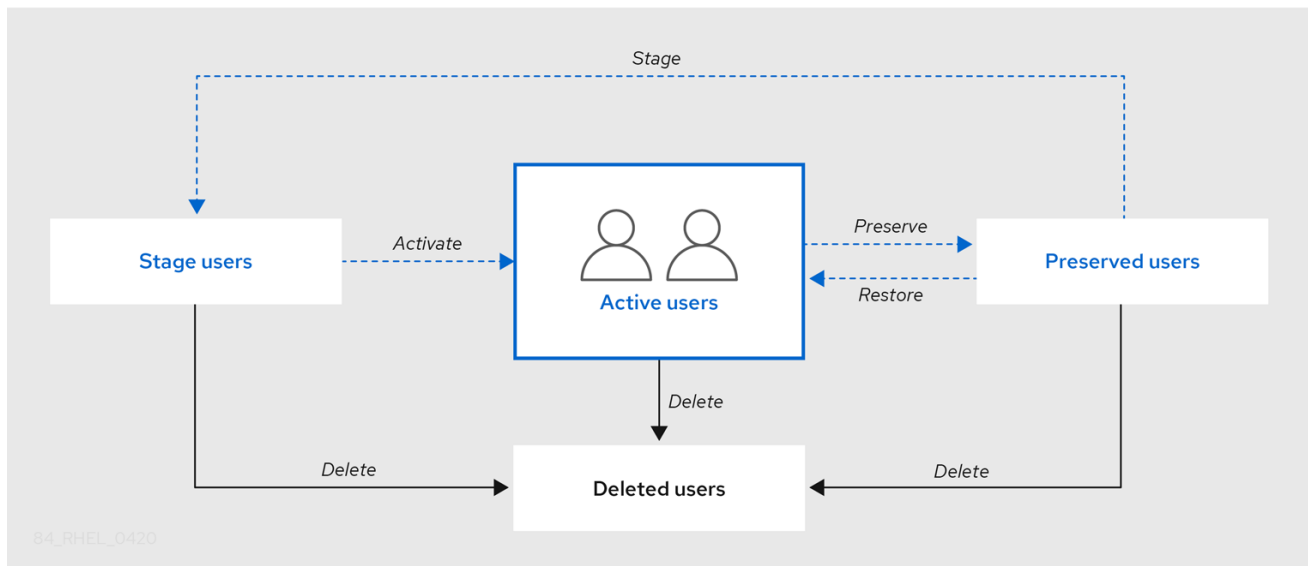
### Deleting a user account

If the employee is dismissed, [delete the account](#) without a backup.

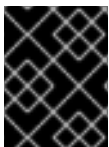
## 12.1. USER LIFE CYCLE

Identity Management (IdM) supports three user account states:

- **Stage** users are not allowed to authenticate. This is an initial state. Some of the user account properties required for active users cannot be set, for example, group membership.
- **Active** users are allowed to authenticate. All required user account properties must be set in this state.
- **Preserved** users are former active users that are considered inactive and cannot authenticate to IdM. Preserved users retain most of the account properties they had as active users, but they are not part of any user groups.



You can delete user entries permanently from the IdM database.



### IMPORTANT

Deleted user accounts cannot be restored. When you delete a user account, all the information associated with the account is permanently lost.

A new administrator can only be created by a user with administrator rights, such as the default admin user. If you accidentally delete all administrator accounts, the Directory Manager must create a new administrator manually in the Directory Server.



### WARNING

Do not delete the **admin** user. As **admin** is a pre-defined user required by IdM, this operation causes problems with certain commands. If you want to define and use an alternative admin user, disable the pre-defined **admin** user with **ipa user-disable admin** after you granted admin permissions to at least one different user.



### WARNING

Do not add local users to IdM. The Name Service Switch (NSS) always resolves IdM users and groups before resolving local users and groups. This means that, for example, IdM group membership does not work for local users.

## 12.2. ADDING USERS IN THE WEB UI

Usually, you need to create a new user account before a new employee starts to work. Such a stage account is not accessible and you need to activate it later.



## NOTE

Alternatively, you can create an active user account directly. For adding active user, follow the procedure below and add the user account in the **Active users** tab.

## Prerequisites

- Administrator privileges for managing IdM or User Administrator role.

## Procedure

1. Log in to the IdM Web UI.  
For details, see [Accessing the IdM Web UI in a web browser](#) .
2. Go to **Users → Stage Users** tab.  
Alternatively, you can add the user account in the **Users → Active users**, however, you cannot add user groups to the account.
3. Click the + **Add** icon.
4. In the **Add stage user** dialog box, enter **First name** and **Last name** of the new user.
5. [Optional] In the **User login** field, add a login name.  
If you leave it empty, the IdM server creates the login name in the following pattern: The first letter of the first name and the surname. The whole login name can have up to 32 characters.
6. [Optional] In the GID drop down menu, select groups in which the user should be included.
7. [Optional] In the **Password** and **Verify password** fields, enter your password and confirm it, ensuring they both match.
8. Click on the **Add** button.

Add stage user

User login

First name \*

Example

Last name \*

User

Class

New Password

••••••••

Verify Password

••••••••

\* Required field

Add

Add and Add Another

Add and Edit

Cancel

At this point, you can see the user account in the **Stage Users** table.

RED HAT IDENTITY MANAGEMENT

Administrator

Identity

Policy

Authentication

Network Services

IPA Server

Users

Hosts

Services

Groups

ID Views

Automember

User categories

Active users

Stage users

Preserved users

Stage Users

Search

Refresh

Delete

+ Add

Activate

|                          | User login | First name | Last name | UID | Email address         | Telephone Number | Job Title |
|--------------------------|------------|------------|-----------|-----|-----------------------|------------------|-----------|
| <input type="checkbox"/> | euser      | Example    | User      | -1  | euser@idm.example.com |                  |           |

Showing 1 to 1 of 1 entries.



#### NOTE

If you click on the user name, you can edit advanced settings, such as adding a phone number, address, or occupation.

## 12.3. ACTIVATING STAGE USERS IN THE IDM WEB UI

You must follow this procedure to activate a stage user account, before the user can log in to IdM and before the user can be added to an IdM group.

#### Prerequisites

- Administrator privileges for managing the IdM Web UI or User Administrator role.
- At least one staged user account in IdM.

## Procedure

1. Log in to the IdM Web UI.  
For details, see [Accessing the IdM Web UI in a web browser](#).
2. Go to **Users** → **Stage users** tab.
3. Click the check-box of the user account you want to activate.
4. Click on the **Activate** button.

RED HAT IDENTITY MANAGEMENT

Administrator

Identity Policy Authentication Network Services IPA Server

Users Hosts Services Groups ID Views Automember

User categories

Active users

Stage users

Preserved users

### Stage Users

Search

Refresh Delete +Add Activate

|                          | User login | First name | Last name | UID | Email address         | Telephone Number | Job Title |
|--------------------------|------------|------------|-----------|-----|-----------------------|------------------|-----------|
| <input type="checkbox"/> | euser      | Example    | User      | -1  | euser@idm.example.com |                  |           |

Showing 1 to 1 of 1 entries.

5. On the **Confirmation** dialog box, click **OK**.

If the activation is successful, the IdM Web UI displays a green confirmation that the user has been activated and the user account has been moved to **Active users**. The account is active and the user can authenticate to the IdM domain and IdM Web UI. The user is prompted to change their password on the first login.

### Active users

Search

Refresh Delete +Add -Disable Enable Actions

|                                     | User login  | First name | Last name     | Status    | UID      | Email address               | Telephone Number | Job Title |
|-------------------------------------|-------------|------------|---------------|-----------|----------|-----------------------------|------------------|-----------|
| <input type="checkbox"/>            | admin       |            | Administrator | ✓ Enabled | 78000000 |                             |                  |           |
| <input checked="" type="checkbox"/> | euser       | Example    | User          | ✓ Enabled | 78000006 | euser@idm.example.com       |                  |           |
| <input type="checkbox"/>            | staged.user | Staged     | User          | ✓ Enabled | 78000008 | staged.user@idm.example.com |                  |           |

Showing 1 to 3 of 3 entries.



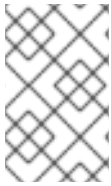
### NOTE

At this stage, you can add the active user account to user groups.

## 12.4. DISABLING USER ACCOUNTS IN THE WEB UI

You can disable active user accounts. Disabling a user account deactivates the account, therefore, user accounts cannot be used to authenticate and using IdM services, such as Kerberos, or perform any tasks.

Disabled user accounts still exist within IdM and all of the associated information remains unchanged. Unlike preserved user accounts, disabled user accounts remain in the active state and can be a member of user groups.



## NOTE

After disabling a user account, any existing connections remain valid until the user's Kerberos TGT and other tickets expire. After the ticket expires, the user will not be able to renew it.

## Prerequisites

- Administrator privileges for managing the IdM Web UI or User Administrator role.

## Procedure

- Log in to the IdM Web UI.  
For details, see [Accessing the IdM Web UI in a web browser](#).
- Go to **Users** → **Active users** tab.
- Click the check-box of the user accounts you want to disable.
- Click on the **Disable** button.

Active users

Search

Refresh Delete + Add **Disable** **Enable** Actions ▾

| <input type="checkbox"/>            | User login     | First name | Last name     | Status       | UID      | Email address                  | Telephone Number | Job Title |
|-------------------------------------|----------------|------------|---------------|--------------|----------|--------------------------------|------------------|-----------|
| <input type="checkbox"/>            | admin          |            | Administrator | ✓<br>Enabled | 78000000 |                                |                  |           |
| <input checked="" type="checkbox"/> | euser          | Example    | User          | ✓<br>Enabled | 78000006 | euser@idm.example.com          |                  |           |
| <input type="checkbox"/>            | preserved.user | Preserved  | User          | ✓<br>Enabled | 78000009 | preserved.user@idm.example.com |                  |           |

Showing 1 to 3 of 3 entries.

- In the **Confirmation** dialog box, click on the **OK** button.

If the disabling procedure has been successful, you can verify in the Status column in the **Active users** table.

| <input type="checkbox"/> | User login     | First name | Last name     | Status        | UID      | Email address                  | Telephone Number |
|--------------------------|----------------|------------|---------------|---------------|----------|--------------------------------|------------------|
| <input type="checkbox"/> | admin          |            | Administrator | ✓<br>Enabled  | 78000000 |                                |                  |
| <input type="checkbox"/> | euser          | Example    | User          | —<br>Disabled | 78000006 | euser@idm.example.com          |                  |
| <input type="checkbox"/> | preserved.user | Preserved  | User          | ✓<br>Enabled  | 78000009 | preserved.user@idm.example.com |                  |

## 12.5. ENABLING USER ACCOUNTS IN THE WEB UI

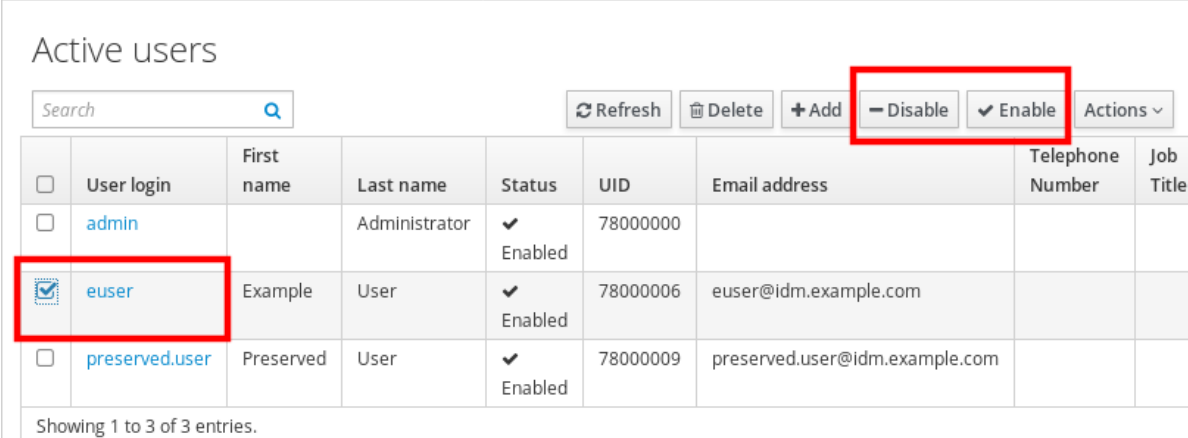
With IdM you can enable disabled active user accounts. Enabling a user account activates the disabled account.

## Prerequisites

- Administrator privileges for managing the IdM Web UI or User Administrator role.

## Procedure

1. Log in to the IdM Web UI.
2. Go to **Users** → **Active users** tab.
3. Click the check-box of the user accounts you want to enable.
4. Click on the **Enable** button.



Active users

Search

Refresh Delete Add Disable Enable Actions ▾

| <input type="checkbox"/>            | User login     | First name | Last name     | Status    | UID      | Email address                  | Telephone Number | Job Title |
|-------------------------------------|----------------|------------|---------------|-----------|----------|--------------------------------|------------------|-----------|
| <input type="checkbox"/>            | admin          |            | Administrator | ✓ Enabled | 78000000 |                                |                  |           |
| <input checked="" type="checkbox"/> | euser          | Example    | User          | ✓ Enabled | 78000006 | euser@idm.example.com          |                  |           |
| <input type="checkbox"/>            | preserved.user | Preserved  | User          | ✓ Enabled | 78000009 | preserved.user@idm.example.com |                  |           |

Showing 1 to 3 of 3 entries.

5. In the **Confirmation** dialog box, click on the **OK** button.

If the change has been successful, you can verify in the Status column in the **Active users** table.

## 12.6. PRESERVING ACTIVE USERS IN THE IDM WEB UI

Preserving user accounts enables you to remove accounts from the **Active users** tab, yet keeping these accounts in IdM.

Preserve the user account if the employee leaves the company. If you want to disable user accounts for a couple of weeks or months (parental leave, for example), disable the account. For details, see [Disabling user accounts in the Web UI](#). The preserved accounts are not active and users cannot use them to access your internal network, however, the account stays in the database with all the data.

You can move the restored accounts back to the active mode.



### NOTE

The list of users in the preserved state can provide a history of past user accounts.

## Prerequisites

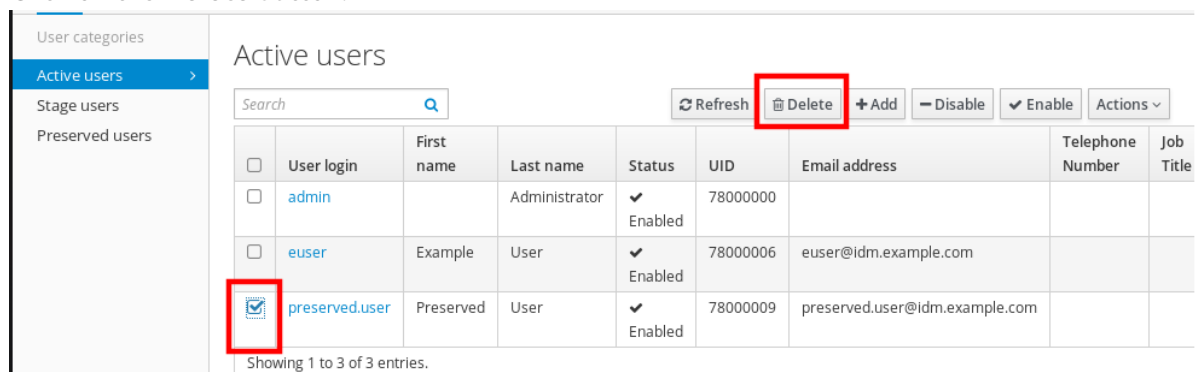
- Administrator privileges for managing the IdM (Identity Management) Web UI or User Administrator role.

## Procedure

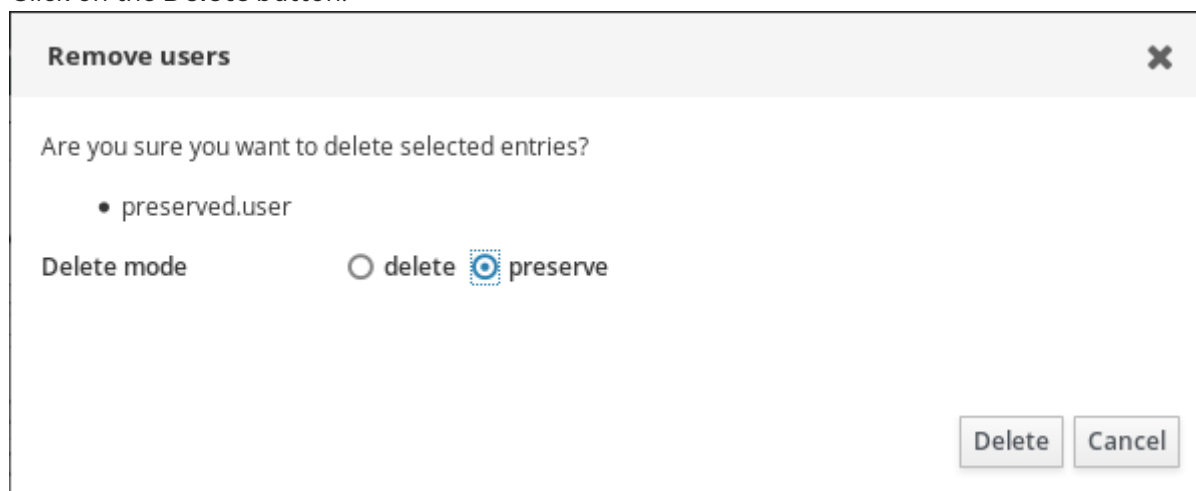


**Procedure**

1. Log in to the IdM Web UI.  
For details, see [Accessing the IdM Web UI in a web browser](#).
2. Go to **Users → Active users** tab.
3. Click the check-box of the user accounts you want to preserve.
4. Click on the **Delete** button.



5. In the **Remove users** dialog box, switch the **Delete mode** radio button to **preserve**.
6. Click on the **Delete** button.



As a result, the user account is moved to **Preserved users**.

If you need to restore preserved users, see the [Restoring users in the IdM Web UI](#).

## 12.7. RESTORING USERS IN THE IDM WEB UI

IdM (Identity Management) enables you to restore preserved user accounts back to the active state. You can restore a preserved user to an active user or a stage user.

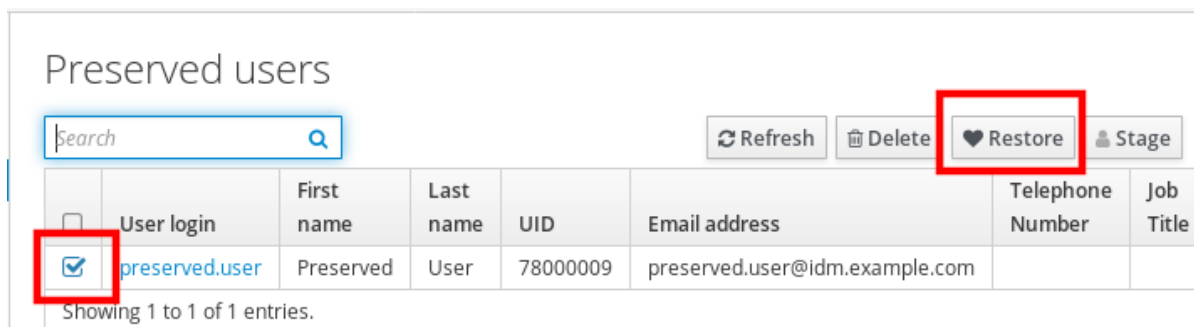
**Prerequisites**

- Administrator privileges for managing the IdM Web UI or User Administrator role.

**Procedure**

1. Log in to the IdM Web UI.  
For details, see [Accessing the IdM Web UI in a web browser](#).

2. Go to **Users → Preserved users** tab.
3. Click the check-box at the user accounts you want to restore.
4. Click on the **Restore** button.



5. In the **Confirmation** dialog box, click on the **OK** button.

The IdM Web UI displays a green confirmation and moves the user accounts to the **Active users** tab.

## 12.8. DELETING USERS IN THE IDM WEB UI

Deleting users is an irreversible operation, causing the user accounts to be permanently deleted from the IdM database, including group memberships and passwords. Any external configuration for the user, such as the system account and home directory, is not deleted, but is no longer accessible through IdM.

You can delete:

- Active users – the IdM Web UI offers you with the options:
  - Preserving users temporarily  
For details, see the [Preserving active users in the IdM Web UI](#) .
  - Deleting them permanently
- Stage users – you can just delete stage users permanently.
- Preserved users – you can delete preserved users permanently.

The following procedure describes deleting active users. Similarly, you can delete user accounts on:

- The **Stage users** tab
- The **Preserved users** tab

### Prerequisites

- Administrator privileges for managing the IdM Web UI or User Administrator role.

### Procedure

1. Log in to the IdM Web UI.  
For details, see [Accessing the IdM Web UI in a web browser](#) .
2. Go to **Users → Active users** tab.  
Alternatively, you can delete the user account in the **Users → Stage users** or **Users → Preserved users**.

3. Click the **Delete** icon.
4. In the **Remove users** dialog box, switch the **Delete mode** radio button to **delete**.
5. Click on the **Delete** button.

The users accounts have been permanently deleted from IdM.

## CHAPTER 13. MANAGING USER ACCOUNTS USING ANSIBLE PLAYBOOKS

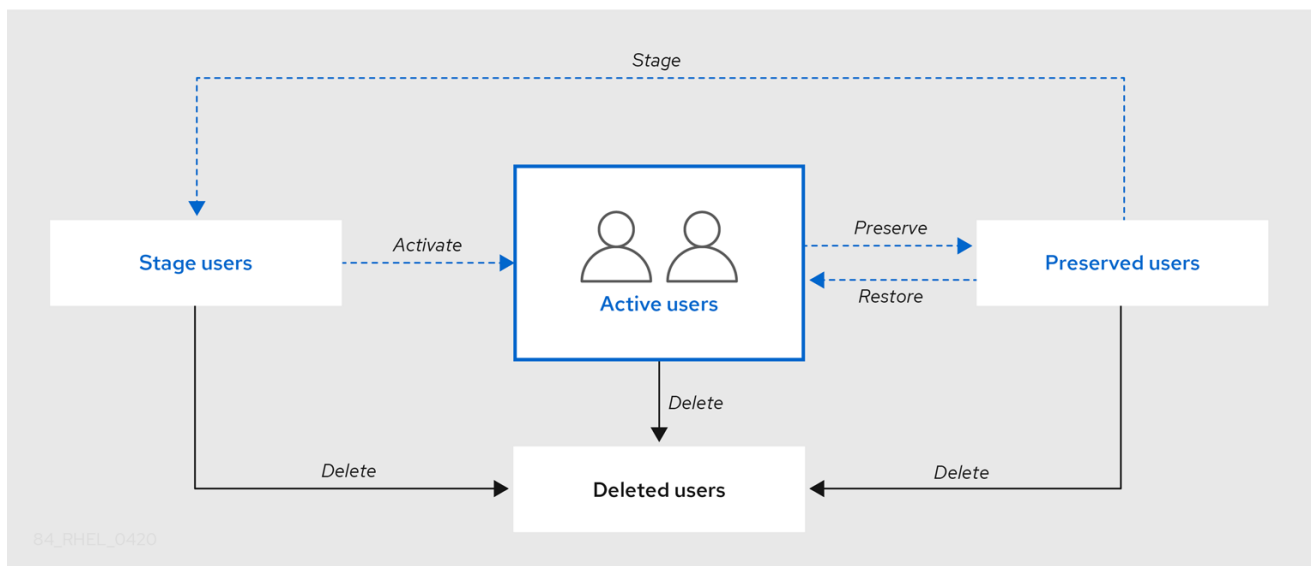
You can manage users in IdM using Ansible playbooks. After presenting the [user life cycle](#), this chapter describes how to use Ansible playbooks for the following operations:

- [Ensuring the presence of a single user](#) listed directly in the **YML** file.
- [Ensuring the presence of multiple users](#) listed directly in the **YML** file.
- [Ensuring the presence of multiple users](#) listed in a **JSON** file that is referenced from the **YML** file.
- [Ensuring the absence of users](#) listed directly in the **YML** file.

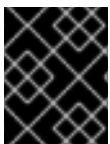
### 13.1. USER LIFE CYCLE

Identity Management (IdM) supports three user account states:

- **Stage** users are not allowed to authenticate. This is an initial state. Some of the user account properties required for active users cannot be set, for example, group membership.
- **Active** users are allowed to authenticate. All required user account properties must be set in this state.
- **Preserved** users are former active users that are considered inactive and cannot authenticate to IdM. Preserved users retain most of the account properties they had as active users, but they are not part of any user groups.



You can delete user entries permanently from the IdM database.



#### IMPORTANT

Deleted user accounts cannot be restored. When you delete a user account, all the information associated with the account is permanently lost.

A new administrator can only be created by a user with administrator rights, such as the default admin user. If you accidentally delete all administrator accounts, the Directory Manager must create a new administrator manually in the Directory Server.



### WARNING

Do not delete the **admin** user. As **admin** is a pre-defined user required by IdM, this operation causes problems with certain commands. If you want to define and use an alternative admin user, disable the pre-defined **admin** user with **ipa user-disable admin** after you granted admin permissions to at least one different user.



### WARNING

Do not add local users to IdM. The Name Service Switch (NSS) always resolves IdM users and groups before resolving local users and groups. This means that, for example, IdM group membership does not work for local users.

## 13.2. ENSURING THE PRESENCE OF AN IDM USER USING AN ANSIBLE PLAYBOOK

The following procedure describes ensuring the presence of a user in IdM using an Ansible playbook.

### Prerequisites

- You know the IdM **admin** password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the **ansible-freeipa** package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipadmin\_password**.

### Procedure

1. Create an inventory file, for example **inventory.file**, and define **ipaserver** in it:

```
[ipaserver]
server.idm.example.com
```

2. Create an Ansible playbook file with the data of the user whose presence in IdM you want to

ensure. To simplify this step, you can copy and modify the example in the `/usr/share/doc/ansible-freeipa/playbooks/user/add-user.yml` file. For example, to create user named `idm_user` and add `Password123` as the user password:

```
---
- name: Playbook to handle users
  hosts: ipaserver

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - name: Create user idm_user
    ipauser:
      ipaadmin_password: "{{ ipaadmin_password }}"
      name: idm_user
      first: Alice
      last: Acme
      uid: 1000111
      gid: 10011
      phone: "+555123457"
      email: idm_user@acme.com
      passwordexpiration: "2023-01-19 23:59:59"
      password: "Password123"
      update_password: on_create
```

You must use the following options to add a user:

- **name:** the login name
- **first:** the first name string
- **last:** the last name string

For the full list of available user options, see the `/usr/share/doc/ansible-freeipa/README-user.md` Markdown file.



#### NOTE

If you use the **update\_password: on\_create** option, Ansible only creates the user password when it creates the user. If the user is already created with a password, Ansible does not generate a new password.

3. Run the playbook:

```
$ ansible-playbook --vault-password-file=password_file -v -i
path_to_inventory_directory/inventory.file path_to_playbooks_directory/add-ldm-
user.yml
```

#### Verification steps

- You can verify if the new user account exists in IdM by using the **ipa user-show** command:
  1. Log into **ipaserver** as admin:

```
$ ssh admin@server.idm.example.com
Password:
[admin@server /]$
```

2. Request a Kerberos ticket for admin:

```
$ kinit admin
Password for admin@IDM.EXAMPLE.COM:
```

3. Request information about *idm\_user*:

```
$ ipa user-show idm_user
User login: idm_user
First name: Alice
Last name: Acme
....
```

The user named *idm\_user* is present in IdM.

## 13.3. ENSURING THE PRESENCE OF MULTIPLE IDM USERS USING ANSIBLE PLAYBOOKS

The following procedure describes ensuring the presence of multiple users in IdM using an Ansible playbook.

### Prerequisites

- You know the IdM **admin** password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the *~/MyPlaybooks/* directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipadmin\_password**.

### Procedure

1. Create an inventory file, for example **inventory.file**, and define **ipaserver** in it:

```
[ipaserver]
server.idm.example.com
```

2. Create an Ansible playbook file with the data of the users whose presence you want to ensure in IdM. To simplify this step, you can copy and modify the example in the **/usr/share/doc/ansible-freeipa/playbooks/user/ensure-users-present.yml** file. For example, to create users *idm\_user\_1*, *idm\_user\_2*, and *idm\_user\_3*, and add *Password123* as the password of *idm\_user\_1*:

```
---
```

```

- name: Playbook to handle users
  hosts: ipaserver

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - name: Create user idm_users
    ipauser:
      ipaadmin_password: "{{ ipaadmin_password }}"
      users:
      - name: idm_user_1
        first: Alice
        last: Acme
        uid: 10001
        gid: 10011
        phone: "+555123457"
        email: idm_user@acme.com
        passwordexpiration: "2023-01-19 23:59:59"
        password: "Password123"
      - name: idm_user_2
        first: Bob
        last: Acme
        uid: 100011
        gid: 10011
      - name: idm_user_3
        first: Eve
        last: Acme
        uid: 1000111
        gid: 10011

```



#### NOTE

If you do not specify the **update\_password: on\_create** option, Ansible re-sets the user password every time the playbook is run: if the user has changed the password since the last time the playbook was run, Ansible re-sets password.

3. Run the playbook:

```

$ ansible-playbook --vault-password-file=password_file -v -i
path_to_inventory_directory/inventory.file path_to_playbooks_directory/add-
users.yml

```

#### Verification steps

- You can verify if the user account exists in IdM by using the **ipa user-show** command:

1. Log into **ipaserver** as administrator:

```

$ ssh administrator@server.idm.example.com
Password:
[admin@server /]$

```

2. Display information about *idm\_user\_1*:



```
$ ipa user-show idm_user_1
User login: idm_user_1
First name: Alice
Last name: Acme
Password: True
....
```

The user named *idm\_user\_1* is present in IdM.

## 13.4. ENSURING THE PRESENCE OF MULTIPLE IDM USERS FROM A JSON FILE USING ANSIBLE PLAYBOOKS

The following procedure describes how you can ensure the presence of multiple users in IdM using an Ansible playbook. The users are stored in a **JSON** file.

### Prerequisites

- You know the IdM **admin** password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the *~/MyPlaybooks/* directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipaadmin\_password**.

### Procedure

1. Create an inventory file, for example **inventory.file**, and define **ipaserver** in it:

```
[ipaserver]
server.idm.example.com
```

2. Create an Ansible playbook file with the necessary tasks. Reference the **JSON** file with the data of the users whose presence you want to ensure. To simplify this step, you can copy and modify the example in the **/usr/share/doc/ansible-freeipa/ensure-users-present-ymlfile.yml** file:

```
---
- name: Ensure users' presence
  hosts: ipaserver

  vars_files:
    - /home/user_name/MyPlaybooks/secret.yml
  tasks:
    - name: Include users.json
      include_vars:
        file: users.json

    - name: Users present
```

```
ipauser:
  ipaadmin_password: "{{ ipaadmin_password }}"
  users: "{{ users }}"
```

3. Create the **users.json** file, and add the IdM users into it. To simplify this step, you can copy and modify the example in the `/usr/share/doc/ansible-freeipa/playbooks/user/users.json` file. For example, to create users *idm\_user\_1*, *idm\_user\_2*, and *idm\_user\_3*, and add *Password123* as the password of *idm\_user\_1*:

```
{
  "users": [
    {
      "name": "idm_user_1",
      "first": "Alice",
      "last": "Acme",
      "password": "Password123"
    },
    {
      "name": "idm_user_2",
      "first": "Bob",
      "last": "Acme"
    },
    {
      "name": "idm_user_3",
      "first": "Eve",
      "last": "Acme"
    }
  ]
}
```

4. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the **secret.yml** file, and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i
path_to_inventory_directory/inventory.file path_to_playbooks_directory/ensure-users-
present-jsonfile.yml
```

## Verification steps

- You can verify if the user accounts are present in IdM using the **ipa user-show** command:

1. Log into **ipaserver** as administrator:

```
$ ssh administrator@server.idm.example.com
Password:
[admin@server /]$
```

2. Display information about *idm\_user\_1*:

```
$ ipa user-show idm_user_1
User login: idm_user_1
First name: Alice
```

```
Last name: Acme
Password: True
....
```

The user named *idm\_user\_1* is present in IdM.

## 13.5. ENSURING THE ABSENCE OF USERS USING ANSIBLE PLAYBOOKS

The following procedure describes how you can use an Ansible playbook to ensure that specific users are absent from IdM.

### Prerequisites

- You know the IdM **admin** password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the *~/MyPlaybooks/* directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipaadmin\_password**.

### Procedure

1. Create an inventory file, for example **inventory.file**, and define **ipaserver** in it:

```
[ipaserver]
server.idm.example.com
```

2. Create an Ansible playbook file with the users whose absence from IdM you want to ensure. To simplify this step, you can copy and modify the example in the **/usr/share/doc/ansible-freeipa/playbooks/user/ensure-users-present.yml** file. For example, to delete users *idm\_user\_1*, *idm\_user\_2*, and *idm\_user\_3*:

```
---
- name: Playbook to handle users
  hosts: ipaserver

  vars_files:
    - /home/user_name/MyPlaybooks/secret.yml
  tasks:
    - name: Delete users idm_user_1, idm_user_2, idm_user_3
      ipauser:
        ipaadmin_password: "{{ ipaadmin_password }}"
        users:
          - name: idm_user_1
          - name: idm_user_2
          - name: idm_user_3
        state: absent
```

3. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the **secret.yml** file, and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i  
path_to_inventory_directory/inventory.file path_to_playbooks_directory/delete-  
users.yml
```

## Verification steps

You can verify that the user accounts do not exist in IdM by using the **ipa user-show** command:

1. Log into **ipaserver** as administrator:

```
$ ssh administrator@server.idm.example.com  
Password:  
[admin@server /]$
```

2. Request information about *idm\_user\_1*:

```
$ ipa user-show idm_user_1  
ipa: ERROR: idm_user_1: user not found
```

The user named *idm\_user\_1* does not exist in IdM.

## 13.6. ADDITIONAL RESOURCES

- See the **README-user.md** Markdown file in the **/usr/share/doc/ansible-freeipa/** directory.
- See sample Ansible playbooks in the **/usr/share/doc/ansible-freeipa/playbooks/user** directory.

## CHAPTER 14. MANAGING USER GROUPS IN IDM CLI

This chapter introduces user groups management using the IdM CLI.

A user group is a set of users with common privileges, password policies, and other characteristics.

A user group in Identity Management (IdM) can include:

- IdM users
- other IdM user groups
- external users, which are users that exist outside of IdM

### 14.1. THE DIFFERENT GROUP TYPES IN IDM

IdM supports the following types of groups:

#### POSIX groups (the default)

POSIX groups support Linux POSIX attributes for their members. Note that groups that interact with Active Directory cannot use POSIX attributes.

POSIX attributes identify users as separate entities. Examples of POSIX attributes relevant to users include **uidNumber**, a user number (UID), and **gidNumber**, a group number (GID).

#### Non-POSIX groups

Non-POSIX groups do not support POSIX attributes. For example, these groups do not have a GID defined.

All members of this type of group must belong to the IdM domain.

#### External groups

Use external groups to add group members that exist in an identity store outside of the IdM domain, such as:

- A local system
- An Active Directory domain
- A directory service

External groups do not support POSIX attributes. For example, these groups do not have a GID defined.

Table 14.1. User groups created by default

| Group name      | Default group members   |
|-----------------|---|
| <b>ipausers</b> | All IdM users   |
| <b>admins</b>   | Users with administrative privileges, including the default <b>admin</b> user |
| <b>editors</b>  | This is a legacy group that no longer has any special privileges              |

| Group name          | Default group members                                       |
|---------------------|---|
| <b>trust admins</b> | Users with privileges to manage the Active Directory trusts |

When you add a user to a user group, the user gains the privileges and policies associated with the group. For example, to grant administrative privileges to a user, add the user to the **admins** group.



### WARNING

Do not delete the **admins** group. As **admins** is a pre-defined group required by IdM, this operation causes problems with certain commands.

In addition, IdM creates *user private groups* by default whenever a new user is created in IdM. For more information about private groups, see [Adding users without a private group](#).

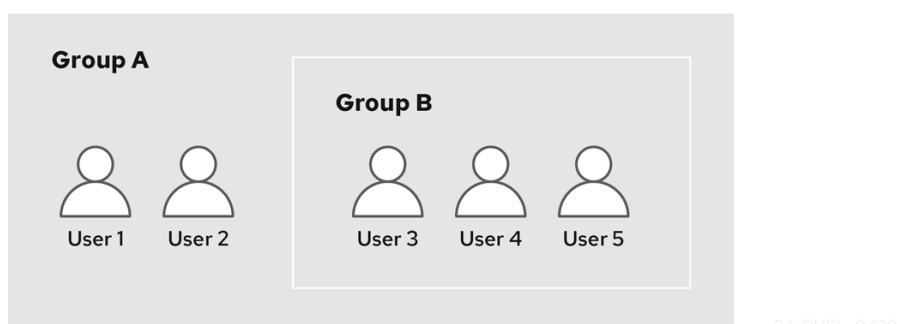
## 14.2. DIRECT AND INDIRECT GROUP MEMBERS

User group attributes in IdM apply to both direct and indirect members: when group B is a member of group A, all users in group B are considered indirect members of group A.

For example, in the following diagram:

- User 1 and User 2 are *direct members* of group A.
- User 3, User 4, and User 5 are *indirect members* of group A.

**Figure 14.1. Direct and Indirect Group Membership**



If you set a password policy for user group A, the policy also applies to all users in user group B.

## 14.3. ADDING A USER GROUP USING IDM CLI

Follow this procedure to add a user group using the IdM CLI.

### Prerequisites

- You must be logged in as the administrator. For details, see [Using kinit to log in to IdM manually](#) .

### Procedure

- Add a user group by using the **ipa group-add *group\_name*** command. For example, to create group\_a:

```
$ ipa group-add group_a
-----
Added group "group_a"
-----
Group name: group_a
GID: 1133400009
```

By default, **ipa group-add** adds a POSIX user group. To specify a different group type, add options to **ipa group-add**:

- **--nonposix** to create a non-POSIX group
  - **--external** to create an external group
- For details on group types, see [The different group types in IdM](#) .

You can specify a custom GID when adding a user group by using the **--gid=*custom\_GID*** option. If you do this, be careful to avoid ID conflicts. If you do not specify a custom GID, IdM automatically assigns a GID from the available ID range.



### WARNING

Do not add local groups to IdM. The Name Service Switch (NSS) always resolves IdM users and groups before resolving local users and groups. This means that, for example, IdM group membership does not work for local users.

## 14.4. SEARCHING FOR USER GROUPS USING IDM CLI

Follow this procedure to search for existing user groups using the IdM CLI.

### Procedure

- Display all user groups by using the **ipa group-find** command. To specify a group type, add options to **ipa group-find**:
  - Display all POSIX groups using the **ipa group-find --posix** command.
  - Display all non-POSIX groups using the **ipa group-find --nonposix** command.
  - Display all external groups using the **ipa group-find --external** command.

For more information about different group types, see [The different group types in IdM](#) .

## 14.5. DELETING A USER GROUP USING IDM CLI

Follow this procedure to delete a user group using IdM CLI. Note that deleting a group does not delete the group members from IdM.

### Prerequisites

- You must be logged in as the administrator. For details, see [Using kinit to log in to IdM manually](#) .

### Procedure

- Delete a user group by using the **ipa group-del *group\_name*** command. For example, to delete group\_a:

```
$ ipa group-del group_a
-----
Deleted group "group_a"
-----
```

## 14.6. ADDING A MEMBER TO A USER GROUP USING IDM CLI

You can add both users and user groups as members of a user group. For more information, see [The different group types in IdM](#) and [Direct and indirect group members](#). Follow this procedure to add a member to a user group by using the IdM CLI.

### Prerequisites

- You must be logged in as the administrator. For details, see [Using kinit to log in to IdM manually](#) .

### Procedure

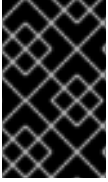
- Add a member to a user group by using the **ipa group-add-member** command. Specify the type of member using these options:
  - **--users** adds an IdM user
  - **--external** adds a user that exists outside the IdM domain, in the format of **DOMAIN\user\_name** or **user\_name@domain**
  - **--groups** adds an IdM user group

For example, to add group\_b as a member of group\_a:

```
$ ipa group-add-member group_a --groups=group_b
Group name: group_a
GID: 1133400009
Member users: user_a
Member groups: group_b
Indirect Member users: user_b
-----
Number of members added 1
-----
```

Members of group\_b are now indirect members of group\_a.





### IMPORTANT

When adding a group as a member of another group, do not create recursive groups. For example, if Group A is a member of Group B, do not add Group B as a member of Group A. Recursive groups can cause unpredictable behavior.



### NOTE

After you add a member to a user group, the update may take some time to spread to all clients in your Identity Management environment. This is because when any given host resolves users, groups and netgroups, the **System Security Services Daemon (SSSD)** first looks into its cache and performs server lookups only for missing or expired records.

## 14.7. ADDING USERS WITHOUT A USER PRIVATE GROUP

By default, IdM creates user private groups (UPGs) whenever a new user is created in IdM. UPGs are a specific group type:

- The UPG has the same name as the newly created user.
- The user is the only member of the UPG. The UPG cannot contain any other members.
- The GID of the private group matches the UID of the user.

However, it is possible to add users without creating a UPG.

### 14.7.1. Users without a user private group

If a NIS group or another system group already uses the GID that would be assigned to a user private group, it is necessary to avoid creating a UPG.

You can do this in two ways:

- Add a new user without a UPG, without disabling private groups globally. See [Adding a user without a user private group when private groups are globally enabled](#).
- Disable UPGs globally for all users, then add a new user. See [Disabling user private groups globally for all users](#) and [Adding a user when user private groups are globally disabled](#).

In both cases, IdM will require specifying a GID when adding new users, otherwise the operation will fail. This is because IdM requires a GID for the new user, but the default user group **ipausers** is a non-POSIX group and therefore does not have an associated GID. The GID you specify does not have to correspond to an already existing group.



### NOTE

Specifying the GID does not create a new group. It only sets the GID attribute for the new user, because the attribute is required by IdM.

### 14.7.2. Adding a user without a user private group when private groups are globally enabled

You can add a user without creating a user private group (UPG) even when UPGs are enabled on the system. This requires manually setting a GID for the new user. For details on why this is needed, see [Users without a user private group](#).

## Procedure

- To prevent IdM from creating a UPG, add the **--noprivate** option to the **ipa user-add** command.  
Note that for the command to succeed, you must specify a custom GID. For example, to add a new user with GID 10000:

```
$ ipa user-add jsmith --first=John --last=Smith --noprivate --gid 10000
```

### 14.7.3. Disabling user private groups globally for all users

You can disable user private groups (UPGs) globally. This prevents the creation of UPGs for all new users. Existing users are unaffected by this change.

## Procedure

- Obtain administrator privileges:

```
$ kinit admin
```

- IdM uses the Directory Server Managed Entries Plug-in to manage UPGs. List the instances of the plug-in:

```
$ ipa-managed-entries --list
```

- To ensure IdM does not create UPGs, disable the plug-in instance responsible for managing user private groups:

```
$ ipa-managed-entries -e "UPG Definition" disable
Disabling Plugin
```



## NOTE

To re-enable the **UPG Definition** instance later, use the **ipa-managed-entries -e "UPG Definition" enable** command.

- Restart Directory Server to load the new configuration.

```
$ sudo systemctl restart dirsrv.target
```

To add a user after UPGs have been disabled, you need to specify a GID. For more information, see [Adding a user when user private groups are globally disabled](#)

## Verification steps

- To check if UPGs are globally disabled, use the disable command again:

```
$ ipa-managed-entries -e "UPG Definition" disable
Plugin already disabled
```

### 14.7.4. Adding a user when user private groups are globally disabled

When user private groups (UPGs) are disabled globally, IdM does not assign a GID to a new user automatically. To successfully add a user, you must assign a GID manually or by using an automember rule. For details on why this is required, see [Users without a user private group](#).

### Prerequisites

- UPGs must be disabled globally for all users. For more information, see [Disabling user private groups globally for all users](#).

### Procedure

- To make sure adding a new user succeeds when creating UPGs is disabled, choose one of the following:
  - Specify a custom GID when adding a new user. The GID does not have to correspond to an already existing user group.  
For example, when adding a user from the command line, add the **--gid** option to the **ipa user-add** command.
  - Use an automember rule to add the user to an existing group with a GID.

## 14.8. ADDING USERS OR GROUPS AS MEMBER MANAGERS TO AN IDM USER GROUP USING THE IDM CLI

Follow this procedure to add users or groups as member managers to an IdM user group using the IdM CLI. Member managers can add users or groups to IdM user groups but cannot change the attributes of a group.

### Prerequisites

- You must be logged in as the administrator. For details, see [Using kinit to log in to IdM manually](#).
- You must have the name of the user or group you are adding as member managers and the name of the group you want them to manage.

### Procedure

- Add a user as a member manager to an IdM user group by using the **ipa group-add-member-manager** command.

For example, to add the user **test** as a member manager of **group\_a**:

```
$ ipa group-add-member-manager group_a --users=test
Group name: group_a
GID: 1133400009
Membership managed by users: test
-----
Number of members added 1
-----
```

User **test** can now manage members of **group\_a**.

- Add a group as a member manager to an IdM user group by using the **ipa group-add-member-manager** command.

For example, to add the group **group\_admins** as a member manager of **group\_a**:

```
$ ipa group-add-member-manager group_a --groups=group_admins
Group name: group_a
GID: 1133400009
Membership managed by groups: group_admins
Membership managed by users: test
-----
Number of members added 1
-----
```

Group **group\_admins** can now manage members of **group\_a**.



## NOTE

After you add a member manager to a user group, the update may take some time to spread to all clients in your Identity Management environment.

## Verification steps

- Using the **ipa group-show** command to verify the user and group were added as member managers.

```
$ ipa group-show group_a
Group name: group_a
GID: 1133400009
Membership managed by groups: group_admins
Membership managed by users: test
```

## Additional resources

- See **ipa group-add-member-manager --help** for more details.

# 14.9. VIEWING GROUP MEMBERS USING IDM CLI

Follow this procedure to view members of a group using IdM CLI. You can view both direct and indirect group members. For more information, see [Direct and indirect group members](#).

## Procedure:

- To list members of a group, use the **ipa group-show *group\_name*** command. For example:

```
$ ipa group-show group_a
...
Member users: user_a
Member groups: group_b
Indirect Member users: user_b
```



## NOTE

The list of indirect members does not include external users from trusted Active Directory domains. The Active Directory trust user objects are not visible in the Identity Management interface because they do not exist as LDAP objects within Identity Management.

## 14.10. REMOVING A MEMBER FROM A USER GROUP USING IDM CLI

Follow this procedure to remove a member from a user group using IdM CLI.

### Prerequisites

- You must be logged in as the administrator. For details, see [Using kinit to log in to IdM manually](#) .

### Procedure

- Optional.* Use the **ipa group-show** command to confirm that the group includes the member you want to remove.
- Remove a member from a user group by using the **ipa group-remove-member** command. Specify members to remove using these options:

- users** removes an IdM user
- external** removes a user that exists outside the IdM domain, in the format of **DOMAIN\user\_name** or **user\_name@domain**
- groups** removes an IdM user group

For example, to remove *user1*, *user2*, and *group1* from a group called *group\_name*:

```
$ ipa group-remove-member group_name --users=user1 --users=user2 --groups=group1
```

## 14.11. REMOVING USERS OR GROUPS AS MEMBER MANAGERS FROM AN IDM USER GROUP USING THE IDM CLI

Follow this procedure to remove users or groups as member managers from an IdM user group using the IdM CLI. Member managers can remove users or groups from IdM user groups but cannot change the attributes of a group.

### Prerequisites

- You must be logged in as the administrator. For details, see [Using kinit to log in to IdM manually](#) .
- You must have the name of the existing member manager user or group you are removing and the name of the group they are managing.

### Procedure

- Remove a user as a member manager of an IdM user group by using the **ipa group-remove-member-manager** command.

For example, to remove the user **test** as a member manager of **group\_a**:

```
$ ipa group-remove-member-manager group_a --users=test
Group name: group_a
GID: 1133400009
Membership managed by groups: group_admins
-----
Number of members removed 1
-----
```

■

User **test** can no longer manage members of **group\_a**.

- Remove a group as a member manager of an IdM user group by using the **ipa group-remove-member-manager** command.

For example, to remove the group **group\_admins** as a member manager of **group\_a**:

```
$ ipa group-remove-member-manager group_a --groups=group_admins
Group name: group_a
GID: 1133400009
-----
Number of members removed 1
-----
```

Group **group\_admins** can no longer manage members of **group\_a**.



#### NOTE

After you remove a member manager from a user group, the update may take some time to spread to all clients in your Identity Management environment.

#### Verification steps

- Using the **ipa group-show** command to verify the user and group were removed as member managers.

```
$ ipa group-show group_a
Group name: group_a
GID: 1133400009
```

#### Additional resources

- See **ipa group-remove-member-manager --help** for more details.

## CHAPTER 15. MANAGING USER GROUPS IN IDM WEB UI

This chapter introduces user groups management using the IdM web UI.

A user group is a set of users with common privileges, password policies, and other characteristics.

A user group in Identity Management (IdM) can include:

- IdM users
- other IdM user groups
- external users, which are users that exist outside of IdM

### 15.1. THE DIFFERENT GROUP TYPES IN IDM

IdM supports the following types of groups:

#### POSIX groups (the default)

POSIX groups support Linux POSIX attributes for their members. Note that groups that interact with Active Directory cannot use POSIX attributes.

POSIX attributes identify users as separate entities. Examples of POSIX attributes relevant to users include **uidNumber**, a user number (UID), and **gidNumber**, a group number (GID).

#### Non-POSIX groups

Non-POSIX groups do not support POSIX attributes. For example, these groups do not have a GID defined.

All members of this type of group must belong to the IdM domain.

#### External groups

Use external groups to add group members that exist in an identity store outside of the IdM domain, such as:

- A local system
- An Active Directory domain
- A directory service

External groups do not support POSIX attributes. For example, these groups do not have a GID defined.

Table 15.1. User groups created by default

| Group name      | Default group members   |
|-----------------|---|
| <b>ipausers</b> | All IdM users   |
| <b>admins</b>   | Users with administrative privileges, including the default <b>admin</b> user |
| <b>editors</b>  | This is a legacy group that no longer has any special privileges              |

| Group name          | Default group members                                       |
|---------------------|---|
| <b>trust admins</b> | Users with privileges to manage the Active Directory trusts |

When you add a user to a user group, the user gains the privileges and policies associated with the group. For example, to grant administrative privileges to a user, add the user to the **admins** group.



### WARNING

Do not delete the **admins** group. As **admins** is a pre-defined group required by IdM, this operation causes problems with certain commands.

In addition, IdM creates *user private groups* by default whenever a new user is created in IdM. For more information about private groups, see [Adding users without a private group](#).

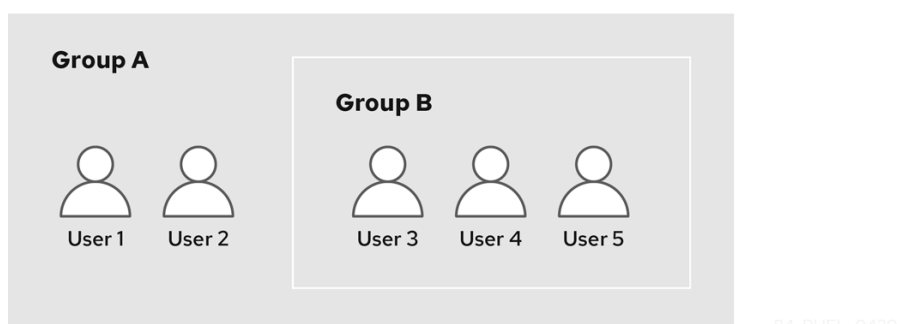
## 15.2. DIRECT AND INDIRECT GROUP MEMBERS

User group attributes in IdM apply to both direct and indirect members: when group B is a member of group A, all users in group B are considered indirect members of group A.

For example, in the following diagram:

- User 1 and User 2 are *direct members* of group A.
- User 3, User 4, and User 5 are *indirect members* of group A.

**Figure 15.1. Direct and Indirect Group Membership**



If you set a password policy for user group A, the policy also applies to all users in user group B.

## 15.3. ADDING A USER GROUP USING IDM WEB UI

Follow this procedure to add a user group using the IdM Web UI.

### Prerequisites



- You are logged in to the IdM Web UI.

### Procedure

1. Click **Identity** → **Groups**, and select **User Groups** in the left sidebar.
2. Click **Add** to start adding the group.
3. Fill out the information about the group. For more information about user group types, see [The different group types in IdM](#).  
You can specify a custom GID for the group. If you do this, be careful to avoid ID conflicts. If you do not specify a custom GID, IdM automatically assigns a GID from the available ID range.

**Add user group** [X]

**Group name \***

**Description**

**Group Type** ☐ Non-POSIX ☐ External ☒ POSIX

**GID**

\* Required field

4. Click **Add** to confirm.

## 15.4. DELETING A USER GROUP USING IDM WEB UI

Follow this procedure to delete a user group using the IdM Web UI. Note that deleting a group does not delete the group members from IdM.

### Prerequisites

- You are logged in to the IdM Web UI.

### Procedure

1. Click **Identity** → **Groups** and select **User Groups**.
2. Select the group to delete.

3. Click **Delete**.
4. Click **Delete** to confirm.

## 15.5. ADDING A MEMBER TO A USER GROUP USING IDM WEB UI

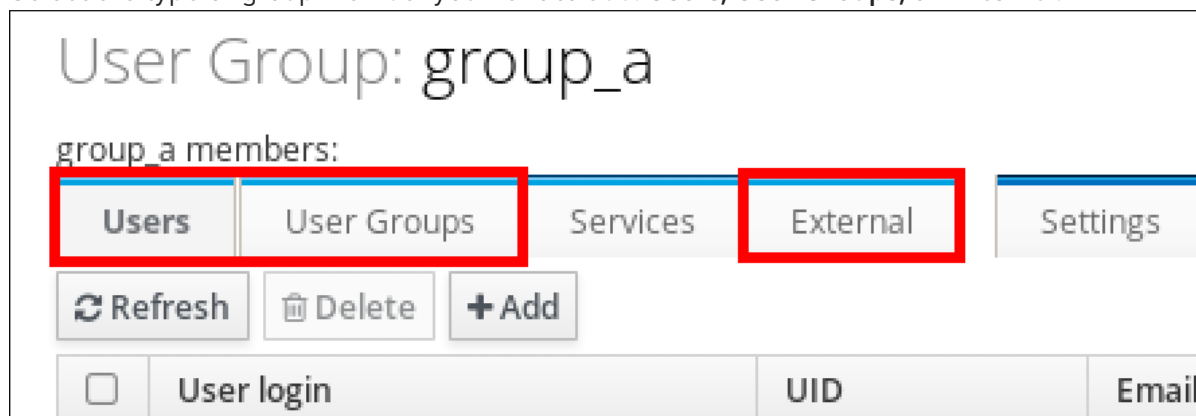
You can add both users and user groups as members of a user group. For more information, see [The different group types in IdM](#) and [Direct and indirect group members](#).

### Prerequisites

- You are logged in to the IdM Web UI.

### Procedure

1. Click **Identity** → **Groups** and select **User Groups** in the left sidebar.
2. Click the name of the group.
3. Select the type of group member you want to add: **Users**, **User Groups**, or **External**.



4. Click **Add**.
5. Select the check box next to one or more members you want to add.
6. Click the rightward arrow to move the selected members to the group.

**Add users into user group 'group\_a'**

Filter available Users Filter

| Available                           |            |                   | Prospective              |            |
|-------------------------------------|------------|-------------------|--------------------------|------------|
| <input type="checkbox"/>            | User login | <span>&gt;</span> | <input type="checkbox"/> | User login |
| <input type="checkbox"/>            | admin      | <span>&lt;</span> |                          |            |
| <input checked="" type="checkbox"/> | ua         |                   |                          |            |
| <input type="checkbox"/>            | ub         |                   |                          |            |

Add Cancel

- Click **Add** to confirm.

## 15.6. ADDING USERS OR GROUPS AS MEMBER MANAGERS TO AN IDM USER GROUP USING THE WEB UI

Follow this procedure to add users or groups as member managers to an IdM user group using the Web UI. Member managers can add users or groups to IdM user groups but cannot change the attributes of a group.

### Prerequisites

- You are logged in to the IdM Web UI.
- You must have the name of the user or group you are adding as member managers and the name of the group you want them to manage.

### Procedure

- Click **Identity → Groups** and select **User Groups** in the left sidebar.
- Click the name of the group.
- Select the type of group member manager you want to add: **Users** or **User Groups**.

## User Group: group\_a

group\_a members:

|       |             |          |          |                   |
|-------|-------------|----------|----------|-------------------|
| Users | User Groups | Services | External | User ID overrides |
|-------|-------------|----------|----------|-------------------|

group\_a member managers:

|             |       |
|-------------|-------|
| User Groups | Users |
|-------------|-------|

- Click **Add**.
- Select the check box next to one or more members you want to add.
- Click the rightward arrow to move the selected members to the group.

**Add users as member managers for user group 'group\_a'** ✕

Filter

| Available   |   | Prospective                         |
|---|---|-------------------------------------|
| <input type="checkbox"/> User login   | <div style="border: 2px solid red; padding: 2px; display: inline-block;">&gt;</div><br><div style="border: 1px solid #ccc; padding: 2px; display: inline-block;">&lt;</div> | <input type="checkbox"/> User login |
| <input type="checkbox"/> admin  |   |                                     |
| <div style="border: 2px solid red; padding: 2px;"><input checked="" type="checkbox"/></div> test1 |   |                                     |
| <input type="checkbox"/> test2  |   |                                     |
| <input type="checkbox"/> test_user  |   |                                     |
| <input type="checkbox"/> test_user2   |   |                                     |
| <input type="checkbox"/> tuser3   |   |                                     |

- Click **Add** to confirm.



### NOTE

After you add a member manager to a user group, the update may take some time to spread to all clients in your Identity Management environment.

### Verification steps

- Verify the newly added user or user group has been added to the member manager list of users or user groups:

## User Group: project

project members:

|       |             |          |
|-------|-------------|----------|
| Users | User Groups | Services |
|-------|-------------|----------|

project member managers:

|                 |       |
|-----------------|-------|
| User Groups (1) | Users |
|-----------------|-------|

|         |        |       |
|---------|--------|-------|
| Refresh | Delete | + Add |
|---------|--------|-------|

|                          |                |
|--------------------------|----------------|
| <input type="checkbox"/> | Group name     |
| <input type="checkbox"/> | project_admins |

### Additional resources

- See **ipa group-add-member-manager --help** for more information.

## 15.7. VIEWING GROUP MEMBERS USING IDM WEB UI

Follow this procedure to view members of a group using the IdM Web UI. You can view both direct and indirect group members. For more information, see [Direct and indirect group members](#).

### Prerequisites

- You are logged in to the IdM Web UI.

### Procedure

1. Select **Identity → Groups**.
2. Select **User Groups** in the left sidebar.
3. Click the name of the group you want to view.
4. Switch between **Direct Membership** and **Indirect Membership**.

|                          |            |       |   |                  |           |  |
|--------------------------|------------|-------|---|------------------|-----------|--|
| Refresh                  | Delete     | + Add | Show Results <input checked="" type="radio"/> Direct Membership <input type="radio"/> Indirect Membership |                  |           |  |
| <input type="checkbox"/> | User login | UID   | Email address   | Telephone Number | Job Title |  |

## 15.8. REMOVING A MEMBER FROM A USER GROUP USING IDM WEB UI

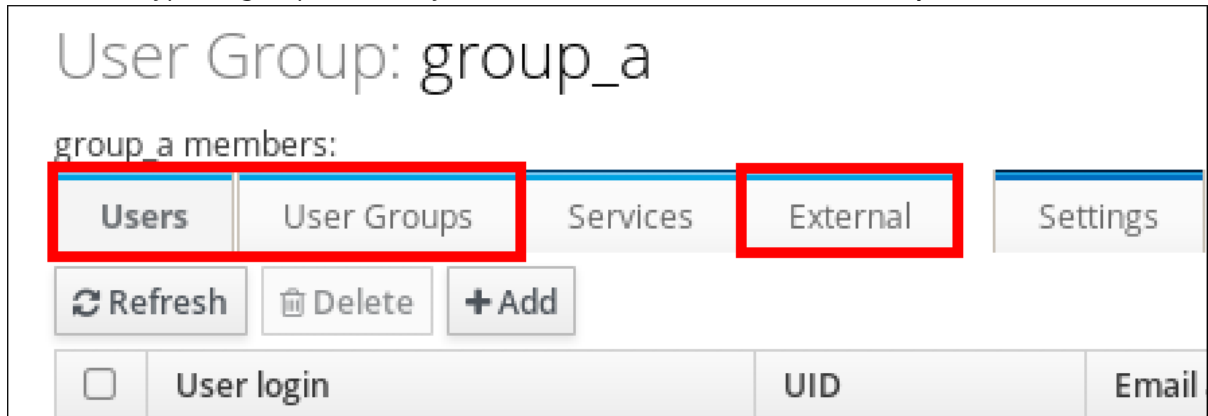
Follow this procedure to remove a member from a user group using the IdM Web UI.

### Prerequisites

- You are logged in to the IdM Web UI.

### Procedure

1. Click **Identity → Groups** and select **User Groups** in the left sidebar.
2. Click the name of the group.
3. Select the type of group member you want to remove: **Users**, **User Groups**, or **External**.



4. Select the check box next to the member you want to remove.
5. Click **Delete**.
6. Click **Delete** to confirm.

## 15.9. REMOVING USERS OR GROUPS AS MEMBER MANAGERS FROM AN IDM USER GROUP USING THE WEB UI

Follow this procedure to remove users or groups as member managers from an IdM user group using the Web UI. Member managers can remove users or groups from IdM user groups but cannot change the attributes of a group.

### Prerequisites

- You are logged in to the IdM Web UI.
- You must have the name of the existing member manager user or group you are removing and the name of the group they are managing.

### Procedure

1. Click **Identity → Groups** and select **User Groups** in the left sidebar.
2. Click the name of the group.
3. Select the type of member manager you want to remove: **Users** or **User Groups**.

## User Group: group\_a

group\_a members:

|       |             |          |          |                   |
|-------|-------------|----------|----------|-------------------|
| Users | User Groups | Services | External | User ID overrides |
|-------|-------------|----------|----------|-------------------|

group\_a member managers:

|             |       |
|-------------|-------|
| User Groups | Users |
|-------------|-------|

4. Select the check box next to the member manager you want to remove.
5. Click **Delete**.
6. Click **Delete** to confirm.



### NOTE

After you remove a member manager from a user group, the update may take some time to spread to all clients in your Identity Management environment.

### Verification steps

- Verify the user or user group has been removed from the member manager list of users or user groups:

## User Group: project

project members:

|       |             |          |
|-------|-------------|----------|
| Users | User Groups | Services |
|-------|-------------|----------|

project member managers:

|             |           |
|-------------|-----------|
| User Groups | Users (1) |
|-------------|-----------|

|                          |            |
|--------------------------|------------|
| <input type="checkbox"/> | Group name |
| No entries.              |            |

### Additional resources

- See **ipa group-add-member-manager --help** for more details.

## CHAPTER 16. MANAGING USER GROUPS USING ANSIBLE PLAYBOOKS

This section introduces user group management using Ansible playbooks.

A user group is a set of users with common privileges, password policies, and other characteristics.

A user group in Identity Management (IdM) can include:

- IdM users
- other IdM user groups
- external users, which are users that exist outside of IdM

The section includes the following topics:

- [The different group types in IdM](#)
- [Direct and indirect group members](#)
- [Ensuring the presence of IdM groups and group members using Ansible playbooks](#)
- [Using Ansible to enable AD users to administer IdM](#)
- [Ensuring the presence of member managers in IdM user groups using Ansible playbooks](#)
- [Ensuring the absence of member managers in IdM user groups using Ansible playbooks](#)

### 16.1. THE DIFFERENT GROUP TYPES IN IDM

IdM supports the following types of groups:

#### POSIX groups (the default)

POSIX groups support Linux POSIX attributes for their members. Note that groups that interact with Active Directory cannot use POSIX attributes.

POSIX attributes identify users as separate entities. Examples of POSIX attributes relevant to users include **uidNumber**, a user number (UID), and **gidNumber**, a group number (GID).

#### Non-POSIX groups

Non-POSIX groups do not support POSIX attributes. For example, these groups do not have a GID defined.

All members of this type of group must belong to the IdM domain.

#### External groups

Use external groups to add group members that exist in an identity store outside of the IdM domain, such as:

- A local system
- An Active Directory domain
- A directory service



External groups do not support POSIX attributes. For example, these groups do not have a GID defined.

**Table 16.1. User groups created by default**

| Group name          | Default group members   |
|---------------------|---|
| <b>ipausers</b>     | All IdM users   |
| <b>admins</b>       | Users with administrative privileges, including the default <b>admin</b> user |
| <b>editors</b>      | This is a legacy group that no longer has any special privileges              |
| <b>trust admins</b> | Users with privileges to manage the Active Directory trusts                   |

When you add a user to a user group, the user gains the privileges and policies associated with the group. For example, to grant administrative privileges to a user, add the user to the **admins** group.



#### WARNING

Do not delete the **admins** group. As **admins** is a pre-defined group required by IdM, this operation causes problems with certain commands.

In addition, IdM creates *user private groups* by default whenever a new user is created in IdM. For more information about private groups, see [Adding users without a private group](#).

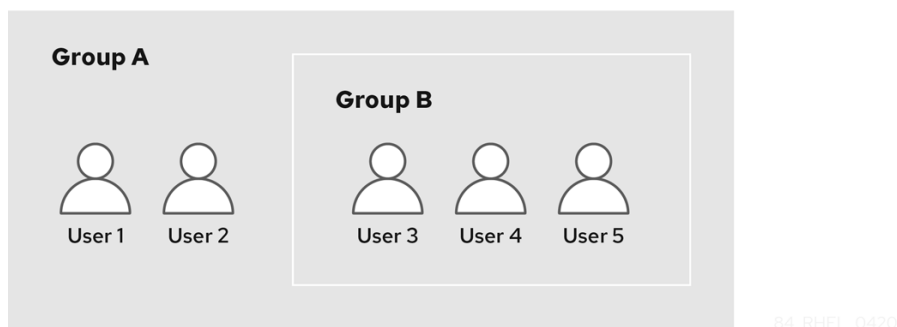
## 16.2. DIRECT AND INDIRECT GROUP MEMBERS

User group attributes in IdM apply to both direct and indirect members: when group B is a member of group A, all users in group B are considered indirect members of group A.

For example, in the following diagram:

- User 1 and User 2 are *direct members* of group A.
- User 3, User 4, and User 5 are *indirect members* of group A.

Figure 16.1. Direct and Indirect Group Membership



If you set a password policy for user group A, the policy also applies to all users in user group B.

## 16.3. ENSURING THE PRESENCE OF IDM GROUPS AND GROUP MEMBERS USING ANSIBLE PLAYBOOKS

The following procedure describes ensuring the presence of IdM groups and group members - both users and user groups - using an Ansible playbook.

### Prerequisites

- You know the IdM administrator password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the `secret.yml` Ansible vault stores your `ipaadmin_password`.
- The users you want to reference in your Ansible playbook exist in IdM. For details on ensuring the presence of users using Ansible, see [Managing user accounts using Ansible playbooks](#).

### Procedure

1. Create an inventory file, for example **inventory.file**, and define **ipaserver** in it:

```
[ipaserver]
server.idm.example.com
```

2. Create an Ansible playbook file with the necessary user and group information:

```
---
- name: Playbook to handle groups
  hosts: ipaserver

  vars_files:
    - /home/user_name/MyPlaybooks/secret.yml
  tasks:
```

```

- name: Create group ops with gid 1234
  ipagroup:
    ipaadmin_password: "{{ ipaadmin_password }}"
    name: ops
    gidnumber: 1234

- name: Create group sysops
  ipagroup:
    ipaadmin_password: "{{ ipaadmin_password }}"
    name: sysops
    user:
      - idm_user

- name: Create group appops
  ipagroup:
    ipaadmin_password: "{{ ipaadmin_password }}"
    name: appops

- name: Add group members sysops and appops to group ops
  ipagroup:
    ipaadmin_password: "{{ ipaadmin_password }}"
    name: ops
    group:
      - sysops
      - appops

```

3. Run the playbook:

```

$ ansible-playbook --vault-password-file=password_file -v -i
path_to_inventory_directory/inventory.file path_to_playbooks_directory/add-group-
members.yml

```

## Verification steps

You can verify if the **ops** group contains **sysops** and **appops** as direct members and **idm\_user** as an indirect member by using the **ipa group-show** command:

1. Log into **ipaserver** as administrator:

```

$ ssh admin@server.idm.example.com
Password:
[admin@server /]$

```

2. Display information about **ops**:

```

ipaserver]$ ipa group-show ops
Group name: ops
GID: 1234
Member groups: sysops, appops
Indirect Member users: idm_user

```

The **appops** and **sysops** groups – the latter including the **idm\_user** user – exist in IdM.

## Additional resources

- See the `/usr/share/doc/ansible-freeipa/README-group.md` Markdown file.

## 16.4. USING ANSIBLE TO ENABLE AD USERS TO ADMINISTER IDM

Follow this procedure to use an Ansible playbook to ensure that a user ID override is present in an Identity Management (IdM) group. The user ID override is the override of an Active Directory (AD) user that you created in the Default Trust View after you established a trust with AD. As a result of running the playbook, an AD user, for example an AD administrator, is able to fully administer IdM without having two different accounts and passwords.

### Prerequisites

- You know the IdM **admin** password.
- You have [installed a trust with AD](#).
- The user ID override of the AD user already exists in IdM. If it does not, create it with the **ipa idoverrideuser-add 'default trust view' ad\_user@ad.example.com** command.
- The [group to which you are adding the user ID override already exists in IdM](#).
- You are using the 4.8.7 version of IdM or later. To view the version of IdM you have installed on your server, enter **ipa --version**.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the `secret.yml` Ansible vault stores your **ipaadmin\_password**.

### Procedure

1. Navigate to your `~/MyPlaybooks/` directory:

```
$ cd ~/MyPlaybooks/
```

2. Create an **add-useridoverride-to-group.yml** playbook with the following content:

```
---
- name: Playbook to ensure presence of users in a group
  hosts: ipaserver

  - name: Ensure the ad_user@ad.example.com user ID override is a member of the admins
    group:
      ipagroup:
        ipaadmin_password: "{{ ipaadmin_password }}"
        name: admins
      idoverrideuser:
        - ad_user@ad.example.com
```

In the example:

- Secret123 is the IdM **admin** password.
- **admins** is the name of the IdM POSIX group to which you are adding the **ad\_user@ad.example.com** ID override. Members of this group have full administrator privileges.
- **ad\_user@ad.example.com** is the user ID override of an AD administrator. The user is stored in the AD domain with which a trust has been established.

3. Save the file.

4. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the **secret.yml** file, and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory add-  
useridoverride-to-group.yml
```

#### Additional resources

- [ID overrides for AD users](#)
- [/usr/share/doc/ansible-freeipa/README-group.md](#)
- [/usr/share/doc/ansible-freeipa/playbooks/user](#)
- [Using ID views in Active Directory environments](#)
- [Enabling AD users to administer IdM](#)

## 16.5. ENSURING THE PRESENCE OF MEMBER MANAGERS IN IDM USER GROUPS USING ANSIBLE PLAYBOOKS

The following procedure describes ensuring the presence of IdM member managers - both users and user groups - using an Ansible playbook.

#### Prerequisites

- You know the IdM administrator password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the **~/MyPlaybooks/** directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipaadmin\_password**.
- You must have the name of the user or group you are adding as member managers and the name of the group you want them to manage.

## Procedure

1. Create an inventory file, for example **inventory.file**, and define **ipaserver** in it:

```
[ipaserver]
server.idm.example.com
```

2. Create an Ansible playbook file with the necessary user and group member management information:

```
---
- name: Playbook to handle membership management
  hosts: ipaserver

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - name: Ensure user test is present for group_a
    ipagroup:
      ipaadmin_password: "{{ ipaadmin_password }}"
      name: group_a
      membermanager_user: test

  - name: Ensure group_admins is present for group_a
    ipagroup:
      ipaadmin_password: "{{ ipaadmin_password }}"
      name: group_a
      membermanager_group: group_admins
```

3. Run the playbook:

```
$ ansible-playbook --vault-password-file=password_file -v -i
path_to_inventory_directory/inventory.file path_to_playbooks_directory/add-member-
managers-user-groups.yml
```

## Verification steps

You can verify if the **group\_a** group contains **test** as a member manager and **group\_admins** is a member manager of **group\_a** by using the **ipa group-show** command:

1. Log into **ipaserver** as administrator:

```
$ ssh admin@server.idm.example.com
Password:
[admin@server ~]$
```

2. Display information about *managergroup*:

```
ipaserver]$ ipa group-show group_a
Group name: group_a
GID: 1133400009
Membership managed by groups: group_admins
Membership managed by users: test
```

## Additional resources

- See **ipa host-add-member-manager --help**.
- See the **ipa** man page.

## 16.6. ENSURING THE ABSENCE OF MEMBER MANAGERS IN IDM USER GROUPS USING ANSIBLE PLAYBOOKS

The following procedure describes ensuring the absence of IdM member managers – both users and user groups – using an Ansible playbook.

### Prerequisites

- You know the IdM administrator password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the **ansible-freeipa** package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipaadmin\_password**.
- You must have the name of the existing member manager user or group you are removing and the name of the group they are managing.

### Procedure

1. Create an inventory file, for example **inventory.file**, and define **ipaserver** in it:

```
[ipaserver]
server.idm.example.com
```

2. Create an Ansible playbook file with the necessary user and group member management information:

```
---
- name: Playbook to handle membership management
  hosts: ipaserver

  vars_files:
    - /home/user_name/MyPlaybooks/secret.yml
  tasks:
    - name: Ensure member manager user and group members are absent for group_a
      ipagroup:
        ipaadmin_password: "{{ ipaadmin_password }}"
        name: group_a
        membermanager_user: test
        membermanager_group: group_admins
        action: member
        state: absent
```

3. Run the playbook:

```
$ ansible-playbook --vault-password-file=password_file -v -i
path_to_inventory_directory/inventory.file path_to_playbooks_directory/ensure-
member-managers-are-absent.yml
```

## Verification steps

You can verify if the **group\_a** group does not contain **test** as a member manager and **group\_admins** as a member manager of **group\_a** by using the **ipa group-show** command:

1. Log into **ipaserver** as administrator:

```
$ ssh admin@server.idm.example.com
Password:
[admin@server /]$
```

2. Display information about group\_a:

```
ipaserver]$ ipa group-show group_a
Group name: group_a
GID: 1133400009
```

## Additional resources

- See **ipa host-remove-member-manager --help**.
- See the **ipa** man page.



## CHAPTER 17. AUTOMATING GROUP MEMBERSHIP USING IDM CLI

Using automatic group membership allows you to assign users and hosts to groups automatically based on their attributes. For example, you can:

- Divide employees' user entries into groups based on the employees' manager, location, or any other attribute.
- Divide hosts based on their class, location, or any other attribute.
- Add all users or all hosts to a single global group.

This chapter covers the following topics:

- [Benefits of automatic group membership](#)
- [Automember rules](#)
- [Adding an automember rule using IdM CLI](#)
- [Adding a condition to an automember rule using IdM CLI](#)
- [Viewing existing automember rules using IdM CLI](#)
- [Deleting an automember rule using IdM CLI](#)
- [Removing a condition from an automember rule using IdM CLI](#)
- [Applying automember rules to existing entries using IdM CLI](#)
- [Configuring a default automember group using IdM CLI](#)

### 17.1. BENEFITS OF AUTOMATIC GROUP MEMBERSHIP

Using automatic membership for users allows you to:

- **Reduce the overhead of manually managing group memberships**  
You no longer have to assign every user and host to groups manually.
- **Improve consistency in user and host management**  
Users and hosts are assigned to groups based on strictly defined and automatically evaluated criteria.
- **Simplify the management of group-based settings**  
Various settings are defined for groups and then applied to individual group members, for example **sudo** rules, automount, or access control. Adding users and hosts to groups automatically makes managing these settings easier.

### 17.2. AUTOMEMBER RULES

When configuring automatic group membership, the administrator defines automember rules. An automember rule applies to a specific user or host target group. It cannot apply to more than one group at a time.

After creating a rule, the administrator adds conditions to it. These specify which users or hosts get included or excluded from the target group:

- **Inclusive conditions**  
When a user or host entry meets an inclusive condition, it will be included in the target group.
- **Exclusive conditions**  
When a user or host entry meets an exclusive condition, it will not be included in the target group.

The conditions are specified as regular expressions in the Perl-compatible regular expressions (PCRE) format. For more information about PCRE, see the **pcresyntax(3)** man page.



#### NOTE

IdM evaluates exclusive conditions before inclusive conditions. In case of a conflict, exclusive conditions take precedence over inclusive conditions.

An automember rule applies to every entry created in the future. These entries will be automatically added to the specified target group. If an entry meets the conditions specified in multiple automember rules, it will be added to all the corresponding groups.

Existing entries are **not** affected by the new rule. If you want to change existing entries, see [Applying automember rules to existing entries using IdM CLI](#).

## 17.3. ADDING AN AUTOMEMBER RULE USING IDM CLI

Follow this procedure to add an automember rule using the IdM CLI. For information about automember rules, see [Automember rules](#).

After adding an automember rule, you can add conditions to it using the procedure described in [Adding a condition to an automember rule](#).



#### NOTE

Existing entries are **not** affected by the new rule. If you want to change existing entries, see [Applying automember rules to existing entries using IdM CLI](#).

### Prerequisites

- You must be logged in as the administrator. For details, see [Using kinit to log in to IdM manually](#).
- The target group of the new rule must exist in IdM.

### Procedure

1. Enter the **ipa automember-add** command to add an automember rule.
2. When prompted, specify:
  - **Automember rule.** This is the target group name.
  - **Grouping Type.** This specifies whether the rule targets a user group or a host group. To target a user group, enter **group**. To target a host group, enter **hostgroup**.

For example, to add an automember rule for a user group named **user\_group**:

```
$ ipa automember-add
Automember Rule: user_group
Grouping Type: group
-----
Added automember rule "user_group"
-----
Automember Rule: user_group
```

### Verification steps

- You can display existing automember rules and conditions in IdM using [Viewing existing automember rules using IdM CLI](#).

## 17.4. ADDING A CONDITION TO AN AUTOMEMBER RULE USING IDM CLI

After configuring automember rules, you can then add a condition to that automember rule using the IdM CLI. For information about automember rules, see [Automember rules](#).

### Prerequisites

- You must be logged in as the administrator. For details, see [Using kinit to log in to IdM manually](#).
- The target rule must exist in IdM. For details, see [Adding an automember rule using IdM CLI](#).

### Procedure

1. Define one or more inclusive or exclusive conditions using the **ipa automember-add-condition** command.
2. When prompted, specify:
  - **Automember rule.** This is the target rule name. See [Automember rules](#) for details.
  - **Attribute Key.** This specifies the entry attribute to which the filter will apply. For example, **uid** for users.
  - **Grouping Type.** This specifies whether the rule targets a user group or a host group. To target a user group, enter **group**. To target a host group, enter **hostgroup**.
  - **Inclusive regex** and **Exclusive regex.** These specify one or more conditions as regular expressions. If you only want to specify one condition, press **Enter** when prompted for the other.

For example, the following condition targets all users with any value (.\* ) in their user login attribute (**uid**).

```
$ ipa automember-add-condition
Automember Rule: user_group
Attribute Key: uid
Grouping Type: group
[Inclusive Regex]: .*
```

```
[Exclusive Regex]:
-----
Added condition(s) to "user_group"
-----
Automember Rule: user_group
Inclusive Regex: uid=.*
-----
Number of conditions added 1
-----
```

As another example, you can use an automembership rule to target all Windows users synchronized from Active Directory (AD). To achieve this, create a condition that targets all users with **ntUser** in their **objectClass** attribute, which is shared by all AD users:

```
$ ipa automember-add-condition
Automember Rule: ad_users
Attribute Key: objectclass
Grouping Type: group
[Inclusive Regex]: ntUser
[Exclusive Regex]:
-----
Added condition(s) to "ad_users"
-----
Automember Rule: ad_users
Inclusive Regex: objectclass=ntUser
-----
Number of conditions added 1
-----
```

### Verification steps

- You can display existing automember rules and conditions in IdM using [Viewing existing automember rules using IdM CLI](#).

## 17.5. VIEWING EXISTING AUTOMEMBER RULES USING IDM CLI

Follow this procedure to view existing automember rules using the IdM CLI.

### Prerequisites

- You must be logged in as the administrator. For details, see [Using kinit to log in to IdM manually](#).

### Procedure

- Enter the **ipa automember-find** command.
- When prompted, specify the **Grouping type**:
  - To target a user group, enter **group**.
  - To target a host group, enter **hostgroup**.  
For example:

```
$ ipa automember-find
```

```

Grouping Type: group
-----
1 rules matched
-----
Automember Rule: user_group
Inclusive Regex: uid=.*
-----
Number of entries returned 1
-----

```

## 17.6. DELETING AN AUTOMEMBER RULE USING IDM CLI

Follow this procedure to delete an automember rule using the IdM CLI.

Deleting an automember rule also deletes all conditions associated with the rule. To remove only specific conditions from a rule, see [Removing a condition from an automember rule using IdM CLI](#) .

### Prerequisites

- You must be logged in as the administrator. For details, see [Using kinit to log in to IdM manually](#) .

### Procedure

1. Enter the **ipa automember-del** command.
2. When prompted, specify:
  - **Automember rule.** This is the rule you want to delete.
  - **Grouping rule.** This specifies whether the rule you want to delete is for a user group or a host group. Enter **group** or **hostgroup**.

## 17.7. REMOVING A CONDITION FROM AN AUTOMEMBER RULE USING IDM CLI

Follow this procedure to remove a specific condition from an automember rule.

### Prerequisites

- You must be logged in as the administrator. For details, see [Using kinit to log in to IdM manually](#) .

### Procedure

1. Enter the **ipa automember-remove-condition** command.
2. When prompted, specify:
  - **Automember rule.** This is the name of the rule from which you want to remove a condition.
  - **Attribute Key.** This is the target entry attribute. For example, **uid** for users.
  - **Grouping Type.** This specifies whether the condition you want to delete is for a user group or a host group. Enter **group** or **hostgroup**.

- **Inclusive regex** and **Exclusive regex**. These specify the conditions you want to remove. If you only want to specify one condition, press **Enter** when prompted for the other.  
For example:

```
$ ipa automember-remove-condition
Automember Rule: user_group
Attribute Key: uid
Grouping Type: group
[Inclusive Regex]: .*
[Exclusive Regex]:
-----
Removed condition(s) from "user_group"
-----
Automember Rule: user_group
-----
Number of conditions removed 1
-----
```

## 17.8. APPLYING AUTOMEMBER RULES TO EXISTING ENTRIES USING IDM CLI

Automember rules apply automatically to user and host entries created after the rules were added. They are not applied retroactively to entries that existed before the rules were added.

To apply automember rules to previously added entries, you have to manually rebuild automatic membership. Rebuilding automatic membership re-evaluates all existing automember rules and applies them either to all user or hosts entries, or to specific entries.



### NOTE

Rebuilding automatic membership **does not** remove user or host entries from groups, even if the entries no longer match the group's inclusive conditions. To remove them manually, see [Removing a member from a user group using IdM CLI](#) or [Removing IdM host group members using the CLI](#).

### Prerequisites

- You must be logged in as the administrator. For details, see link: [Using kinit to log in to IdM manually](#).

### Procedure

- To rebuild automatic membership, enter the **ipa automember-rebuild** command. Use the following options to specify the entries to target:
  - To rebuild automatic membership for all users, use the **--type=group** option:

```
$ ipa automember-rebuild --type=group
-----
Automember rebuild task finished. Processed (9) entries.
-----
```

- To rebuild automatic membership for all hosts, use the **--type=hostgroup** option.

- To rebuild automatic membership for a specified user or users, use the **--users=***target\_user* option:

```
$ ipa automember-rebuild --users=target_user1 --users=target_user2
-----
Automember rebuild task finished. Processed (2) entries.
-----
```

- To rebuild automatic membership for a specified host or hosts, use the **--hosts=***client.idm.example.com* option.

## 17.9. CONFIGURING A DEFAULT AUTOMEMBER GROUP USING IDM CLI

When you configure a default automember group, new user or host entries that do not match any automember rule are automatically added to this default group.

### Prerequisites

- You must be logged in as the administrator. For details, see [Using kinit to log in to IdM manually](#).
- The target group you want to set as default exists in IdM.

### Procedure

1. Enter the **ipa automember-default-group-set** command to configure a default automember group.
2. When prompted, specify:
  - **Default (fallback) Group**, which specifies the target group name.
  - **Grouping Type**, which specifies whether the target is a user group or a host group. To target a user group, enter **group**. To target a host group, enter **hostgroup**.  
For example:

```
$ ipa automember-default-group-set
Default (fallback) Group: default_user_group
Grouping Type: group
-----
Set default (fallback) group for automember "default_user_group"
-----
Default (fallback) Group:
cn=default_user_group,cn=groups,cn=accounts,dc=example,dc=com
```



### NOTE

To remove the current default automember group, enter the **ipa automember-default-group-remove** command.

### Verification steps

- To verify that the group is set correctly, enter the **ipa automember-default-group-show** command. The command displays the current default automember group. For example:

**\$ ipa automember-default-group-show**

Grouping Type: **group**

Default (fallback) Group:

cn=default\_user\_group,cn=groups,cn=accounts,dc=example,dc=com



## CHAPTER 18. AUTOMATING GROUP MEMBERSHIP USING IDM WEB UI

Using automatic group membership enables you to assign users and hosts to groups automatically based on their attributes. For example, you can:

- Divide employees' user entries into groups based on the employees' manager, location, or any other attribute.
- Divide hosts based on their class, location, or any other attribute.
- Add all users or all hosts to a single global group.

This chapter covers the following topics:

- [Benefits of automatic group membership](#)
- [Automember rules](#)
- [Adding an automember rule using IdM Web UI](#)
- [Adding a condition to an automember rule using IdM Web UI](#)
- [Viewing existing automember rules and conditions using IdM Web UI](#)
- [Deleting an automember rule using IdM Web UI](#)
- [Removing a condition from an automember rule using IdM Web UI](#)
- [Applying automember rules to existing entries using IdM Web UI](#)
- [Configuring a default user group using IdM Web UI](#)
- [Configuring a default host group using IdM Web UI](#)

### 18.1. BENEFITS OF AUTOMATIC GROUP MEMBERSHIP

Using automatic membership for users allows you to:

- **Reduce the overhead of manually managing group memberships**  
You no longer have to assign every user and host to groups manually.
- **Improve consistency in user and host management**  
Users and hosts are assigned to groups based on strictly defined and automatically evaluated criteria.
- **Simplify the management of group-based settings**  
Various settings are defined for groups and then applied to individual group members, for example **sudo** rules, automount, or access control. Adding users and hosts to groups automatically makes managing these settings easier.

### 18.2. AUTOMEMBER RULES

When configuring automatic group membership, the administrator defines automember rules. An automember rule applies to a specific user or host target group. It cannot apply to more than one group at a time.

After creating a rule, the administrator adds conditions to it. These specify which users or hosts get included or excluded from the target group:

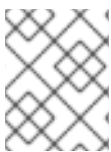
- **Inclusive conditions**

When a user or host entry meets an inclusive condition, it will be included in the target group.

- **Exclusive conditions**

When a user or host entry meets an exclusive condition, it will not be included in the target group.

The conditions are specified as regular expressions in the Perl-compatible regular expressions (PCRE) format. For more information about PCRE, see the **pcresyntax(3)** man page.



#### NOTE

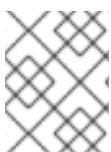
IdM evaluates exclusive conditions before inclusive conditions. In case of a conflict, exclusive conditions take precedence over inclusive conditions.

An automember rule applies to every entry created in the future. These entries will be automatically added to the specified target group. If an entry meets the conditions specified in multiple automember rules, it will be added to all the corresponding groups.

Existing entries are **not** affected by the new rule. If you want to change existing entries, see [Applying automember rules to existing entries using IdM Web UI](#).

## 18.3. ADDING AN AUTOMEMBER RULE USING IDM WEB UI

Follow this procedure to add an automember rule using the IdM Web UI. For information about automember rules, see [Automember rules](#).



#### NOTE

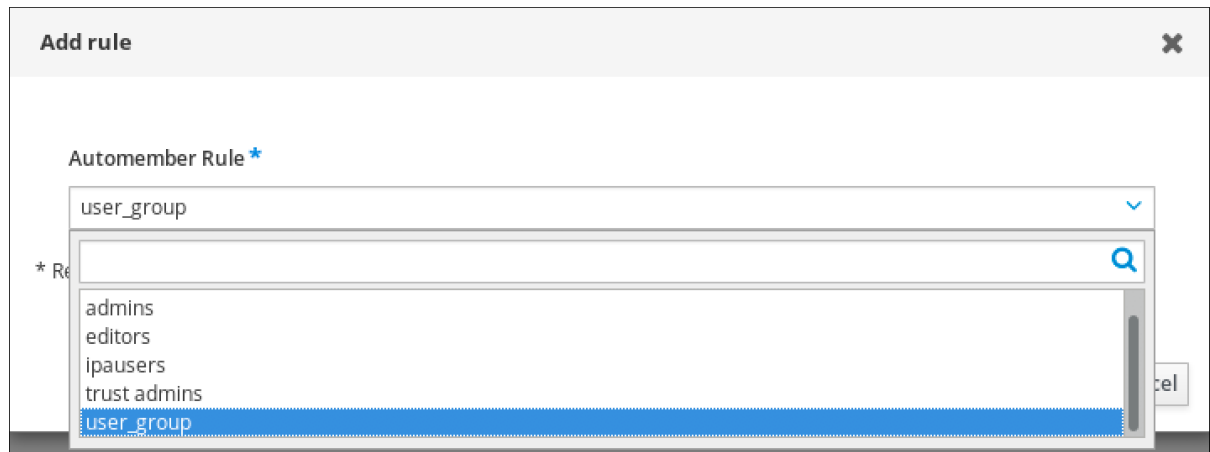
Existing entries are **not** affected by the new rule. If you want to change existing entries, see [Applying automember rules to existing entries using IdM Web UI](#).

#### Prerequisites

- You are logged in to the IdM Web UI.
- You must be a member of the **admins** group.
- The target group of the new rule exists in IdM.

#### Procedure

1. Click **Identity → Automember**, and select either **User group rules** or **Host group rules**.
2. Click **Add**.
3. In the **Automember rule** field, select the group to which the rule will apply. This is the target group name.



4. Click **Add** to confirm.
5. Optional: You can add conditions to the new rule using the procedure described in [Adding a condition to an automember rule using IdM Web UI](#).

## 18.4. ADDING A CONDITION TO AN AUTOMEMBER RULE USING IDM WEB UI

After configuring automember rules, you can then add a condition to that automember rule using the IdM Web UI. For information about automember rules, see [Automember rules](#).

### Prerequisites

- You are logged in to the IdM Web UI.
- You must be a member of the **admins** group.
- The target rule exists in IdM.

### Procedure

1. Click **Identity** → **Automember**, and select either **User group rules** or **Host group rules**.
2. Click on the rule to which you want to add a condition.
3. In the **Inclusive** or **Exclusive** sections, click **Add**.

User group rule: user\_group

### General

**Automember Rule**

user\_group

**Description**

### Inclusive

| <input type="checkbox"/> | Attribute | Expression | Delete | + Add |
|--------------------------|-----------|------------|--------|-------|
| <input type="checkbox"/> | uid       | .*         |        |       |

### Exclusive

| <input type="checkbox"/> | Attribute | Expression | Delete | + Add |
|--------------------------|-----------|------------|--------|-------|
| <input type="checkbox"/> |           |            |        |       |

4. In the **Attribute** field, select the required attribute, for example *uid*.
5. In the **Expression** field, define a regular expression.
6. Click **Add**.  
For example, the following condition targets all users with any value (.\* ) in their user ID (uid) attribute.

**Add Condition into automember** ✕

**Attribute** uid

**Expression \*** .\*

\* Required field

## 18.5. VIEWING EXISTING AUTOMEMBER RULES AND CONDITIONS USING IDM WEB UI

Follow this procedure to view existing automember rules and conditions using the IdM Web UI.

## Prerequisites

- You are logged in to the IdM Web UI.
- You must be a member of the **admins** group.

## Procedure

1. Click **Identity** → **Automember**, and select either **User group rules** or **Host group rules** to view the respective automember rules.
2. Optional: Click on a rule to see the conditions for that rule in the **Inclusive** or **Exclusive** sections.

User group rule: user\_group

Refresh
Revert
Save

General
Automember Rule
user\_group
Description

Inclusive

| <input type="checkbox"/> | Attribute | Expression | Delete | Add |
|--------------------------|-----------|------------|--------|-----|
| <input type="checkbox"/> | uid       | ,*         |        |     |

Exclusive

| <input type="checkbox"/> | Attribute | Expression | Delete | Add |
|--------------------------|-----------|------------|--------|-----|
|--------------------------|-----------|------------|--------|-----|

## 18.6. DELETING AN AUTOMEMBER RULE USING IDM WEB UI

Follow this procedure to delete an automember rule using the IdM Web UI.

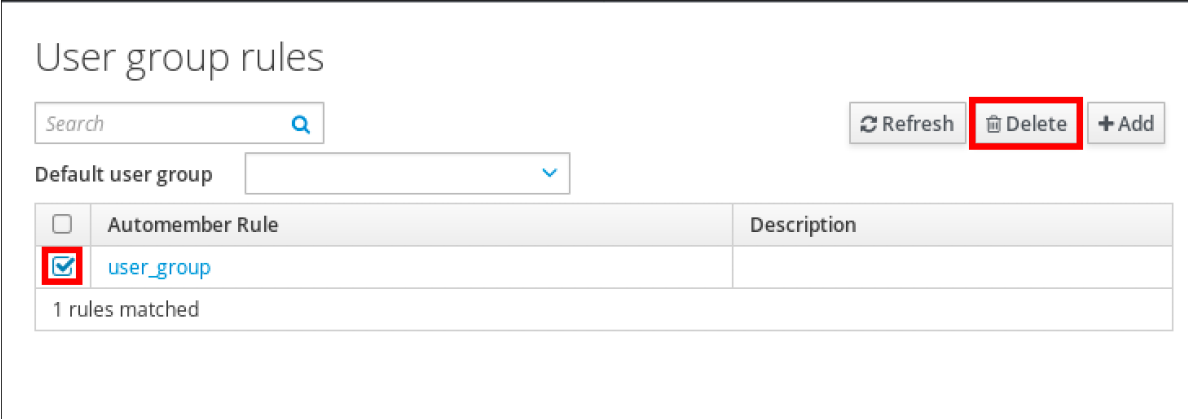
Deleting an automember rule also deletes all conditions associated with the rule. To remove only specific conditions from a rule, see [Removing a condition from an automember rule using IdM Web UI](#) .

## Prerequisites

- You are logged in to the IdM Web UI.
- You must be a member of the **admins** group.

## Procedure

1. Click **Identity** → **Automember**, and select either **User group rules** or **Host group rules** to view the respective automember rules.
2. Select the check box next to the rule you want to remove.
3. Click **Delete**.



User group rules

Search

Default user group

| <input type="checkbox"/>            | Automember Rule | Description |
|-------------------------------------|-----------------|-------------|
| <input checked="" type="checkbox"/> | user_group      |             |

1 rules matched

4. Click **Delete** to confirm.

## 18.7. REMOVING A CONDITION FROM AN AUTOMEMBER RULE USING IDM WEB UI

Follow this procedure to remove a specific condition from an automember rule using the IdM Web UI.

### Prerequisites

- You are logged in to the IdM Web UI.
- You must be a member of the **admins** group.

### Procedure

1. Click **Identity** → **Automember**, and select either **User group rules** or **Host group rules** to view the respective automember rules.
2. Click on a rule to see the conditions for that rule in the **Inclusive** or **Exclusive** sections.
3. Select the check box next to the conditions you want to remove.
4. Click **Delete**.

User group rule: user\_group

Refresh
Revert
Save

General
Automember Rule
user\_group
Description

Inclusive

| <input type="checkbox"/>            | Attribute | Expression | Delete + Add |
|-------------------------------------|-----------|------------|--------------|
| <input checked="" type="checkbox"/> | uid       | .*         | Delete + Add |

Exclusive

| <input type="checkbox"/> | Attribute | Expression | Delete + Add |
|--------------------------|-----------|------------|--------------|
|--------------------------|-----------|------------|--------------|

- Click **Delete** to confirm.

## 18.8. APPLYING AUTOMEMBER RULES TO EXISTING ENTRIES USING IDM WEB UI

Automember rules apply automatically to user and host entries created after the rules were added. They are not applied retroactively to entries that existed before the rules were added.

To apply automember rules to previously added entries, you have to manually rebuild automatic membership. Rebuilding automatic membership re-evaluates all existing automember rules and applies them either to all user or hosts entries, or to specific entries.



### NOTE

Rebuilding automatic membership **does not** remove user or host entries from groups, even if the entries no longer match the group's inclusive conditions. To remove them manually, see [Removing a member from a user group using IdM Web UI](#) or [Removing host group members in the IdM Web UI](#).

### 18.8.1. Rebuilding automatic membership for all users or hosts

Follow this procedure to rebuild automatic membership for all user or host entries.

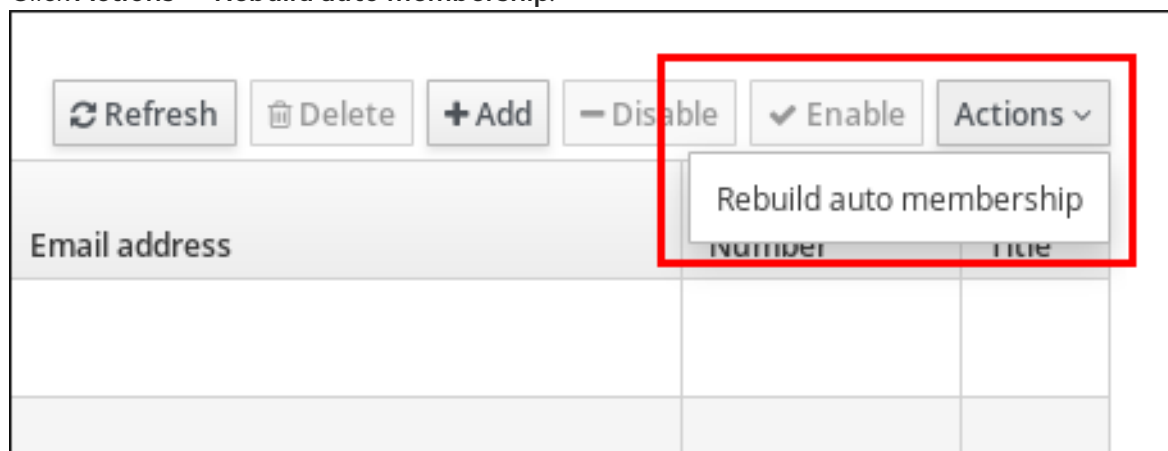
#### Prerequisites

- You are logged in to the IdM Web UI.

- You must be a member of the **admins** group.

### Procedure

1. Select **Identity** → **Users** or **Hosts**.
2. Click **Actions** → **Rebuild auto membership**.



### 18.8.2. Rebuilding automatic membership for a single user or host only

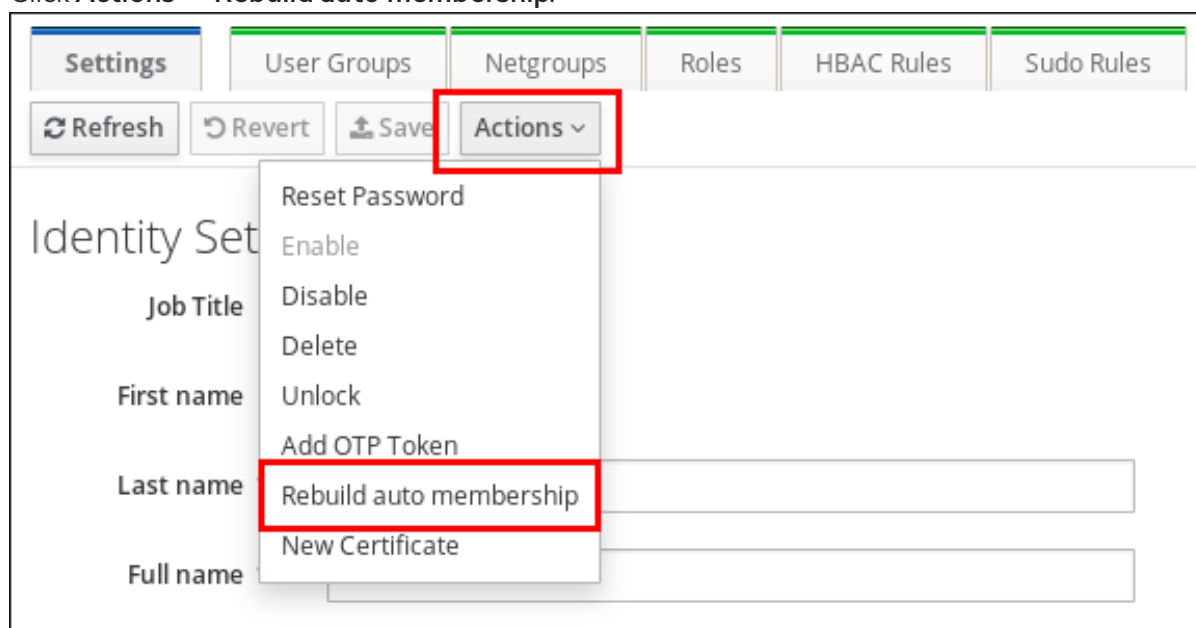
Follow this procedure to rebuild automatic membership for a specific user or host entry.

### Prerequisites

- You are logged in to the IdM Web UI.
- You must be a member of the **admins** group.

### Procedure

1. Select **Identity** → **Users** or **Hosts**.
2. Click on the required user or host name.
3. Click **Actions** → **Rebuild auto membership**.





## 18.9. CONFIGURING A DEFAULT USER GROUP USING IDM WEB UI

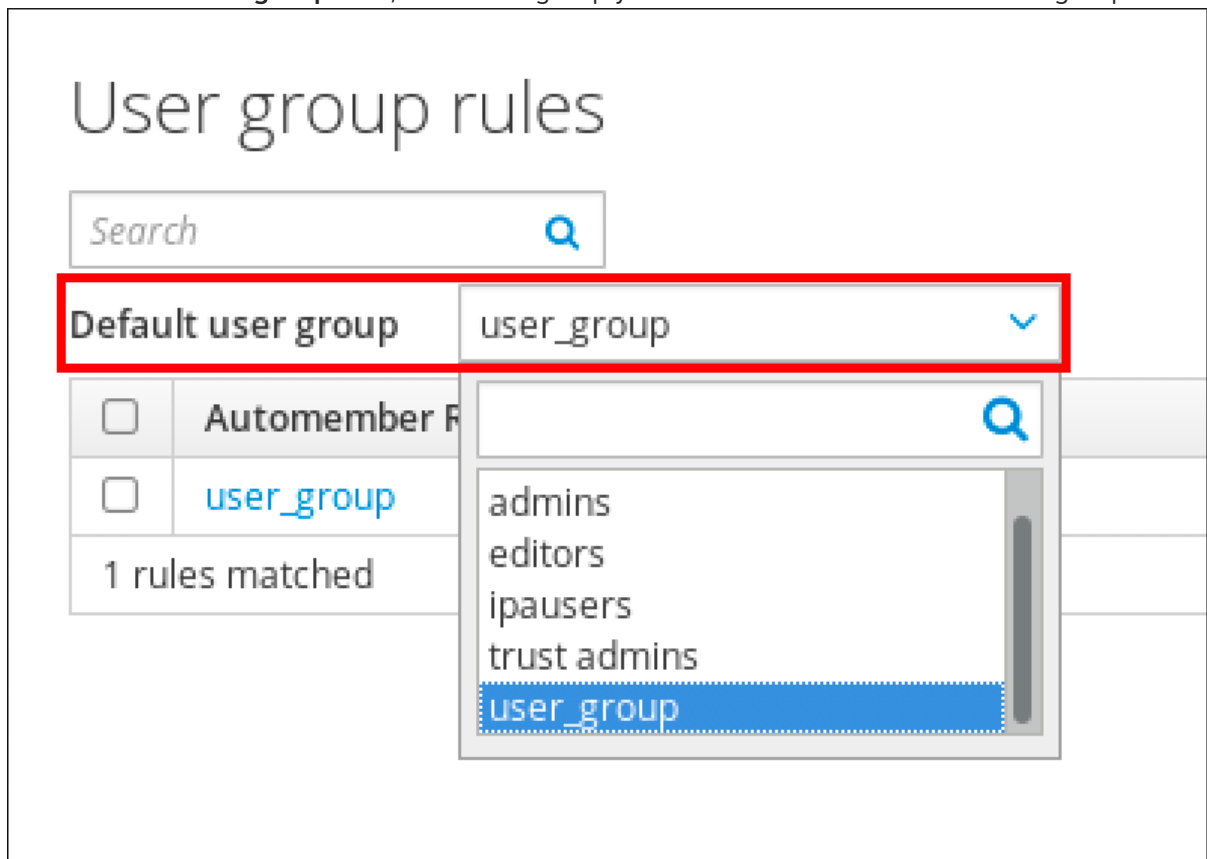
When you configure a default user group, new user entries that do not match any automember rule are automatically added to this default group.

### Prerequisites

- You are logged in to the IdM Web UI.
- You must be a member of the **admins** group.
- The target user group you want to set as default exists in IdM.

### Procedure

1. Click **Identity** → **Automember**, and select **User group rules**.
2. In the **Default user group** field, select the group you want to set as the default user group.



## 18.10. CONFIGURING A DEFAULT HOST GROUP USING IDM WEB UI

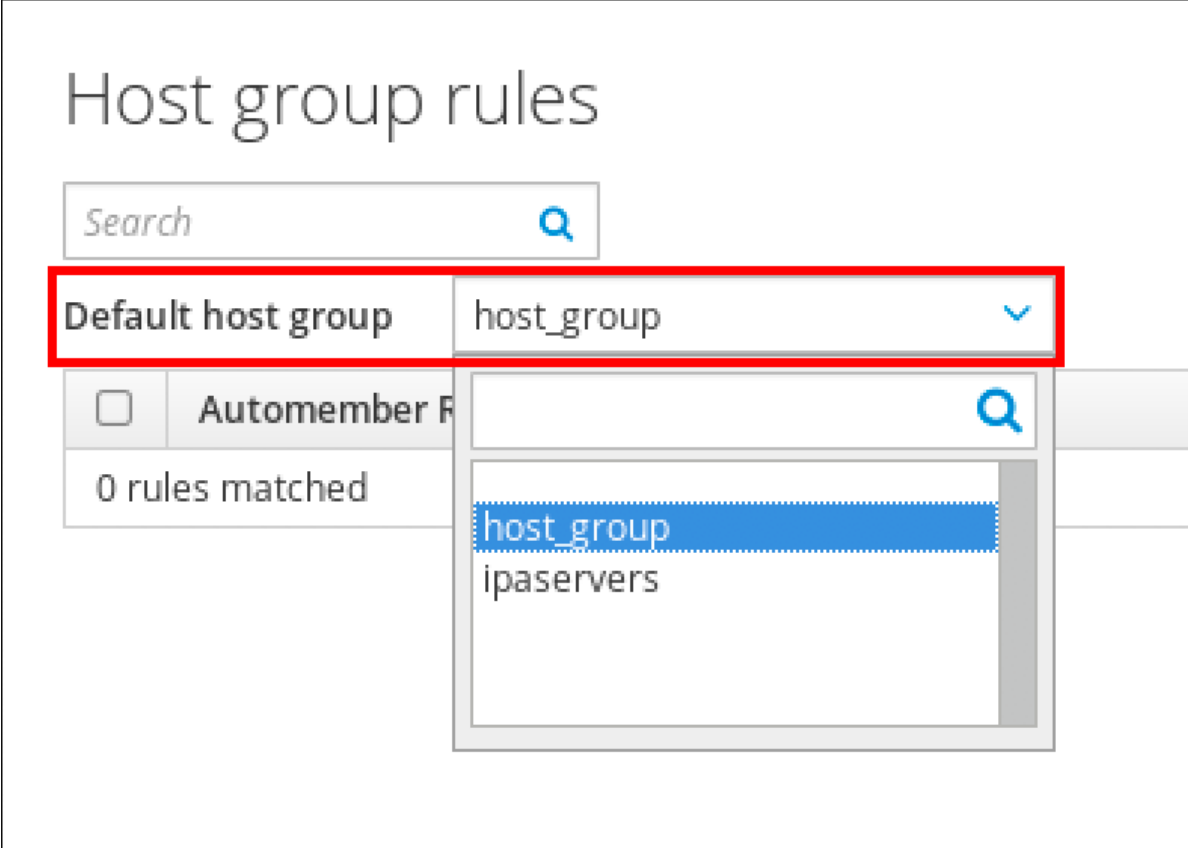
When you configure a default host group, new host entries that do not match any automember rule are automatically added to this default group.

### Prerequisites

- You are logged in to the IdM Web UI.
- You must be a member of the **admins** group.
- The target host group you want to set as default exists in IdM.

## Procedure

1. Click **Identity** → **Automember**, and select **Host group rules**.
2. In the **Default host group** field, select the group you want to set as the default host group.



The screenshot shows the 'Host group rules' configuration page. At the top, there is a search bar with the placeholder text 'Search' and a magnifying glass icon. Below the search bar, there is a table with two columns: 'Default host group' and 'Automember F'. The 'Default host group' column has a dropdown menu open, showing 'host\_group' selected. A red box highlights the dropdown menu. Below the dropdown menu, there is a search bar with the placeholder text 'Search' and a magnifying glass icon. Below the search bar, there is a list of host groups: 'host\_group' and 'ipaservers'. The 'host\_group' entry is highlighted in blue. Below the list, there is a message that says '0 rules matched'.

## CHAPTER 19. USING ANSIBLE TO AUTOMATE GROUP MEMBERSHIP IN IDM

Using automatic group membership, you can assign users and hosts user groups and host groups automatically, based on their attributes. For example, you can:

- Divide employees' user entries into groups based on the employees' manager, location, position or any other attribute. You can list all attributes by entering **ipa user-add --help** on the command-line.
- Divide hosts into groups based on their class, location, or any other attribute. You can list all attributes by entering **ipa host-add --help** on the command-line.
- Add all users or all hosts to a single global group.

You can use Red Hat Ansible Engine to automate the management of automatic group membership in Identity Management (IdM).

This section covers the following topics:

- [Preparing your Ansible control node for managing IdM](#)
- [Using Ansible to ensure that an automember rule for an IdM user group is present](#)
- [Using Ansible to ensure that a condition is present in an IdM user group automember rule](#)
- [Using Ansible to ensure that a condition is absent in an IdM user group automember rule](#)
- [Using Ansible to ensure that an automember rule for an IdM group is absent](#)
- [Using Ansible to ensure that a condition is present in an IdM host group automember rule](#)

### 19.1. PREPARING YOUR ANSIBLE CONTROL NODE FOR MANAGING IDM

As a system administrator managing Identity Management (IdM), when working with Red Hat Ansible Engine, it is good practice to do the following:

- Create a subdirectory dedicated to Ansible playbooks in your home directory, for example **~/MyPlaybooks**.
- Copy and adapt sample Ansible playbooks from the **/usr/share/doc/ansible-freeipa/\*** and **/usr/share/doc/rhel-system-roles/\*** directories and subdirectories into your **~/MyPlaybooks** directory.
- Include your inventory file in your **~/MyPlaybooks** directory.

By following this practice, you can find all your playbooks in one place and you can run your playbooks without invoking root privileges.



## NOTE

You only need **root** privileges on the managed nodes to execute the **ipaserver**, **ipareplica**, **ipaclient**, **ipabackup**, **ipasmartcard\_server** and **ipasmartcard\_client** **ansible-freeipa** roles. These roles require privileged access to directories and the **dnf** software package manager.

Follow this procedure to create the **~/MyPlaybooks** directory and configure it so that you can use it to store and run Ansible playbooks.

## Prerequisites

- You have installed an IdM server on your managed nodes, **server.idm.example.com** and **replica.idm.example.com**.
- You have configured DNS and networking so you can log in to the managed nodes, **server.idm.example.com** and **replica.idm.example.com**, directly from the control node.
- You know the IdM **admin** password.

## Procedure

1. Create a directory for your Ansible configuration and playbooks in your home directory:

```
$ mkdir ~/MyPlaybooks/
```

2. Change into the **~/MyPlaybooks/** directory:

```
$ cd ~/MyPlaybooks
```

3. Create the **~/MyPlaybooks/ansible.cfg** file with the following content:

```
[defaults]
inventory = /home/your_username/MyPlaybooks/inventory

[privilege_escalation]
become=True
```

4. Create the **~/MyPlaybooks/inventory** file with the following content:

```
[ipaserver]
server.idm.example.com

[ipareplicas]
replica1.idm.example.com
replica2.idm.example.com

[ipacluster:children]
ipaserver
ipareplicas

[ipacluster:vars]
ipaadmin_password=SomeADMINpassword
```

```
[ipaclients]
ipaclient1.example.com
ipaclient2.example.com

[ipaclients:vars]
ipaadmin_password=SomeADMINpassword
```

This configuration defines two host groups, **eu** and **us**, for hosts in these locations. Additionally, this configuration defines the **ipaserver** host group, which contains all hosts from the **eu** and **us** groups.

5. [Optional] Create an SSH public and private key. To simplify access in your test environment, do not set a password on the private key:

```
$ ssh-keygen
```

6. Copy the SSH public key to the IdM **admin** account on each managed node:

```
$ ssh-copy-id admin@server.idm.example.com
$ ssh-copy-id admin@replica.idm.example.com
```

You must enter the IdM **admin** password when you enter these commands.

#### Additional resources

- [Installing an Identity Management server using an Ansible playbook](#) .
- [How to build your inventory](#) .

## 19.2. USING ANSIBLE TO ENSURE THAT AN AUTOMEMBER RULE FOR AN IDM USER GROUP IS PRESENT

The following procedure describes how to use an Ansible playbook to ensure an **automember** rule for an Identity Management (IdM) group exists. In the example, the presence of an **automember** rule is ensured for the **testing\_group** user group.

#### Prerequisites

- You know the IdM **admin** password.
- The **testing\_group** user group exists in IdM.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipaadmin\_password**.

#### Procedure

1. Navigate to your `~/MyPlaybooks/` directory:

```
$ cd ~/MyPlaybooks/
```

2. Copy the **automember-group-present.yml** Ansible playbook file located in the `/usr/share/doc/ansible-freeipa/playbooks/automember/` directory:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/automember/automember-group-present.yml automember-group-present-copy.yml
```

3. Open the **automember-group-present-copy.yml** file for editing.
4. Adapt the file by setting the following variables in the **ipaautomember** task section:
  - Set the **ipaadmin\_password** variable to the password of the IdM **admin**.
  - Set the **name** variable to **testing\_group**.
  - Set the **automember\_type** variable to **group**.
  - Ensure that the **state** variable is set to **present**.

This is the modified Ansible playbook file for the current example:

```
---
- name: Automember group present example
  hosts: ipaserver
  vars_files:
    - /home/user_name/MyPlaybooks/secret.yml
  tasks:
    - name: Ensure group automember rule admins is present
      ipaautomember:
        ipaadmin_password: "{{ ipaadmin_password }}"
        name: testing_group
        automember_type: group
        state: present
```

5. Save the file.
6. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the **secret.yml** file, and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory automember-group-present-copy.yml
```

#### Additional resources

- See [Benefits of automatic group membership](#) and [Automember rules](#).
- See [Using Ansible to ensure that a condition is present in an IdM user group automember rule](#) .
- See the **README-automember.md** file in the `/usr/share/doc/ansible-freeipa/` directory.
- See the `/usr/share/doc/ansible-freeipa/playbooks/automember` directory.

## 19.3. USING ANSIBLE TO ENSURE THAT A SPECIFIED CONDITION IS PRESENT IN AN IDM USER GROUP AUTOMEMBER RULE

The following procedure describes how to use an Ansible playbook to ensure that a specified condition exists in an **automember** rule for an Identity Management (IdM) group. In the example, the presence of a UID-related condition in the **automember** rule is ensured for the **testing\_group** group. By specifying the **.\*** condition, you ensure that all future IdM users automatically become members of the **testing\_group**.

### Prerequisites

- You know the IdM **admin** password.
- The **testing\_group** user group and automember user group rule exist in IdM.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipaadmin\_password**.

### Procedure

1. Navigate to your `~/MyPlaybooks/` directory:

```
$ cd ~/MyPlaybooks/
```

2. Copy the **automember-hostgroup-rule-present.yml** Ansible playbook file located in the `/usr/share/doc/ansible-freeipa/playbooks/automember/` directory and name it, for example, **automember-usergroup-rule-present.yml**:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/automember/automember-hostgroup-rule-present.yml automember-usergroup-rule-present.yml
```

3. Open the **automember-usergroup-rule-present.yml** file for editing.
4. Adapt the file by modifying the following parameters:
  - Rename the playbook to correspond to your use case, for example: **Automember user group rule member present**.
  - Rename the task to correspond to your use case, for example: **Ensure an automember condition for a user group is present**.
  - Set the following variables in the **ipaautomember** task section:
    - Set the **ipaadmin\_password** variable to the password of the IdM **admin**.
    - Set the **name** variable to **testing\_group**.
    - Set the **automember\_type** variable to **group**.

- Ensure that the **state** variable is set to **present**.
- Ensure that the **action** variable is set to **member**.
- Set the **inclusive key** variable to **UID**.
- Set the **inclusive expression** variable to **.\***

This is the modified Ansible playbook file for the current example:

```
---
- name: Automember user group rule member present
  hosts: ipaserver
  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - name: Ensure an automember condition for a user group is present
    ipaautomember:
      ipaadmin_password: "{{ ipaadmin_password }}"
      name: testing_group
      automember_type: group
      state: present
      action: member
      inclusive:
        - key: UID
          expression: .*
```

5. Save the file.
6. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the **secret.yml** file, and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory automember-
usergroup-rule-present.yml
```

### Verification steps

1. Log in as an IdM administrator.

```
$ kinit admin
```

2. Add a user, for example:

```
$ ipa user-add user101 --first user --last 101
-----
Added user "user101"
-----
User login: user101
First name: user
Last name: 101
...
Member of groups: ipausers, testing_group
...
```



## Additional resources

- See [Applying automember rules to existing entries using the IdM CLI](#) .
- See [Benefits of automatic group membership](#) and [Automember rules](#).
- See the **README-automember.md** file in the `/usr/share/doc/ansible-freeipa/` directory.
- See the `/usr/share/doc/ansible-freeipa/playbooks/automember` directory.

## 19.4. USING ANSIBLE TO ENSURE THAT A CONDITION IS ABSENT FROM AN IDM USER GROUP AUTOMEMBER RULE

The following procedure describes how to use an Ansible playbook to ensure a condition is absent from an **automember** rule for an Identity Management (IdM) group. In the example, the absence of a condition in the **automember** rule is ensured that specifies that users whose **initials** are **dp** should be included. The automember rule is applied to the **testing\_group** group. By applying the condition, you ensure that no future IdM user whose initials are **dp** becomes a member of the **testing\_group**.

### Prerequisites

- You know the IdM **admin** password.
- The **testing\_group** user group and automember user group rule exist in IdM.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipaadmin\_password**.

### Procedure

1. Navigate to your `~/MyPlaybooks/` directory:

```
$ cd ~/MyPlaybooks/
```

2. Copy the **automember-hostgroup-rule-absent.yml** Ansible playbook file located in the `/usr/share/doc/ansible-freeipa/playbooks/automember/` directory and name it, for example, **automember-usergroup-rule-absent.yml**:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/automember/automember-hostgroup-rule-absent.yml automember-usergroup-rule-absent.yml
```

3. Open the **automember-usergroup-rule-absent.yml** file for editing.
4. Adapt the file by modifying the following parameters:
  - Rename the playbook to correspond to your use case, for example: **Automember user group rule member absent**.

- Rename the task to correspond to your use case, for example: **Ensure an automember condition for a user group is absent**.
- Set the following variables in the **ipaautomember** task section:
  - Set the **ipaadmin\_password** variable to the password of the IdM **admin**.
  - Set the **name** variable to **testing\_group**.
  - Set the **automember\_type** variable to **group**.
  - Ensure that the **state** variable is set to **absent**.
  - Ensure that the **action** variable is set to **member**.
  - Set the **inclusive key** variable to **initials**.
  - Set the **inclusive expression** variable to **dp**.

This is the modified Ansible playbook file for the current example:

```
---
- name: Automember user group rule member absent
  hosts: ipaserver
  vars_files:
    - /home/user_name/MyPlaybooks/secret.yml
  tasks:
    - name: Ensure an automember condition for a user group is absent
      ipaautomember:
        ipaadmin_password: "{{ ipaadmin_password }}"
        name: testing_group
        automember_type: group
        state: absent
        action: member
        inclusive:
          - key: initials
            expression: dp
```

5. Save the file.
6. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the **secret.yml** file, and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory automember-
usergroup-rule-absent.yml
```

### Verification steps

1. Log in as an IdM administrator.

```
$ kinit admin
```

2. View the automember group:

```
$ ipa automember-show --type=group testing_group
Automember Rule: testing_group
```

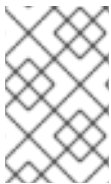
The absence of an **Inclusive Regex: initials=dp** entry in the output confirms that the **testing\_group** automember rule does not contain the condition specified.

### Additional resources

- See [Applying automember rules to existing entries using the IdM CLI](#) .
- See [Benefits of automatic group membership](#) and [Automember rules](#).
- See the **README-automember.md** file in the `/usr/share/doc/ansible-freeipa/` directory.
- See the `/usr/share/doc/ansible-freeipa/playbooks/automember` directory.

## 19.5. USING ANSIBLE TO ENSURE THAT AN AUTOMEMBER RULE FOR AN IDM USER GROUP IS ABSENT

The following procedure describes how to use an Ansible playbook to ensure an **automember** rule is absent for an Identity Management (IdM) group. In the example, the absence of an **automember** rule is ensured for the **testing\_group** group.



### NOTE

Deleting an automember rule also deletes all conditions associated with the rule. To remove only specific conditions from a rule, see [Using Ansible to ensure that a condition is absent in an IdM user group automember rule](#).

### Prerequisites

- You know the IdM **admin** password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the **ansible-freeipa** package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipadmin\_password**.

### Procedure

1. Navigate to your `~/MyPlaybooks/` directory:

```
$ cd ~/MyPlaybooks/
```

2. Copy the **automember-group-absent.yml** Ansible playbook file located in the `/usr/share/doc/ansible-freeipa/playbooks/automember/` directory:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/automember/automember-group-absent.yml automember-group-absent-copy.yml
```

3. Open the **automember-group-absent-copy.yml** file for editing.
4. Adapt the file by setting the following variables in the **ipaaautomember** task section:
  - Set the **ipaadmin\_password** variable to the password of the IdM **admin**.
  - Set the **name** variable to **testing\_group**.
  - Set the **automember\_type** variable to **group**.
  - Ensure that the **state** variable is set to **absent**.

This is the modified Ansible playbook file for the current example:

```
---
- name: Automember group absent example
  hosts: ipaserver
  vars_files:
    - /home/user_name/MyPlaybooks/secret.yml
  tasks:
    - name: Ensure group automember rule admins is absent
      ipaaautomember:
        ipaadmin_password: "{{ ipaadmin_password }}"
        name: testing_group
        automember_type: group
        state: absent
```

5. Save the file.
6. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the **secret.yml** file, and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory automember-group-absent.yml
```

#### Additional resources

- See [Benefits of automatic group membership](#) and [Automember rules](#).
- See the **README-automember.md** file in the **/usr/share/doc/ansible-freeipa/** directory.
- See the **/usr/share/doc/ansible-freeipa/playbooks/automember** directory.

## 19.6. USING ANSIBLE TO ENSURE THAT A CONDITION IS PRESENT IN AN IDM HOST GROUP AUTOMEMBER RULE

Follow this procedure to use Ansible to ensure that a condition is present in an IdM host group automember rule. The example describes how to ensure that hosts with the **FQDN** of **\*.idm.example.com** are members of the **primary\_dns\_domain\_hosts** host group and hosts whose **FQDN** is **\*.example.org** are not members of the **primary\_dns\_domain\_hosts** host group.

## Prerequisites

- You know the IdM **admin** password.
- The **primary\_dns\_domain\_hosts** host group and automember host group rule exist in IdM.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipadmin\_password**.

## Procedure

1. Navigate to your `~/MyPlaybooks/` directory:

```
$ cd ~/MyPlaybooks/
```

2. Copy the **automember-hostgroup-rule-present.yml** Ansible playbook file located in the `/usr/share/doc/ansible-freeipa/playbooks/automember/` directory:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/automember/automember-hostgroup-rule-present.yml automember-hostgroup-rule-present-copy.yml
```

3. Open the **automember-hostgroup-rule-present-copy.yml** file for editing.
4. Adapt the file by setting the following variables in the **ipaautomember** task section:
  - Set the **ipadmin\_password** variable to the password of the IdM **admin**.
  - Set the **name** variable to **primary\_dns\_domain\_hosts**.
  - Set the **automember\_type** variable to **hostgroup**.
  - Ensure that the **state** variable is set to **present**.
  - Ensure that the **action** variable is set to **member**.
  - Ensure that the **inclusive key** variable is set to **fqdn**.
  - Set the corresponding **inclusive expression** variable to **\*.idm.example.com**.
  - Set the **exclusive key** variable to **fqdn**.
  - Set the corresponding **exclusive expression** variable to **\*.example.org**.

This is the modified Ansible playbook file for the current example:

```
---
- name: Automember user group rule member present
  hosts: ipaserver
  vars_files:
```

```
- /home/user_name/MyPlaybooks/secret.yml
tasks:
- name: Ensure an automember condition for a user group is present
  ipaautomember:
    ipaadmin_password: "{{ ipaadmin_password }}"
    name: primary_dns_domain_hosts
    automember_type: hostgroup
    state: present
    action: member
    inclusive:
      - key: fqdn
        expression: *.idm.example.com
    exclusive:
      - key: fqdn
        expression: *.example.org
```

5. Save the file.
6. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the **secret.yml** file, and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory automember-
hostgroup-rule-present-copy.yml
```

#### Additional resources

- See [Applying automember rules to existing entries using the IdM CLI](#) .
- See [Benefits of automatic group membership](#) and [Automember rules](#).
- See the **README-automember.md** file in the **/usr/share/doc/ansible-freeipa/** directory.
- See the **/usr/share/doc/ansible-freeipa/playbooks/automember** directory.

## 19.7. ADDITIONAL RESOURCES

- [Managing user accounts using Ansible playbooks](#)
- [Managing hosts using Ansible playbooks](#)
- [Managing user groups using Ansible playbooks](#)
- [Managing host groups using the IdM CLI](#)

## CHAPTER 20. ACCESS CONTROL IN IDM

Access control defines the rights or permissions users have been granted to perform operations on other users or objects, such as hosts or services. Identity Management (IdM) provides several access control areas to make it clear what kind of access is being granted and to whom it is granted. As part of this, IdM draws a distinction between access control to resources within the domain and access control to the IdM configuration itself.

This chapter outlines the different internal access control mechanisms that are available for IdM users both to the resources within the domain and to the IdM configuration itself.

### 20.1. ACCESS CONTROL INSTRUCTIONS IN IDM

The Identity Management (IdM) access control structure is based on the 389 Directory Server access control. By using access control instructions (ACIs), you can grant or deny specific IdM users access over other entries. All entries, including IdM users, are stored in LDAP.

An ACI has three parts:

#### Actor

The entity that is being granted permission to do something. In LDAP access control models, you can, for example, specify that the ACI rule is applied only when a user binds to the directory using their distinguished name (DN). Such a specification is called the *bind rule*: it defines who the user is and can optionally require other limits on the bind attempt, such as restricting attempts to a certain time of day or a certain machine.

#### Target

The entry that the actor is allowed to perform operations on.

#### Operation type

Determines what kinds of actions the actor is allowed to perform. The most common operations are add, delete, write, read, and search. In IdM, the read and search rights of a non-administrative user are limited, and even more so in the IdM Web UI than the IdM CLI.

When an LDAP operation is attempted, the following occurs:

1. The IdM client sends user credentials to an IdM server as part of the bind operation.
2. The IdM server DS checks the user credentials.
3. The IdM server DS checks the user account to see if the user has a permission to perform the requested operation.

### 20.2. ACCESS CONTROL METHODS IN IDM

Identity Management (IdM) divides access control methods into the following categories:

#### Self-service rules

Define what operations a user can perform on the user's own personal entry. This access control type only allows write permissions to specific attributes within the user entry. Users can update the values of specific attributes but cannot add or delete the attributes as such.

#### Delegation rules

By using a delegation rule, you can allow a specific user group to perform write, that is edit, operations on specific attributes of users in another user group. Similarly to self-service rules, this

form of access control rule is limited to editing the values of specific attributes. It does not grant the ability to add or remove whole entries or control over unspecified attributes.

### Role-based access control

Creates special access control groups that are then granted much broader authority over all types of entities in the IdM domain. Roles can be granted edit, add, and delete rights, meaning they can be granted complete control over entire entries, not just selected attributes.

Certain roles are already available in IdM by default, for example **Enrollment Administrator**, **IT Security Specialist**, and **IT Specialist**. You can create additional roles to manage any types of entries, such as hosts, automount configuration, netgroups, DNS settings, and IdM configuration.

### Additional resources

- [Using Ansible playbooks to manage self-service rules in IdM](#)
- [Delegating permissions to user groups to manage users using Ansible playbooks](#)
- [Using Ansible playbooks to manage role-based access control in IdM](#)



## CHAPTER 21. MANAGING SELF-SERVICE RULES IN IDM USING THE CLI

Learn about self-service rules in Identity Management (IdM) and how to create and edit self-service access rules in the command-line interface (CLI).

### 21.1. SELF-SERVICE ACCESS CONTROL IN IDM

Self-service access control rules define which operations an Identity Management (IdM) entity can perform on its IdM Directory Server entry: for example, IdM users have the ability to update their own passwords.

This method of control allows an authenticated IdM entity to edit specific attributes within its LDAP entry, but does not allow **add** or **delete** operations on the entire entry.



#### WARNING

Be careful when working with self-service access control rules: configuring access control rules improperly can inadvertently elevate an entity's privileges.

### 21.2. CREATING SELF-SERVICE RULES USING THE CLI

Follow this procedure to create self-service access rules in IdM using the command-line interface (CLI).

#### Prerequisites

- Administrator privileges for managing IdM or the **User Administrator** role.
- An active Kerberos ticket. For details, see [Using kinit to log in to IdM manually](#) .

#### Procedure

- To add a self-service rule, use the **ipa selfservice-add** command and specify the following two options:

##### **--permissions**

sets the **read** and **write** permissions the Access Control Instruction (ACI) grants.

##### **--attrs**

sets the complete list of attributes to which this ACI grants permission.

For example, to create a self-service rule allowing users to modify their own name details:

```
$ ipa selfservice-add "Users can manage their own name details" --permissions=write --
attrs=givenname --attrs=displayname --attrs=title --attrs=initials
```

```
-----
Added selfservice "Users can manage their own name details"
-----
```

Self-service name: Users can manage their own name details  
 Permissions: write  
 Attributes: givenname, displayname, title, initials

## 21.3. EDITING SELF-SERVICE RULES USING THE CLI

Follow this procedure to edit self-service access rules in IdM using the command-line interface (CLI).

### Prerequisites

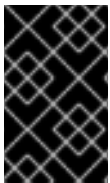
- Administrator privileges for managing IdM or the **User Administrator** role.
- An active Kerberos ticket. For details, see [Using kinit to log in to IdM manually](#).

### Procedure

1. *Optional:* Display existing self-service rules with the **ipa selfservice-find** command.
2. *Optional:* Display details for the self-service rule you want to modify with the **ipa selfservice-show** command.
3. Use the **ipa selfservice-mod** command to edit a self-service rule.

For example:

```
$ ipa selfservice-mod "Users can manage their own name details" --attrs=givenname --
attrs=displayname --attrs=title --attrs=initials --attrs=surname
-----
Modified selfservice "Users can manage their own name details"
-----
Self-service name: Users can manage their own name details
Permissions: write
Attributes: givenname, displayname, title, initials
```



### IMPORTANT

Using the **ipa selfservice-mod** command overwrites the previously defined permissions and attributes, so always include the complete list of existing permissions and attributes along with any new ones you want to define.

### Verification steps

- Use the **ipa selfservice-show** command to display the self-service rule you edited.

```
$ ipa selfservice-show "Users can manage their own name details"
-----
Self-service name: Users can manage their own name details
Permissions: write
Attributes: givenname, displayname, title, initials
```

## 21.4. DELETING SELF-SERVICE RULES USING THE CLI

Follow this procedure to delete self-service access rules in IdM using the command-line interface (CLI).

## Prerequisites

- Administrator privileges for managing IdM or the **User Administrator** role.
- An active Kerberos ticket. For details, see [Using kinit to log in to IdM manually](#) .

## Procedure

- Use the **ipa selfservice-del** command to delete a self-service rule.

For example:

```
$ ipa selfservice-del "Users can manage their own name details"
```

```
-----  
Deleted selfservice "Users can manage their own name details"  
-----
```

## Verification steps

- Use the **ipa selfservice-find** command to display all self-service rules. The rule you just deleted should be missing.

## CHAPTER 22. MANAGING SELF-SERVICE RULES USING THE IDM WEB UI

Learn about self-service rules in Identity Management (IdM) and how to create and edit self-service access rules in the web interface (IdM Web UI).

### 22.1. SELF-SERVICE ACCESS CONTROL IN IDM

Self-service access control rules define which operations an Identity Management (IdM) entity can perform on its IdM Directory Server entry: for example, IdM users have the ability to update their own passwords.

This method of control allows an authenticated IdM entity to edit specific attributes within its LDAP entry, but does not allow **add** or **delete** operations on the entire entry.



#### WARNING

Be careful when working with self-service access control rules: configuring access control rules improperly can inadvertently elevate an entity's privileges.

### 22.2. CREATING SELF-SERVICE RULES USING THE IDM WEB UI

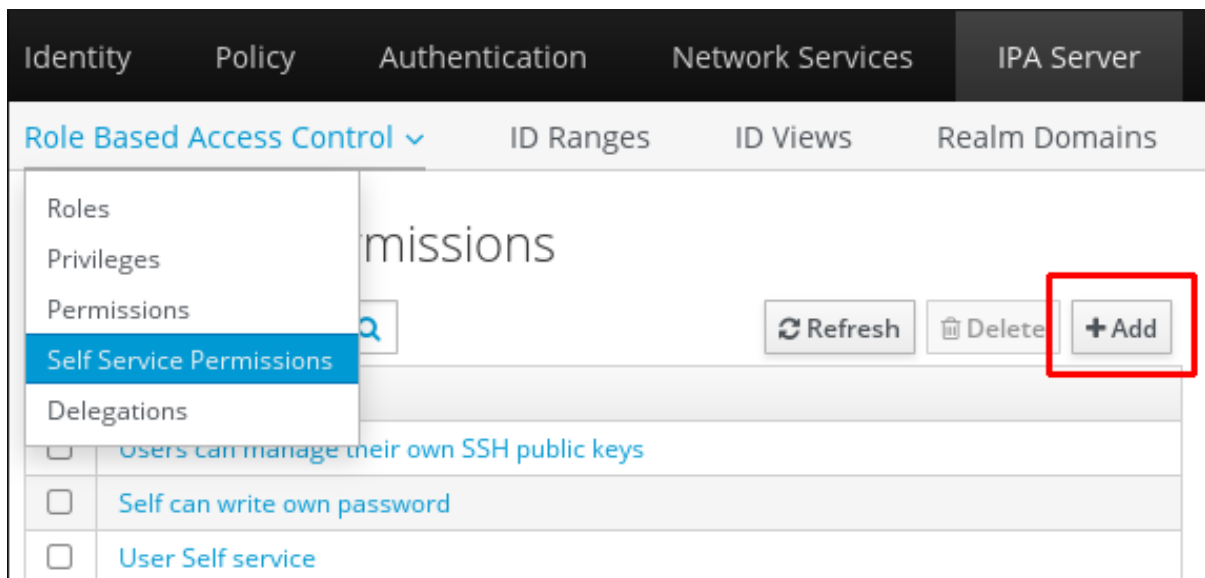
Follow this procedure to create self-service access rules in IdM using the web interface (IdM Web UI).

#### Prerequisites

- Administrator privileges for managing IdM or the **User Administrator** role.
- You are logged-in to the IdM Web UI. For details, see [Accessing the IdM Web UI in a web browser](#).

#### Procedure

1. Open the **Role-Based Access Control** submenu in the **IPA Server** tab and select **Self Service Permissions**.
2. Click **Add** at the upper-right of the list of the self-service access rules:



3. The **Add Self Service Permission** window opens. Enter the name of the new self-service rule in the **Self-service name** field. Spaces are allowed:

The screenshot shows the 'Add Self Service Permission' window. The 'Self-service name' field contains 'Adding Personal Info'. The 'Attributes' section shows a list of attributes with checkboxes, including 'jpegphoto' and 'initials' which are checked.

4. Select the check boxes next to the attributes you want users to be able to edit.
5. *Optional:* If an attribute you want to provide access to is not listed, you can add a listing for it:
  - a. Click the **Add** button.
  - b. Enter the attribute name in the **Attribute** text field of the following **Add Custom Attribute** window.
  - c. Click the **OK** button to add the attribute

- d. Verify that the new attribute is selected
6. Click the **Add** button at the bottom of the form to save the new self-service rule. Alternatively, you can save and continue editing the self-service rule by clicking the **Add and Edit** button, or save and add further rules by clicking the **Add and Add another** button.

## 22.3. EDITING SELF-SERVICE RULES USING THE IDM WEB UI

Follow this procedure to edit self-service access rules in IdM using the web interface (IdM Web UI).

### Prerequisites

- Administrator privileges for managing IdM or the **User Administrator** role.
- You are logged-in to the IdM Web UI. For details, see [Accessing the IdM Web UI in a web browser](#).

### Procedure

1. Open the **Role-Based Access Control** submenu in the **IPA Server** tab and select **Self Service Permissions**.
2. Click on the name of the self-service rule you want to modify.

Self Service Permissions » User Self service

## Self Service Permission: User Self service

**Settings**

**Refresh** **Reset** **Update**

### General

**Self-service name** User Self service

**Attributes \***  **Add**

|  |  |
|--|--|
| <input type="checkbox"/> audio                               | <input checked="" type="checkbox"/> businesscategory |
| <input checked="" type="checkbox"/> carlicense               | <input checked="" type="checkbox"/> cn               |
| <input type="checkbox"/> departmentnumber                    | <input checked="" type="checkbox"/> description      |
| <input type="checkbox"/> destinationindicator                | <input checked="" type="checkbox"/> displayname      |
| <input type="checkbox"/> employeenumber                      | <input checked="" type="checkbox"/> employeetype     |
| <input checked="" type="checkbox"/> facsimiletelephonenumber | <input checked="" type="checkbox"/> gecoss           |
| <input type="checkbox"/> gidnumber                           | <input checked="" type="checkbox"/> givenname        |
| <input type="checkbox"/> homedirectory                       | <input checked="" type="checkbox"/> homephone        |
| <input type="checkbox"/> homepostaladdress                   | <input checked="" type="checkbox"/> inetuserhttpurl  |
| <input type="checkbox"/> inetuserstatus                      | <input checked="" type="checkbox"/> initials         |

3. The edit page only allows you to edit the list of attributes to you want to add or remove to the self-service rule. Select or deselect the appropriate check boxes.
4. Click the **Save** button to save your changes to the self-service rule.

## 22.4. DELETING SELF-SERVICE RULES USING THE IDM WEB UI

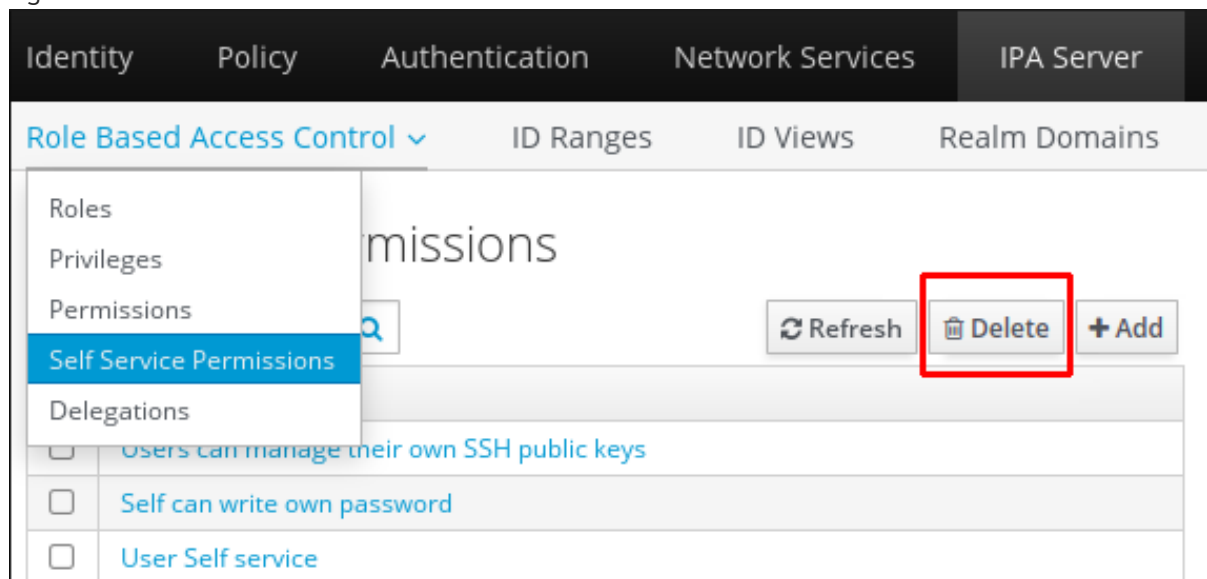
Follow this procedure to delete self-service access rules in IdM using the web interface (IdM Web UI).

### Prerequisites

- Administrator privileges for managing IdM or the **User Administrator** role.
- You are logged-in to the IdM Web UI. For details, see [Accessing the IdM Web UI in a web browser](#).

### Procedure

1. Open the **Role-Based Access Control** submenu in the **IPA Server** tab and select **Self Service Permissions**.
2. Select the check box next to the rule you want to delete, then click on the **Delete** button on the right of the list.



3. A dialog opens, click on **Delete** to confirm.

## CHAPTER 23. USING ANSIBLE PLAYBOOKS TO MANAGE SELF-SERVICE RULES IN IDM

This section introduces self-service rules in Identity Management (IdM) and describes how to create and edit self-service access rules using Ansible playbooks. Self-service access control rules allow an IdM entity to perform specified operations on its IdM Directory Server entry.

- [Self-service access control in IdM](#)
- [Using Ansible to ensure that a self-service rule is present](#)
- [Using Ansible to ensure that a self-service rule is absent](#)
- [Using Ansible to ensure that a self-service rule has specific attributes](#)
- [Using Ansible to ensure that a self-service rule does not have specific attributes](#)

### 23.1. SELF-SERVICE ACCESS CONTROL IN IDM

Self-service access control rules define which operations an Identity Management (IdM) entity can perform on its IdM Directory Server entry: for example, IdM users have the ability to update their own passwords.

This method of control allows an authenticated IdM entity to edit specific attributes within its LDAP entry, but does not allow **add** or **delete** operations on the entire entry.



#### WARNING

Be careful when working with self-service access control rules: configuring access control rules improperly can inadvertently elevate an entity's privileges.

### 23.2. USING ANSIBLE TO ENSURE THAT A SELF-SERVICE RULE IS PRESENT

The following procedure describes how to use an Ansible playbook to define self-service rules and ensure their presence on an Identity Management (IdM) server. In this example, the new **Users can manage their own name details** rule grants users the ability to change their own **givenname**, **displayname**, **title** and **initials** attributes. This allows them to, for example, change their display name or initials if they want to.

#### Prerequisites

- You know the IdM administrator password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.



- The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
- The example assumes that the `secret.yml` Ansible vault stores your `ipaadmin_password`.

## Procedure

1. Navigate to the `~/MyPlaybooks/` directory:

```
$ cd ~/MyPlaybooks/
```

2. Make a copy of the `selfservice-present.yml` file located in the `/usr/share/doc/ansible-freeipa/playbooks/selfservice/` directory:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/selfservice/selfservice-present.yml
selfservice-present-copy.yml
```

3. Open the `selfservice-present-copy.yml` Ansible playbook file for editing.
4. Adapt the file by setting the following variables in the `ipaselfservice` task section:
  - Set the `ipaadmin_password` variable to the password of the IdM administrator.
  - Set the `name` variable to the name of the new self-service rule.
  - Set the `permission` variable to a comma-separated list of permissions to grant: `read` and `write`.
  - Set the `attribute` variable to a list of attributes that users can manage themselves: `givenname`, `displayname`, `title`, and `initials`.

This is the modified Ansible playbook file for the current example:

```
---
- name: Self-service present
  hosts: ipaserver

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - name: Ensure self-service rule "Users can manage their own name details" is present
    ipaselfservice:
      ipaadmin_password: "{{ ipaadmin_password }}"
      name: "Users can manage their own name details"
      permission: read, write
      attribute:
      - givenname
      - displayname
      - title
      - initials
```

5. Save the file.
6. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the `secret.yml` file, and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory selfservice-present-copy.yml
```

### Additional resources

- See [Self-service access control in IdM](#).
- See the **README-selfservice.md** file in the `/usr/share/doc/ansible-freeipa/` directory.
- See the `/usr/share/doc/ansible-freeipa/playbooks/selfservice` directory.

## 23.3. USING ANSIBLE TO ENSURE THAT A SELF-SERVICE RULE IS ABSENT

The following procedure describes how to use an Ansible playbook to ensure a specified self-service rule is absent from your IdM configuration. The example below describes how to make sure the **Users can manage their own name details** self-service rule does not exist in IdM. This will ensure that users cannot, for example, change their own display name or initials.

### Prerequisites

- You know the IdM administrator password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipaadmin\_password**.

### Procedure

1. Navigate to the `~/MyPlaybooks/` directory:

```
$ cd ~/MyPlaybooks/
```

2. Make a copy of the **selfservice-absent.yml** file located in the `/usr/share/doc/ansible-freeipa/playbooks/selfservice/` directory:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/selfservice/selfservice-absent.yml selfservice-absent-copy.yml
```

3. Open the **selfservice-absent-copy.yml** Ansible playbook file for editing.
4. Adapt the file by setting the following variables in the **ipaselfservice** task section:
  - Set the **ipaadmin\_password** variable to the password of the IdM administrator.
  - Set the **name** variable to the name of the self-service rule.

- Set the **state** variable to **absent**.

This is the modified Ansible playbook file for the current example:

```
---
- name: Self-service absent
  hosts: ipaserver

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - name: Ensure self-service rule "Users can manage their own name details" is absent
    ipaselfservice:
      ipaadmin_password: "{{ ipaadmin_password }}"
      name: "Users can manage their own name details"
      state: absent
```

5. Save the file.
6. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the **secret.yml** file, and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory selfservice-absent-copy.yml
```

#### Additional resources

- See [Self-service access control in IdM](#).
- See the **README-selfservice.md** file in the `/usr/share/doc/ansible-freeipa/` directory.
- See the sample playbooks in the `/usr/share/doc/ansible-freeipa/playbooks/selfservice` directory.

## 23.4. USING ANSIBLE TO ENSURE THAT A SELF-SERVICE RULE HAS SPECIFIC ATTRIBUTES

The following procedure describes how to use an Ansible playbook to ensure that an already existing self-service rule has specific settings. In the example, you ensure the **Users can manage their own name details** self-service rule also has the **surname** member attribute.

#### Prerequisites

- You know the IdM administrator password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.

- The example assumes that the **secret.yml** Ansible vault stores your **ipaadmin\_password**.
- The **Users can manage their own name details** self-service rule exists in IdM.

## Procedure

1. Navigate to the **~/MyPlaybooks/** directory:

```
$ cd ~/MyPlaybooks/
```

2. Make a copy of the **selfservice-member-present.yml** file located in the **/usr/share/doc/ansible-freeipa/playbooks/selfservice/** directory:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/selfservice/selfservice-member-present.yml selfservice-member-present-copy.yml
```

3. Open the **selfservice-member-present-copy.yml** Ansible playbook file for editing.
4. Adapt the file by setting the following variables in the **ipaselfservice** task section:
  - Set the **ipaadmin\_password** variable to the password of the IdM administrator.
  - Set the **name** variable to the name of the self-service rule to modify.
  - Set the **attribute** variable to **surname**.
  - Set the **action** variable to **member**.

This is the modified Ansible playbook file for the current example:

```
---
- name: Self-service member present
  hosts: ipaserver

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - name: Ensure selfservice "Users can manage their own name details" member attribute
    surname is present
    ipaselfservice:
      ipaadmin_password: "{{ ipaadmin_password }}"
      name: "Users can manage their own name details"
      attribute:
      - surname
      action: member
```

5. Save the file.
6. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the **secret.yml** file, and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory selfservice-member-present-copy.yml
```

## Additional resources

- See [Self-service access control in IdM](#).
- See the **README-selfservice.md** file available in the `/usr/share/doc/ansible-freeipa/` directory.
- See the sample playbooks in the `/usr/share/doc/ansible-freeipa/playbooks/selfservice` directory.

## 23.5. USING ANSIBLE TO ENSURE THAT A SELF-SERVICE RULE DOES NOT HAVE SPECIFIC ATTRIBUTES

The following procedure describes how to use an Ansible playbook to ensure that a self-service rule does not have specific settings. You can use this playbook to make sure a self-service rule does not grant undesired access. In the example, you ensure the **Users can manage their own name details** self-service rule does not have the **givenname** and **surname** member attributes.

### Prerequisites

- You know the IdM administrator password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the `secret.yml` Ansible vault stores your `ipadmin_password`.
- The **Users can manage their own name details** self-service rule exists in IdM.

### Procedure

1. Navigate to the `~/MyPlaybooks/` directory:

```
$ cd ~/MyPlaybooks/
```

2. Make a copy of the `selfservice-member-absent.yml` file located in the `/usr/share/doc/ansible-freeipa/playbooks/selfservice/` directory:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/selfservice/selfservice-member-absent.yml selfservice-member-absent-copy.yml
```

3. Open the `selfservice-member-absent-copy.yml` Ansible playbook file for editing.
4. Adapt the file by setting the following variables in the `ipaselfservice` task section:
  - Set the `ipadmin_password` variable to the password of the IdM administrator.
  - Set the `name` variable to the name of the self-service rule you want to modify.

- Set the **attribute** variable to **givenname** and **surname**.
- Set the **action** variable to **member**.
- Set the **state** variable to **absent**.

This is the modified Ansible playbook file for the current example:

```
---
- name: Self-service member absent
  hosts: ipaserver

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - name: Ensure selfservice "Users can manage their own name details" member attributes
    givenname and surname are absent
    ipaselfservice:
      ipaadmin_password: "{{ ipaadmin_password }}"
      name: "Users can manage their own name details"
      attribute:
      - givenname
      - surname
      action: member
      state: absent
```

5. Save the file.
6. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the **secret.yml** file, and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory selfservice-
member-absent-copy.yml
```

### Additional resources

- See [Self-service access control in IdM](#) .
- See the **README-selfservice.md** file in the **/usr/share/doc/ansible-freeipa/** directory.
- See the sample playbooks in the **/usr/share/doc/ansible-freeipa/playbooks/selfservice** directory.

## CHAPTER 24. DELEGATING PERMISSIONS TO USER GROUPS TO MANAGE USERS USING IDM CLI

Delegation is one of the access control methods in IdM, along with self-service rules and role-based access control (RBAC). You can use delegation to assign permissions to one group of users to manage entries for another group of users.

This section covers the following topics:

- [Delegation rules](#)
- [Creating a delegation rule using IdM CLI](#)
- [Viewing existing delegation rules using IdM CLI](#)
- [Modifying a delegation rule using IdM CLI](#)
- [Deleting a delegation rule using IdM CLI](#)

### 24.1. DELEGATION RULES

You can delegate permissions to user groups to manage users by creating **delegation rules**.

Delegation rules allow a specific user group to perform write (edit) operations on specific attributes for users in another user group. This form of access control rule is limited to editing the values of a subset of attributes you specify in a delegation rule; it does not grant the ability to add or remove whole entries or control over unspecified attributes.

Delegation rules grant permissions to existing user groups in IdM. You can use delegation to, for example, allow the **managers** user group to manage selected attributes of users in the **employees** user group.

### 24.2. CREATING A DELEGATION RULE USING IDM CLI

Follow this procedure to create a delegation rule using the IdM CLI.

#### Prerequisites

- You are logged in as a member of the **admins** group.

#### Procedure

- Enter the **ipa delegation-add** command. Specify the following options:
  - **--group**: the group who *is being granted permissions* to the entries of users in the user group.
  - **--membergroup**: the group *whose entries can be edited* by members of the delegation group.
  - **--permissions**: whether users will have the right to view the given attributes ( *read*) and add or change the given attributes (*write*). If you do not specify permissions, only the *write* permission will be added.
  - **--attrs**: the attributes which users in the member group are allowed to view or edit.

For example:

```
$ ipa delegation-add "basic manager attributes" --permissions=read --permissions=write --
attrs=businesscategory --attrs=departmentnumber --attrs=employeetype --
attrs=employeenumber --group=managers --membergroup=employees
```

```
-----
Added delegation "basic manager attributes"
-----
```

```
Delegation name: basic manager attributes
Permissions: read, write
Attributes: businesscategory, departmentnumber, employeetype, employeenumber
Member user group: employees
User group: managers
```

## 24.3. VIEWING EXISTING DELEGATION RULES USING IDM CLI

Follow this procedure to view existing delegation rules using the IdM CLI.

### Prerequisites

- You are logged in as a member of the **admins** group.

### Procedure

- Enter the **ipa delegation-find** command:

```
$ ipa delegation-find
-----
1 delegation matched
-----
Delegation name: basic manager attributes
Permissions: read, write
Attributes: businesscategory, departmentnumber, employeenumber, employeetype
Member user group: employees
User group: managers
-----
Number of entries returned 1
-----
```

## 24.4. MODIFYING A DELEGATION RULE USING IDM CLI

Follow this procedure to modify an existing delegation rule using the IdM CLI.



### IMPORTANT

The **--attrs** option overwrites whatever the previous list of supported attributes was, so always include the complete list of attributes along with any new attributes. This also applies to the **--permissions** option.

### Prerequisites

- You are logged in as a member of the **admins** group.



## Procedure

- Enter the **ipa delegation-mod** command with the desired changes. For example, to add the **displayname** attribute to the **basic manager attributes** example rule:

```
$ ipa delegation-mod "basic manager attributes" --attrs=businesscategory --
attrs=departmentnumber --attrs=employeeetype --attrs=employeenumber --
attrs=displayname
```

```
-----
Modified delegation "basic manager attributes"
-----
```

```
Delegation name: basic manager attributes
Permissions: read, write
Attributes: businesscategory, departmentnumber, employeeetype, employeenumber,
displayname
Member user group: employees
User group: managers
```

## 24.5. DELETING A DELEGATION RULE USING IDM CLI

Follow this procedure to delete an existing delegation rule using the IdM CLI.

### Prerequisites

- You are logged in as a member of the **admins** group.

## Procedure

- Enter the **ipa delegation-del** command.
- When prompted, enter the name of the delegation rule you want to delete:

```
$ ipa delegation-del
Delegation name: basic manager attributes
-----
Deleted delegation "basic manager attributes"
-----
```

## CHAPTER 25. DELEGATING PERMISSIONS TO USER GROUPS TO MANAGE USERS USING IDM WEBUI

Delegation is one of the access control methods in IdM, along with self-service rules and role-based access control (RBAC). You can use delegation to assign permissions to one group of users to manage entries for another group of users.

This section covers the following topics:

- [Delegation rules](#)
- [Creating a delegation rule using IdM WebUI](#)
- [Viewing existing delegation rules using IdM WebUI](#)
- [Modifying a delegation rule using IdM WebUI](#)
- [Deleting a delegation rule using IdM WebUI](#)

### 25.1. DELEGATION RULES

You can delegate permissions to user groups to manage users by creating **delegation rules**.

Delegation rules allow a specific user group to perform write (edit) operations on specific attributes for users in another user group. This form of access control rule is limited to editing the values of a subset of attributes you specify in a delegation rule; it does not grant the ability to add or remove whole entries or control over unspecified attributes.

Delegation rules grant permissions to existing user groups in IdM. You can use delegation to, for example, allow the **managers** user group to manage selected attributes of users in the **employees** user group.

### 25.2. CREATING A DELEGATION RULE USING IDM WEBUI

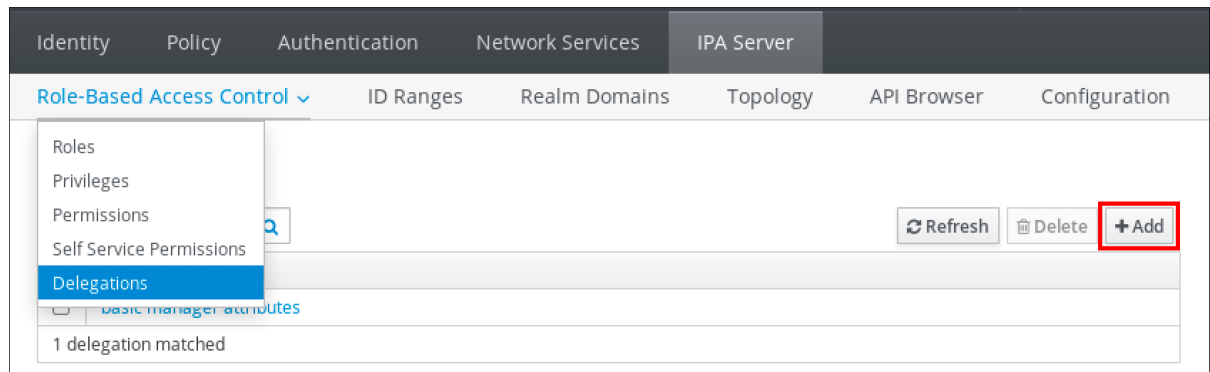
Follow this procedure to create a delegation rule using the IdM WebUI.

#### Prerequisites

- You are logged in to the IdM Web UI as a member of the **admins** group.

#### Procedure

1. From the **IPA Server** menu, click **Role-Based Access Control → Delegations**.
2. Click **Add**.



3. In the **Add delegation** window, do the following:
  - a. Name the new delegation rule.
  - b. Set the permissions by selecting the check boxes that indicate whether users will have the right to view the given attributes (*read*) and add or change the given attributes ( *write*).
  - c. In the User group drop-down menu, select the group *who is being granted permissions* to view or edit the entries of users in the member group.
  - d. In the **Member user group** drop-down menu, select the group *whose entries can be edited* by members of the delegation group.
  - e. In the attributes box, select the check boxes by the attributes to which you want to grant permissions.

Add delegation

Delegation name \*

Permissions

☒ read
☒ write

User group \*

Member user \*  
group

Attributes \*

☐ audio
☒ businesscategory

☐ carlicense
☐ cn

☒ departmentnumber
☐ description

☐ destinationindicator
☐ displayname

☒ employeeenumber
☒ employeetype

☐ facsimiletelephonenumber
☐ gecos

☐ gidnumber
☐ givenname

☐ homedirectory
☐ homephone

☐ homepostaladdress
☐ inetuserhttpurl

☐ inetuserstatus
☐ initials

☐ internationalisdnnumber
☐ ipacertmapdata

☐ ipakrbauthzdata
☐ ipanthash

☐ ipanthomedirectory
☐ ipanthomedirectorydrive

☐ ipantlogonscript
☐ ipantprofilepath

☐ ipantsecurityidentifier
☐ ipasshpubkey

☐ ipatokenradiusconfiglink
☐ ipatokenradiususername

☐ ipauniqueid
☐ ipauserauthtype

☐ jpegphoto
☐ krballowedtodelegateto

☐ krbcanonicalname
☐ krbextradata

\* Required field

Add
Add and Add Another
Add and Edit
Cancel

- f. Click the **Add** button to save the new delegation rule.

## 25.3. VIEWING EXISTING DELEGATION RULES USING IDM WEBUI

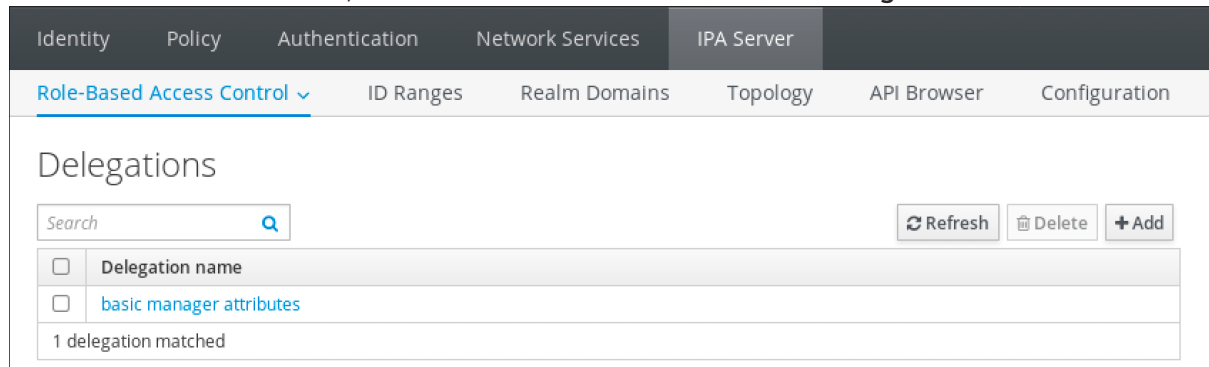
Follow this procedure to view existing delegation rules using the IdM WebUI.

### Prerequisites

- You are logged in to the IdM Web UI as a member of the **admins** group.

## Procedure

- From the **IPA Server** menu, click **Role-Based Access Control** → **Delegations**.



## 25.4. MODIFYING A DELEGATION RULE USING IDM WEBUI

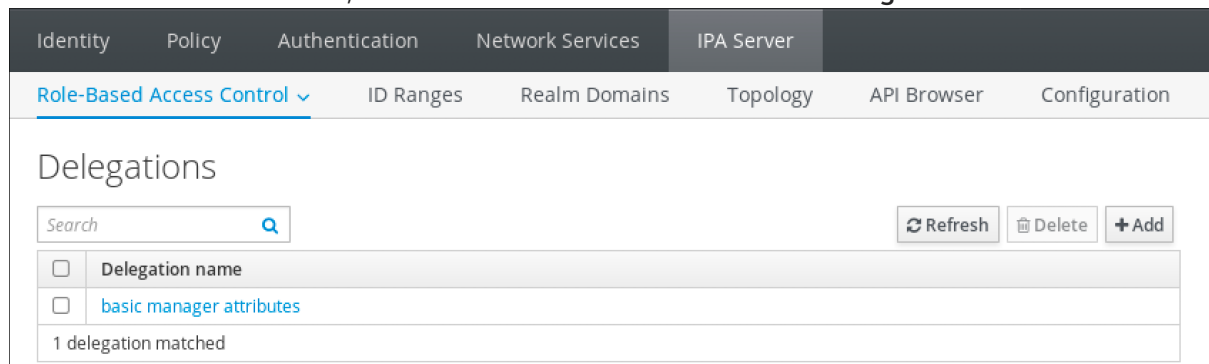
Follow this procedure to modify an existing delegation rule using the IdM WebUI.

### Prerequisites

- You are logged in to the IdM Web UI as a member of the **admins** group.

## Procedure

- From the **IPA Server** menu, click **Role-Based Access Control** → **Delegations**.



- Click on the rule you want to modify.
- Make the desired changes:
  - Change the name of the rule.
  - Change granted permissions by selecting the check boxes that indicate whether users will have the right to view the given attributes (*read*) and add or change the given attributes (*write*).
  - In the User group drop-down menu, select the group *who is being granted permissions* to view or edit the entries of users in the member group.
  - In the **Member user group** drop-down menu, select the group *whose entries can be edited* by members of the delegation group.

- In the attributes box, select the check boxes by the attributes to which you want to grant permissions. To remove permissions to an attribute, uncheck the relevant check box.

The screenshot shows the 'Delegations' page in the IdM WebUI. The breadcrumb is 'Delegations > basic manager attributes'. The page title is 'Delegation: basic manager attributes'. Below the title are buttons for 'Settings', 'Refresh', 'Revert', and 'Save' (highlighted with a red box). The 'General' section shows the delegation name 'basic manager attributes'. The 'Permissions' section has 'read' and 'write' checked, with an 'Undo' button. The 'User group' is 'managers' and the 'Member user group' is 'employees'. The 'Attributes' section has a filter box and an 'Add' button. A list of attributes is shown with checkboxes: 'audio', 'cn', 'destinationindicator', 'employeetype' (checked), 'gidnumber', 'homephone', 'inetuserstatus', 'ipacertmapdata', 'ipanthomedirectory', 'ipantprofilepath', 'businesscategory' (checked), 'departmentnumber' (checked), 'displayname' (checked), 'facsimiletelephonenumber', 'givenname', 'homepostaladdress', 'initials', 'ipakrbauthzdata', 'ipanthomedirectorydrive', 'ipantsecurityidentifier', 'carlicense', 'description', 'employeenumber' (checked), 'gecos', 'homedirectory' (checked), 'inetuserhttpurl', 'internationalisdnnumber', 'ipanthash', 'ipantlogonscript', and 'ipasshpubkey'.

- Click the **Save** button to save the changes.

## 25.5. DELETING A DELEGATION RULE USING IDM WEBUI

Follow this procedure to delete an existing delegation rule using the IdM WebUI.

### Prerequisites

- You are logged in to the IdM Web UI as a member of the **admins** group.

### Procedure

1. From the **IPA Server** menu, click **Role-Based Access Control** → **Delegations**.
2. Select the check box next to the rule you want to remove.
3. Click **Delete**.

The screenshot shows the 'Delegations' page in the IdM WebUI. The breadcrumb is 'Role-Based Access Control > ID Ranges > Realm Domains > Topology > API Browser > Configuration'. The page title is 'Delegations'. Below the title is a search box and buttons for 'Refresh', 'Delete' (highlighted with a red box), and '+ Add'. A table lists the delegations: 'basic manager attributes' is selected with a checked checkbox. Below the table, it says '1 delegation matched'.

4. Click **Delete** to confirm.

## CHAPTER 26. DELEGATING PERMISSIONS TO USER GROUPS TO MANAGE USERS USING ANSIBLE PLAYBOOKS

Delegation is one of the access control methods in IdM, along with self-service rules and role-based access control (RBAC). You can use delegation to assign permissions to one group of users to manage entries for another group of users.

This section covers the following topics:

- [Delegation rules](#)
- [Creating the Ansible inventory file for IdM](#)
- [Using Ansible to ensure that a delegation rule is present](#)
- [Using Ansible to ensure that a delegation rule is absent](#)
- [Using Ansible to ensure that a delegation rule has specific attributes](#)
- [Using Ansible to ensure that a delegation rule does not have specific attributes](#)

### 26.1. DELEGATION RULES

You can delegate permissions to user groups to manage users by creating **delegation rules**.

Delegation rules allow a specific user group to perform write (edit) operations on specific attributes for users in another user group. This form of access control rule is limited to editing the values of a subset of attributes you specify in a delegation rule; it does not grant the ability to add or remove whole entries or control over unspecified attributes.

Delegation rules grant permissions to existing user groups in IdM. You can use delegation to, for example, allow the **managers** user group to manage selected attributes of users in the **employees** user group.

### 26.2. CREATING AN ANSIBLE INVENTORY FILE FOR IDM

When working with Ansible, it is good practice to create, in your home directory, a subdirectory dedicated to Ansible playbooks that you copy and adapt from the **/usr/share/doc/ansible-freeipa/\*** and **/usr/share/doc/rhel-system-roles/\*** subdirectories. This practice has the following advantages:

- You can find all your playbooks in one place.
- You can run your playbooks without invoking **root** privileges.

#### Procedure

1. Create a directory for your Ansible configuration and playbooks in your home directory:

```
$ mkdir ~/MyPlaybooks/
```

2. Change into the **~/MyPlaybooks/** directory:

```
$ cd ~/MyPlaybooks
```



3. Create the `~/MyPlaybooks/ansible.cfg` file with the following content:

```
[defaults]
inventory = /home/<username>/MyPlaybooks/inventory

[privilege_escalation]
become=True
```

4. Create the `~/MyPlaybooks/inventory` file with the following content:

```
[eu]
server.idm.example.com

[us]
replica.idm.example.com

[ipaserver:children]
eu
us
```

This configuration defines two host groups, **eu** and **us**, for hosts in these locations. Additionally, this configuration defines the **ipaserver** host group, which contains all hosts from the **eu** and **us** groups.

## 26.3. USING ANSIBLE TO ENSURE THAT A DELEGATION RULE IS PRESENT

The following procedure describes how to use an Ansible playbook to define privileges for a new IdM delegation rule and ensure its presence. In the example, the new **basic manager attributes** delegation rule grants the **managers** group the ability to read and write the following attributes for members of the **employees** group:

- **businesscategory**
- **departmentnumber**
- **employeenumber**
- **employeeetype**

### Prerequisites

- You know the IdM administrator password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the `secret.yml` Ansible vault stores your `ipadmin_password`.

## Procedure

1. Navigate to the `~/MyPlaybooks/` directory:

```
$ cd ~/MyPlaybooks/
```

2. Make a copy of the **delegation-present.yml** file located in the `/usr/share/doc/ansible-freeipa/playbooks/delegation/` directory:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/delegation/delegation-present.yml
delegation-present-copy.yml
```

3. Open the **delegation-present-copy.yml** Ansible playbook file for editing.
4. Adapt the file by setting the following variables in the **ipadelegation** task section:
  - Set the **ipaadmin\_password** variable to the password of the IdM administrator.
  - Set the **name** variable to the name of the new delegation rule.
  - Set the **permission** variable to a comma-separated list of permissions to grant: **read** and **write**.
  - Set the **attribute** variable to a list of attributes the delegated user group can manage: **businesscategory**, **departmentnumber**, **employeenumber**, and **employeeetype**.
  - Set the **group** variable to the name of the group that is being given access to view or modify attributes.
  - Set the **membergroup** variable to the name of the group whose attributes can be viewed or modified.

This is the modified Ansible playbook file for the current example:

```
---
- name: Playbook to manage a delegation rule
  hosts: ipaserver

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml

  tasks:
  - name: Ensure delegation "basic manager attributes" is present
    ipadelegation:
      ipaadmin_password: "{{ ipaadmin_password }}"
      name: "basic manager attributes"
      permission: read, write
      attribute:
        - businesscategory
        - departmentnumber
        - employeenumber
        - employeeetype
      group: managers
      membergroup: employees
```

5. Save the file.

6. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the **secret.yml** file, and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i ~/MyPlaybooks/inventory
delegation-present-copy.yml
```

#### Additional resources

- See [Delegation rules](#).
- See the **README-delegation.md** file in the `/usr/share/doc/ansible-freeipa/` directory.
- See the sample playbooks in the `/usr/share/doc/ansible-freeipa/playbooks/ipadelegation` directory.

## 26.4. USING ANSIBLE TO ENSURE THAT A DELEGATION RULE IS ABSENT

The following procedure describes how to use an Ansible playbook to ensure a specified delegation rule is absent from your IdM configuration. The example below describes how to make sure the custom **basic manager attributes** delegation rule does not exist in IdM.

#### Prerequisites

- You know the IdM administrator password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipadmin\_password**.

#### Procedure

1. Navigate to the `~/MyPlaybooks/` directory:

```
$ cd ~/MyPlaybooks>/
```

2. Make a copy of the **delegation-absent.yml** file located in the `/usr/share/doc/ansible-freeipa/playbooks/delegation/` directory:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/delegation/delegation-present.yml
delegation-absent-copy.yml
```

3. Open the **delegation-absent-copy.yml** Ansible playbook file for editing.
4. Adapt the file by setting the following variables in the **ipadelegation** task section:
  - Set the **ipadmin\_password** variable to the password of the IdM administrator.

- Set the **name** variable to the name of the delegation rule.
- Set the **state** variable to **absent**.

This is the modified Ansible playbook file for the current example:

```
---
- name: Delegation absent
  hosts: ipaserver

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - name: Ensure delegation "basic manager attributes" is absent
    ipadelegation:
      ipadmin_password: "{{ ipadmin_password }}"
      name: "basic manager attributes"
      state: absent
```

5. Save the file.
6. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the **secret.yml** file, and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i ~/MyPlaybooks/inventory
delegation-absent-copy.yml
```

#### Additional resources

- See [Delegation rules](#).
- See the **README-delegation.md** file in the `/usr/share/doc/ansible-freeipa/` directory.
- See the sample playbooks in the `/usr/share/doc/ansible-freeipa/playbooks/ipadelegation` directory.

## 26.5. USING ANSIBLE TO ENSURE THAT A DELEGATION RULE HAS SPECIFIC ATTRIBUTES

The following procedure describes how to use an Ansible playbook to ensure that a delegation rule has specific settings. You can use this playbook to modify a delegation role you have previously created. In the example, you ensure the **basic manager attributes** delegation rule only has the **departmentnumber** member attribute.

#### Prerequisites

- You know the IdM administrator password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.

- The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
- The example assumes that the `secret.yml` Ansible vault stores your `ipaadmin_password`.
- The `basic manager attributes` delegation rule exists in IdM.

## Procedure

1. Navigate to the `~/MyPlaybooks/` directory:

```
$ cd ~/MyPlaybooks/
```

2. Make a copy of the `delegation-member-present.yml` file located in the `/usr/share/doc/ansible-freeipa/playbooks/delegation/` directory:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/delegation/delegation-member-present.yml delegation-member-present-copy.yml
```

3. Open the `delegation-member-present-copy.yml` Ansible playbook file for editing.
4. Adapt the file by setting the following variables in the `ipadelegation` task section:
  - Set the `ipaadmin_password` variable to the password of the IdM administrator.
  - Set the `name` variable to the name of the delegation rule to modify.
  - Set the `attribute` variable to `departmentnumber`.
  - Set the `action` variable to `member`.

This is the modified Ansible playbook file for the current example:

```
---
- name: Delegation member present
  hosts: ipaserver

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - name: Ensure delegation "basic manager attributes" member attribute departmentnumber
    is present
    ipadelegation:
      ipaadmin_password: "{{ ipaadmin_password }}"
      name: "basic manager attributes"
      attribute:
      - departmentnumber
      action: member
```

5. Save the file.
6. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the `secret.yml` file, and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i ~/MyPlaybooks/inventory
delegation-member-present-copy.yml
```

### Additional resources

- See [Delegation rules](#).
- See the **README-delegation.md** file in the `/usr/share/doc/ansible-freeipa/` directory.
- See the sample playbooks in the `/usr/share/doc/ansible-freeipa/playbooks/ipadelegation` directory.

## 26.6. USING ANSIBLE TO ENSURE THAT A DELEGATION RULE DOES NOT HAVE SPECIFIC ATTRIBUTES

The following procedure describes how to use an Ansible playbook to ensure that a delegation rule does not have specific settings. You can use this playbook to make sure a delegation role does not grant undesired access. In the example, you ensure the **basic manager attributes** delegation rule does not have the **employeenumber** and **employeetype** member attributes.

### Prerequisites

- You know the IdM administrator password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipadmin\_password**.
- The **basic manager attributes** delegation rule exists in IdM.

### Procedure

1. Navigate to the `~/MyPlaybooks/` directory:

```
$ cd ~/MyPlaybooks/
```

2. Make a copy of the **delegation-member-absent.yml** file located in the `/usr/share/doc/ansible-freeipa/playbooks/delegation/` directory:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/delegation/delegation-member-absent.yml delegation-member-absent-copy.yml
```

3. Open the **delegation-member-absent-copy.yml** Ansible playbook file for editing.
4. Adapt the file by setting the following variables in the **ipadelegation** task section:
  - Set the **ipadmin\_password** variable to the password of the IdM administrator.

- Set the **name** variable to the name of the delegation rule to modify.
- Set the **attribute** variable to **employeenumber** and **employeetype**.
- Set the **action** variable to **member**.
- Set the **state** variable to **absent**.

This is the modified Ansible playbook file for the current example:

```
---
- name: Delegation member absent
  hosts: ipaserver

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - name: Ensure delegation "basic manager attributes" member attributes employeenumber
    and employeetype are absent
    ipadelegation:
      ipaadmin_password: "{{ ipaadmin_password }}"
      name: "basic manager attributes"
      attribute:
        - employeenumber
        - employeetype
      action: member
      state: absent
```

5. Save the file.
6. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the **secret.yml** file, and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i ~/MyPlaybooks/inventory
delegation-member-absent-copy.yml
```

### Additional resources

- See [Delegation rules](#).
- See the **README-delegation.md** file in the **/usr/share/doc/ansible-freeipa/** directory.
- See the sample playbooks in the **/usr/share/doc/ansible-freeipa/playbooks/ipadelegation** directory.

## CHAPTER 27. MANAGING ROLE-BASED ACCESS CONTROLS IN IDM USING THE CLI

Learn more about role-based access control in Identity Management (IdM) and the following operations which are run in the command-line interface (CLI):

- [Managing permissions](#)
- [Managing privileges](#)
- [Managing roles](#)

### 27.1. ROLE-BASED ACCESS CONTROL IN IDM

Role-based access control (RBAC) in IdM grants a very different kind of authority to users compared to self-service and delegation access controls.

Role-based access control is composed of three parts:

- **Permissions** grant the right to perform a specific task such as adding or deleting users, modifying a group, enabling read-access, etc.
- **Privileges** combine permissions, for example all the permissions needed to add a new user.
- **Roles** grant a set of privileges to users, user groups, hosts or host groups.

#### 27.1.1. Permissions in IdM

Permissions are the lowest level unit of role-based access control, they define operations together with the LDAP entries to which those operations apply. Comparable to building blocks, permissions can be assigned to as many privileges as needed.

One or more **rights** define what operations are allowed:

- **write**
- **read**
- **search**
- **compare**
- **add**
- **delete**
- **all**

These operations apply to three basic **targets**:

- **subtree**: a domain name (DN); the subtree under this DN
- **target filter**: an LDAP filter
- **target**: DN with possible wildcards to specify entries

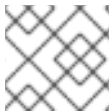
Additionally, the following convenience options set the corresponding attribute(s):



- **type**: a type of object (user, group, etc); sets **subtree** and **target filter**
- **memberof**: members of a group; sets a **target filter**
- **targetgroup**: grants access to modify a specific group (such as granting the rights to manage group membership); sets a **target**

With IdM permissions, you can control which users have access to which objects and even which attributes of these objects. IdM enables you to allow or block individual attributes or change the entire visibility of a specific IdM function, such as users, groups, or sudo, to all anonymous users, all authenticated users, or just a certain group of privileged users.

For example, the flexibility of this approach to permissions is useful for an administrator who wants to limit access of users or groups only to the specific sections these users or groups need to access and to make the other sections completely hidden to them.



#### NOTE

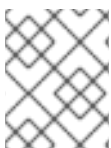
A permission cannot contain other permissions.

### 27.1.2. Default managed permissions

Managed permissions are permissions that come by default with IdM. They behave like other permissions created by the user, with the following differences:

- You cannot delete them or modify their name, location, and target attributes.
- They have three sets of attributes:
  - **Default** attributes, the user cannot modify them, as they are managed by IdM
  - **Included** attributes, which are additional attributes added by the user
  - **Excluded** attributes, which are attributes removed by the user

A managed permission applies to all attributes that appear in the default and included attribute sets but not in the excluded set.



#### NOTE

While you cannot delete a managed permission, setting its bind type to permission and removing the managed permission from all privileges effectively disables it.

Names of all managed permissions start with **System:**, for example **System: Add Sudo rule** or **System: Modify Services**. Earlier versions of IdM used a different scheme for default permissions. For example, the user could not delete them and was only able to assign them to privileges. Most of these default permissions have been turned into managed permissions, however, the following permissions still use the previous scheme:

- Add Automember Rebuild Membership Task
- Add Configuration Sub-Entries
- Add Replication Agreements
- Certificate Remove Hold

- Get Certificates status from the CA
- Read DNA Range
- Modify DNA Range
- Read PassSync Managers Configuration
- Modify PassSync Managers Configuration
- Read Replication Agreements
- Modify Replication Agreements
- Remove Replication Agreements
- Read LDBM Database Configuration
- Request Certificate
- Request Certificate ignoring CA ACLs
- Request Certificates from a different host
- Retrieve Certificates from the CA
- Revoke Certificate
- Write IPA Configuration



#### NOTE

If you attempt to modify a managed permission from the command line, the system does not allow you to change the attributes that you cannot modify, the command fails. If you attempt to modify a managed permission from the Web UI, the attributes that you cannot modify are disabled.

### 27.1.3. Privileges in IdM

A privilege is a group of permissions applicable to a role.

While a permission provides the rights to do a single operation, there are certain IdM tasks that require multiple permissions to succeed. Therefore, a privilege combines the different permissions required to perform a specific task.

For example, setting up an account for a new IdM user requires the following permissions:

- Creating a new user entry
- Resetting a user password
- Adding the new user to the default IPA users group

Combining these three low-level tasks into a higher level task in the form of a custom privilege named, for example, **Add User** makes it easier for a system administrator to manage roles. IdM already contains several default privileges. Apart from users and user groups, privileges are also assigned to hosts and host groups, as well as network services. This practice permits a fine-grained control of operations by a set of users on a set of hosts using specific network services.

**NOTE**

A privilege may not contain other privileges.

**27.1.4. Roles in IdM**

A role is a list of privileges that users specified for the role possess.

In effect, permissions grant the ability to perform given low-level tasks (create a user entry, add an entry to a group, etc.), privileges combine one or more of these permissions needed for a higher-level task (such as creating a new user in a given group). Roles gather privileges together as needed: for example, a User Administrator role would be able to add, modify, and delete users.

**IMPORTANT**

Roles are used to classify permitted actions. They are not used as a tool to implement privilege separation or to protect from privilege escalation.

**NOTE**

Roles can not contain other roles.

**27.1.5. Predefined roles in Identity Management**

Red Hat Identity Management provides the following range of pre-defined roles:

**Table 27.1. Predefined Roles in Identity Management**

| Role                     | Privilege  | Description  |
|--------------------------|--|--|
| Enrollment Administrator | Host Enrollment  | Responsible for client, or host, enrollment  |
| helpdesk                 | Modify Users and Reset passwords, Modify Group membership  | Responsible for performing simple user administration tasks  |
| IT Security Specialist   | Netgroups Administrators, HBAC Administrator, Sudo Administrator   | Responsible for managing security policy such as host-based access controls, sudo rules                        |
| IT Specialist            | Host Administrators, Host Group Administrators, Service Administrators, Automount Administrators             | Responsible for managing hosts   |
| Security Architect       | Delegation Administrator, Replication Administrators, Write IPA Configuration, Password Policy Administrator | Responsible for managing the Identity Management environment, creating trusts, creating replication agreements |

| Role               | Privilege  | Description                               |
|--------------------|--|---|
| User Administrator | User Administrators, Group Administrators, Stage User Administrators | Responsible for creating users and groups |

## 27.2. MANAGING IDM PERMISSIONS IN THE CLI

Follow this procedure to manage Identity Management (IdM) permissions using the command-line interface (CLI).

### Prerequisites

- Administrator privileges for managing IdM or the **User Administrator** role.
- An active Kerberos ticket. For details, see [Using kinit to log in to IdM manually](#).

### Procedure

- Create new permission entries with the **ipa permission-add** command.  
For example, to add a permission named *dns admin*:

```
$ ipa permission-add "dns admin"
```

- Specify the properties of the permission with the following options:

- bindtype** specifies the bind rule type. This option accepts the **all**, **anonymous**, and **permission** arguments. The **permission** bindtype means that only the users who are granted this permission via a role can exercise it.  
For example:

```
$ ipa permission-add "dns admin" --bindtype=all
```

If you do not specify **--bindtype**, then **permission** is the default value.



### NOTE

It is not possible to add permissions with a non-default bind rule type to privileges. You also cannot set a permission that is already present in a privilege to a non-default bind rule type.

- right** lists the rights granted by the permission, it replaces the deprecated **--permissions** option. The available values are **add**, **delete**, **read**, **search**, **compare**, **write**, **all**.  
You can set multiple attributes by using multiple **--right** options or with a comma-separated list inside curly braces. For example:

```
$ ipa permission-add "dns admin" --right=read --right=write
```

```
$ ipa permission-add "dns admin" --right={read,write}
```



## NOTE

**add** and **delete** are entry-level operations (for example deleting a user, adding a group, etc.) while **read**, **search**, **compare** and **write** are more attribute-level: you can write to **userCertificate** but not read **userPassword**.

- **--attrs** gives the list of attributes over which the permission is granted. You can set multiple attributes by using multiple **--attrs** options or by listing the options in a comma-separated list inside curly braces. For example:

```
$ ipa permission-add "dns admin" --attrs=description --attrs=automountKey
```

```
$ ipa permission-add "dns admin" --attrs={description,automountKey}
```

The attributes provided with **--attrs** must exist and be allowed attributes for the given object type, otherwise the command fails with schema syntax errors.

- **--type** defines the entry object type to which the permission applies, such as user, host, or service. Each type has its own set of allowed attributes. For example:

```
$ ipa permission-add "manage service" --right=all --type=service --attrs=krbprincipalkey -
--attrs=krbprincipalname --attrs=managedby
```

- **--subtree** gives a subtree entry; the filter then targets every entry beneath this subtree entry. Provide an existing subtree entry; **--subtree** does not accept wildcards or non-existent domain names (DNs). Include a DN within the directory. Because IdM uses a simplified, flat directory tree structure, **--subtree** can be used to target some types of entries, like automount locations, which are containers or parent entries for other configuration. For example:

```
$ ipa permission-add "manage automount locations" --
subtree="ldap://ldap.example.com:389/cn=automount,dc=example,dc=com" --right=write
--attrs=automountmapname --attrs=automountkey --attrs=automountInformation
```



## NOTE

The **--type** and **--subtree** options are mutually exclusive: you can see the inclusion of filters for **--type** as a simplification of **--subtree**, intending to make life easier for an admin.

- **--filter** uses an LDAP filter to identify which entries the permission applies to. IdM automatically checks the validity of the given filter. The filter can be any valid LDAP filter, for example:

```
$ ipa permission-add "manage Windows groups" --filter="(!(objectclass=posixgroup))" --
right=write --attrs=description
```

- **--memberof** sets the target filter to members of the given group after checking that the group exists. For example, to let the users with this permission modify the login shell of members of the engineers group:

```
$ ipa permission-add ManageShell --right="write" --type=user --attr=loginshell --
memberof=engineers
```

- **--targetgroup** sets target to the specified user group after checking that the group exists. For example, to let those with the permission write the member attribute in the engineers group (so they can add or remove members):

```
$ ipa permission-add ManageMembers --right="write" --
subtree=cn=groups,cn=accounts,dc=example,dc=test --attr=member --
targetgroup=engineers
```

- Optionally, you can specify a target domain name (DN):
  - **--target** specifies the DN to apply the permission to. Wildcards are accepted.
  - **--targetto** specifies the DN subtree where an entry can be moved to.
  - **--targetfrom** specifies the DN subtree from where an entry can be moved.

## 27.3. COMMAND OPTIONS FOR EXISTING PERMISSIONS

Use the following variants to modify existing permissions as needed:

- To edit existing permissions, use the **ipa permission-mod** command. You can use the same command options as for adding permissions.
- To find existing permissions, use the **ipa permission-find** command. You can use the same command options as for adding permissions.
- To view a specific permission, use the **ipa permission-show** command. The **--raw** argument shows the raw 389-ds ACI that is generated. For example:

```
$ ipa permission-show <permission> --raw
```

- The **ipa permission-del** command deletes a permission completely.

### Additional resources

- See the **ipa** man page.
- See the **ipa help** command.

## 27.4. MANAGING IDM PRIVILEGES IN THE CLI

Follow this procedure to manage Identity Management (IdM) privileges using the command-line interface (CLI).

### Prerequisites

- Administrator privileges for managing IdM or the **User Administrator** role.
- An active Kerberos ticket. For details, see link: [Using kinit to log in to IdM manually](#) .
- Existing permissions. For details about permissions, see [Managing IdM permissions in the CLI](#) .

## Procedure

1. Add privilege entries using the **ipa privilege-add** command  
For example, to add a privilege named *managing filesystems* with a description:

```
$ ipa privilege-add "managing filesystems" --desc="for filesystems"
```

2. Assign the required permissions to the privilege group with the **privilege-add-permission** command  
For example, to add the permissions named *managing automount* and *managing ftp services* to the *managing filesystems* privilege:

```
$ ipa privilege-add-permission "managing filesystems" --permissions="managing automount"
--permissions="managing ftp services"
```

## 27.5. COMMAND OPTIONS FOR EXISTING PRIVILEGES

Use the following variants to modify existing privileges as needed:

- To modify existing privileges, use the **ipa privilege-mod** command.
- To find existing privileges, use the **ipa privilege-find** command.
- To view a specific privilege, use the **ipa privilege-show** command.
- The **ipa privilege-remove-permission** command removes one or more permissions from a privilege.
- The **ipa privilege-del** command deletes a privilege completely.

### Additional resources

- See the **ipa** man page.
- See the **ipa help** command.

## 27.6. MANAGING IDM ROLES IN THE CLI

Follow this procedure to manage Identity Management (IdM) roles using the command-line interface (CLI).

### Prerequisites

- Administrator privileges for managing IdM or the **User Administrator** role.
- An active Kerberos ticket. For details, see [Using kinit to log in to IdM manually](#) .
- Existing privileges. For details about privileges, see [Managing IdM privileges in the CLI](#) .

## Procedure

1. Add new role entries using the **ipa role-add** command:

```
$ ipa role-add --desc="User Administrator" useradmin
```

```
-----  
Added role "useradmin"  
-----
```

```
Role name: useradmin
```

```
Description: User Administrator
```

2. Add the required privileges to the role using the **ipa role-add-privilege** command:

```
$ ipa role-add-privilege --privileges="user administrators" useradmin
```

```
Role name: useradmin
```

```
Description: User Administrator
```

```
Privileges: user administrators
```

```
-----  
Number of privileges added 1  
-----
```

3. Add the required members to the role using the **ipa role-add-member** command. Allowed member types are: users, groups, hosts and hostgroups.  
For example, to add the group named *useradmins* to the previously created *useradmin* role:

```
$ ipa role-add-member --groups=useradmins useradmin
```

```
Role name: useradmin
```

```
Description: User Administrator
```

```
Member groups: useradmins
```

```
Privileges: user administrators
```

```
-----  
Number of members added 1  
-----
```

## 27.7. COMMAND OPTIONS FOR EXISTING ROLES

Use the following variants to modify existing roles as needed:

- To modify existing roles, use the **ipa role-mod** command.
- To find existing roles, use the **ipa role-find** command.
- To view a specific role, use the **ipa role-show** command.
- To remove a member from the role, use the **ipa role-remove-member** command.
- The **ipa role-remove-privilege** command removes one or more privileges from a role.
- The **ipa role-del** command deletes a role completely.

### Additional resources

- See the **ipa** man page
- See the **ipa help** command.



## CHAPTER 28. MANAGING ROLE-BASED ACCESS CONTROLS USING THE IDM WEB UI

Learn more about role-based access control in Identity Management (IdM) and the following operations which are run in the web interface (Web UI):

- [Managing permissions](#)
- [Managing privileges](#)
- [Managing roles](#)

### 28.1. ROLE-BASED ACCESS CONTROL IN IDM

Role-based access control (RBAC) in IdM grants a very different kind of authority to users compared to self-service and delegation access controls.

Role-based access control is composed of three parts:

- **Permissions** grant the right to perform a specific task such as adding or deleting users, modifying a group, enabling read-access, etc.
- **Privileges** combine permissions, for example all the permissions needed to add a new user.
- **Roles** grant a set of privileges to users, user groups, hosts or host groups.

#### 28.1.1. Permissions in IdM

Permissions are the lowest level unit of role-based access control, they define operations together with the LDAP entries to which those operations apply. Comparable to building blocks, permissions can be assigned to as many privileges as needed.

One or more **rights** define what operations are allowed:

- **write**
- **read**
- **search**
- **compare**
- **add**
- **delete**
- **all**

These operations apply to three basic **targets**:

- **subtree**: a domain name (DN); the subtree under this DN
- **target filter**: an LDAP filter
- **target**: DN with possible wildcards to specify entries

Additionally, the following convenience options set the corresponding attribute(s):

- **type**: a type of object (user, group, etc); sets **subtree** and **target filter**
- **memberof**: members of a group; sets a **target filter**
- **targetgroup**: grants access to modify a specific group (such as granting the rights to manage group membership); sets a **target**

With IdM permissions, you can control which users have access to which objects and even which attributes of these objects. IdM enables you to allow or block individual attributes or change the entire visibility of a specific IdM function, such as users, groups, or sudo, to all anonymous users, all authenticated users, or just a certain group of privileged users.

For example, the flexibility of this approach to permissions is useful for an administrator who wants to limit access of users or groups only to the specific sections these users or groups need to access and to make the other sections completely hidden to them.



#### NOTE

A permission cannot contain other permissions.

### 28.1.2. Default managed permissions

Managed permissions are permissions that come by default with IdM. They behave like other permissions created by the user, with the following differences:

- You cannot delete them or modify their name, location, and target attributes.
- They have three sets of attributes:
  - **Default** attributes, the user cannot modify them, as they are managed by IdM
  - **Included** attributes, which are additional attributes added by the user
  - **Excluded** attributes, which are attributes removed by the user

A managed permission applies to all attributes that appear in the default and included attribute sets but not in the excluded set.



#### NOTE

While you cannot delete a managed permission, setting its bind type to permission and removing the managed permission from all privileges effectively disables it.

Names of all managed permissions start with **System:**, for example **System: Add Sudo rule** or **System: Modify Services**. Earlier versions of IdM used a different scheme for default permissions. For example, the user could not delete them and was only able to assign them to privileges. Most of these default permissions have been turned into managed permissions, however, the following permissions still use the previous scheme:

- Add Automember Rebuild Membership Task
- Add Configuration Sub-Entries
- Add Replication Agreements
- Certificate Remove Hold

- Get Certificates status from the CA
- Read DNA Range
- Modify DNA Range
- Read PassSync Managers Configuration
- Modify PassSync Managers Configuration
- Read Replication Agreements
- Modify Replication Agreements
- Remove Replication Agreements
- Read LDBM Database Configuration
- Request Certificate
- Request Certificate ignoring CA ACLs
- Request Certificates from a different host
- Retrieve Certificates from the CA
- Revoke Certificate
- Write IPA Configuration



#### NOTE

If you attempt to modify a managed permission from the command line, the system does not allow you to change the attributes that you cannot modify, the command fails. If you attempt to modify a managed permission from the Web UI, the attributes that you cannot modify are disabled.

### 28.1.3. Privileges in IdM

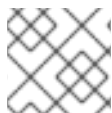
A privilege is a group of permissions applicable to a role.

While a permission provides the rights to do a single operation, there are certain IdM tasks that require multiple permissions to succeed. Therefore, a privilege combines the different permissions required to perform a specific task.

For example, setting up an account for a new IdM user requires the following permissions:

- Creating a new user entry
- Resetting a user password
- Adding the new user to the default IPA users group

Combining these three low-level tasks into a higher level task in the form of a custom privilege named, for example, **Add User** makes it easier for a system administrator to manage roles. IdM already contains several default privileges. Apart from users and user groups, privileges are also assigned to hosts and host groups, as well as network services. This practice permits a fine-grained control of operations by a set of users on a set of hosts using specific network services.

**NOTE**

A privilege may not contain other privileges.

**28.1.4. Roles in IdM**

A role is a list of privileges that users specified for the role possess.

In effect, permissions grant the ability to perform given low-level tasks (create a user entry, add an entry to a group, etc.), privileges combine one or more of these permissions needed for a higher-level task (such as creating a new user in a given group). Roles gather privileges together as needed: for example, a User Administrator role would be able to add, modify, and delete users.

**IMPORTANT**

Roles are used to classify permitted actions. They are not used as a tool to implement privilege separation or to protect from privilege escalation.

**NOTE**

Roles can not contain other roles.

**28.1.5. Predefined roles in Identity Management**

Red Hat Identity Management provides the following range of pre-defined roles:

**Table 28.1. Predefined Roles in Identity Management**

| Role                     | Privilege  | Description  |
|--------------------------|--|--|
| Enrollment Administrator | Host Enrollment  | Responsible for client, or host, enrollment  |
| helpdesk                 | Modify Users and Reset passwords, Modify Group membership  | Responsible for performing simple user administration tasks  |
| IT Security Specialist   | Netgroups Administrators, HBAC Administrator, Sudo Administrator   | Responsible for managing security policy such as host-based access controls, sudo rules                        |
| IT Specialist            | Host Administrators, Host Group Administrators, Service Administrators, Automount Administrators             | Responsible for managing hosts   |
| Security Architect       | Delegation Administrator, Replication Administrators, Write IPA Configuration, Password Policy Administrator | Responsible for managing the Identity Management environment, creating trusts, creating replication agreements |

| Role               | Privilege  | Description                               |
|--------------------|--|---|
| User Administrator | User Administrators, Group Administrators, Stage User Administrators | Responsible for creating users and groups |

## 28.2. MANAGING PERMISSIONS IN THE IDM WEB UI

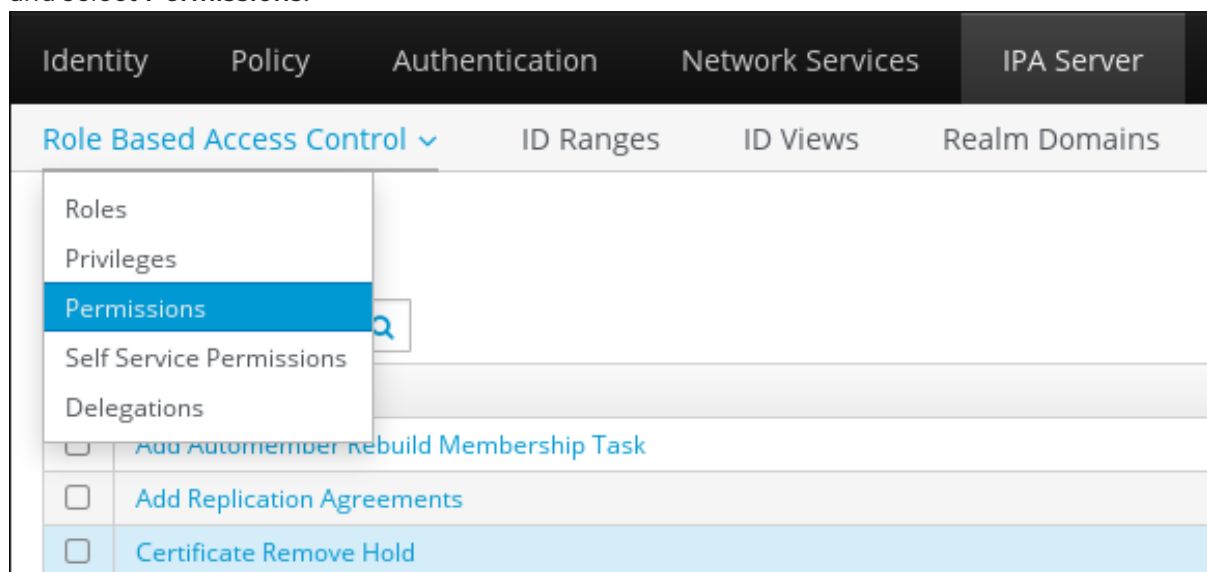
Follow this procedure to manage permissions in Identity Management (IdM) using the web interface (IdM Web UI).

### Prerequisites

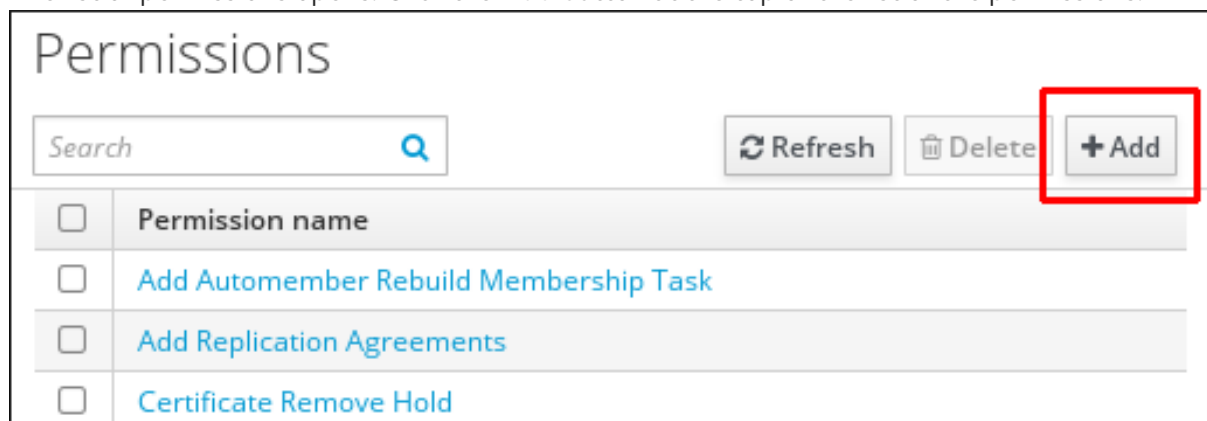
- Administrator privileges for managing IdM or the **User Administrator** role.
- You are logged-in to the IdM Web UI. For details, see [Accessing the IdM Web UI in a web browser](#).

### Procedure

1. To add a new permission, open the **Role-Based Access Control** submenu in the **IPA Server** tab and select **Permissions**:



2. The list of permissions opens: Click the **Add** button at the top of the list of the permissions:



3. The **Add Permission** form opens. Specify the name of the new permission and define its properties accordingly:

Add Permission

Permission name \*

New Permission

Bind rule type

☒ permission
 ☐ all
 ☐ anonymous

Granted rights \*

☒ read
 ☐ search
 ☐ compare
 ☐ write
 ☐ add
 ☐ delete
 ☐ all

Type

Subtree \*

dc=demo1,dc=freeipa,dc=org

Extra target filter

Add

Target DN

Member of group

employees

▼

Undo

Add

Effective attributes

uid

Undo

loginshell

Undo

Add

\* Required field

Add

Add and Add Another

Add and Edit

Cancel

4. Select the appropriate Bind rule type:

- **permission** is the default permission type, granting access through privileges and roles
- **all** specifies that the permission applies to all authenticated users
- **anonymous** specifies that the permission applies to all users, including unauthenticated users

**NOTE**

It is not possible to add permissions with a non-default bind rule type to privileges. You also cannot set a permission that is already present in a privilege to a non-default bind rule type.

5. Choose the rights to grant with this permission in **Granted rights**.
6. Define the method to identify the target entries for the permission:
  - **Type** specifies an entry type, such as user, host, or service. If you choose a value for the **Type** setting, a list of all possible attributes which will be accessible through this ACI for that entry type appears under **Effective Attributes**. Defining **Type** sets **Subtree** and **Target DN** to one of the predefined values.
  - **Subtree** (required) specifies a subtree entry; every entry beneath this subtree entry is then targeted. Provide an existing subtree entry, as **Subtree** does not accept wildcards or non-existent domain names (DNs). For example: **cn=automount,dc=example,dc=com**
  - **Extra target filter** uses an LDAP filter to identify which entries the permission applies to. The filter can be any valid LDAP filter, for example: **!(objectclass=posixgroup)** IdM automatically checks the validity of the given filter. If you enter an invalid filter, IdM warns you about this when you attempt to save the permission.
  - **Target DN** specifies the domain name (DN) and accepts wildcards. For example: **uid=\*,cn=users,cn=accounts,dc=com**
  - **Member of group** sets the target filter to members of the given group. After you specify the filter settings and click **Add**, IdM validates the filter. If all the permission settings are correct, IdM will perform the search. If some of the permissions settings are incorrect, IdM will display a message informing you about which setting is set incorrectly.
7. Add attributes to the permission:
  - If you set **Type**, choose the **Effective attributes** from the list of available ACI attributes.
  - If you did not use **Type**, add the attributes manually by writing them into the **Effective attributes** field. Add a single attribute at a time; to add multiple attributes, click **Add** to add another input field.

**IMPORTANT**

If you do not set any attributes for the permission, then the permissions includes all attributes by default.

8. Finish adding the permissions with the **Add** buttons at the bottom of the form:
  - Click the **Add** button to save the permission and go back to the list of permissions.
  - Alternatively, you can save the permission and continue adding additional permissions in the same form by clicking the **Add and Add another** button
  - The **Add and Edit** button enables you to save and continue editing the newly created permission.

9. *Optional.* You can also edit the properties of an existing permission by clicking its name from the list of permissions to display the **Permission settings** page.
10. *Optional.* If you need to remove an existing permission, click the **Delete** button once you ticked the check box next to its name in the list, to display The **Remove permissions** dialog.



## NOTE

Operations on default managed permissions are restricted: the attributes you cannot modify are disabled in the IdM Web UI and you cannot delete the managed permissions completely.

However, you can effectively disable a managed permission that has a bind type set to permission, by removing the managed permission from all privileges.



For example, to let those with the permission write the member attribute in the engineers group (so they can add or remove members):

Add permission

Permission name \*

ManageMembers

Bind rule type

☒ permission
 ☐ all
 ☐ anonymous

Granted rights \*

☐ read
 ☐ search
 ☐ compare
 ☒ write
 ☐ add
 ☐ delete
 ☐ all

Type

Subtree \*

dc=idm,dc=mylab,dc=local

Extra target filter

Add

Target DN

Member of group

engineers

Undo

Add

Effective attributes

member

Undo

Add

\* Required field

Add

Add and Add Another

Add and Edit

Cancel

## 28.3. MANAGING PRIVILEGES IN THE IDM WEBUI

Follow this procedure to manage privileges in IdM using the web interface (IdM Web UI).

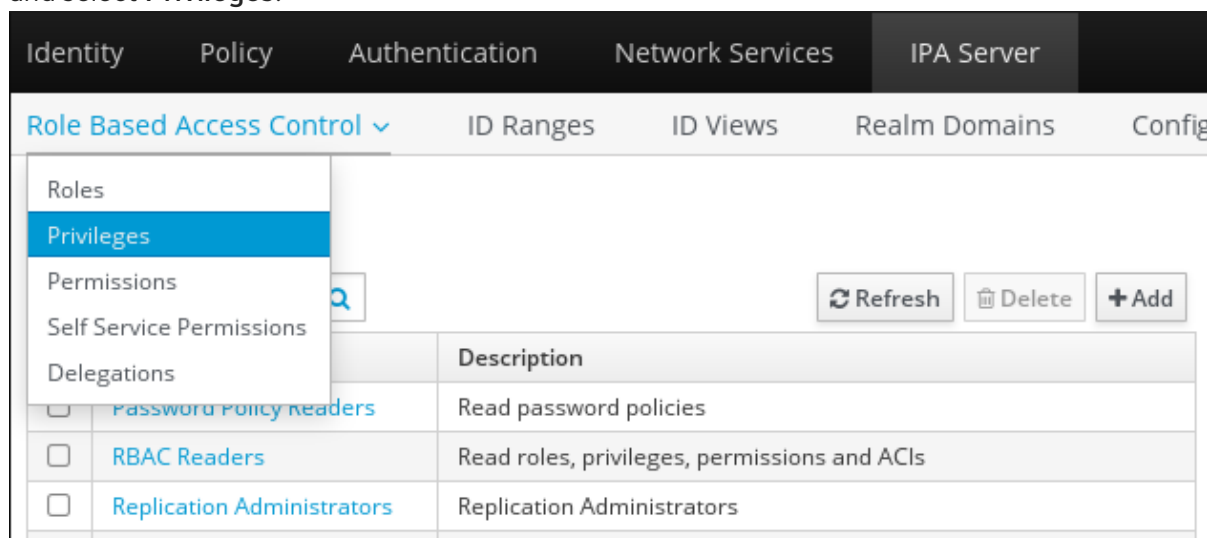
### Prerequisites

- Administrator privileges for managing IdM or the **User Administrator** role.
- You are logged-in to the IdM Web UI. For details, see [Accessing the IdM Web UI in a web browser](#).

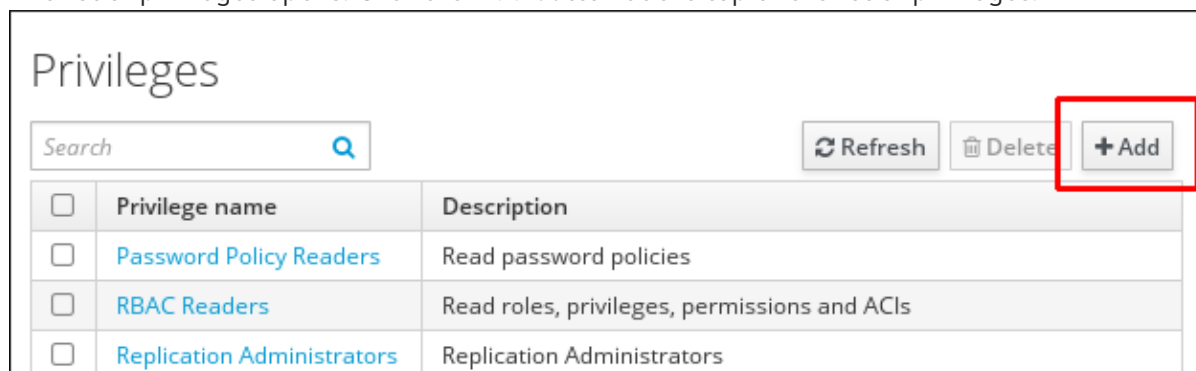
- Existing permissions. For details about permissions, see [Managing permissions in the IdM Web UI](#).

## Procedure

- To add a new privilege, open the **Role-Based Access Control** submenu in the **IPA Server** tab and select **Privileges**:



- The list of privileges opens. Click the **Add** button at the top of the list of privileges:

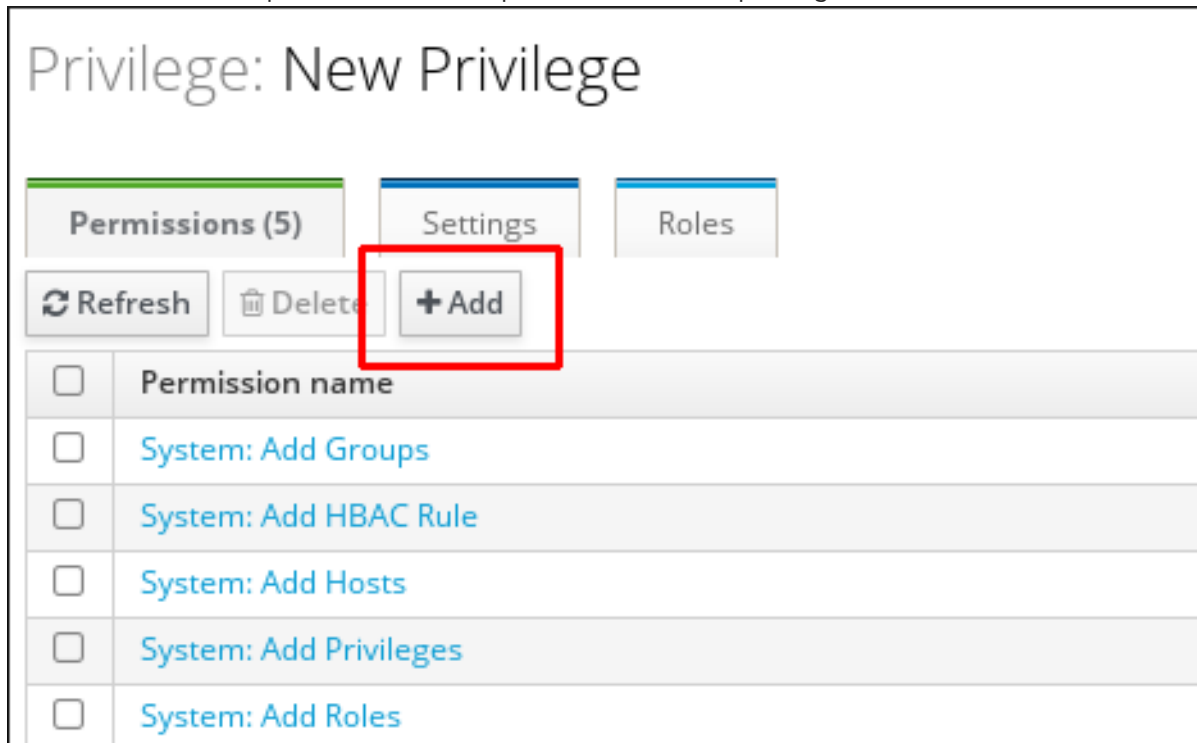


- The **Add Privilege** form opens. Enter the name and a description of the privilege:

The screenshot shows the 'Add Privilege' form. It has two input fields: 'Privilege name' (required) and 'Description'. The 'Privilege name' field contains 'New Privilege' and the 'Description' field contains 'For employees'. There are buttons for 'Add', 'Add and Add Another', 'Add and Edit', and 'Cancel' at the bottom. A note indicates that the asterisk (\*) denotes a required field.

- Click the **Add and Edit** button to save the new privilege and continue to the privilege configuration page to add permissions.
- Edit the properties of privileges by clicking on the privileges name in the privileges list. The privileges configuration page opens.

6. The **Permissions** tab displays a list of permissions included in the selected privilege. Click the **Add** button at the top of the list to add permissions to the privilege:



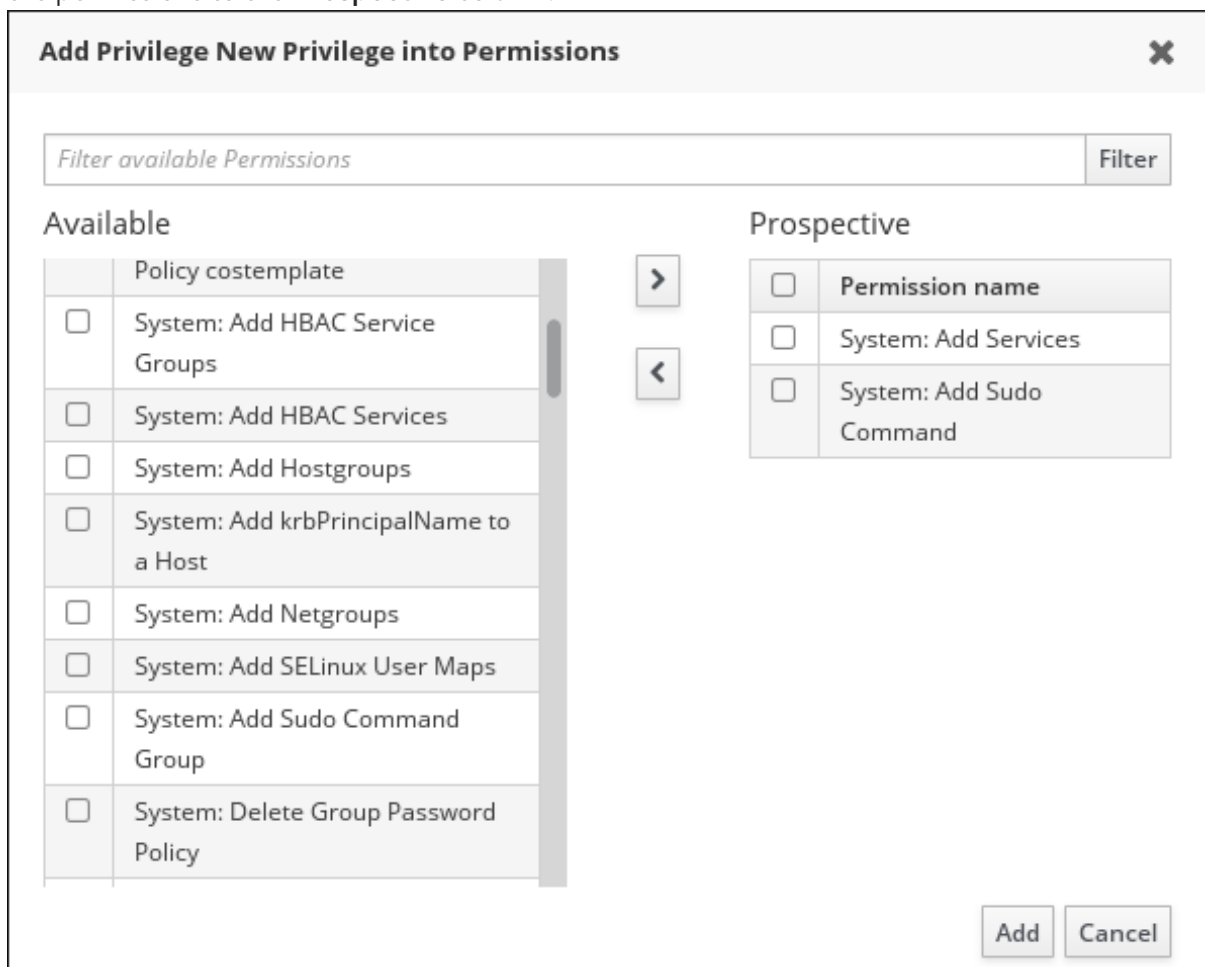
Privilege: New Privilege

Permissions (5) Settings Roles

Refresh Delete + Add

| <input type="checkbox"/> | Permission name        |
|--------------------------|------------------------|
| <input type="checkbox"/> | System: Add Groups     |
| <input type="checkbox"/> | System: Add HBAC Rule  |
| <input type="checkbox"/> | System: Add Hosts      |
| <input type="checkbox"/> | System: Add Privileges |
| <input type="checkbox"/> | System: Add Roles      |

7. Tick the check box next to the name of each permission to add, and use the > button to move the permissions to the **Prospective** column:



Add Privilege New Privilege into Permissions

Filter available Permissions Filter

Available

| <input type="checkbox"/> | Policy costemplate                     |
|--------------------------|--|
| <input type="checkbox"/> | System: Add HBAC Service Groups        |
| <input type="checkbox"/> | System: Add HBAC Services              |
| <input type="checkbox"/> | System: Add Hostgroups                 |
| <input type="checkbox"/> | System: Add krbPrincipalName to a Host |
| <input type="checkbox"/> | System: Add Netgroups                  |
| <input type="checkbox"/> | System: Add SELinux User Maps          |
| <input type="checkbox"/> | System: Add Sudo Command Group         |
| <input type="checkbox"/> | System: Delete Group Password Policy   |

> <

Prospective

| <input type="checkbox"/> | Permission name          |
|--------------------------|--------------------------|
| <input type="checkbox"/> | System: Add Services     |
| <input type="checkbox"/> | System: Add Sudo Command |

Add Cancel

8. Confirm by clicking the **Add** button.

9. *Optional.* If you need to remove permissions, click the **Delete** button after you ticked the check box next to the relevant permission: the **Remove privileges from permissions** dialog opens.
10. *Optional.* If you need to delete an existing privilege, click the **Delete** button after you ticked the check box next to its name in the list: the **Remove privileges** dialog opens.

## 28.4. MANAGING ROLES IN THE IDM WEB UI

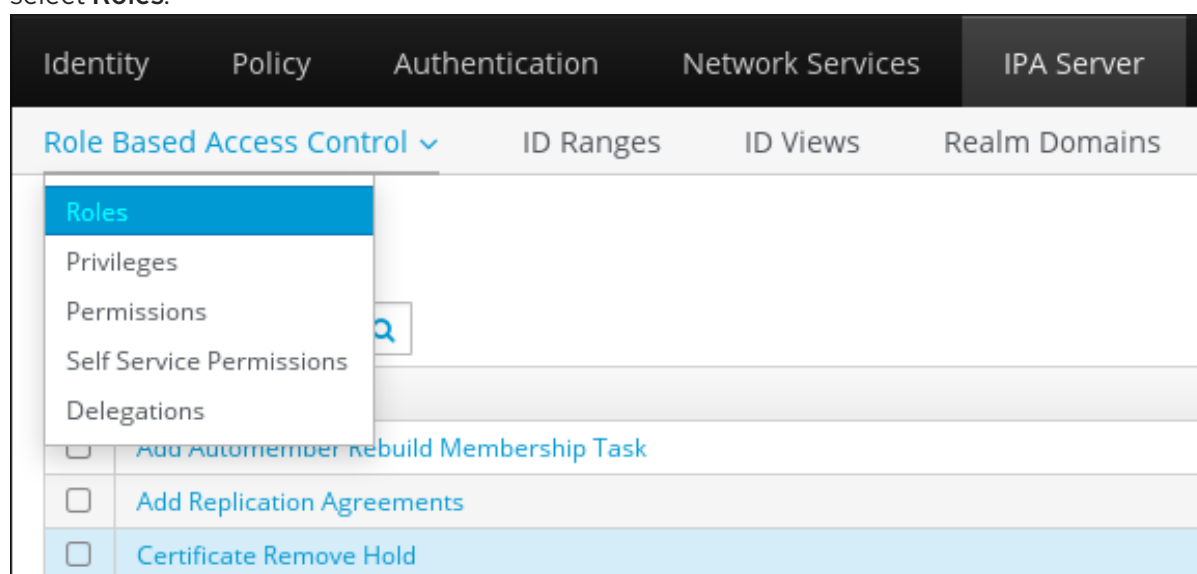
Follow this procedure to manage roles in Identity Management (IdM) using the web interface (IdM Web UI).

### Prerequisites

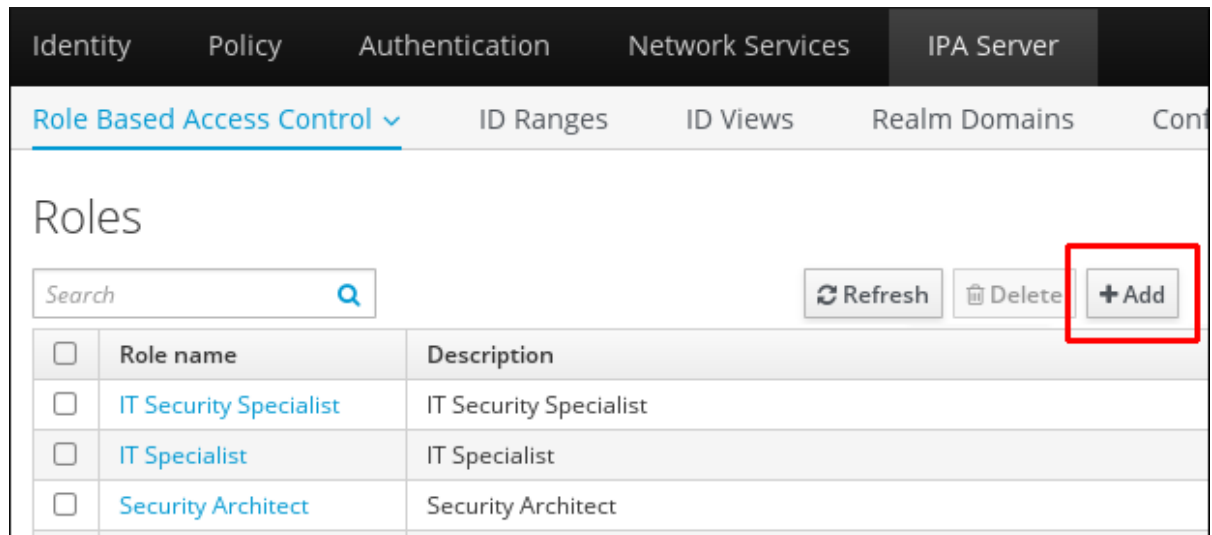
- Administrator privileges for managing IdM or the **User Administrator** role.
- You are logged-in to the IdM Web UI. For details, see [Accessing the IdM Web UI in a web browser](#).
- Existing privileges. For details about privileges, see [Managing privileges in the IdM Web UI](#).

### Procedure

1. To add a new role, open the **Role-Based Access Control** submenu in the **IPA Server** tab and select **Roles**:



2. The list of roles opens. Click the **Add** button at the top of the list of the role-based access control instructions.

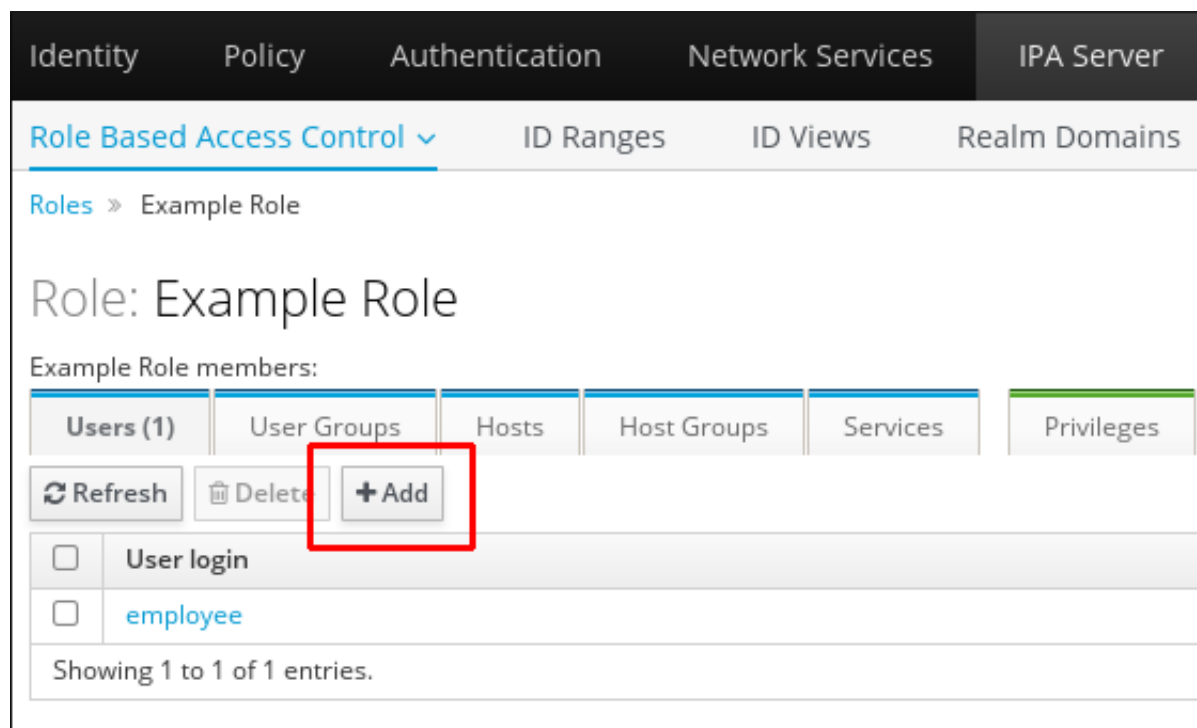


3. The **Add Role** form opens. Enter the role name and a description:

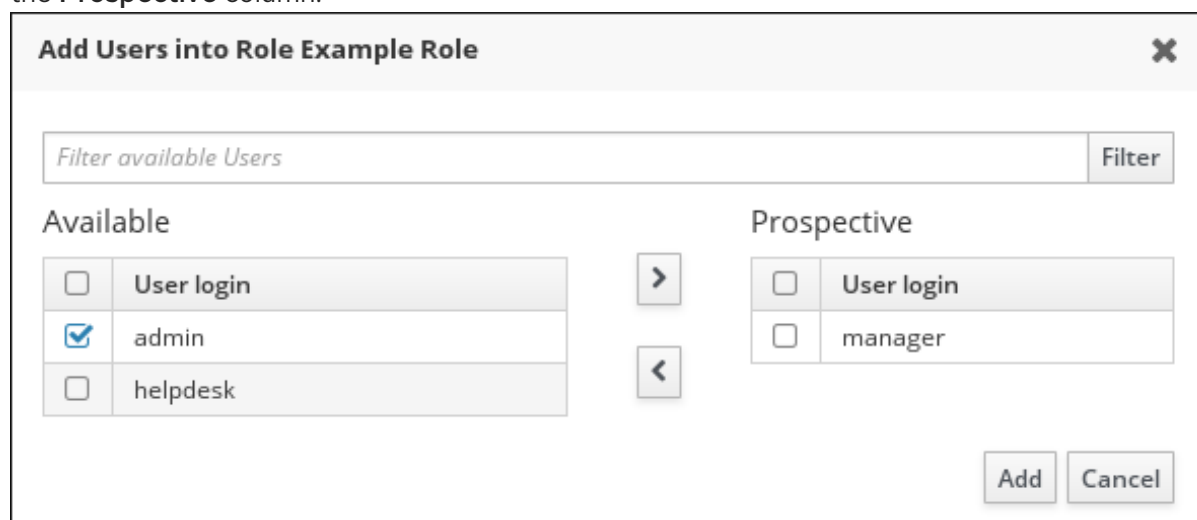
The 'Add Role' form is shown with the following fields and buttons:

- Role name \***: A text input field containing 'Example Role'.
- Description**: A text area containing 'For engineers'.
- \* Required field**: A note indicating that the role name is a required field.
- Buttons**: 'Add', 'Add and Add Another', 'Add and Edit', and 'Cancel'.

4. Click the **Add and Edit** button to save the new role and go to the role configuration page to add privileges and users.
5. Edit the properties of roles by clicking on the roles name in the role list. The roles configuration page opens.
6. Add members using the **Users**, **Users Groups**, **Hosts**, **Host Groups** or **Services** tabs, by clicking the **Add** button on top of the relevant list(s).



7. In the window that opens, select the members on the left and use the > button to move them to the **Prospective** column.



8. At the top of the **Privileges** tab, click **Add**.

The screenshot shows the 'Role: Example Role' configuration page in the IDM web UI. The 'Privileges (4)' tab is selected, and the '+ Add' button is highlighted with a red box. The page displays a list of privileges under the 'Example Role members:' section.

| Users (1)                              | User Groups                           | Hosts                                | Host Groups | Services | Privileges (4) | Settings |
|--|---------------------------------------|--------------------------------------|-------------|----------|----------------|----------|
| <input type="button" value="Refresh"/> | <input type="button" value="Delete"/> | <input type="button" value="+ Add"/> |             |          |                |          |
| <input type="checkbox"/>               | Privilege name                        |                                      |             |          |                |          |
| <input type="checkbox"/>               | Automount Administrators              |                                      |             |          |                |          |
| <input type="checkbox"/>               | Certificate Administrators            |                                      |             |          |                |          |
| <input type="checkbox"/>               | DNS Administrators                    |                                      |             |          |                |          |

9. Select the privileges on the left and use the > button to move them to the **Prospective** column.

The screenshot shows the 'Add Role Example Role into Privileges' dialog box. The 'Available' list on the left contains various privileges, and the 'Prospective' list on the right contains a subset of them. The '>' button is used to move privileges from the 'Available' list to the 'Prospective' list.

| Available   |                                     | Prospective  |
|---|-------------------------------------|--|
| <input type="checkbox"/> Privilege name                   | <input type="button" value="&gt;"/> | <input type="checkbox"/> Privilege name            |
| <input type="checkbox"/> ADTrust Agents                   | <input type="button" value="&lt;"/> | <input type="checkbox"/> Group Administrators      |
| <input type="checkbox"/> Automember Readers               |                                     | <input type="checkbox"/> Host Administrators       |
| <input type="checkbox"/> Automember Task Administrator    |                                     | <input type="checkbox"/> Host Group Administrators |
| <input type="checkbox"/> DNS Servers                      |                                     |  |
| <input type="checkbox"/> HBAC Administrator               |                                     |  |
| <input type="checkbox"/> Host Enrollment                  |                                     |  |
| <input type="checkbox"/> IPA Masters Readers              |                                     |  |
| <input type="checkbox"/> Kerberos Ticket Policy Readers   |                                     |  |
| <input type="checkbox"/> Modify Group membership          |                                     |  |
| <input type="checkbox"/> Modify Users and Reset passwords |                                     |  |
| <input type="checkbox"/> Netgroups Administrators         |                                     |  |
| <input type="checkbox"/> New Privilege                    |                                     |  |
| <input type="checkbox"/> Password Policy Administrator    |                                     |  |
| <input type="checkbox"/> Password Policy Readers          |                                     |  |

10. Click the **Add** button to save.

11. *Optional.* If you need to remove privileges or members from a role, click the **Delete** button after you ticked the check box next to the name of the entity you want to remove. A dialog opens.
12. *Optional.* If you need to remove an existing role, click the **Delete** button after you ticked the check box next to its name in the list, to display the **Remove roles** dialog.



## CHAPTER 29. USING ANSIBLE PLAYBOOKS TO MANAGE ROLE-BASED ACCESS CONTROL IN IDM

Role-based access control (RBAC) is a policy-neutral access-control mechanism defined around roles and privileges. The components of RBAC in Identity Management (IdM) are roles, privileges and permissions:

- **Permissions** grant the right to perform a specific task such as adding or deleting users, modifying a group, enabling read-access, etc.
- **Privileges** combine permissions, for example all the permissions needed to add a new user.
- **Roles** grant a set of privileges to users, user groups, hosts or host groups.

Especially in large companies, using RBAC can help create a hierarchical system of administrators with their individual areas of responsibility.

This chapter describes the following operations performed when managing RBAC using Ansible playbooks:

- [Permissions in IdM](#)
- [Default managed permissions](#)
- [Privileges in IdM](#)
- [Roles in IdM](#)
- [Predefined roles in IdM](#)
- [Using Ansible to ensure an IdM RBAC role with privileges is present](#)
- [Using Ansible to ensure an IdM RBAC role is absent](#)
- [Using Ansible to ensure that a group of users is assigned to an IdM RBAC role](#)
- [Using Ansible to ensure that specific users are not assigned to an IdM RBAC role](#)
- [Using Ansible to ensure a service is a member of an IdM RBAC role](#)
- [Using Ansible to ensure a host is a member of an IdM RBAC role](#)
- [Using Ansible to ensure a host group is a member of an IdM RBAC role](#)

### 29.1. PERMISSIONS IN IDM

Permissions are the lowest level unit of role-based access control, they define operations together with the LDAP entries to which those operations apply. Comparable to building blocks, permissions can be assigned to as many privileges as needed.

One or more **rights** define what operations are allowed:

- **write**
- **read**
- **search**

- **compare**
- **add**
- **delete**
- **all**

These operations apply to three basic **targets**:

- **subtree**: a domain name (DN); the subtree under this DN
- **target filter**: an LDAP filter
- **target**: DN with possible wildcards to specify entries

Additionally, the following convenience options set the corresponding attribute(s):

- **type**: a type of object (user, group, etc); sets **subtree** and **target filter**
- **memberof**: members of a group; sets a **target filter**
- **targetgroup**: grants access to modify a specific group (such as granting the rights to manage group membership); sets a **target**

With IdM permissions, you can control which users have access to which objects and even which attributes of these objects. IdM enables you to allow or block individual attributes or change the entire visibility of a specific IdM function, such as users, groups, or sudo, to all anonymous users, all authenticated users, or just a certain group of privileged users.

For example, the flexibility of this approach to permissions is useful for an administrator who wants to limit access of users or groups only to the specific sections these users or groups need to access and to make the other sections completely hidden to them.



#### NOTE

A permission cannot contain other permissions.

## 29.2. DEFAULT MANAGED PERMISSIONS

Managed permissions are permissions that come by default with IdM. They behave like other permissions created by the user, with the following differences:

- You cannot delete them or modify their name, location, and target attributes.
- They have three sets of attributes:
  - **Default** attributes, the user cannot modify them, as they are managed by IdM
  - **Included** attributes, which are additional attributes added by the user
  - **Excluded** attributes, which are attributes removed by the user

A managed permission applies to all attributes that appear in the default and included attribute sets but not in the excluded set.

**NOTE**

While you cannot delete a managed permission, setting its bind type to permission and removing the managed permission from all privileges effectively disables it.

Names of all managed permissions start with **System:**, for example **System: Add Sudo rule** or **System: Modify Services**. Earlier versions of IdM used a different scheme for default permissions. For example, the user could not delete them and was only able to assign them to privileges. Most of these default permissions have been turned into managed permissions, however, the following permissions still use the previous scheme:

- Add Automember Rebuild Membership Task
- Add Configuration Sub-Entries
- Add Replication Agreements
- Certificate Remove Hold
- Get Certificates status from the CA
- Read DNA Range
- Modify DNA Range
- Read PassSync Managers Configuration
- Modify PassSync Managers Configuration
- Read Replication Agreements
- Modify Replication Agreements
- Remove Replication Agreements
- Read LDBM Database Configuration
- Request Certificate
- Request Certificate ignoring CA ACLs
- Request Certificates from a different host
- Retrieve Certificates from the CA
- Revoke Certificate
- Write IPA Configuration

**NOTE**

If you attempt to modify a managed permission from the command line, the system does not allow you to change the attributes that you cannot modify, the command fails. If you attempt to modify a managed permission from the Web UI, the attributes that you cannot modify are disabled.

## 29.3. PRIVILEGES IN IDM

A privilege is a group of permissions applicable to a role.

While a permission provides the rights to do a single operation, there are certain IdM tasks that require multiple permissions to succeed. Therefore, a privilege combines the different permissions required to perform a specific task.

For example, setting up an account for a new IdM user requires the following permissions:

- Creating a new user entry
- Resetting a user password
- Adding the new user to the default IPA users group

Combining these three low-level tasks into a higher level task in the form of a custom privilege named, for example, **Add User** makes it easier for a system administrator to manage roles. IdM already contains several default privileges. Apart from users and user groups, privileges are also assigned to hosts and host groups, as well as network services. This practice permits a fine-grained control of operations by a set of users on a set of hosts using specific network services.



### NOTE

A privilege may not contain other privileges.

## 29.4. ROLES IN IDM

A role is a list of privileges that users specified for the role possess.

In effect, permissions grant the ability to perform given low-level tasks (create a user entry, add an entry to a group, etc.), privileges combine one or more of these permissions needed for a higher-level task (such as creating a new user in a given group). Roles gather privileges together as needed: for example, a User Administrator role would be able to add, modify, and delete users.



### IMPORTANT

Roles are used to classify permitted actions. They are not used as a tool to implement privilege separation or to protect from privilege escalation.



### NOTE

Roles can not contain other roles.

## 29.5. PREDEFINED ROLES IN IDENTITY MANAGEMENT

Red Hat Identity Management provides the following range of pre-defined roles:

**Table 29.1. Predefined Roles in Identity Management**

| Role                     | Privilege       | Description                                 |
|--------------------------|-----------------|---|
| Enrollment Administrator | Host Enrollment | Responsible for client, or host, enrollment |

| Role                   | Privilege  | Description  |
|------------------------|--|--|
| helpdesk               | Modify Users and Reset passwords, Modify Group membership  | Responsible for performing simple user administration tasks  |
| IT Security Specialist | Netgroups Administrators, HBAC Administrator, Sudo Administrator   | Responsible for managing security policy such as host-based access controls, sudo rules                        |
| IT Specialist          | Host Administrators, Host Group Administrators, Service Administrators, Automount Administrators             | Responsible for managing hosts   |
| Security Architect     | Delegation Administrator, Replication Administrators, Write IPA Configuration, Password Policy Administrator | Responsible for managing the Identity Management environment, creating trusts, creating replication agreements |
| User Administrator     | User Administrators, Group Administrators, Stage User Administrators   | Responsible for creating users and groups  |

## 29.6. USING ANSIBLE TO ENSURE AN IDM RBAC ROLE WITH PRIVILEGES IS PRESENT

To exercise more granular control over role-based access (RBAC) to resources in Identity Management (IdM) than the default roles provide, create a custom role.

The following procedure describes how to use an Ansible playbook to define privileges for a new IdM custom role and ensure its presence. In the example, the new **user\_and\_host\_administrator** role contains a unique combination of the following privileges that are present in IdM by default:

- **Group Administrators**
- **User Administrators**
- **Stage User Administrators**
- **Group Administrators**

### Prerequisites

- You know the IdM administrator password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.

- The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
- The example assumes that the `secret.yml` Ansible vault stores your `ipaadmin_password`.

## Procedure

1. Navigate to the `~/<MyPlaybooks>/` directory:

```
$ cd ~/<MyPlaybooks>/
```

2. Make a copy of the `role-member-user-present.yml` file located in the `/usr/share/doc/ansible-freeipa/playbooks/role/` directory:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/role/role-member-user-present.yml role-member-user-present-copy.yml
```

3. Open the `role-member-user-present-copy.yml` Ansible playbook file for editing.
4. Adapt the file by setting the following variables in the `iparole` task section:
  - Set the `ipaadmin_password` variable to the password of the IdM administrator.
  - Set the `name` variable to the name of the new role.
  - Set the `privilege` list to the names of the IdM privileges that you want to include in the new role.
  - Optionally, set the `user` variable to the name of the user to whom you want to grant the new role.
  - Optionally, set the `group` variable to the name of the group to which you want to grant the new role.

This is the modified Ansible playbook file for the current example:

```
---
- name: Playbook to manage IPA role with members.
  hosts: ipaserver
  become: true
  gather_facts: no

  vars_files:
    - /home/user_name/MyPlaybooks/secret.yml
  tasks:
    - iparole:
        ipaadmin_password: "{{ ipaadmin_password }}"
        name: user_and_host_administrator
        user: idm_user01
        group: idm_group01
        privilege:
          - Group Administrators
          - User Administrators
          - Stage User Administrators
          - Group Administrators
```

5. Save the file.
6. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the **secret.yml** file, and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i
~/<MyPlaybooks>/inventory role-member-user-present-copy.yml
```

#### Additional resources

- See [Encrypting content with Ansible Vault](#).
- See [Roles in IdM](#).
- See the **README-role** file in the `/usr/share/doc/ansible-freeipa/` directory.
- See the sample playbooks in the `/usr/share/doc/ansible-freeipa/playbooks/iparole` directory.

## 29.7. USING ANSIBLE TO ENSURE AN IDM RBAC ROLE IS ABSENT

As a system administrator managing role-based access control (RBAC) in Identity Management (IdM), you may want to ensure the absence of an obsolete role so that no administrator assigns it to any user accidentally.

The following procedure describes how to use an Ansible playbook to ensure a role is absent. The example below describes how to make sure the custom **user\_and\_host\_administrator** role does not exist in IdM.

#### Prerequisites

- You know the IdM administrator password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipadmin\_password**.

#### Procedure

1. Navigate to the `~/<MyPlaybooks>/` directory:

```
$ cd ~/<MyPlaybooks>/
```

2. Make a copy of the **role-is-absent.yml** file located in the `/usr/share/doc/ansible-freeipa/playbooks/role/` directory:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/role/role-is-absent.yml role-is-absent-copy.yml
```

3. Open the **role-is-absent-copy.yml** Ansible playbook file for editing.
4. Adapt the file by setting the following variables in the **iparole** task section:
  - Set the **ipaadmin\_password** variable to the password of the IdM administrator.
  - Set the **name** variable to the name of the role.
  - Ensure that the **state** variable is set to **absent**.

This is the modified Ansible playbook file for the current example:

```
---
- name: Playbook to manage IPA role with members.
  hosts: ipaserver
  become: true
  gather_facts: no

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - iparole:
      ipaadmin_password: "{{ ipaadmin_password }}"
      name: user_and_host_administrator
      state: absent
```

5. Save the file.
6. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the **secret.yml** file, and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i
~/<MyPlaybooks>/inventory role-is-absent-copy.yml
```

### Additional resources

- See [Encrypting content with Ansible Vault](#).
- See [Roles in IdM](#).
- See the **README-role** Markdown file in the `/usr/share/doc/ansible-freeipa/` directory.
- See the sample playbooks in the `/usr/share/doc/ansible-freeipa/playbooks/iparole` directory.

## 29.8. USING ANSIBLE TO ENSURE THAT A GROUP OF USERS IS ASSIGNED TO AN IDM RBAC ROLE

As a system administrator managing role-based access control (RBAC) in Identity Management (IdM), you may want to assign a role to a specific group of users, for example junior administrators.

The following example describes how to use an Ansible playbook to ensure the built-in IdM RBAC **helpdesk** role is assigned to **junior\_sysadmins**.

### Prerequisites



- You know the IdM administrator password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the `secret.yml` Ansible vault stores your `ipaadmin_password`.

## Procedure

1. Navigate to the `~/<MyPlaybooks>/` directory:

```
$ cd ~/<MyPlaybooks>/
```

2. Make a copy of the `role-member-group-present.yml` file located in the `/usr/share/doc/ansible-freeipa/playbooks/role/` directory:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/role/role-member-group-present.yml
role-member-group-present-copy.yml
```

3. Open the `role-member-group-present-copy.yml` Ansible playbook file for editing.
4. Adapt the file by setting the following variables in the `iparole` task section:
  - Set the `ipaadmin_password` variable to the password of the IdM administrator.
  - Set the `name` variable to the name of the role you want to assign.
  - Set the `group` variable to the name of the group.
  - Set the `action` variable to `member`.

This is the modified Ansible playbook file for the current example:

```
---
- name: Playbook to manage IPA role with members.
  hosts: ipaserver
  become: true
  gather_facts: no

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - iparole:
      ipaadmin_password: "{{ ipaadmin_password }}"
      name: helpdesk
      group: junior_sysadmins
      action: member
```

5. Save the file.

6. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the **secret.yml** file, and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i
~/<MyPlaybooks>/inventory role-member-group-present-copy.yml
```

#### Additional resources

- See [Encrypting content with Ansible Vault](#).
- See [Roles in IdM](#).
- See the **README-role** Markdown file in the `/usr/share/doc/ansible-freeipa/` directory.
- See the sample playbooks in the `/usr/share/doc/ansible-freeipa/playbooks/iparole` directory.

## 29.9. USING ANSIBLE TO ENSURE THAT SPECIFIC USERS ARE NOT ASSIGNED TO AN IDM RBAC ROLE

As a system administrator managing role-based access control (RBAC) in Identity Management (IdM), you may want to ensure that an RBAC role is not assigned to specific users after they have, for example, moved to different positions within the company.

The following procedure describes how to use an Ansible playbook to ensure that the users named **user\_01** and **user\_02** are not assigned to the **helpdesk** role.

#### Prerequisites

- You know the IdM administrator password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipaadmin\_password**.

#### Procedure

1. Navigate to the `~/MyPlaybooks/` directory:

```
$ cd ~/MyPlaybooks/
```

2. Make a copy of the **role-member-user-absent.yml** file located in the `/usr/share/doc/ansible-freeipa/playbooks/role/` directory:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/role/role-member-user-absent.yml role-
member-user-absent-copy.yml
```

3. Open the **role-member-user-absent-copy.yml** Ansible playbook file for editing.

4. Adapt the file by setting the following variables in the **iparole** task section:

- Set the **ipaadmin\_password** variable to the password of the IdM administrator.
- Set the **name** variable to the name of the role you want to assign.
- Set the **user** list to the names of the users.
- Set the **action** variable to **member**.
- Set the **state** variable to **absent**.

This is the modified Ansible playbook file for the current example:

```
---
- name: Playbook to manage IPA role with members.
  hosts: ipaserver
  become: true
  gather_facts: no

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - iparole:
      ipaadmin_password: "{{ ipaadmin_password }}"
      name: helpdesk
      user
      - user_01
      - user_02
      action: member
      state: absent
```

5. Save the file.

6. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the **secret.yml** file, and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i
~/<MyPlaybooks>/inventory role-member-user-absent-copy.yml
```

#### Additional resources

- See [Encrypting content with Ansible Vault](#).
- See [Roles in IdM](#).
- See the **README-role** Markdown file in the `/usr/share/doc/ansible-freeipa/` directory.
- See the sample playbooks in the `/usr/share/doc/ansible-freeipa/playbooks/iparole` directory.

## 29.10. USING ANSIBLE TO ENSURE A SERVICE IS A MEMBER OF AN IDM RBAC ROLE

As a system administrator managing role-based access control (RBAC) in Identity Management (IdM), you may want to ensure that a specific service that is enrolled into IdM is a member of a particular role.

The following example describes how to ensure that the custom **web\_administrator** role can manage the **HTTP** service that is running on the **client01.idm.example.com** server.

## Prerequisites

- You know the IdM administrator password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipadmin\_password**.
- The **web\_administrator** role exists in IdM.
- The **HTTP/client01.idm.example.com@IDM.EXAMPLE.COM** service exists in IdM.

## Procedure

1. Navigate to the `~/<MyPlaybooks>/` directory:

```
$ cd ~/<MyPlaybooks>/
```

2. Make a copy of the **role-member-service-present.yml** file located in the `/usr/share/doc/ansible-freeipa/playbooks/role/` directory:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/role/role-member-service-present-absent.yml role-member-service-present-copy.yml
```

3. Open the **role-member-service-present-copy.yml** Ansible playbook file for editing.
4. Adapt the file by setting the following variables in the **iparole** task section:
  - Set the **ipadmin\_password** variable to the password of the IdM administrator.
  - Set the **name** variable to the name of the role you want to assign.
  - Set the **service** list to the name of the service.
  - Set the **action** variable to **member**.

This is the modified Ansible playbook file for the current example:

```
---
- name: Playbook to manage IPA role with members.
  hosts: ipaserver
  become: true
  gather_facts: no

  vars_files:
    - /home/user_name/MyPlaybooks/secret.yml
```

```

tasks:
- iparole:
    ipaadmin_password: "{{ ipaadmin_password }}"
    name: web_administrator
    service:
    - HTTP/client01.idm.example.com
    action: member

```

5. Save the file.
6. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the **secret.yml** file, and the inventory file:

```

$ ansible-playbook --vault-password-file=password_file -v -i
~/<MyPlaybooks>/inventory role-member-service-present-copy.yml

```

### Additional resources

- See [Encrypting content with Ansible Vault](#).
- See [Roles in IdM](#).
- See the **README-role** Markdown file in the `/usr/share/doc/ansible-freeipa/` directory.
- See the sample playbooks in the `/usr/share/doc/ansible-freeipa/playbooks/iparole` directory.

## 29.11. USING ANSIBLE TO ENSURE A HOST IS A MEMBER OF AN IDM RBAC ROLE

As a system administrator managing role-based access control in Identity Management (IdM), you may want to ensure that a specific host or host group is associated with a specific role. The following example describes how to ensure that the custom **web\_administrator** role can manage the **client01.idm.example.com** IdM host on which the **HTTP** service is running.

### Prerequisites

- You know the IdM administrator password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipaadmin\_password**.
- The **web\_administrator** role exists in IdM.
- The **client01.idm.example.com** host exists in IdM.

### Procedure

1. Navigate to the `~/<MyPlaybooks>/` directory:

```
$ cd ~/<MyPlaybooks>/
```

2. Make a copy of the **role-member-host-present.yml** file located in the `/usr/share/doc/ansible-freeipa/playbooks/role/` directory:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/role/role-member-host-present.yml role-member-host-present-copy.yml
```

3. Open the **role-member-host-present-copy.yml** Ansible playbook file for editing.
4. Adapt the file by setting the following variables in the **iparole** task section:
  - Set the **ipaadmin\_password** variable to the password of the IdM administrator.
  - Set the **name** variable to the name of the role you want to assign.
  - Set the **host** list to the name of the host.

This is the modified Ansible playbook file for the current example:

```
---
- name: Playbook to manage IPA role with members.
  hosts: ipaserver
  become: true
  gather_facts: no

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - iparole:
      ipaadmin_password: "{{ ipaadmin_password }}"
      name: web_administrator
      host:
      - client01.idm.example.com
      action: member
```

5. Save the file.
6. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the **secret.yml** file, and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i
~/<MyPlaybooks>/inventory role-member-host-present-copy.yml
```

#### Additional resources

- See [Encrypting content with Ansible Vault](#).
- See [Roles in IdM](#).
- See the **README-role** Markdown file in the `/usr/share/doc/ansible-freeipa/` directory.
- See the sample playbooks in the `/usr/share/doc/ansible-freeipa/playbooks/iparole` directory.

## 29.12. USING ANSIBLE TO ENSURE A HOST GROUP IS A MEMBER OF AN IDM RBAC ROLE

As a system administrator managing role-based access control in Identity Management (IdM), you may want to ensure that a specific host or host group is associated with a specific role. The following example describes how to ensure that the custom **web\_administrator** role can manage the **web\_servers** group of IdM hosts on which the **HTTP** service is running.

### Prerequisites

- You know the IdM administrator password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the `secret.yml` Ansible vault stores your `ipaadmin_password`.
- The **web\_administrator** role exists in IdM.
- The **web\_servers** host group exists in IdM.

### Procedure

1. Navigate to the `~/<MyPlaybooks>/` directory:

```
$ cd ~/<MyPlaybooks>/
```

2. Make a copy of the `role-member-hostgroup-present.yml` file located in the `/usr/share/doc/ansible-freeipa/playbooks/role/` directory:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/role/role-member-hostgroup-present.yml role-member-hostgroup-present-copy.yml
```

3. Open the `role-member-hostgroup-present-copy.yml` Ansible playbook file for editing.
4. Adapt the file by setting the following variables in the **iparole** task section:
  - Set the **ipaadmin\_password** variable to the password of the IdM administrator.
  - Set the **name** variable to the name of the role you want to assign.
  - Set the **hostgroup** list to the name of the hostgroup.

This is the modified Ansible playbook file for the current example:

```
---
- name: Playbook to manage IPA role with members.
  hosts: ipaserver
  become: true
```

```
gather_facts: no

vars_files:
- /home/user_name/MyPlaybooks/secret.yml
tasks:
- iparole:
    ipaadmin_password: "{{ ipaadmin_password }}"
    name: web_administrator
    hostgroup:
    - web_servers
    action: member
```

5. Save the file.
6. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the **secret.yml** file, and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i
~/<MyPlaybooks>/inventory role-member-hostgroup-present-copy.yml
```

#### Additional resources

- See [Encrypting content with Ansible Vault](#) .
- See [Roles in IdM](#) .
- See the **README-role** Markdown file in the `/usr/share/doc/ansible-freeipa/` directory.
- See the sample playbooks in the `/usr/share/doc/ansible-freeipa/playbooks/iparole` directory.



## CHAPTER 30. USING ANSIBLE PLAYBOOKS TO MANAGE RBAC PRIVILEGES

Role-based access control (RBAC) is a policy-neutral access-control mechanism defined around roles, privileges, and permissions. Especially in large companies, using RBAC can help create a hierarchical system of administrators with their individual areas of responsibility.

This chapter describes the following operations for using Ansible playbooks to manage RBAC privileges in Identity Management (IdM):

- [Using Ansible to ensure a custom RBAC privilege is present](#)
- [Using Ansible to ensure member permissions are present in a custom IdM RBAC privilege](#)
- [Using Ansible to ensure an IdM RBAC privilege does not include a permission](#)
- [Using Ansible to rename a custom IdM RBAC privilege](#)
- [Using Ansible to ensure an IdM RBAC privilege is absent](#)

### Prerequisites

- You understand the [concepts and principles of RBAC](#).

### 30.1. USING ANSIBLE TO ENSURE A CUSTOM IDM RBAC PRIVILEGE IS PRESENT

To have a fully-functioning custom privilege in Identity Management (IdM) role-based access control (RBAC), you need to proceed in stages:

1. Create a privilege with no permissions attached.
2. Add permissions of your choice to the privilege.

The following procedure describes how to create an empty privilege using an Ansible playbook so that you can later add permissions to it. The example describes how to create a privilege named **full\_host\_administration** that is meant to combine all IdM permissions related to host administration.

### Prerequisites

- You know the IdM administrator password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipaadmin\_password**.

### Procedure

1. Navigate to the `~/MyPlaybooks/` directory:

```
$ cd ~/MyPlaybooks/
```

2. Make a copy of the **privilege-present.yml** file located in the `/usr/share/doc/ansible-freeipa/playbooks/privilege/` directory:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/privilege/privilege-present.yml privilege-present-copy.yml
```

3. Open the **privilege-present-copy.yml** Ansible playbook file for editing.
4. Adapt the file by setting the following variables in the **ipaprivilege** task section:
  - Set the **ipaadmin\_password** variable to the password of the IdM administrator.
  - Set the **name** variable to the name of the new privilege, **full\_host\_administration**.
  - Optionally, describe the privilege using the **description** variable.

This is the modified Ansible playbook file for the current example:

```
---
- name: Privilege present example
  hosts: ipaserver

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - name: Ensure privilege full_host_administration is present
    ipaprivilege:
      ipaadmin_password: "{{ ipaadmin_password }}"
      name: full_host_administration
      description: This privilege combines all IdM permissions related to host
      administration
```

5. Save the file.
6. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the **secret.yml** file, and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory privilege-present-copy.yml
```

## 30.2. USING ANSIBLE TO ENSURE MEMBER PERMISSIONS ARE PRESENT IN A CUSTOM IDM RBAC PRIVILEGE

To have a fully-functioning custom privilege in Identity Management (IdM) role-based access control (RBAC), you need to proceed in stages:

1. Create a privilege with no permissions attached.
2. Add permissions of your choice to the privilege.

The following procedure describes how to use an Ansible playbook to add permissions to a privilege created in the previous step. The example describes how to add all IdM permissions related to host administration to a privilege named **full\_host\_administration**. By default, the permissions are distributed between the **Host Enrollment**, **Host Administrators** and **Host Group Administrator** privileges.

## Prerequisites

- You know the IdM administrator password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the `secret.yml` Ansible vault stores your `ipaadmin_password`.
- The **full\_host\_administration** privilege exists. For information about how to create a privilege using Ansible, see [Using Ansible to ensure a custom IdM RBAC privilege is present](#) .

## Procedure

1. Navigate to the `~/MyPlaybooks/` directory:

```
$ cd ~/MyPlaybooks/
```

2. Make a copy of the **privilege-member-present.yml** file located in the `/usr/share/doc/ansible-freeipa/playbooks/privilege/` directory:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/privilege/privilege-member-present.yml
privilege-member-present-copy.yml
```

3. Open the **privilege-member-present-copy.yml** Ansible playbook file for editing.
4. Adapt the file by setting the following variables in the **ipaprivilege** task section:
  - Adapt the **name** of the task to correspond to your use case.
  - Set the **ipaadmin\_password** variable to the password of the IdM administrator.
  - Set the **name** variable to the name of the privilege.
  - Set the **permission** list to the names of the permissions that you want to include in the privilege.
  - Make sure that the **action** variable is set to **member**.

This is the modified Ansible playbook file for the current example:

```
---
- name: Privilege member present example
  hosts: ipaserver
```

```

vars_files:
- /home/user_name/MyPlaybooks/secret.yml
tasks:
- name: Ensure that permissions are present for the "full_host_administration" privilege
  ipaprivilege:
    ipaadmin_password: "{{ ipaadmin_password }}"
    name: full_host_administration
    permission:
      - "System: Add krbPrincipalName to a Host"
      - "System: Enroll a Host"
      - "System: Manage Host Certificates"
      - "System: Manage Host Enrollment Password"
      - "System: Manage Host Keytab"
      - "System: Manage Host Principals"
      - "Retrieve Certificates from the CA"
      - "Revoke Certificate"
      - "System: Add Hosts"
      - "System: Add krbPrincipalName to a Host"
      - "System: Enroll a Host"
      - "System: Manage Host Certificates"
      - "System: Manage Host Enrollment Password"
      - "System: Manage Host Keytab"
      - "System: Manage Host Keytab Permissions"
      - "System: Manage Host Principals"
      - "System: Manage Host SSH Public Keys"
      - "System: Manage Service Keytab"
      - "System: Manage Service Keytab Permissions"
      - "System: Modify Hosts"
      - "System: Remove Hosts"
      - "System: Add Hostgroups"
      - "System: Modify Hostgroup Membership"
      - "System: Modify Hostgroups"
      - "System: Remove Hostgroups"

```

5. Save the file.
6. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the **secret.yml** file, and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory privilege-member-present-copy.yml
```

### 30.3. USING ANSIBLE TO ENSURE AN IDM RBAC PRIVILEGE DOES NOT INCLUDE A PERMISSION

As a system administrator of Identity Management (IdM), you can customize the IdM role-based access control.

The following procedure describes how to use an Ansible playbook to remove a permission from a privilege. The example describes how to remove the **Request Certificates ignoring CA ACLs** permission from the default **Certificate Administrators** privilege because, for example, the administrator considers it a security risk.

#### Prerequisites

- You know the IdM administrator password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the `secret.yml` Ansible vault stores your `ipaadmin_password`.

## Procedure

1. Navigate to the `~/MyPlaybooks/` directory:

```
$ cd ~/MyPlaybooks/
```

2. Make a copy of the `privilege-member-present.yml` file located in the `/usr/share/doc/ansible-freeipa/playbooks/privilege/` directory:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/privilege/privilege-member-absent.yml
privilege-member-absent-copy.yml
```

3. Open the `privilege-member-absent-copy.yml` Ansible playbook file for editing.
4. Adapt the file by setting the following variables in the `ipaprivilege` task section:
  - Adapt the **name** of the task to correspond to your use case.
  - Set the `ipaadmin_password` variable to the password of the IdM administrator.
  - Set the **name** variable to the name of the privilege.
  - Set the **permission** list to the names of the permissions that you want to remove from the privilege.
  - Make sure that the **action** variable is set to **member**.
  - Make sure that the **state** variable is set to **absent**.

This is the modified Ansible playbook file for the current example:

```
---
- name: Privilege absent example
  hosts: ipaserver

  vars_files:
    - /home/user_name/MyPlaybooks/secret.yml
  tasks:
    - name: Ensure that the "Request Certificate ignoring CA ACLs" permission is absent from
      the "Certificate Administrators" privilege
      ipaprivilege:
        ipaadmin_password: "{{ ipaadmin_password }}"
        name: Certificate Administrators
```

```

permission:
- "Request Certificate ignoring CA ACLs"
action: member
state: absent

```

5. Save the file.
6. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the **secret.yml** file, and the inventory file:

```

$ ansible-playbook --vault-password-file=password_file -v -i inventory privilege-
member-absent-copy.yml

```

## 30.4. USING ANSIBLE TO RENAME A CUSTOM IDM RBAC PRIVILEGE

As a system administrator of Identity Management (IdM), you can customize the IdM role-based access control.

The following procedure describes how to rename a privilege because, for example, you have removed a few permissions from it. As a result, the name of the privilege is no longer accurate. In the example, the administrator renames a **full\_host\_administration** privilege to **limited\_host\_administration**.

### Prerequisites

- You know the IdM administrator password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipadmin\_password**.
- The **full\_host\_administration** privilege exists. For more information about how to add a privilege, see [Using Ansible to ensure a custom IdM RBAC privilege is present](#) .

### Procedure

1. Navigate to the `~/MyPlaybooks/` directory:

```

$ cd ~/MyPlaybooks/

```

2. Make a copy of the **privilege-present.yml** file located in the `/usr/share/doc/ansible-freeipa/playbooks/privilege/` directory:

```

$ cp /usr/share/doc/ansible-freeipa/playbooks/privilege/privilege-present.yml rename-
privilege.yml

```

3. Open the **rename-privilege.yml** Ansible playbook file for editing.

4. Adapt the file by setting the following variables in the **ipaprivilege** task section:
  - Set the **ipaadmin\_password** variable to the password of the IdM administrator.
  - Set the **name** variable to the current name of the privilege.
  - Add the **rename** variable and set it to the new name of the privilege.
  - Add the **state** variable and set it to **renamed**.
5. Rename the playbook itself, for example:

```
---
- name: Rename a privilege
  hosts: ipaserver
```

6. Rename the task in the playbook, for example:

```
[...]
tasks:
- name: Ensure the full_host_administration privilege is renamed to
  limited_host_administration
  ipaprivilege:
  [...]
```

This is the modified Ansible playbook file for the current example:

```
---
- name: Rename a privilege
  hosts: ipaserver

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - name: Ensure the full_host_administration privilege is renamed to
    limited_host_administration
    ipaprivilege:
      ipaadmin_password: "{{ ipaadmin_password }}"
      name: full_host_administration
      rename: limited_host_administration
      state: renamed
```

7. Save the file.
8. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the **secret.yml** file, and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory rename-
privilege.yml
```

## 30.5. USING ANSIBLE TO ENSURE AN IDM RBAC PRIVILEGE IS ABSENT

As a system administrator of Identity Management (IdM), you can customize the IdM role-based access

control. The following procedure describes how to use an Ansible playbook to ensure that an RBAC privilege is absent. The example describes how to ensure that the **CA administrator** privilege is absent. As a result of the procedure, the **admin** administrator becomes the only user capable of managing certificate authorities in IdM.

## Prerequisites

- You know the IdM administrator password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the `secret.yml` Ansible vault stores your `ipaadmin_password`.

## Procedure

1. Navigate to the `~/MyPlaybooks/` directory:

```
$ cd ~/MyPlaybooks/
```

2. Make a copy of the `privilege-absent.yml` file located in the `/usr/share/doc/ansible-freeipa/playbooks/privilege/` directory:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/privilege/privilege-absent.yml privilege-absent-copy.yml
```

3. Open the `privilege-absent-copy.yml` Ansible playbook file for editing.
4. Adapt the file by setting the following variables in the `ipaprivilege` task section:
  - Set the `ipaadmin_password` variable to the password of the IdM administrator.
  - Set the `name` variable to the name of the privilege you want to remove.
  - Make sure that the `state` variable is set it to `absent`.
5. Rename the task in the playbook, for example:

```
[...]
tasks:
- name: Ensure privilege "CA administrator" is absent
  ipaprivilege:
  [...]
```

This is the modified Ansible playbook file for the current example:

```
---
- name: Privilege absent example
  hosts: ipaserver
```



```

vars_files:
- /home/user_name/MyPlaybooks/secret.yml
tasks:
- name: Ensure privilege "CA administrator" is absent
  ipaprivilege:
    ipaadmin_password: "{{ ipaadmin_password }}"
    name: CA administrator
    state: absent

```

6. Save the file.
7. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the **secret.yml** file, and the inventory file:

```

$ ansible-playbook --vault-password-file=password_file -v -i inventory privilege-
absent-copy.yml

```

## 30.6. ADDITIONAL RESOURCES

- See [Privileges in IdM](#).
- See [Permissions in IdM](#).
- See the **README-privilege** file available in the `/usr/share/doc/ansible-freeipa/` directory.
- See the sample playbooks in the `/usr/share/doc/ansible-freeipa/playbooks/ipaprivilege` directory.

## CHAPTER 31. USING ANSIBLE PLAYBOOKS TO MANAGE RBAC PERMISSIONS IN IDM

Role-based access control (RBAC) is a policy-neutral access control mechanism defined around roles, privileges, and permissions. Especially in large companies, using RBAC can help create a hierarchical system of administrators with their individual areas of responsibility.

This chapter describes the following operations performed when managing RBAC permissions in Identity Management (IdM) using Ansible playbooks:

- [Using Ansible to ensure an RBAC permission is present](#)
- [Using Ansible to ensure an RBAC permission with an attribute is present](#)
- [Using Ansible to ensure an RBAC permission is absent](#)
- [Using Ansible to ensure an attribute is a member of an IdM RBAC permission](#)
- [Using Ansible to ensure an attribute is not a member of an IdM RBAC permission](#)
- [Using Ansible to rename an IdM RBAC permission](#)

### Prerequisites

- You understand the [concepts and principles of RBAC](#).

### 31.1. USING ANSIBLE TO ENSURE AN RBAC PERMISSION IS PRESENT

As a system administrator of Identity Management (IdM), you can customize the IdM role-based access control (RBAC).

The following procedure describes how to use an Ansible playbook to ensure a permission is present in IdM so that it can be added to a privilege. The example describes how to ensure the following target state:

- The **MyPermission** permission exists.
- The **MyPermission** permission can only be applied to hosts.
- A user granted a privilege that contains the permission can do all of the following possible operations on an entry:
  - Write
  - Read
  - Search
  - Compare
  - Add
  - Delete

### Prerequisites

- You know the IdM administrator password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the `secret.yml` Ansible vault stores your `ipaadmin_password`.

## Procedure

1. Navigate to the `~/MyPlaybooks/` directory:

```
$ cd ~/MyPlaybooks/
```

2. Make a copy of the `permission-present.yml` file located in the `/usr/share/doc/ansible-freeipa/playbooks/permission/` directory:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/permission/permission-present.yml
permission-present-copy.yml
```

3. Open the `permission-present-copy.yml` Ansible playbook file for editing.
4. Adapt the file by setting the following variables in the `ipapermission` task section:
  - Adapt the **name** of the task to correspond to your use case.
  - Set the `ipaadmin_password` variable to the password of the IdM administrator.
  - Set the **name** variable to the name of the permission.
  - Set the **object\_type** variable to `host`.
  - Set the **right** variable to `all`.

This is the modified Ansible playbook file for the current example:

```
---
- name: Permission present example
  hosts: ipaserver

  vars_files:
    - /home/user_name/MyPlaybooks/secret.yml
  tasks:
    - name: Ensure that the "MyPermission" permission is present
      ipapermission:
        ipaadmin_password: "{{ ipaadmin_password }}"
        name: MyPermission
        object_type: host
        right: all
```

5. Save the file.

6. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the **secret.yml** file, and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory permission-present-copy.yml
```

## 31.2. USING ANSIBLE TO ENSURE AN RBAC PERMISSION WITH AN ATTRIBUTE IS PRESENT

As a system administrator of Identity Management (IdM), you can customize the IdM role-based access control (RBAC).

The following procedure describes how to use an Ansible playbook to ensure a permission is present in IdM so that it can be added to a privilege. The example describes how to ensure the following target state:

- The **MyPermission** permission exists.
- The **MyPermission** permission can only be used to add hosts.
- A user granted a privilege that contains the permission can do all of the following possible operations on a host entry:
  - Write
  - Read
  - Search
  - Compare
  - Add
  - Delete
- The host entries created by a user that is granted a privilege that contains the **MyPermission** permission can have a **description** value.



### NOTE

The type of attribute that you can specify when creating or modifying a permission is not constrained by the IdM LDAP schema. However, specifying, for example, **attrs: car\_licence** if the **object\_type** is **host** later results in the **ipa: ERROR: attribute "car-licence" not allowed** error message when you try to exercise the permission and add a specific car licence value to a host.

### Prerequisites

- You know the IdM administrator password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.

- The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
- The example assumes that the `secret.yml` Ansible vault stores your `ipaadmin_password`.

## Procedure

1. Navigate to the `~/MyPlaybooks/` directory:

```
$ cd ~/MyPlaybooks/
```

2. Make a copy of the `permission-present.yml` file located in the `/usr/share/doc/ansible-freeipa/playbooks/permission/` directory:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/permission/permission-present.yml
permission-present-with-attribute.yml
```

3. Open the `permission-present-with-attribute.yml` Ansible playbook file for editing.
4. Adapt the file by setting the following variables in the `ipapermission` task section:
  - Adapt the **name** of the task to correspond to your use case.
  - Set the `ipaadmin_password` variable to the password of the IdM administrator.
  - Set the **name** variable to the name of the permission.
  - Set the **object\_type** variable to **host**.
  - Set the **right** variable to **all**.
  - Set the **attrs** variable to **description**.

This is the modified Ansible playbook file for the current example:

```
---
- name: Permission present example
  hosts: ipaserver

  vars_files:
    - /home/user_name/MyPlaybooks/secret.yml
  tasks:
    - name: Ensure that the "MyPermission" permission is present with an attribute
      ipapermission:
        ipaadmin_password: "{{ ipaadmin_password }}"
        name: MyPermission
        object_type: host
        right: all
        attrs: description
```

5. Save the file.
6. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the `secret.yml` file, and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory permission-
present-with-attribute.yml
```

### Additional resources

- See [User and group schema](#) in *Linux Domain Identity, Authentication and Policy Guide* in RHEL 7.

## 31.3. USING ANSIBLE TO ENSURE AN RBAC PERMISSION IS ABSENT

As a system administrator of Identity Management (IdM), you can customize the IdM role-based access control (RBAC).

The following procedure describes how to use an Ansible playbook to ensure a permission is absent in IdM so that it cannot be added to a privilege.

### Prerequisites

- You know the IdM administrator password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the `secret.yml` Ansible vault stores your `ipadmin_password`.

### Procedure

1. Navigate to the `~/MyPlaybooks/` directory:

```
$ cd ~/MyPlaybooks/
```

2. Make a copy of the `permission-absent.yml` file located in the `/usr/share/doc/ansible-freeipa/playbooks/permission/` directory:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/permission/permission-absent.yml
permission-absent-copy.yml
```

3. Open the `permission-absent-copy.yml` Ansible playbook file for editing.
4. Adapt the file by setting the following variables in the `ipapermission` task section:
  - Adapt the **name** of the task to correspond to your use case.
  - Set the `ipadmin_password` variable to the password of the IdM administrator.
  - Set the **name** variable to the name of the permission.

This is the modified Ansible playbook file for the current example:

–

```

---
- name: Permission absent example
  hosts: ipaserver

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - name: Ensure that the "MyPermission" permission is absent
    ipapermission:
      ipaadmin_password: "{{ ipaadmin_password }}"
      name: MyPermission
      state: absent

```

5. Save the file.
6. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the **secret.yml** file, and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory permission-absent-copy.yml
```

## 31.4. USING ANSIBLE TO ENSURE AN ATTRIBUTE IS A MEMBER OF AN IDM RBAC PERMISSION

As a system administrator of Identity Management (IdM), you can customize the IdM role-based access control (RBAC).

The following procedure describes how to use an Ansible playbook to ensure that an attribute is a member of an RBAC permission in IdM. As a result, a user with the permission can create entries that have the attribute.

The example describes how to ensure that the host entries created by a user with a privilege that contains the **MyPermission** permission can have **gecos** and **description** values.



### NOTE

The type of attribute that you can specify when creating or modifying a permission is not constrained by the IdM LDAP schema. However, specifying, for example, **attrs: car\_licence** if the **object\_type** is **host** later results in the **ipa: ERROR: attribute "car-licence" not allowed** error message when you try to exercise the permission and add a specific car licence value to a host.

### Prerequisites

- You know the IdM administrator password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.

- The example assumes that the **secret.yml** Ansible vault stores your **ipaadmin\_password**.
- The **MyPermission** permission exists.

## Procedure

1. Navigate to the **~/MyPlaybooks/** directory:

```
$ cd ~/MyPlaybooks/
```

2. Make a copy of the **permission-member-present.yml** file located in the **/usr/share/doc/ansible-freeipa/playbooks/permission/** directory:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/permission/permission-member-present.yml permission-member-present-copy.yml
```

3. Open the **permission-member-present-copy.yml** Ansible playbook file for editing.
4. Adapt the file by setting the following variables in the **ipapermission** task section:
  - Adapt the **name** of the task to correspond to your use case.
  - Set the **ipaadmin\_password** variable to the password of the IdM administrator.
  - Set the **name** variable to the name of the permission.
  - Set the **attrs** list to the **description** and **gecos** variables.
  - Make sure the **action** variable is set to **member**.

This is the modified Ansible playbook file for the current example:

```
---
- name: Permission member present example
  hosts: ipaserver

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - name: Ensure that the "gecos" and "description" attributes are present in
    "MyPermission"
    ipapermission:
      ipaadmin_password: "{{ ipaadmin_password }}"
      name: MyPermission
      attrs:
      - description
      - geccos
      action: member
```

5. Save the file.
6. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the **secret.yml** file, and the inventory file:



```
$ ansible-playbook --vault-password-file=password_file -v -i inventory permission-member-present-copy.yml
```

## 31.5. USING ANSIBLE TO ENSURE AN ATTRIBUTE IS NOT A MEMBER OF AN IDM RBAC PERMISSION

As a system administrator of Identity Management (IdM), you can customize the IdM role-based access control (RBAC).

The following procedure describes how to use an Ansible playbook to ensure that an attribute is not a member of an RBAC permission in IdM. As a result, when a user with the permission creates an entry in IdM LDAP, that entry cannot have a value associated with the attribute.

The example describes how to ensure the following target state:

- The **MyPermission** permission exists.
- The host entries created by a user with a privilege that contains the **MyPermission** permission cannot have the **description** attribute.

### Prerequisites

- You know the IdM administrator password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the `secret.yml` Ansible vault stores your `ipaadmin_password`.
- The **MyPermission** permission exists.

### Procedure

1. Navigate to the `~/MyPlaybooks/` directory:

```
$ cd ~/MyPlaybooks/
```

2. Make a copy of the `permission-member-absent.yml` file located in the `/usr/share/doc/ansible-freeipa/playbooks/permission/` directory:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/permission/permission-member-absent.yml permission-member-absent-copy.yml
```

3. Open the `permission-member-absent-copy.yml` Ansible playbook file for editing.
4. Adapt the file by setting the following variables in the `ipapermission` task section:
  - Adapt the **name** of the task to correspond to your use case.

- Set the **ipaadmin\_password** variable to the password of the IdM administrator.
- Set the **name** variable to the name of the permission.
- Set the **attrs** variable to **description**.
- Set the **action** variable to **member**.
- Make sure the **state** variable is set to **absent**

This is the modified Ansible playbook file for the current example:

```
---
- name: Permission absent example
  hosts: ipaserver

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - name: Ensure that an attribute is not a member of "MyPermission"
    ipapermission:
      ipaadmin_password: "{{ ipaadmin_password }}"
      name: MyPermission
      attrs: description
      action: member
      state: absent
```

5. Save the file.
6. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the **secret.yml** file, and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory permission-
member-absent-copy.yml
```

## 31.6. USING ANSIBLE TO RENAME AN IDM RBAC PERMISSION

As a system administrator of Identity Management (IdM), you can customize the IdM role-based access control.

The following procedure describes how to use an Ansible playbook to rename a permission. The example describes how to rename **MyPermission** to **MyNewPermission**.

### Prerequisites

- You know the IdM administrator password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.

- The example assumes that the **secret.yml** Ansible vault stores your **ipaadmin\_password**.
- The **MyPermission** exists in IdM.
- The **MyNewPermission** does not exist in IdM.

## Procedure

1. Navigate to the **~/MyPlaybooks/** directory:

```
$ cd ~/MyPlaybooks/
```

2. Make a copy of the **permission-renamed.yml** file located in the **/usr/share/doc/ansible-freeipa/playbooks/permission/** directory:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/permission/permission-renamed.yml
permission-renamed-copy.yml
```

3. Open the **permission-renamed-copy.yml** Ansible playbook file for editing.
4. Adapt the file by setting the following variables in the **ipapermission** task section:
  - Adapt the **name** of the task to correspond to your use case.
  - Set the **ipaadmin\_password** variable to the password of the IdM administrator.
  - Set the **name** variable to the name of the permission.

This is the modified Ansible playbook file for the current example:

```
---
- name: Permission present example
  hosts: ipaserver

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - name: Rename the "MyPermission" permission
    ipapermission:
      ipaadmin_password: "{{ ipaadmin_password }}"
      name: MyPermission
      rename: MyNewPermission
      state: renamed
```

5. Save the file.
6. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the **secret.yml** file, and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory permission-
renamed-copy.yml
```

## 31.7. ADDITIONAL RESOURCES

- See [Permissions in IdM](#).
- See [Privileges in IdM](#).
- See the **README-permission** file available in the `/usr/share/doc/ansible-freeipa/` directory.
- See the sample playbooks in the `/usr/share/doc/ansible-freeipa/playbooks/ipapermission` directory.

## CHAPTER 32. MANAGING USER PASSWORDS IN IDM

### 32.1. WHO CAN CHANGE IDM USER PASSWORDS AND HOW

Regular users without the permission to change other users' passwords can change only their own personal password. The new password must meet the IdM password policies applicable to the groups of which the user is a member. For details on configuring password policies, see [Defining IdM password policies](#).

Administrators and users with password change rights can set initial passwords for new users and reset passwords for existing users. These passwords:

- Do not have to meet the IdM password policies.
- Expire after the first successful login. When this happens, IdM prompts the user to change the expired password immediately. To disable this behavior, see [Enabling password reset in IdM without prompting the user for a password change at the next login](#).



#### NOTE

The LDAP Directory Manager (DM) user can change user passwords using LDAP tools. The new password can override any IdM password policies. Passwords set by DM do not expire after the first login.

### 32.2. CHANGING YOUR USER PASSWORD IN THE IDM WEB UI

As an Identity Management (IdM) user, you can change your user password in the IdM Web UI.

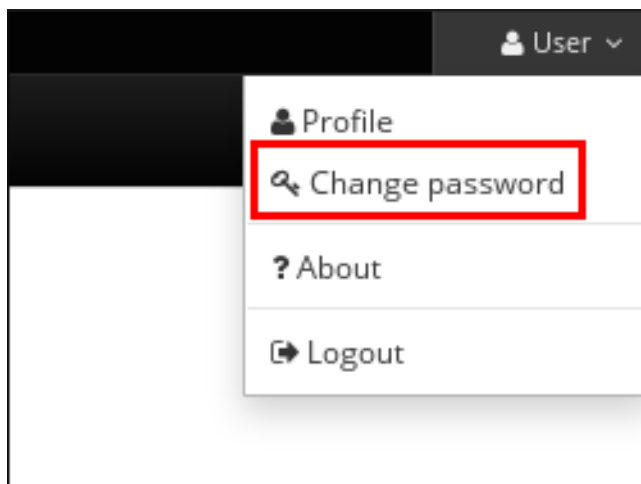
#### Prerequisites

- You are logged in to the IdM Web UI.

#### Procedure

1. In the upper right corner, click **User name** → **Change password**

Figure 32.1. Resetting Password



2. Enter the current and new passwords.

## 32.3. RESETTING ANOTHER USER'S PASSWORD IN THE IDM WEB UI

As an administrative user of Identity Management (IdM), you can change passwords for other users in the IdM Web UI.

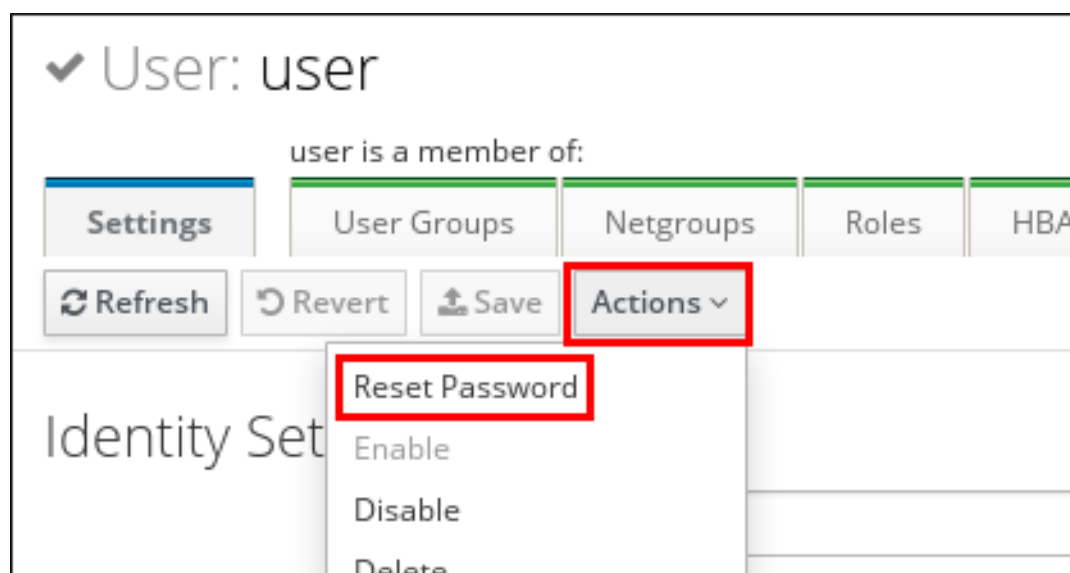
### Prerequisites

- You are logged in to the IdM Web UI as an administrative user.

### Procedure

1. Select **Identity** → **Users**.
2. Click the name of the user to edit.
3. Click **Actions** → **Reset password**.

Figure 32.2. Resetting Password



4. Enter the new password, and click **Reset Password**.

Figure 32.3. Confirming New Password



## 32.4. RESETTING THE DIRECTORY MANAGER USER PASSWORD

If you lose the Identity Management (IdM) Directory Manager password, you can reset it.

## Prerequisites

- You have **root** access to an IdM server.

## Procedure

1. Generate a new password hash by using the **pwdhash** command. For example:

```
# pwdhash -D /etc/dirsrv/slapd-IDM-EXAMPLE-COM password
{PBKDF2_SHA256}AAAgABU0bKhyjY53NcxY33ueoPjOUWtl4iyYN5uW...
```

By specifying the path to the Directory Server configuration, you automatically use the password storage scheme set in the **nsslapd-rootpwstorage** attribute to encrypt the new password.

2. On every IdM server in your topology, execute the following steps:
  - a. Stop all IdM services installed on the server:

```
# ipactl stop
```

- b. Edit the **/etc/dirsrv/IDM-EXAMPLE-COM/dse.ldif** file and set the **nsslapd-rootpw** attribute to the value generated by the **pwdhash** command:

```
nsslapd-rootpw:
{PBKDF2_SHA256}AAAgABU0bKhyjY53NcxY33ueoPjOUWtl4iyYN5uW...
```

- c. Start all IdM services installed on the server:

```
# ipactl start
```

## 32.5. CHANGING YOUR USER PASSWORD OR RESETTNG ANOTHER USER'S PASSWORD IN IDM CLI

You can change your user password using the Identity Management (IdM) command-line interface (CLI). If you are an administrative user, you can use the CLI to reset another user's password.

## Prerequisites

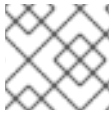
- You have obtained a ticket-granting ticket (TGT) for an IdM user.
- If you are resetting another user's password, you must have obtained a TGT for an administrative user in IdM.

## Procedure

- Enter the **ipa user-mod** command with the name of the user and the **--password** option. The command will prompt you for the new password.

```
$ ipa user-mod idm_user --password
Password:
Enter Password again to verify:
-----
```

```
Modified user "idm_user"
-----
...
```

**NOTE**

You can also use the **ipa passwd** *idm\_user* command instead of **ipa user-mod**.

## 32.6. ENABLING PASSWORD RESET IN IDM WITHOUT PROMPTING THE USER FOR A PASSWORD CHANGE AT THE NEXT LOGIN

By default, when an administrator resets another user's password, the password expires after the first successful login. As IdM Directory Manager, you can specify the following privileges for individual IdM administrators:

- They can perform password change operations without requiring users to change their passwords subsequently on their first login.
- They can bypass the password policy so that no strength or history enforcement is applied.

**WARNING**

Bypassing the password policy can be a security threat. Exercise caution when selecting users to whom you grant these additional privileges.

**Prerequisites**

- You know the Directory Manager password.

**Procedure**

1. On every Identity Management (IdM) server in the domain, make the following changes:

- a. Enter the **ldapmodify** command to modify LDAP entries. Specify the name of the IdM server and the 389 port and press Enter:

```
$ ldapmodify -x -D "cn=Directory Manager" -W -h server.idm.example.com -p 389
Enter LDAP Password:
```

- b. Enter the Directory Manager password.
- c. Enter the distinguished name for the **ipa\_pwd\_extop** password synchronization entry and press Enter:

```
dn: cn=ipa_pwd_extop,cn=plugins,cn=config
```

- d. Specify the **modify** type of change and press Enter:

```
changetype: modify
```



- e. Specify what type of modification you want LDAP to execute and to which attribute. Press Enter:

```
add: passSyncManagersDNs
```

- f. Specify the administrative user accounts in the **passSyncManagersDNs** attribute. The attribute is multi-valued. For example, to grant the **admin** user the password resetting powers of Directory Manager:

```
passSyncManagersDNs: \
uid=admin,cn=users,cn=accounts,dc=example,dc=com
```

- g. Press Enter twice to stop editing the entry.

The whole procedure looks as follows:

```
$ ldapmodify -x -D "cn=Directory Manager" -W -h server.idm.example.com -p 389
Enter LDAP Password:
dn: cn=ipa_pwd_extop,cn=plugins,cn=config
changetype: modify
add: passSyncManagersDNs
passSyncManagersDNs: uid=admin,cn=users,cn=accounts,dc=example,dc=com
```

The **admin** user, listed under **passSyncManagerDNs**, now has the additional privileges.

## 32.7. CHECKING IF AN IDM USER'S ACCOUNT IS LOCKED

As an Identity Management (IdM) administrator, you can check if an IdM user's account is locked. For that, you must compare a user's maximum allowed number of failed login attempts with the number of the user's actual failed logins.

### Prerequisites

- You have obtained the ticket-granting ticket (TGT) of an administrative user in IdM.

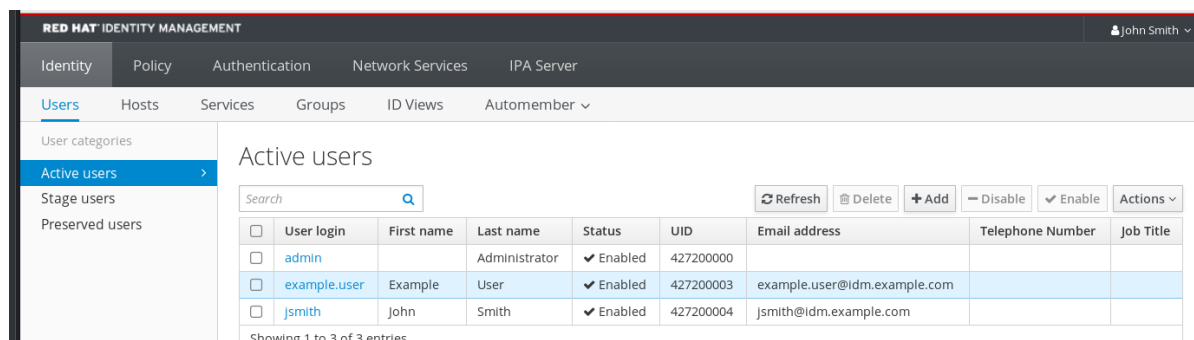
### Procedure

1. Display the status of the user account to see the number of failed logins:

```
$ ipa user-status example_user
-----
Account disabled: False
-----
Server: idm.example.com
Failed logins: 8
Last successful authentication: N/A
Last failed authentication: 20220229080317Z
Time now: 2022-02-29T08:04:46Z
-----
Number of entries returned 1
-----
```

2. Display the number of allowed login attempts for a particular user:

- a. Log in to the IdM Web UI as IdM administrator.
- b. Open the **Identity** → **Users** → **Active users** tab.



- a. Click the user name to open the user settings.
  - b. In the **Password policy** section, locate the **Max failures** item.
3. Compare the number of failed logins as displayed in the output of the **ipa user-status** command with the **Max failures** number displayed in the IdM Web UI. If the number of failed logins equals that of maximum allowed login attempts, the user account is locked.

### Additional resources

- [Unlocking user accounts after password failures in IdM](#)

## 32.8. UNLOCKING USER ACCOUNTS AFTER PASSWORD FAILURES IN IDM

If a user attempts to log in using an incorrect password a certain number of times, Identity Management (IdM) locks the user account, which prevents the user from logging in. For security reasons, IdM does not display any warning message that the user account has been locked. Instead, the CLI prompt might continue asking the user for a password again and again.

IdM automatically unlocks the user account after a specified amount of time has passed. Alternatively, you can unlock the user account manually with the following procedure.

### Prerequisites

- You have obtained the ticket-granting ticket of an IdM administrative user.

### Procedure

- To unlock a user account, use the **ipa user-unlock** command.

```
$ ipa user-unlock idm_user
```

```
-----
Unlocked account "idm_user"
-----
```

After this, the user can log in again.

## Additional resources

- [Checking if an IdM user's account is locked](#)

## 32.9. ENABLING THE TRACKING OF LAST SUCCESSFUL KERBEROS AUTHENTICATION FOR USERS IN IDM

For performance reasons, Identity Management (IdM) running in Red Hat Enterprise Linux 8 does not store the time stamp of the last successful Kerberos authentication of a user. As a consequence, certain commands, such as **ipa user-status**, do not display the time stamp.

### Prerequisites

- You have obtained the ticket-granting ticket (TGT) of an administrative user in IdM.
- You have **root** access to the IdM server on which you are executing the procedure.

### Procedure

1. Display the currently enabled password plug-in features:

```
# ipa config-show | grep "Password plugin features"
Password plugin features: AllowNThash, KDC:Disable Last Success
```

The output shows that the **KDC:Disable Last Success** plug-in is enabled. The plug-in hides the last successful Kerberos authentication attempt from being visible in the **ipa user-status** output.

2. Add the **--ipaconfigstring=feature** parameter for every feature to the **ipa config-mod** command that is currently enabled, except for **KDC:Disable Last Success**:

```
# ipa config-mod --ipaconfigstring='AllowNThash'
```

This command enables only the **AllowNThash** plug-in. To enable multiple features, specify the **--ipaconfigstring=feature** parameter separately for each feature.

3. Restart IdM:

```
# ipactl restart
```

## CHAPTER 33. DEFINING IDM PASSWORD POLICIES

This chapter describes Identity Management (IdM) password policies and how to add a new password policy in IdM using an Ansible playbook.

### 33.1. WHAT IS A PASSWORD POLICY

A password policy is a set of rules that passwords must meet. For example, a password policy can define the minimum password length and the maximum password lifetime. All users affected by this policy are required to set a sufficiently long password and change it frequently enough to meet the specified conditions. In this way, password policies help reduce the risk of someone discovering and misusing a user's password.

### 33.2. PASSWORD POLICIES IN IDM

Passwords are the most common way for Identity Management (IdM) users to authenticate to the IdM Kerberos domain. Password policies define the requirements that these IdM user passwords must meet.



#### NOTE

The IdM password policy is set in the underlying LDAP directory, but the Kerberos Key Distribution Center (KDC) enforces the password policy.

[Password policy attributes](#) lists the attributes you can use to define a password policy in IdM.

**Table 33.1. Password Policy Attributes**

| Attribute    | Explanation  | Example   |
|--------------|--|---|
| Max lifetime | <p>The maximum amount of time in days that a password is valid before a user must reset it. The default value is 90 days.</p> <p>Note that if the attribute is set to 0, the password never expires.</p> | <p>Max lifetime = 180</p> <p>User passwords are valid only for 180 days. After that, IdM prompts users to change them.</p>      |
| Min lifetime | <p>The minimum amount of time in hours that must pass between two password change operations.</p>  | <p>Min lifetime = 1</p> <p>After users change their passwords, they must wait at least 1 hour before changing them again.</p>   |
| History size | <p>The number of previous passwords that are stored. A user cannot reuse a password from their password history but can reuse old passwords that are not stored.</p>                                     | <p>History size = 0</p> <p>In this case, the password history is empty and users can reuse any of their previous passwords.</p> |

| Attribute              | Explanation  | Example   |
|------------------------|--|---|
| Character classes      | <p>The number of different character classes the user must use in the password. The character classes are:</p> <ul style="list-style-type: none"> <li>* Uppercase characters</li> <li>* Lowercase characters</li> <li>* Digits</li> <li>* Special characters, such as comma (,), period (.), asterisk (*)</li> <li>* Other UTF-8 characters</li> </ul> <p>Using a character three or more times in a row decreases the character class by one. For example:</p> <ul style="list-style-type: none"> <li>* <b>Secret1</b> has 3 character classes: uppercase, lowercase, digits</li> <li>* <b>Secret111</b> has 2 character classes: uppercase, lowercase, digits, and a -1 penalty for using <b>1</b> repeatedly</li> </ul> | <p>Character classes = 0</p> <p>The default number of classes required is 0. To configure the number, run the <b>ipa pwpolicy-mod</b> command with the <b>--minclasses</b> option.</p> <p>See also the <a href="#">Important</a> note below this table.</p> |
| Min length             | <p>The minimum number of characters in a password.</p> <p>If any of the <a href="#">additional password policy options</a> are set, then the minimum length of passwords is 6 characters.</p>  | <p>Min length = 8</p> <p>Users cannot use passwords shorter than 8 characters.</p>  |
| Max failures           | <p>The maximum number of failed login attempts before IdM locks the user account.</p>  | <p>Max failures = 6</p> <p>IdM locks the user account when the user enters a wrong password 7 times in a row.</p>   |
| Failure reset interval | <p>The amount of time in seconds after which IdM resets the current number of failed login attempts.</p>   | <p>Failure reset interval = 60</p> <p>If the user waits for more than 1 minute after the number of failed login attempts defined in <b>Max failures</b>, the user can attempt to log in again without risking a user account lock.</p>                      |
| Lockout duration       | <p>The amount of time in seconds that the user account is locked after the number of failed login attempts defined in <b>Max failures</b>.</p>   | <p>Lockout duration = 600</p> <p>Users with locked accounts are unable to log in for 10 minutes.</p>  |



## IMPORTANT

Use the English alphabet and common symbols for the character classes requirement if you have a diverse set of hardware that may not have access to international characters and symbols. For more information about character class policies in passwords, see [What characters are valid in a password?](#) in Red Hat Knowledgebase.

### 33.3. ENSURING THE PRESENCE OF A PASSWORD POLICY IN IDM USING AN ANSIBLE PLAYBOOK

Follow this procedure to ensure the presence of a password policy in Identity Management (IdM) using an Ansible playbook.

In the default **global\_policy** password policy in IdM, the number of different character classes in the password is set to 0. The history size is also set to 0.

Complete this procedure to enforce a stronger password policy for an IdM group using an Ansible playbook.



## NOTE

You can only define a password policy for an IdM group. You cannot define a password policy for an individual user.

#### Prerequisites

- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipaadmin\_password**.
- You know the IdM administrator password.
- The group for which you are ensuring the presence of a password policy exists in IdM.

#### Procedure

1. Create an inventory file, for example **inventory.file**, and define the **FQDN** of your IdM server in the **[ipaserver]** section:

```
[ipaserver]
server.idm.example.com
```

2. Create your Ansible playbook file that defines the password policy whose presence you want to ensure. To simplify this step, copy and modify the example in the **/usr/share/doc/ansible-freeipa/playbooks/pwpolicy/pwpolicy\_present.yml** file:

```
---
- name: Tests
```

```

hosts: ipaserver

vars_files:
- /home/user_name/MyPlaybooks/secret.yml
tasks:
- name: Ensure presence of pwpolicy for group ops
  ipapwpolicy:
    ipaadmin_password: "{{ ipaadmin_password }}"
    name: ops
    minlife: 7
    maxlife: 49
    history: 5
    priority: 1
    lockouttime: 300
    minlength: 8
    minclasses: 4
    maxfail: 3
    failinterval: 5

```

For details on what the individual variables mean, see [Password policy attributes](#).

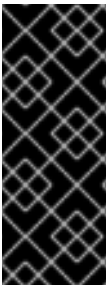
3. Run the playbook:

```

$ ansible-playbook --vault-password-file=password_file -v -i
path_to_inventory_directory/inventory.file
path_to_playbooks_directory/new_pwpolicy_present.yml

```

You have successfully used an Ansible playbook to ensure that a password policy for the **ops** group is present in IdM.



### IMPORTANT

The priority of the **ops** password policy is set to *1*, whereas the **global\_policy** password policy has no priority set. For this reason, the **ops** policy automatically supersedes **global\_policy** for the **ops** group and is enforced immediately.

**global\_policy** serves as a fallback policy when no group policy is set for a user, and it can never take precedence over a group policy.

### Additional resources

- See the **README-pwpolicy.md** file in the `/usr/share/doc/ansible-freeipa/` directory.
- See [Password policy priorities](#).

## 33.4. ADDITIONAL PASSWORD POLICY OPTIONS IN IDM

As an Identity Management (IdM) administrator, you can strengthen the default password requirements by enabling additional password policy options based on the **libpwquality** feature set. The additional password policy options include the following:

### **--maxrepeat**

Specifies the maximum acceptable number of same consecutive characters in the new password.

### **--maxsequence**

Specifies the maximum length of monotonic character sequences in the new password. Examples of such a sequence are **12345** or **fedcb**. Most such passwords will not pass the simplicity check.

#### **--dictcheck**

If nonzero, checks whether the password, with possible modifications, matches a word in a dictionary. Currently **libpwquality** performs the dictionary check using the **cracklib** library.

#### **--usercheck**

If nonzero, checks whether the password, with possible modifications, contains the user name in some form. It is not performed for user names shorter than 3 characters.

You cannot apply the additional password policy options to existing passwords. If you apply any of the additional options, IdM automatically sets the **--minlength** option, the minimum number of characters in a password, to **6** characters.



#### **NOTE**

In a mixed environment with RHEL 7 and RHEL 8 servers, you can enforce the additional password policy settings only on servers running on RHEL 8.4 and later. If a user is logged in to an IdM client and the IdM client is communicating with an IdM server running on RHEL 8.3 or earlier, then the new password policy requirements set by the system administrator will not be applied. To ensure consistent behavior, upgrade or update all servers to RHEL 8.4 and later.

#### **Additional resources:**

- [Applying additional password policies to an IdM group](#)
- **pwquality(3)** man page

## **33.5. APPLYING ADDITIONAL PASSWORD POLICY OPTIONS TO AN IDM GROUP**

Follow this procedure to apply additional password policy options in Identity Management (IdM). The example describes how to strengthen the password policy for the **managers** group by making sure that the new passwords do not contain the users' respective user names and that the passwords contain no more than two identical characters in succession.

#### **Prerequisites**

- You are logged in as an IdM administrator.
- The **managers** group exists in IdM.
- The **managers** password policy exists in IdM.

#### **Procedure**

1. Apply the user name check to all new passwords suggested by the users in the **managers** group:

```
$ ipa pwpolicy-mod --usercheck=True managers
```



**NOTE**

If you do not specify the name of the password policy, the default **global\_policy** is modified.

2. Set the maximum number of identical consecutive characters to 2 in the **managers** password policy:

```
$ ipa pwpolicy-mod --maxrepeat=2 managers
```

A password now will not be accepted if it contains more than 2 identical consecutive characters. For example, the **eR873mUi111YJQ** combination is unacceptable because it contains three **1s** in succession.

**Verification**

1. Add a test user named **test\_user**:

```
$ ipa user-add test_user
First name: test
Last name: user
-----
Added user "test_user"
-----
```

2. Add the test user to the **managers** group:
  - a. In the IdM Web UI, click **Identity** → **Groups** → **User Groups**.
  - b. Click **managers**.
  - c. Click **Add**.
  - d. In the **Add users into user group 'managers'** page, check **test\_user**.
  - e. Click the **>** arrow to move the user to the **Prospective** column.
  - f. Click **Add**.
3. Reset the password for the test user:
  - a. Go to **Identity** → **Users**.
  - b. Click **test\_user**.
  - c. In the **Actions** menu, click **Reset Password**.
  - d. Enter a temporary password for the user.
4. On the command line, try to obtain a Kerberos ticket-granting ticket (TGT) for the **test\_user**:

```
$ kinit test_user
```

- a. Enter the temporary password.

- b. The system informs you that you must change your password. Enter a password that contains the user name of **test\_user**:

```

Password expired. You must change it now.
Enter new password:
Enter it again:
Password change rejected: Password not changed.
Unspecified password quality failure while trying to change password.
Please try again.

```



#### NOTE

Kerberos does not have fine-grained error password policy reporting and, in certain cases, does not provide a clear reason why a password was rejected.

- c. The system informs you that the entered password was rejected. Enter a password that contains three or more identical characters in succession:

```

Password change rejected: Password not changed.
Unspecified password quality failure while trying to change password.
Please try again.

Enter new password:
Enter it again:

```

- d. The system informs you that the entered password was rejected. Enter a password that meets the criteria of the **managers** password policy:

```

Password change rejected: Password not changed.
Unspecified password quality failure while trying to change password.
Please try again.

Enter new password:
Enter it again:

```

5. View the obtained TGT:

```

$ klist
Ticket cache: KCM:0:33945
Default principal: test_user@IDM.EXAMPLE.COM

Valid starting    Expires          Service principal
07/07/2021 12:44:44 07/08/2021 12:44:44
krbtgt@IDM.EXAMPLE.COM@IDM.EXAMPLE.COM

```

The **managers** password policy now works correctly for users in the **managers** group.

#### Additional resources

- [Additional password policies in IdM](#)

## 33.6. USING AN ANSIBLE PLAYBOOK TO APPLY ADDITIONAL PASSWORD POLICY OPTIONS TO AN IDM GROUP

You can use an Ansible playbook to apply additional password policy options to strengthen the password policy requirements for a specific IdM group. You can use the **maxrepeat**, **maxsequence**, **dictcheck** and **usercheck** password policy options for this purpose. The example describes how to set the following requirements for the **managers** group:

- Users' new passwords do not contain the users' respective user names.
- The passwords contain no more than two identical characters in succession.
- Any monotonic character sequences in the passwords are not longer than 3 characters. This means that the system does not accept a password with a sequence such as **1234** or **abcd**.

### Prerequisites

- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the **ansible-freeipa** package on the Ansible controller.
  - You have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server in the `~/MyPlaybooks/` directory.
  - You have stored your **ipaadmin\_password** in the **secret.yml** Ansible vault.
- The group for which you are ensuring the presence of a password policy exists in IdM.

### Procedure

1. Create your Ansible playbook file **manager\_pwpolicy\_present.yml** that defines the password policy whose presence you want to ensure. To simplify this step, copy and modify the following example:

```
---
- name: Tests
  hosts: ipaserver

  vars_files:
    - /home/user_name/MyPlaybooks/secret.yml
  tasks:
    - name: Ensure presence of usercheck and maxrepeat pwpolicy for group managers
      ipapwpolicy:
        ipaadmin_password: "{{ ipaadmin_password }}"
        name: managers
        usercheck: True
        maxrepeat: 2
        maxsequence: 3
```

2. Run the playbook:

```
$ ansible-playbook --vault-password-file=password_file -v -i
path_to_inventory_directory/inventory.file
path_to_playbooks_directory/manager_pwpolicy_present.yml
```

## Verification

1. Add a test user named **test\_user**:

```
$ ipa user-add test_user
First name: test
Last name: user
-----
Added user "test_user"
-----
```

2. Add the test user to the **managers** group:
  - a. In the IdM Web UI, click **Identity** → **Groups** → **User Groups**.
  - b. Click **managers**.
  - c. Click **Add**.
  - d. In the **Add users into user group 'managers'** page, check **test\_user**.
  - e. Click the > arrow to move the user to the **Prospective** column.
  - f. Click **Add**.
3. Reset the password for the test user:
  - a. Go to **Identity** → **Users**.
  - b. Click **test\_user**.
  - c. In the **Actions** menu, click **Reset Password**.
  - d. Enter a temporary password for the user.
4. On the command line, try to obtain a Kerberos ticket-granting ticket (TGT) for the **test\_user**:

```
$ kinit test_user
```

- a. Enter the temporary password.
- b. The system informs you that you must change your password. Enter a password that contains the user name of **test\_user**:

```
Password expired. You must change it now.
Enter new password:
Enter it again:
Password change rejected: Password not changed.
Unspecified password quality failure while trying to change password.
Please try again.
```

**NOTE**

Kerberos does not have fine-grained error password policy reporting and, in certain cases, does not provide a clear reason why a password was rejected.

- c. The system informs you that the entered password was rejected. Enter a password that contains three or more identical characters in succession:

Password change rejected: Password not changed.  
 Unspecified password quality failure while trying to change password.  
 Please try again.

Enter new password:  
 Enter it again:

- d. The system informs you that the entered password was rejected. Enter a password that contains a monotonic character sequence longer than 3 characters. Examples of such sequences include **1234** and **fedc**:

Password change rejected: Password not changed.  
 Unspecified password quality failure while trying to change password.  
 Please try again.

Enter new password:  
 Enter it again:

- e. The system informs you that the entered password was rejected. Enter a password that meets the criteria of the **managers** password policy:

Password change rejected: Password not changed.  
 Unspecified password quality failure while trying to change password.  
 Please try again.

Enter new password:  
 Enter it again:

5. Verify that you have obtained a TGT, which is only possible after having entered a valid password:

**\$ klist**

Ticket cache: KCM:0:33945  
 Default principal: test\_user@IDM.EXAMPLE.COM

| Valid starting      | Expires             | Service principal                      |
|---------------------|---------------------|--|
| 07/07/2021 12:44:44 | 07/08/2021 12:44:44 | krbtgt@IDM.EXAMPLE.COM@IDM.EXAMPLE.COM |

**Additional resources**

- [Additional password policies in IdM](#)
- `/usr/share/doc/ansible-freeipa/README-pwpolicy.md`
- `/usr/share/doc/ansible-freeipa/playbooks/pwpolicy`

## CHAPTER 34. MANAGING EXPIRING PASSWORD NOTIFICATIONS

You can use the Expiring Password Notification (EPN) tool, provided by the **ipa-client-epn** package, to build a list of Identity Management (IdM) users whose passwords are expiring in a configured amount of time. To install, configure, and use the EPN tool, refer to the relevant sections.

- [What is the Expiring Password Notification tool](#)
- [Installing the Expiring Password Notification tool](#)
- [Running the EPN tool to send emails to users whose passwords are expiring](#)
- [Enabling the ipa-epn.timer to send an email to all users whose passwords are expiring](#)
- [Modifying the Expiring Password Notification email template](#)

### 34.1. WHAT IS THE EXPIRING PASSWORD NOTIFICATION TOOL

The Expiring Password Notification (EPN) tool is a standalone tool you can use to build a list of Identity Management (IdM) users whose passwords are expiring in a configured amount of time.

IdM administrators can use EPN to:

- Display a list of affected users in JSON format, which is created when run in dry-run mode.
- Calculate how many emails will be sent for a given day or date range.
- Send password expiration email notifications to users.
- Configure the **ipa-epn.timer** to run the EPN tool daily and send an email to users whose passwords are expiring within the defined future date ranges.
- Customize the email notification to send to users.



#### NOTE

If a user account is disabled, no email notifications are sent if the password is going to expire.

### 34.2. INSTALLING THE EXPIRING PASSWORD NOTIFICATION TOOL

Follow this procedure to install the Expiring Password Notification (EPN) tool.

#### Prerequisites

- Install the EPN tool on either an Identity Management (IdM) replica or an IdM client with a local Postfix SMTP server configured as a smart host.

#### Procedure

- Install the EPN tool:

```
# yum install ipa-client-epn
```

## 34.3. RUNNING THE EPN TOOL TO SEND EMAILS TO USERS WHOSE PASSWORDS ARE EXPIRING

Follow this procedure to run the Expiring Password Notification (EPN) tool to send emails to users whose passwords are expiring.



### NOTE

The EPN tool is stateless. If the EPN tool fails to email any of the users whose passwords are expiring on a given day, the EPN tool does not save a list of those users.

### Prerequisites

- The **ipa-client-epn** package is installed. See [Installing the Expiring Password Notification tool](#).
- Customize the **ipa-epn** email template if required. See [Modifying the Expiring Password Notification email template](#).

### Procedure

1. Update the **epn.conf** configuration file to set the options for the EPN tool to notify users of upcoming password expiration.

```
# vi /etc/ipa/epn.conf
```

2. Update the **notify\_ttls** as required. The default is to notify users whose passwords are expiring in 28, 14, 7, 3, and 1 day(s).

```
notify_ttls = 28, 14, 7, 3, 1
```

3. Configure your SMTP server and port:

```
smtp_server = localhost
smtp_port = 25
```

4. Specify the email address from which the email expiration notification is sent. Any unsuccessfully delivered emails are returned to this address.

```
mail_from = admin-email@example.com
```

5. Save the **/etc/ipa/epn.conf** file.
6. Run the EPN tool in dry-run mode to generate a list of the users to whom the password expiration email notification would be sent if you run the tool without the **--dry-run** option.

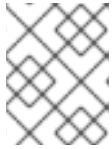
```
ipa-epn --dry-run
[
  {
    "uid": "user5",
    "cn": "user 5",
    "krbpasswordexpiration": "2020-04-17 15:51:53",
    "mail": "[user5@ipa.test]"
  }
]
```

```

    ]
    [
      {
        "uid": "user6",
        "cn": "user 6",
        "krbpasswordexpiration": "2020-12-17 15:51:53",
        "mail": "[user5@ipa.test]"
      }
    ]

```

The IPA-EPN command was successful



#### NOTE

If the list of users returned is very large and you run the tool without the **--dry-run** option, this might cause an issue with your email server.

7. Run the EPN tool without the **--dry-run** option to send expiration emails to the list of all the users returned when you ran the EPN tool in dry-run mode:

```

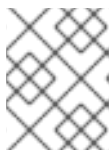
ipa-epn
[
  {
    "uid": "user5",
    "cn": "user 5",
    "krbpasswordexpiration": "2020-10-01 15:51:53",
    "mail": "[user5@ipa.test]"
  }
]
[
  {
    "uid": "user6",
    "cn": "user 6",
    "krbpasswordexpiration": "2020-12-17 15:51:53",
    "mail": "[user5@ipa.test]"
  }
]

```

The IPA-EPN command was successful

8. You can add EPN to any monitoring system and invoke it with the **--from-nbdays** and **--to-nbdays** options to determine how many users passwords are going to expire within a specific time frame:

```
# ipa-epn --from-nbdays 8 --to-nbdays 12
```



#### NOTE

If you invoke the EPN tool with the **--from-nbdays** and **--to-nbdays** options, it is automatically executed in dry-run mode.

### Verification steps

- Run the EPN tool and verify an email notification is sent.

### Additional resources



#### Additional resources

- See **ipa-epn** man page.
- See **epn.conf** man page.

## 34.4. ENABLING THE IPA-EPN.TIMER TO SEND AN EMAIL TO ALL USERS WHOSE PASSWORDS ARE EXPIRING

Follow this procedure to use **ipa-epn.timer** to run the Expiring Password Notification (EPN) tool to send emails to users whose passwords are expiring. The **ipa-epn.timer** parses the **epn.conf** file and sends an email to users whose passwords are expiring within the defined future date ranges configured in that file.

### Prerequisites

- The **ipa-client-epn** package is installed. See [Installing the Expiring Password Notification tool](#)
- Customize the **ipa-epn** email template if required. See [Modifying the Expiring Password Notification email template](#)

### Procedure

- Start the **ipa-epn.timer**:

```
systemctl start ipa-epn.timer
```

Once you start the timer, by default, the EPN tool is run every day at 1 a.m.

#### Additional resources

- See the **ipa-epn** man page.

## 34.5. MODIFYING THE EXPIRING PASSWORD NOTIFICATION EMAIL TEMPLATE

Follow this procedure to customize the Expiring Password Notification (EPN) email message template.

### Prerequisites

- The **ipa-client-epn** package is installed.

### Procedure

1. Open the EPN message template:

```
# vi /etc/ipa/epn/expire_msg.template
```

2. Update the template text as required.

```
Hi {{ fullname }},

Your password will expire on {{ expiration }}.
```

Please change it as soon as possible.

You can use the following variables in the template.

- User ID: uid
- Full name: fullname
- First name: first
- Last name: last
- Password expiration date: expiration

3. Save the message template file.

### Verification steps

- Run the EPN tool and verify the email notification contains the updated text.

### Additional resources

- See the **ipa-epn** man page.

## CHAPTER 35. USING AN ID VIEW TO OVERRIDE A USER ATTRIBUTE VALUE ON AN IDM CLIENT

If an Identity Management (IdM) user want to override some of their user or group attributes stored in the IdM LDAP server, for example the login name, home directory, certificate used for authentication, or **SSH** keys, you as IdM administrator can redefine these values for a specific IdM client, using IdM ID views. For example, you can specify a different home directory for a user on the IdM client that the user most commonly uses for logging in to IdM.

This chapter describes how to redefine a POSIX attribute value associated with an IdM user on a host enrolled into IdM as a client. Specifically, the chapter describes how to redefine the user login name and home directory.

This chapter includes the following sections:

- [ID views](#)
- [Potential negative impact of ID views on SSSD performance](#)
- [Attributes an ID view can override](#)
- [Getting help for ID view commands](#)
- [Using an ID view to override the login name of an IdM user on a specific host](#)
- [Modifying an IdM ID view](#)
- [Adding an ID view to override an IdM user home directory on an IdM client](#)
- [Applying an ID view to an IdM host group](#)

### 35.1. ID VIEWS

An ID view in Identity Management (IdM) is an IdM client-side view specifying the following information:

- New values for centrally defined POSIX user or group attributes
- The client host or hosts on which the new values apply.

An ID view contains one or more overrides. An override is a specific replacement of a centrally defined POSIX attribute value.

You can only define an ID view for an IdM client centrally on IdM servers. You cannot configure client-side overrides for an IdM client locally.

For example, you can use ID views to achieve the following goals:

- Define different attribute values for different environments. For example, you can allow the IdM administrator or another IdM user to have different home directories on different IdM clients: you can configure **/home/encrypted/username** to be this user's home directory on one IdM client and **/dropbox/username** on another client. Using ID views in this situation is convenient as alternatively, for example, changing **fallback\_homedir**, **override\_homedir** or other home directory variables in the client's **/etc/sss/sss.conf** file would affect all users. See [Adding an ID view to override an IdM user home directory on an IdM client](#) for an example procedure.
- Replace a previously generated attribute value with a different value, such as overriding a user's

UID. This ability can be useful when you want to achieve a system-wide change that would otherwise be difficult to do on the LDAP side, for example make 1009 the UID of an IdM user. IdM ID ranges, which are used to generate an IdM user UID, never start as low as 1000 or even 10000. If a reason exists for an IdM user to impersonate a local user with UID 1009 on all IdM clients, you can use ID views to override the UID of this IdM user that was generated when the user was created in IdM.



### IMPORTANT

You can only apply ID views to IdM clients, not to IdM servers.

#### Additional resources

- [Using ID views for Active Directory users](#)
- [SSSD Client-side Views](#)

## 35.2. POTENTIAL NEGATIVE IMPACT OF ID VIEWS ON SSSD PERFORMANCE

When you define an ID view, IdM places the desired override value in the IdM server's System Security Services Daemon (SSSD) cache. The SSSD running on an IdM client then retrieves the override value from the server cache.

Applying an ID view can have a negative impact on System Security Services Daemon (SSSD) performance, because certain optimizations and ID views cannot run at the same time. For example, ID views prevent SSSD from optimizing the process of looking up groups on the server:

- With ID views, SSSD must check every member on the returned list of group member names if the group name is overridden.
- Without ID views, SSSD can only collect the user names from the member attribute of the group object.

This negative effect becomes most apparent when the SSSD cache is empty or after you clear the cache, which makes all entries invalid.

## 35.3. ATTRIBUTES AN ID VIEW CAN OVERRIDE

ID views consist of user and group ID overrides. The overrides define the new POSIX attribute values.

User and group ID overrides can define new values for the following POSIX attributes:

#### User attributes

- Login name (**uid**)
- GECOS entry (**gecos**)
- UID number (**uidNumber**)
- GID number (**gidNumber**)
- Login shell (**loginShell**)

- Home directory (**homeDirectory**)
- SSH public keys (**ipaSshPubkey**)
- Certificate (**userCertificate**)

#### Group attributes

- Group name (**cn**)
- Group GID number (**gidNumber**)

## 35.4. GETTING HELP FOR ID VIEW COMMANDS

You can get help for commands involving Identity Management (IdM) ID views on the IdM command-line interface (CLI).

#### Prerequisites

- You have obtained a Kerberos ticket for an IdM user.

#### Procedure

- To display all commands used to manage ID views and overrides:

```
$ ipa help idviews
ID Views

Manage ID Views

IPA allows to override certain properties of users and groups[...]
[...]
Topic commands:
  idoverridegroup-add      Add a new Group ID override
  idoverridegroup-del      Delete a Group ID override
  [...]
```

- To display detailed help for a particular command, add the **--help** option to the command:

```
$ ipa idview-add --help
Usage: ipa [global-options] idview-add NAME [options]

Add a new ID View.
Options:
  -h, --help      show this help message and exit
  --desc=STR      Description
  [...]
```

## 35.5. USING AN ID VIEW TO OVERRIDE THE LOGIN NAME OF AN IDM USER ON A SPECIFIC HOST

Follow this procedure to create an ID view for a specific IdM client that overrides a POSIX attribute value associated with a specific IdM user. The procedure uses the example of an ID view that enables an IdM user named **idm\_user** to log in to an IdM client named **host1** using the **user\_1234** login name.

## Prerequisites

- You are logged in as IdM administrator.

## Procedure

1. Create a new ID view. For example, to create an ID view named **example\_for\_host1**:

```
$ ipa idview-add example_for_host1
-----
Added ID View "example_for_host1"
-----
ID View Name: example_for_host1
```

2. Add a user override to the **example\_for\_host1** ID view. To override the user login:

- Enter the **ipa idoverrideuser-add** command
- Add the name of the ID view
- Add the user name, also called the anchor
- Add the **--login** option:

```
$ ipa idoverrideuser-add example_for_host1 idm_user --login=user_1234
-----
Added User ID override "idm_user"
-----
Anchor to override: idm_user
User login: user_1234
```

For a list of the available options, run `ipa idoverrideuser-add --help`.



### NOTE

The **ipa idoverrideuser-add --certificate** command replaces all existing certificates for the account in the specified ID view. To append an additional certificate, use the **ipa idoverrideuser-add-cert** command instead:

```
$ ipa idoverrideuser-add-cert example_for_host1 user --
certificate="MIIEATCC..."
```

3. Optional: Using the **ipa idoverrideuser-mod** command, you can specify new attribute values for an existing user override.
4. Apply **example\_for\_host1** to the **host1.idm.example.com** host:

```
$ ipa idview-apply example_for_host1 --hosts=host1.idm.example.com
-----
Applied ID View "example_for_host1"
```

```
-----
hosts: host1.idm.example.com
-----
```

```
-----
Number of hosts the ID View was applied to: 1
-----
```



## NOTE

The **ipa idview-apply** command also accepts the **--hostgroups** option. The option applies the ID view to hosts that belong to the specified host group, but does not associate the ID view with the host group itself. Instead, the **--hostgroups** option expands the members of the specified host group and applies the **--hosts** option individually to every one of them.

This means that if a host is added to the host group in the future, the ID view does not apply to the new host.

5. To apply the new configuration to the **host1.idm.example.com** system immediately:

- a. SSH to the system as root:

```
$ ssh root@host1
Password:
```

- b. Clear the SSSD cache:

```
root@host1 ~]# sss_cache -E
```

- c. Restart the SSSD daemon:

```
root@host1 ~]# systemctl restart sssd
```

## Verification steps

- If you have the credentials of **user\_1234**, you can use them to log in to IdM on **host1**:

1. SSH to **host1** using **user\_1234** as the login name:

```
[root@r8server ~]# ssh user_1234@host1.idm.example.com
Password:

Last login: Sun Jun 21 22:34:25 2020 from 192.168.122.229
[user_1234@host1 ~]$
```

2. Display the working directory:

```
[user_1234@host1 ~]$ pwd
/home/idm_user/
```

- Alternatively, if you have root credentials on **host1**, you can use them to check the output of the **id** command for **idm\_user** and **user\_1234**:

```
[root@host1 ~]# id idm_user
```

```
uid=779800003(user_1234) gid=779800003(idm_user) groups=779800003(idm_user)
[root@host1 ~]# user_1234
uid=779800003(user_1234) gid=779800003(idm_user) groups=779800003(idm_user)
```

## 35.6. MODIFYING AN IDM ID VIEW

An ID view in Identity Management (IdM) overrides a POSIX attribute value associated with a specific IdM user. Follow this procedure to modify an existing ID view. Specifically, it describes how to modify an ID view to enable the user named **idm\_user** to use the **/home/user\_1234/** directory as the user home directory instead of **/home/idm\_user/** on the **host1.idm.example.com** IdM client.

### Prerequisites

- You have root access to **host1.idm.example.com**.
- You are logged in as a user with the required privileges, for example **admin**.
- You have an ID view configured for **idm\_user** that applies to the **host1** IdM client.

### Procedure

1. As root, create the directory that you want **idm\_user** to use on **host1.idm.example.com** as the user home directory:

```
[root@host1 /]# mkdir /home/user_1234/
```

2. Change the ownership of the directory:

```
[root@host1 /]# chown idm_user:idm_user /home/user_1234/
```

3. Display the ID view, including the hosts to which the ID view is currently applied. To display the ID view named **example\_for\_host1**:

```
$ ipa idview-show example_for_host1 --all
dn: cn=example_for_host1,cn=views,cn=accounts,dc=idm,dc=example,dc=com
ID View Name: example_for_host1
User object override: idm_user
Hosts the view applies to: host1.idm.example.com
objectclass: ipaIDView, top, nsContainer
```

The output shows that the ID view currently applies to **host1.idm.example.com**.

4. Modify the user override of the **example\_for\_host1** ID view. To override the user home directory:
  - Enter the **ipa idoverrideuser-add** command
  - Add the name of the ID view
  - Add the user name, also called the anchor
  - Add the **--homedir** option:

```
$ ipa idoverrideuser-mod example_for_host1 idm_user --
```



```
homedir=/home/user_1234
```

```
-----  
Modified a User ID override "idm_user"  
-----
```

```
Anchor to override: idm_user
```

```
User login: user_1234
```

```
Home directory: /home/user_1234/
```

For a list of the available options, run **ipa idoverrideuser-mod --help**.

5. To apply the new configuration to the **host1.idm.example.com** system immediately:

- a. SSH to the system as root:

```
$ ssh root@host1
```

```
Password:
```

- b. Clear the SSSD cache:

```
root@host1 ~]# sss_cache -E
```

- c. Restart the SSSD daemon:

```
root@host1 ~]# systemctl restart sssd
```

### Verification steps

1. **SSH** to **host1** as **idm\_user**:

```
[root@r8server ~]# ssh idm_user@host1.idm.example.com
```

```
Password:
```

```
Last login: Sun Jun 21 22:34:25 2020 from 192.168.122.229
```

```
[user_1234@host1 ~]$
```

2. Print the working directory:

```
[user_1234@host1 ~]$ pwd
```

```
/home/user_1234/
```

### Additional resources

- [Defining global attributes for an AD user by modifying the Default Trust View](#)

## 35.7. ADDING AN ID VIEW TO OVERRIDE AN IDM USER HOME DIRECTORY ON AN IDM CLIENT

An ID view in Identity Management (IdM) overrides a POSIX attribute value associated with a specific IdM user. Follow this procedure to create an ID view that applies to **idm\_user** on an IdM client named **host1** to enable the user to use the **/home/user\_1234/** directory as the user home directory instead of **/home/idm\_user/**.

### Prerequisites

## Prerequisites

- You have root access to **host1.idm.example.com**.
- You are logged in as a user with the required privileges, for example **admin**.

## Procedure

1. As root, create the directory that you want **idm\_user** to use on **host1.idm.example.com** as the user home directory:

```
[root@host1 /]# mkdir /home/user_1234/
```

2. Change the ownership of the directory:

```
[root@host1 /]# chown idm_user:idm_user /home/user_1234/
```

3. Create an ID view. For example, to create an ID view named **example\_for\_host1**:

```
$ ipa idview-add example_for_host1
-----
Added ID View "example_for_host1"
-----
ID View Name: example_for_host1
```

4. Add a user override to the **example\_for\_host1** ID view. To override the user home directory:

- Enter the **ipa idoverrideuser-add** command
- Add the name of the ID view
- Add the user name, also called the anchor
- Add the **--homedir** option:

```
$ ipa idoverrideuser-add example_for_host1 idm_user --homedir=/home/user_1234
-----
Added User ID override "idm_user"
-----
Anchor to override: idm_user
Home directory: /home/user_1234/
```

5. Apply **example\_for\_host1** to the **host1.idm.example.com** host:

```
$ ipa idview-apply example_for_host1 --hosts=host1.idm.example.com
-----
Applied ID View "example_for_host1"
-----
hosts: host1.idm.example.com
-----
Number of hosts the ID View was applied to: 1
-----
```



## NOTE

The **ipa idview-apply** command also accepts the **--hostgroups** option. The option applies the ID view to hosts that belong to the specified host group, but does not associate the ID view with the host group itself. Instead, the **--hostgroups** option expands the members of the specified host group and applies the **--hosts** option individually to every one of them.

This means that if a host is added to the host group in the future, the ID view does not apply to the new host.

6. To apply the new configuration to the **host1.idm.example.com** system immediately:

a. SSH to the system as root:

```
$ ssh root@host1
Password:
```

b. Clear the SSSD cache:

```
root@host1 ~]# sss_cache -E
```

c. Restart the SSSD daemon:

```
root@host1 ~]# systemctl restart sssd
```

## Verification steps

1. **SSH** to **host1** as **idm\_user**:

```
[root@r8server ~]# ssh idm_user@host1.idm.example.com
Password:
Activate the web console with: systemctl enable --now cockpit.socket

Last login: Sun Jun 21 22:34:25 2020 from 192.168.122.229
[idm_user@host1 ~]$
```

2. Print the working directory:

```
[idm_user@host1 ~]$ pwd
/home/user_1234/
```

## Additional resources

- [Overriding Default Trust View attributes for an AD user on an IdM client with an ID view](#)

## 35.8. APPLYING AN ID VIEW TO AN IDM HOST GROUP

The **ipa idview-apply** command accepts the **--hostgroups** option. However, the option acts as a one-time operation that applies the ID view to hosts that currently belong to the specified host group, but does not dynamically associate the ID view with the host group itself. The **--hostgroups** option expands the members of the specified host group and applies the **--hosts** option individually to every one of them.

If you add a new host to the host group later, you must apply the ID view to the new host manually, using the **ipa idview-apply** command with the **--hosts** option.

Similarly, if you remove a host from a host group, the ID view is still assigned to the host after the removal. To unapply the ID view from the removed host, you must run the **ipa idview-unapply id\_view\_name --hosts=name\_of\_the\_removed\_host** command.

Follow this procedure to achieve the following goals:

1. How to create a host group and add hosts to it.
2. How to apply an ID view to the host group.
3. How to add a new host to the host group and apply the ID view to the new host.

## Prerequisites

- Ensure that the ID view you want to apply to the host group exists in IdM. For example, to create an ID view to override an IdM user login name on a specific IdM client, see [Using an ID view to override the login name of an IdM user on a specific host](#).

## Procedure

1. Create a host group and add hosts to it:
  - a. Create a host group. For example, to create a host group named **baltimore**:

```
[root@server ~]# ipa hostgroup-add --desc="Baltimore hosts" baltimore
-----
Added hostgroup "baltimore"
-----
Host-group: baltimore
Description: Baltimore hosts
```

- b. Add hosts to the host group. For example, to add the **host102** and **host103** to the **baltimore** host group:

```
[root@server ~]# ipa hostgroup-add-member --hosts={host102,host103} baltimore
Host-group: baltimore
Description: Baltimore hosts
Member hosts: host102.idm.example.com, host103.idm.example.com
-----
Number of members added 2
-----
```

2. Apply an ID view to the hosts in the host group. For example, to apply the **example\_for\_host1** ID view to the **baltimore** host group:

```
[root@server ~]# ipa idview-apply --hostgroups=baltimore
ID View Name: example_for_host1
-----
Applied ID View "example_for_host1"
-----
hosts: host102.idm.example.com, host103.idm.example.com
```

```
-----
Number of hosts the ID View was applied to: 2
-----
```

3. Add a new host to the host group and apply the ID view to the new host:

- a. Add a new host to the host group. For example, to add the **somehost.idm.example.com** host to the **baltimore** host group:

```
[root@server ~]# ipa hostgroup-add-member --hosts=somehost.idm.example.com
baltimore
Host-group: baltimore
Description: Baltimore hosts
Member hosts: host102.idm.example.com,
host103.idm.example.com,somehost.idm.example.com
-----
Number of members added 1
-----
```

- b. Optionally, display the ID view information. For example, to display the details about the **example\_for\_host1** ID view:

```
[root@server ~]# ipa idview-show example_for_host1 --all
dn: cn=example_for_host1,cn=views,cn=accounts,dc=idm,dc=example,dc=com
ID View Name: example_for_host1
[...]
Hosts the view applies to: host102.idm.example.com, host103.idm.example.com
objectclass: ipaIDView, top, nsContainer
```

The output shows that the ID view is not applied to **somehost.idm.example.com**, the newly-added host in the **baltimore** host group.

- c. Apply the ID view to the new host. For example, to apply the **example\_for\_host1** ID view to **somehost.idm.example.com**:

```
[root@server ~]# ipa idview-apply --host=somehost.idm.example.com
ID View Name: example_for_host1
-----
Applied ID View "example_for_host1"
-----
hosts: somehost.idm.example.com
-----
Number of hosts the ID View was applied to: 1
-----
```

## Verification steps

- Display the ID view information again:

```
[root@server ~]# ipa idview-show example_for_host1 --all
dn: cn=example_for_host1,cn=views,cn=accounts,dc=idm,dc=example,dc=com
ID View Name: example_for_host1
[...]
```

```
Hosts the view applies to: host102.idm.example.com, host103.idm.example.com,  
somehost.idm.example.com  
objectclass: ipaIDView, top, nsContainer
```

The output shows that ID view is now applied to **somehost.idm.example.com**, the newly-added host in the **baltimore** host group.

## 35.9. MIGRATING NIS DOMAINS TO IDENTITY MANAGEMENT

You can use ID views to set host specific UIDs and GIDs for existing hosts to prevent changing permissions for files and directories when migrating NIS domains into IdM.

### Prerequisites

- You authenticated yourself as an admin using the **kinit admin** command.

### Procedure

1. Add users and groups in the IdM domain.
  - a. Create users using the **ipa user-add** command. For more information see: [Adding users to IdM](#).
  - b. Create groups using the **ipa group-add** command. For more information see: [Adding groups to IdM](#).
2. Override IDs IdM generated during the user creation:
  - a. Create a new ID view using **ipa idview-add** command. For more information see: [Getting help for ID view commands](#).
  - b. Add ID overrides for the users and groups to the ID view using **ipa idoverrideuser-add** and **idoverridegroup-add** respectively.
3. Assign the ID view to the specific hosts using **ipa idview-apply** command.
4. Decommission the NIS domains.

### Verification

1. To check if all users and groups were added to the ID view correctly, use the **ipa idview-show** command.

```
$ ipa idview-show example-view  
ID View Name: example-view  
User object overrides: example-user1  
Group object overrides: example-group
```

## CHAPTER 36. USING ID VIEWS FOR ACTIVE DIRECTORY USERS

You can use ID views to specify new values for the POSIX attributes of your Active Directory (AD) users in an IdM-AD Trust environment.

By default, IdM applies the **Default Trust View** to all AD users. You can configure additional ID views on individual IdM clients to further adjust which POSIX attributes specific users receive.

### 36.1. HOW THE DEFAULT TRUST VIEW WORKS

The **Default Trust View** is the default ID view that is always applied to AD users and groups in trust-based setups. It is created automatically when you establish the trust using the **ipa-adtrust-install** command and cannot be deleted.



#### NOTE

The Default Trust View only accepts overrides for AD users and groups, not for IdM users and groups.

Using the Default Trust View, you can define custom POSIX attributes for AD users and groups, thus overriding the values defined in AD.

**Table 36.1. Applying the Default Trust View**

|              | Values in AD | Default Trust View | Result  |
|--------------|--------------|--------------------|---------|
| <b>Login</b> | ad_user      | ad_user            | ad_user |
| <b>UID</b>   | 111          | 222                | 222     |
| <b>GID</b>   | 111          | (no value)         | 111     |

You can also configure additional ID Views to override the Default Trust View on IdM clients. IdM applies the values from the host-specific ID view on top of the Default Trust View:

- If an attribute is defined in the host-specific ID view, IdM applies the value from this ID view.
- If an attribute is not defined in the host-specific ID view, IdM applies the value from the Default Trust View.

**Table 36.2. Applying a host-specific ID view on top of the Default Trust View**

|              | Values in AD | Default Trust View | Host-specific ID view | Result  |
|--------------|--------------|--------------------|-----------------------|---------|
| <b>Login</b> | ad_user      | ad_user            | (no value)            | ad_user |
| <b>UID</b>   | 111          | 222                | 333                   | 333     |

|     | Values in AD | Default Trust View | Host-specific ID view | Result |
|-----|--------------|--------------------|-----------------------|--------|
| GID | 111          | (no value)         | 333                   | 333    |

**NOTE**

You can only apply host-specific ID views to override the Default Trust View on IdM clients. IdM servers and replicas always apply the values from the Default Trust View.

**Additional resources**

- [Using an ID view to override a user attribute value on an IdM client](#)

## 36.2. DEFINING GLOBAL ATTRIBUTES FOR AN AD USER BY MODIFYING THE DEFAULT TRUST VIEW

If you want to override a POSIX attribute for an Active Directory (AD) user throughout your entire IdM deployment, modify the entry for that user in the Default Trust View. This procedure sets the GID for the AD user **ad\_user@ad.example.com** to 732000006.

**Prerequisites**

- You have authenticated as an IdM administrator.
- A group must exist with the GID or you must set the GID in an ID override for a group.

**Procedure**

1. As an IdM administrator, create an ID override for the AD user in the Default Trust View that changes the GID number to 732000006:

```
# ipa idoverrideuser-add 'Default Trust View' ad_user@ad.example.com --gidnumber=732000006
```

2. Clear the entry for the **ad\_user@ad.example.com** user from the SSSD cache on all IdM servers and clients. This removes stale data and allows the new override value to apply.

```
# sssctl cache-expire -u ad_user@ad.example.com
```

**Verification**

- Retrieve information for the **ad\_user@ad.example.com** user to verify the GID reflects the updated value.

```
# id ad_user@ad.example.com
uid=702801456(ad_user@ad.example.com) gid=732000006(ad_admins)
groups=732000006(ad_admins),702800513(domain users@ad.example.com)
```



### 36.3. OVERRIDING DEFAULT TRUST VIEW ATTRIBUTES FOR AN AD USER ON AN IDM CLIENT WITH AN ID VIEW

You might want to override some POSIX attributes from the Default Trust View for an Active Directory (AD) user. For example, you might need to give an AD user a different GID on one particular IdM client. You can use an ID view to override a value from the Default Trust View for an AD user and apply it to a single host. This procedure explains how to set the GID for the **ad\_user@ad.example.com** AD user on the **host1.idm.example.com** IdM client to 732001337.

#### Prerequisites

- You have root access to the **host1.idm.example.com** IdM client.
- You are logged in as a user with the required privileges, for example the **admin** user.

#### Procedure

1. Create an ID view. For example, to create an ID view named **example\_for\_host1**:

```
$ ipa idview-add example_for_host1
-----
Added ID View "example_for_host1"
-----
ID View Name: example_for_host1
```

2. Add a user override to the **example\_for\_host1** ID view. To override the user's GID:

- Enter the **ipa idoverrideuser-add** command
- Add the name of the ID view
- Add the user name, also called the anchor
- Add the **--gidnumber=** option:

```
$ ipa idoverrideuser-add example_for_host1 ad_user@ad.example.com --gidnumber=732001337
-----
Added User ID override "ad_user@ad.example.com"
-----
Anchor to override: ad_user@ad.example.com
GID: 732001337
```

3. Apply **example\_for\_host1** to the **host1.idm.example.com** IdM client:

```
$ ipa idview-apply example_for_host1 --hosts=host1.idm.example.com
-----
Applied ID View "example_for_host1"
-----
hosts: host1.idm.example.com
-----
Number of hosts the ID View was applied to: 1
-----
```



## NOTE

The **ipa idview-apply** command also accepts the **--hostgroups** option. The option applies the ID view to hosts that belong to the specified host group, but does not associate the ID view with the host group itself. Instead, the **--hostgroups** option expands the members of the specified host group and applies the **--hosts** option individually to every one of them.

This means that if a host is added to the host group in the future, the ID view does not apply to the new host.

4. Clear the entry for the **ad\_user@ad.example.com** user from the SSSD cache on the **host1.idm.example.com** IdM client. This removes stale data and allows the new override value to apply.

```
[root@host1 ~]# sssctl cache-expire -u ad_user@ad.example.com
```

## Verification Steps

1. **SSH** to **host1** as **ad\_user@ad.example.com**:

```
[root@r8server ~]# ssh ad_user@ad.example.com@host1.idm.example.com
```

2. Retrieve information for the **ad\_user@ad.example.com** user to verify the GID reflects the updated value.

```
[ad_user@ad.example.com@host1 ~]$ id ad_user@ad.example.com
uid=702801456(ad_user@ad.example.com) gid=732001337(admins2)
groups=732001337(admins2),702800513(domain users@ad.example.com)
```

## 36.4. APPLYING AN ID VIEW TO AN IDM HOST GROUP

The **ipa idview-apply** command accepts the **--hostgroups** option. However, the option acts as a one-time operation that applies the ID view to hosts that currently belong to the specified host group, but does not dynamically associate the ID view with the host group itself. The **--hostgroups** option expands the members of the specified host group and applies the **--hosts** option individually to every one of them.

If you add a new host to the host group later, you must apply the ID view to the new host manually, using the **ipa idview-apply** command with the **--hosts** option.

Similarly, if you remove a host from a host group, the ID view is still assigned to the host after the removal. To unapply the ID view from the removed host, you must run the **ipa idview-unapply *id\_view\_name* --hosts=*name\_of\_the\_removed\_host*** command.

Follow this procedure to achieve the following goals:

1. How to create a host group and add hosts to it.
2. How to apply an ID view to the host group.
3. How to add a new host to the host group and apply the ID view to the new host.

## Prerequisites

- Ensure that the ID view you want to apply to the host group exists in IdM. For example, to create an ID view to override an IdM user login name on a specific IdM client, see [Using an ID view to override the login name of an IdM user on a specific host](#).

## Procedure

1. Create a host group and add hosts to it:

- a. Create a host group. For example, to create a host group named **baltimore**:

```
[root@server ~]# ipa hostgroup-add --desc="Baltimore hosts" baltimore
-----
Added hostgroup "baltimore"
-----
Host-group: baltimore
Description: Baltimore hosts
```

- b. Add hosts to the host group. For example, to add the **host102** and **host103** to the **baltimore** host group:

```
[root@server ~]# ipa hostgroup-add-member --hosts={host102,host103} baltimore
Host-group: baltimore
Description: Baltimore hosts
Member hosts: host102.idm.example.com, host103.idm.example.com
-----
Number of members added 2
-----
```

2. Apply an ID view to the hosts in the host group. For example, to apply the **example\_for\_host1** ID view to the **baltimore** host group:

```
[root@server ~]# ipa idview-apply --hostgroups=baltimore
ID View Name: example_for_host1
-----
Applied ID View "example_for_host1"
-----
hosts: host102.idm.example.com, host103.idm.example.com
-----
Number of hosts the ID View was applied to: 2
-----
```

3. Add a new host to the host group and apply the ID view to the new host:

- a. Add a new host to the host group. For example, to add the **somehost.idm.example.com** host to the **baltimore** host group:

```
[root@server ~]# ipa hostgroup-add-member --hosts=somehost.idm.example.com
baltimore
Host-group: baltimore
Description: Baltimore hosts
Member hosts: host102.idm.example.com,
host103.idm.example.com,somehost.idm.example.com
-----
Number of members added 1
-----
```

- b. Optionally, display the ID view information. For example, to display the details about the **example\_for\_host1** ID view:

```
[root@server ~]# ipa idview-show example_for_host1 --all
dn: cn=example_for_host1,cn=views,cn=accounts,dc=idm,dc=example,dc=com
ID View Name: example_for_host1
[...]
Hosts the view applies to: host102.idm.example.com, host103.idm.example.com
objectclass: ipaIDView, top, nsContainer
```

The output shows that the ID view is not applied to **somehost.idm.example.com**, the newly-added host in the **baltimore** host group.

- c. Apply the ID view to the new host. For example, to apply the **example\_for\_host1** ID view to **somehost.idm.example.com**:

```
[root@server ~]# ipa idview-apply --host=somehost.idm.example.com
ID View Name: example_for_host1
-----
Applied ID View "example_for_host1"
-----
hosts: somehost.idm.example.com
-----
Number of hosts the ID View was applied to: 1
-----
```

### Verification steps

- Display the ID view information again:

```
[root@server ~]# ipa idview-show example_for_host1 --all
dn: cn=example_for_host1,cn=views,cn=accounts,dc=idm,dc=example,dc=com
ID View Name: example_for_host1
[...]
Hosts the view applies to: host102.idm.example.com, host103.idm.example.com,
somehost.idm.example.com
objectclass: ipaIDView, top, nsContainer
```

The output shows that ID view is now applied to **somehost.idm.example.com**, the newly-added host in the **baltimore** host group.

## CHAPTER 37. ADJUSTING ID RANGES MANUALLY

An IdM server generates unique user ID (UID) and group ID (GID) numbers. By creating and assigning different ID ranges to replicas, it also ensures that they never generate the same ID numbers. By default, this process is automatic. However, you can manually adjust the IdM ID range during the IdM server installation, or manually define a replica's DNA ID range.

### 37.1. ID RANGES

ID numbers are divided into *ID ranges*. Keeping separate numeric ranges for individual servers and replicas eliminates the chance that an ID number issued for an entry is already used by another entry on another server or replica.

Note that there are two distinct types of ID ranges:

- The IdM **ID range**, which is assigned during the installation of the first server. This range cannot be modified after it is created. However, you can create a new IdM ID range in addition to the original one. For more information, see [Automatic ID ranges assignment](#) and [Adding a new IdM ID range](#).
- The **Distributed Numeric Assignment** (DNA) ID ranges, which can be modified by the user. These have to fit within an existing IdM ID range. For more information, see [Assigning DNA ID ranges manually](#).  
Replicas can also have a **next** DNA ID range assigned. A replica uses its next range when it runs out of IDs in its current range. Next ranges are not assigned automatically when a replica is deleted and you must [assign them manually](#).

The ranges are updated and shared between the server and replicas by the DNA plug-in, as part of the back end 389 Directory Server instance for the domain.

The DNA range definition is set by two attributes:

- The server's next available number: the low end of the DNA range
- The range size: the number of ID's in the DNA range

The initial bottom range is set during the plug-in instance configuration. After that, the plug-in updates the bottom value. Breaking the available numbers into ranges allows the servers to continually assign numbers without overlapping with each other.

### 37.2. AUTOMATIC ID RANGES ASSIGNMENT

#### IdM ID ranges

By default, an IdM ID range is automatically assigned during the IdM server installation. The **ipa-server-install** command randomly selects and assigns a range of 200,000 IDs from a total of 10,000 possible ranges. Selecting a random range in this way significantly reduces the probability of conflicting IDs in case you decide to merge two separate IdM domains in the future.

**NOTE**

This IdM ID range cannot be modified after it is created. You can only manually adjust the Distributed Numeric Assignment (DNA) ID ranges, using the commands described in [Assigning DNA ID ranges manually](#). A DNA range matching the IdM ID range is automatically created during installation.

**DNA ID ranges**

If you have a single IdM server installed, it controls the whole DNA ID range. When you install a new replica and the replica requests its own DNA ID range, the initial ID range for the server splits and is distributed between the server and replica: the replica receives half of the remaining DNA ID range that is available on the initial server. The server and replica then use their respective portions of the original ID range for new user or group entries. Also, if the replica is close to depleting its allocated ID range and fewer than 100 IDs remain, the replica contacts the other available servers to request a new DNA ID range.

**IMPORTANT**

When you install a replica, it **does not** immediately receive an ID range. A replica receives an ID range the first time the DNA plug-in is used, for example when you first add a user.

If the initial server stops functioning before the replica requests a DNA ID range from it, the replica is unable to contact the server to request the ID range. Attempting to add a new user on the replica then fails. In such situations, [you can find out what ID range is assigned to the disabled server](#), and [assign an ID range to the replica manually](#).

**37.3. ASSIGNING THE IDM ID RANGE MANUALLY DURING SERVER INSTALLATION**

You can override the default behavior and set an IdM ID range manually instead of having it assigned randomly.

**IMPORTANT**

Do not set ID ranges that include UID values of 1000 and lower; these values are reserved for system use. Also, do not set an ID range that would include the 0 value; the SSSD service does not handle the 0 ID value.

**Procedure**

- You can define the IdM ID range manually during server installation by using the following two options with **ipa-server-install**:
  - **--idstart** gives the starting value for UID and GID numbers.
  - **--idmax** gives the maximum UID and GID number; by default, the value is the **--idstart** starting value plus 199,999.

**Verification steps**

- To check if the ID range was assigned correctly, you can display the assigned IdM ID range by using the **ipa idrange-find** command:

```
# ipa idrange-find
-----
1 range matched
-----
Range name: IDM.EXAMPLE.COM_id_range
First Posix ID of the range: 882200000
Number of IDs in the range: 200000
Range type: local domain range
-----
Number of entries returned 1
-----
```

## 37.4. ADDING A NEW IDM ID RANGE

In some cases, you may want to create a new IdM ID range in addition to the original one; for example, when a replica has run out of IDs and the original IdM ID range is depleted.



### IMPORTANT

Adding a new IdM ID range does not create new DNA ID ranges automatically. You must assign new DNA ID ranges to replicas manually as needed. For more information about how to do this, see [assigning DNA ID ranges manually](#).

### Procedure

1. To create a new IdM ID range, use the **ipa idrange-add** command. You must specify the new range name, the first ID number of the range and the range size:

```
# ipa idrange-add IDM.EXAMPLE.COM_new_range --base-id=1000000 --range-
size=200000
-----
Added ID range "IDM.EXAMPLE.COM_new_range"
-----
Range name: IDM.EXAMPLE.COM_new_range
First Posix ID of the range: 1000000
Number of IDs in the range: 200000
Range type: local domain range
```

2. Optional: Update the ID range immediately:
  - a. Clear the System Security Services Daemon (SSSD) cache:

```
# sss_cache -E
```

- b. Restart the SSSD daemon:

```
# systemctl restart sssd
```



### NOTE

If you do not clear the SSSD cache and restart the service, SSSD only detects the new ID range when it updates the domain list and other configuration data stored on the IdM server.

## Verification steps

- You can check if the new range is set correctly by using the **ipa idrange-find** command:

```
# ipa idrange-find
-----
2 ranges matched
-----
Range name: IDM.EXAMPLE.COM_id_range
First Posix ID of the range: 882200000
Number of IDs in the range: 200000
Range type: local domain range

Range name: IDM.EXAMPLE.COM_new_range
First Posix ID of the range: 1000000
Number of IDs in the range: 200000
Range type: local domain range
-----
Number of entries returned 2
-----
```

## 37.5. THE ROLE OF SECURITY AND RELATIVE IDENTIFIERS IN IDM ID RANGES

An Identity Management (IdM) ID range is defined by several parameters:

- The range name
- The first POSIX ID of the range
- The range size: the number of IDs in the range
- The first **relative identifier** (RID) of the corresponding **RID range**
- The first RID of the **secondary RID range**

You can view these values by using the **ipa idrange-show** command:

```
$ ipa idrange-show IDM.EXAMPLE.COM_id_range
Range name: IDM.EXAMPLE.COM_id_range
First Posix ID of the range: 196600000
Number of IDs in the range: 200000
First RID of the corresponding RID range: 1000
First RID of the secondary RID range: 1000000
Range type: local domain range
```

### Security identifiers

The data from the ID ranges of the local domain are used by the IdM server internally to assign unique **security identifiers** (SIDs) to IdM users and groups. The SIDs are stored in the user and group objects. A user's SID consists of the following:

- The domain SID



- The user's **relative identifier** (RID), which is a four-digit 32-bit value appended to the domain SID

For example, if the domain SID is S-1-5-21-123-456-789 and the RID of a user from this domain is 1008, then the user has the SID of S-1-5-21-123-456-789-1008.

## Relative identifiers

The RID itself is computed in the following way:

Subtract the first POSIX ID of the range from the user's POSIX UID, and add the first RID of the corresponding RID range to the result. For example, if the UID of *idmuser* is 196600008, the first POSIX ID is 196600000, and the first RID is 1000, then *idmuser*'s RID is 1008.



### NOTE

The algorithm computing the user's RID checks if a given POSIX ID falls into the ID range allocated before it computes a corresponding RID. For example, if the first ID is 196600000 and the range size is 200000, then the POSIX ID of 1600000 is outside of the ID range and the algorithm does not compute a RID for it.

## Secondary relative identifiers

In IdM, a POSIX UID can be identical to a POSIX GID. This means that if *idmuser* already exists with the UID of 196600008, you can still create a new *idmgroup* group with the GID of 196600008.

However, a SID can define only one object, a user or a group. The SID of S-1-5-21-123-456-789-1008 that has already been created for *idmuser* cannot be shared with *idmgroup*. An alternative SID must be generated for *idmgroup*.

IdM uses a **secondary relative identifier**, or secondary RID, to avoid conflicting SIDs. This secondary RID consists of the following:

- The secondary RID base
- A range size; by default identical with the base range size

In the example above, the secondary RID base is set to 1000000. To compute the RID for the newly created *idmgroup*: subtract the first POSIX ID of the range from the user's POSIX UID, and add the first RID of the secondary RID range to the result. *idmgroup* is therefore assigned the RID of 1000008. Consequently, the SID of *idmgroup* is S-1-5-21-123-456-789-1000008.

IdM uses the secondary RID to compute a SID only if a user or a group object was previously created with a manually set POSIX ID. Otherwise, automatic assignment prevents assigning the same ID twice.

## Additional resources

- [Using Ansible to add a new local IdM ID range](#)

## 37.6. USING ANSIBLE TO ADD A NEW LOCAL IDM ID RANGE

In some cases, you may want to create a new Identity Management (IdM) ID range in addition to the original one; for example, when a replica has run out of IDs and the original IdM ID range is depleted. The following example describes how to create a new IdM ID range by using an Ansible playbook.



## NOTE

Adding a new IdM ID range does not create new DNA ID ranges automatically. You need to assign new DNA ID ranges manually as needed. For more information about how to do this, see [Assigning DNA ID ranges manually](#).

## Prerequisites

- You know the IdM **admin** password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the `secret.yml` Ansible vault stores your `ipaadmin_password`.

## Procedure

1. Navigate to your `~/MyPlaybooks/` directory:

```
$ cd ~/MyPlaybooks/
```

2. Create the `idrange-present.yml` playbook with the following content:

```
---
- name: Playbook to manage idrange
  hosts: ipaserver
  become: no

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - name: Ensure local idrange is present
    ipairange:
      ipaadmin_password: "{{ ipaadmin_password }}"
      name: new_id_range
      base_id: 12000000
      range_size: 200000
      rid_base: 1000000
      secondary_rid_base: 200000000
```

3. Save the file.
4. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the `secret.yml` file, and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory idrange-present.yml
```

5. Optional: Update the ID range immediately:

- a. Clear the System Security Services Daemon (SSSD) cache:

```
# sss_cache -E
```

- b. Restart the SSSD daemon:

```
# systemctl restart sssd
```



#### NOTE

If you do not clear the SSSD cache and restart the service, SSSD only detects the new ID range when it updates the domain list and other configuration data stored on the IdM server.

#### Verification steps

- You can check if the new range is set correctly by using the **ipa idrange-find** command:

```
# ipa idrange-find
-----
2 ranges matched
-----
Range name: IDM.EXAMPLE.COM_id_range
First Posix ID of the range: 882200000
Number of IDs in the range: 200000
Range type: local domain range

Range name: IDM.EXAMPLE.COM_new_id_range
First Posix ID of the range: 12000000
Number of IDs in the range: 200000
Range type: local domain range
-----
Number of entries returned 2
-----
```

#### Additional resources

- [The role of security and relative identifiers in IdM ID ranges](#)

## 37.7. REMOVING AN ID RANGE AFTER REMOVING A TRUST TO AD

If you have removed a trust between your IdM and Active Directory (AD) environments, you might want to remove the ID range associated with it.



## WARNING

IDs allocated to ID ranges associated with trusted domains might still be used for ownership of files and directories on systems enrolled into IdM.

If you remove the ID range that corresponds to an AD trust that you have removed, you will not be able to resolve the ownership of any files and directories owned by AD users.

## Prerequisites

- You have removed a trust to an AD environment.

## Procedure

1. Display all the ID ranges that are currently in use:

```
[root@server ~]# ipa idrange-find
```

2. Identify the name of the ID range associated with the trust you have removed. The first part of the name of the ID range is the name of the trust, for example **AD.EXAMPLE.COM\_id\_range**.
3. Remove the range:

```
[root@server ~]# ipa idrange-del AD.EXAMPLE.COM_id_range
```

4. Restart the SSSD service to remove references to the ID range you have removed.

```
[root@server ~]# systemctl restart sssd
```

## Additional resources

- See [Removing the trust using the command line](#).
- See [Removing the trust using the IdM Web UI](#).

## 37.8. DISPLAYING CURRENTLY ASSIGNED DNA ID RANGES

You can display both the currently active Distributed Numeric Assignment (DNA) ID range on a server, as well as its next DNA range if it has one assigned.

## Procedure

- To display which DNA ID ranges are configured for the servers in the topology, use the following commands:
  - **ipa-replica-manage dnrange-show** displays the current DNA ID range that is set on all servers or, if you specify a server, only on the specified server, for example:

```
# ipa-replica-manage dnarange-show
serverA.example.com: 1001-1500
serverB.example.com: 1501-2000
serverC.example.com: No range set
```

```
# ipa-replica-manage dnarange-show serverA.example.com
serverA.example.com: 1001-1500
```

- **ipa-replica-manage dnanextrange-show** displays the next DNA ID range currently set on all servers or, if you specify a server, only on the specified server, for example:

```
# ipa-replica-manage dnanextrange-show
serverA.example.com: 2001-2500
serverB.example.com: No on-deck range set
serverC.example.com: No on-deck range set
```

```
# ipa-replica-manage dnanextrange-show serverA.example.com
serverA.example.com: 2001-2500
```

## 37.9. MANUAL ID RANGE ASSIGNMENT

In certain situations, it is necessary to manually assign a Distributed Numeric Assignment (DNA) ID range, for example when:

- A replica has run out of IDs and the IdM ID range is depleted  
A replica has exhausted the DNA ID range that was assigned to it, and requesting additional IDs failed because no more free IDs are available in the IdM range.

To solve this situation, extend the DNA ID range assigned to the replica. You can do this in two ways:

- Shorten the DNA ID range assigned to a different replica, then assign the newly available values to the depleted replica.
- Create a new IdM ID range, then set a new DNA ID range for the replica within this created IdM range.

For information about how to create a new IdM ID range, see [Adding a new IdM ID range](#).

- A replica stopped functioning  
A replica's DNA ID range is not automatically retrieved when the replica stops functioning and must be deleted, which means the DNA ID range previously assigned to the replica becomes unavailable. You want to recover the DNA ID range and make it available for other replicas.

To do this, [find out what the ID range values are](#), before manually assigning that range to a different server. Also, to avoid duplicate UIDs or GIDs, make sure that no ID value from the recovered range was previously assigned to a user or group; you can do this by examining the UIDs and GIDs of existing users and groups.

You can manually assign a DNA ID range to a replica using the commands in [Assigning DNA ID ranges manually](#).

**NOTE**

If you assign a new DNA ID range, the UUIDs of the already existing entries on the server or replica stay the same. This does not pose a problem because even if you change the current DNA ID range, IdM keeps a record of what ranges were assigned in the past.

## 37.10. ASSIGNING DNA ID RANGES MANUALLY

In some cases, you may need to manually assign Distributed Numeric Assignment (DNA) ID ranges to existing replicas, for example to reassign a DNA ID range assigned to a non-functioning replica. For more information, see [Manual ID range assignment](#).

When adjusting a DNA ID range manually, make sure that the newly adjusted range is included in the IdM ID range; you can check this using the **ipa idrange-find** command. Otherwise, the command fails.

**IMPORTANT**

Be careful not to create overlapping ID ranges. If any of the ID ranges you assign to servers or replicas overlap, it could result in two different servers assigning the same ID value to different entries.

### Prerequisites

- *Optional.* If you are recovering a DNA ID range from a non-functioning replica, first find the ID range using the commands described in [Displaying currently assigned DNA ID ranges](#).

### Procedure

- To define the current DNA ID range for a specified server, use **ipa-replica-manage dnrangle-set**:

```
# ipa-replica-manage dnrangle-set serverA.example.com 1250-1499
```

- To define the next DNA ID range for a specified server, use **ipa-replica-manage dnanextrange-set**:

```
# ipa-replica-manage dnanextrange-set serverB.example.com 1500-5000
```

### Verification steps

- You can check that the new DNA ranges are set correctly by using the commands described in [Displaying the currently assigned DNA ID ranges](#).

## CHAPTER 38. MANAGING SUBID RANGES MANUALLY

In a containerized environment, sometimes an IdM user needs to assign subID ranges manually. The following instructions help you to manage the subID ranges.

### 38.1. GENERATING SUBID RANGES USING IDM CLI

You can generate a subID range and assign it to a user manually. Assuming, the username *jsmith* exists on an **ipa** server.

#### Prerequisites

- IdM user exists.
- Valid Kerberos ticket is obtained. See [Logging in to IdM in the Web UI: Using a Kerberos ticket](#) for more details.
- **root** privileges.

#### Procedure

1. Check for existing subID ranges:  
**# ipa subid-find**
2. In case the subID range does not exist, generate and assign the new subID range to a user by entering the following command:

```
# ipa subid-generate --owner=jsmith

Added subordinate id "359dfcef-6b76-4911-bd37-bb5b66b8c418"

Unique ID: 359dfcef-6b76-4911-bd37-bb5b66b8c418
Description: auto-assigned subid
Owner: jsmith
SubUID range start: 2147483648
SubUID range size: 65536
SubGID range start: 2147483648
SubGID range size: 65536
```

3. Alternatively, generate and assign the new subID ranges to all users:

```
# /usr/libexec/ipa/ipa-subids --all-users

Found 2 user(s) without subordinate ids
Processing user 'user4' (1/2)
Processing user 'user5' (2/2)
Updated 2 user(s)
The ipa-subids command was successful
```

Note, that to assign subID ranges to the new IdM users by default, enable the following option:

```
# ipa config-mod --user-default-subid=True
```

#### Verification

#### Verification

1. To verify if the user has the subID range assigned, enter the following command:

```
# ipa subid-find --owner=jsmith

1 subordinate id matched

Unique ID: 359dfcef-6b76-4911-bd37-bb5b66b8c418
Owner: jsmith
SubUID range start: 2147483648
SubUID range size: 65536
SubGID range start: 2147483648
SubGID range size: 65536

Number of entries returned 1
```

## 38.2. GENERATING SUBID RANGES USING IDM WEBUI INTERFACE

You can generate a subID range and assign it to a user in the IdM WebUI interface.

### Prerequisites

- An IdM user exists.
- Valid Kerberos ticket is obtained. See [Logging in to IdM in the Web UI: Using a Kerberos ticket](#) for more details.
- **root** privileges.

### Procedure

1. In the IdM WebUI interface expand the **Subordinate IDs** tab and choose **Subordinate IDs** option.
2. When the **Subordinate IDs** interface appears, click the **Add** button in the upper-right corner of the interface. The window “**Add subid**” appears.
3. In the window “**Add subid**” choose an owner, which is the user you want to assign a subID range.
4. Click the **Add** button.

### Verification

1. Check the table under the **Subordinate IDs** tab. A new record should appear and the owner is the user to which you assign the subID range.

## 38.3. MANAGING EXISTING SUBID RANGES USING IDM CLI

You can search for subID ranges and display information about particular one if needed. Assuming, the username *jsmith* exists on an **ipa** server.

### Prerequisites

- An IdM user exists.



## Procedure

1. To display the details about subID range when you know a unique ID hash, enter the following command:

```
# ipa subid-show 359dfcef-6b76-4911-bd37-bb5b66b8c418
```

```
Unique ID: 359dfcef-6b76-4911-bd37-bb5b66b8c418
Owner: jsmith
SubUID range start: 2147483648
SubUID range size: 65536
SubGID range start: 2147483648
SubGID range size: 65536
```

2. To find the details for the subID range when you have a subID from that range, you can use the following command:

```
# ipa subid-match --subuid=2147483648
```

```
1 subordinate id matched
```

```
Unique ID: 359dfcef-6b76-4911-bd37-bb5b66b8c418
Owner: uid=jsmith
SubUID range start: 2147483648
SubUID range size: 65536
SubGID range start: 2147483648
SubGID range size: 65536
```

```
Number of entries returned 1
```

## 38.4. LISTING SUBID RANGES USING THE GETSUBID COMMAND

To list the subID ranges, for example, for the **user1** in IdM environment, follow the instruction below.

### Prerequisites

- The **user1** exists in IdM.
- The **shadow-utils-subid** package is installed.

### Procedure

1. Include **subid: sss** record into **/etc/nsswitch.conf** file.  
Note that you can provide only one value for the **subid** field. Setting the **subid** field to the **sss** value tells the utils to use the subID ranges from the IdM settings. The **file** value or no value sets the utils to use the subID ranges from the **/etc/subuid** and **/etc/subgid** files.
2. List the subID range for a user:

```
# getsubids user1
0: user1 2147483648 65536
```

## CHAPTER 39. USING ANSIBLE TO MANAGE THE REPLICATION TOPOLOGY IN IDM

You can maintain multiple Identity Management (IdM) servers and let them replicate each other for redundancy purposes to mitigate or prevent server loss. For example, if one server fails, the other servers keep providing services to the domain. You can also recover the lost server by creating a new replica based on one of the remaining servers.

Data stored on an IdM server is replicated based on replication agreements: when two servers have a replication agreement configured, they share their data. The data that is replicated is stored in the topology **suffixes**. When two replicas have a replication agreement between their suffixes, the suffixes form a topology **segment**.

This chapter describes how to use **Red Hat Ansible Engine** to manage IdM replication agreements, topology segments, and topology suffixes. The chapter contains the following sections:

- [Using Ansible to ensure a replication agreement exists in IdM](#)
- [Using Ansible to ensure replication agreements exist between multiple IdM replicas](#)
- [Using Ansible to check if a replication agreement exists between two replicas](#)
- [Using Ansible to verify that a topology suffix exists in IdM](#)
- [Using Ansible to re-initialize an IdM replica](#)
- [Using Ansible to ensure a replication agreement is absent in IdM](#)

### 39.1. USING ANSIBLE TO ENSURE A REPLICATION AGREEMENT EXISTS IN IDM

Data stored on an Identity Management (IdM) server is replicated based on replication agreements: when two servers have a replication agreement configured, they share their data. Replication agreements are always bilateral: the data is replicated from the first replica to the other one as well as from the other replica to the first one.

Follow this procedure to use an Ansible playbook to ensure that a replication agreement of the **domain** type exists between **server.idm.example.com** and **replica.idm.example.com**.

#### Prerequisites

- Ensure that you understand the recommendations for designing your IdM topology listed in [Guidelines for connecting IdM replicas in a topology](#) .
- You know the IdM **admin** password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.

- The example assumes that the **secret.yml** Ansible vault stores your **ipaadmin\_password**.

## Procedure

1. Navigate to your **~/MyPlaybooks/** directory:

```
$ cd ~/MyPlaybooks/
```

2. Copy the **add-topologysegment.yml** Ansible playbook file located in the **/usr/share/doc/ansible-freeipa/playbooks/topology/** directory:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/topology/add-topologysegment.yml
add-topologysegment-copy.yml
```

3. Open the **add-topologysegment-copy.yml** file for editing.
4. Adapt the file by setting the following variables in the **ipatopologysegment** task section:
  - Set the **ipaadmin\_password** variable to the password of the IdM **admin**.
  - Set the **suffix** variable to either **domain** or **ca**, depending on what type of segment you want to add.
  - Set the **left** variable to the name of the IdM server that you want to be the left node of the replication agreement.
  - Set the **right** variable to the name of the IdM server that you want to be the right node of the replication agreement.
  - Ensure that the **state** variable is set to **present**.

This is the modified Ansible playbook file for the current example:

```
---
- name: Playbook to handle topologysegment
  hosts: ipaserver

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - name: Add topology segment
    ipatopologysegment:
      ipaadmin_password: "{{ ipaadmin_password }}"
      suffix: domain
      left: server.idm.example.com
      right: replica.idm.example.com
      state: present
```

5. Save the file.
6. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the **secret.yml** file, and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory add-
topologysegment-copy.yml
```

### Additional resources

- See [Explaining Replication Agreements, Topology Suffixes, and Topology Segments](#) .
- See the **README-topology.md** file in the `/usr/share/doc/ansible-freeipa/` directory.
- See the sample playbooks in the `/usr/share/doc/ansible-freeipa/playbooks/topology` directory.

## 39.2. USING ANSIBLE TO ENSURE REPLICATION AGREEMENTS EXIST BETWEEN MULTIPLE IDM REPLICAS

Data stored on an Identity Management (IdM) server is replicated based on replication agreements: when two servers have a replication agreement configured, they share their data. Replication agreements are always bilateral: the data is replicated from the first replica to the other one as well as from the other replica to the first one.

Follow this procedure to ensure replication agreements exist between multiple pairs of replicas in IdM.

### Prerequisites

- Ensure that you understand the recommendations for designing your IdM topology listed in [Connecting the replicas in a topology](#) .
- You know the IdM **admin** password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipaadmin\_password**.

### Procedure

1. Navigate to your `~/MyPlaybooks/` directory:

```
$ cd ~/MyPlaybooks/
```

2. Copy the **add-topologysegments.yml** Ansible playbook file located in the `/usr/share/doc/ansible-freeipa/playbooks/topology/` directory:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/topology/add-topologysegments.yml  
add-topologysegments-copy.yml
```

3. Open the **add-topologysegments-copy.yml** file for editing.
4. Adapt the file by setting the following variables in the **vars** section:
  - Set the **ipaadmin\_password** variable to the password of the IdM **admin**.

- For every topology segment, add a line in the **ipatopology\_segments** section and set the following variables:
  - Set the **suffix** variable to either **domain** or **ca**, depending on what type of segment you want to add.
  - Set the **left** variable to the name of the IdM server that you want to be the left node of the replication agreement.
  - Set the **right** variable to the name of the IdM server that you want to be the right node of the replication agreement.
- 5. In the **tasks** section of the **add-topologysegments-copy.yml** file, ensure that the **state** variable is set to **present**.  
This is the modified Ansible playbook file for the current example:

```
---
- name: Add topology segments
  hosts: ipaserver
  gather_facts: false

  vars:
    ipaadmin_password: "{{ ipaadmin_password }}"
    ipatopology_segments:
      - {suffix: domain, left: replica1.idm.example.com , right: replica2.idm.example.com }
      - {suffix: domain, left: replica2.idm.example.com , right: replica3.idm.example.com }
      - {suffix: domain, left: replica3.idm.example.com , right: replica4.idm.example.com }
      - {suffix: domain+ca, left: replica4.idm.example.com , right: replica1.idm.example.com }

  vars_files:
    - /home/user_name/MyPlaybooks/secret.yml
  tasks:
    - name: Add topology segment
      ipatopologysegment:
        ipaadmin_password: "{{ ipaadmin_password }}"
        suffix: "{{ item.suffix }}"
        name: "{{ item.name | default(omit) }}"
        left: "{{ item.left }}"
        right: "{{ item.right }}"
        state: present
        #state: absent
        #state: checked
        #state: reinitialized
      loop: "{{ ipatopology_segments | default([]) }}"
```

6. Save the file.
7. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the **secret.yml** file, and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory add-
topologysegments-copy.yml
```

## Additional resources

- See [Explaining Replication Agreements, Topology Suffixes, and Topology Segments](#) .
- See the **README-topology.md** file in the `/usr/share/doc/ansible-freeipa/` directory.
- See the sample playbooks in the `/usr/share/doc/ansible-freeipa/playbooks/topology` directory.

### 39.3. USING ANSIBLE TO CHECK IF A REPLICATION AGREEMENT EXISTS BETWEEN TWO REPLICAS

Data stored on an Identity Management (IdM) server is replicated based on replication agreements: when two servers have a replication agreement configured, they share their data. Replication agreements are always bilateral: the data is replicated from the first replica to the other one as well as from the other replica to the first one.

Follow this procedure to verify that replication agreements exist between multiple pairs of replicas in IdM.

#### Prerequisites

- Ensure that you understand the recommendations for designing your Identity Management (IdM) topology listed in [Connecting the replicas in a topology](#) .
- You know the IdM **admin** password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipadmin\_password**.

#### Procedure

1. Navigate to your `~/MyPlaybooks/` directory:

```
$ cd ~/MyPlaybooks/
```

2. Copy the **check-topologysegments.yml** Ansible playbook file located in the `/usr/share/doc/ansible-freeipa/playbooks/topology/` directory:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/topology/check-topologysegments.yml
check-topologysegments-copy.yml
```

3. Open the **check-topologysegments-copy.yml** file for editing.
4. Adapt the file by setting the following variables in the **vars** section:
  - Set the **ipadmin\_password** variable to the password of the IdM **admin**.

- For every topology segment, add a line in the **ipatopology\_segments** section and set the following variables:
  - Set the **suffix** variable to either **domain** or **ca**, depending on the type of segment you are adding.
  - Set the **left** variable to the name of the IdM server that you want to be the left node of the replication agreement.
  - Set the **right** variable to the name of the IdM server that you want to be the right node of the replication agreement.
- 5. In the **tasks** section of the **check-topologysegments-copy.yml** file, ensure that the **state** variable is set to **present**.  
This is the modified Ansible playbook file for the current example:

```
---
- name: Add topology segments
  hosts: ipaserver
  gather_facts: false

  vars:
    ipaadmin_password: "{{ ipaadmin_password }}"
    ipatopology_segments:
      - {suffix: domain, left: replica1.idm.example.com, right: replica2.idm.example.com }
      - {suffix: domain, left: replica2.idm.example.com , right: replica3.idm.example.com }
      - {suffix: domain, left: replica3.idm.example.com , right: replica4.idm.example.com }
      - {suffix: domain+ca, left: replica4.idm.example.com , right:
        replica1.idm.example.com }

  vars_files:
    - /home/user_name/MyPlaybooks/secret.yml
  tasks:
    - name: Check topology segment
      ipatopologysegment:
        ipaadmin_password: "{{ ipaadmin_password }}"
        suffix: "{{ item.suffix }}"
        name: "{{ item.name | default(omit) }}"
        left: "{{ item.left }}"
        right: "{{ item.right }}"
        state: checked
        loop: "{{ ipatopology_segments | default([]) }}"
```

6. Save the file.
7. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the **secret.yml** file, and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory check-topologysegments-copy.yml
```

### Additional resources

- For more information about the concept of topology agreements, suffixes, and segments, see [Explaining Replication Agreements, Topology Suffixes, and Topology Segments](#) .

- See the **README-topology.md** file in the `/usr/share/doc/ansible-freeipa/` directory.
- See the sample playbooks in the `/usr/share/doc/ansible-freeipa/playbooks/topology` directory.

## 39.4. USING ANSIBLE TO VERIFY THAT A TOPOLOGY SUFFIX EXISTS IN IDM

In the context of replication agreements in Identity Management (IdM), topology suffixes store the data that is replicated. IdM supports two types of topology suffixes: **domain** and **ca**. Each suffix represents a separate back end, a separate replication topology. When a replication agreement is configured, it joins two topology suffixes of the same type on two different servers.

The **domain** suffix contains all domain-related data, such as users, groups, and policies. The **ca** suffix contains data for the Certificate System component. It is only present on servers with a certificate authority (CA) installed.

Follow this procedure to use an Ansible playbook to ensure that a topology suffix exists in IdM. The example describes how to ensure that the **domain** suffix exists in IdM.

### Prerequisites

- You know the IdM **admin** password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipadmin\_password**.

### Procedure

1. Navigate to your `~/MyPlaybooks/` directory:

```
$ cd ~/MyPlaybooks/
```

2. Copy the **verify-topologysuffix.yml** Ansible playbook file located in the `/usr/share/doc/ansible-freeipa/playbooks/topology/` directory:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/topology/ verify-topologysuffix.yml  
verify-topologysuffix-copy.yml
```

3. Open the **verify-topologysuffix-copy.yml** Ansible playbook file for editing.
4. Adapt the file by setting the following variables in the **ipatopologysuffix** section:
  - Set the **ipadmin\_password** variable to the password of the IdM **admin**.
  - Set the **suffix** variable to **domain**. If you are verifying the presence of the **ca** suffix, set the variable to **ca**.



- Ensure that the **state** variable is set to **verified**. No other option is possible.

This is the modified Ansible playbook file for the current example:

```
---
- name: Playbook to handle topologysuffix
  hosts: ipaserver

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - name: Verify topology suffix
    ipatopologysuffix:
      ipaadmin_password: "{{ ipaadmin_password }}"
      suffix: domain
      state: verified
```

5. Save the file.
6. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the **secret.yml** file, and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory verify-
topologysuffix-copy.yml
```

#### Additional resources

- See [Explaining Replication Agreements, Topology Suffixes, and Topology Segments](#) .
- See the **README-topology.md** file in the `/usr/share/doc/ansible-freeipa/` directory.
- See the sample playbooks in the `/usr/share/doc/ansible-freeipa/playbooks/topology` directory.

## 39.5. USING ANSIBLE TO REINITIALIZE AN IDM REPLICA

If a replica has been offline for a long period of time or its database has been corrupted, you can reinitialize it. reinitialization refreshes the replica with an updated set of data. reinitialization can, for example, be used if an authoritative restore from backup is required.



#### NOTE

In contrast to replication updates, during which replicas only send changed entries to each other, reinitialization refreshes the whole database.

The local host on which you run the command is the reinitialized replica. To specify the replica from which the data is obtained, use the **direction** option.

Follow this procedure to use an Ansible playbook to reinitialize the **domain** data on **replica.idm.example.com** from **server.idm.example.com**.

#### Prerequisites

- You know the IdM **admin** password.

- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the `secret.yml` Ansible vault stores your `ipaadmin_password`.

## Procedure

1. Navigate to your `~/MyPlaybooks/` directory:

```
$ cd ~/MyPlaybooks/
```

2. Copy the `reinitialize-topologysegment.yml` Ansible playbook file located in the `/usr/share/doc/ansible-freeipa/playbooks/topology/` directory:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/topology/reinitialize-  
topologysegment.yml reinitialize-topologysegment-copy.yml
```

3. Open the `reinitialize-topologysegment-copy.yml` file for editing.
4. Adapt the file by setting the following variables in the `ipatopologysegment` section:
  - Set the `ipaadmin_password` variable to the password of the IdM `admin`.
  - Set the `suffix` variable to `domain`. If you are reinitializing the `ca` data, set the variable to `ca`.
  - Set the `left` variable to the left node of the replication agreement.
  - Set the `right` variable to the right node of the replication agreement.
  - Set the `direction` variable to the direction of the reinitializing data. The `left-to-right` direction means that data flows from the left node to the right node.
  - Ensure that the `state` variable is set to `reinitialized`.

This is the modified Ansible playbook file for the current example:

```
---
- name: Playbook to handle topologysegment
  hosts: ipaserver

  vars_files:
    - /home/user_name/MyPlaybooks/secret.yml
  tasks:
    - name: Reinitialize topology segment
      ipatopologysegment:
        ipaadmin_password: "{{ ipaadmin_password }}"
        suffix: domain
        left: server.idm.example.com
        right: replica.idm.example.com
        direction: left-to-right
        state: reinitialized
```

5. Save the file.
6. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the **secret.yml** file, and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory reinitialize-topologysegment-copy.yml
```

#### Additional resources

- See [Explaining Replication Agreements, Topology Suffixes, and Topology Segments](#) .
- See the **README-topology.md** file in the `/usr/share/doc/ansible-freeipa/` directory.
- See the sample playbooks in the `/usr/share/doc/ansible-freeipa/playbooks/topology` directory.

## 39.6. USING ANSIBLE TO ENSURE A REPLICATION AGREEMENT IS ABSENT IN IDM

Data stored on an Identity Management (IdM) server is replicated based on replication agreements: when two servers have a replication agreement configured, they share their data. Replication agreements are always bilateral: the data is replicated from the first replica to the other one as well as from the other replica to the first one.

Follow this procedure to ensure a replication agreement between two replicas does not exist in IdM. The example describes how to ensure a replication agreement of the **domain** type does not exist between the **replica01.idm.example.com** and **replica02.idm.example.com** IdM servers.

#### Prerequisites

- Ensure that you understand the recommendations for designing your IdM topology listed in [Connecting the replicas in a topology](#)
- You know the IdM **admin** password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the **ansible-freeipa** package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipadmin\_password**.

#### Procedure

1. Navigate to your `~/MyPlaybooks/` directory:

```
$ cd ~/MyPlaybooks/
```

- Copy the **delete-topologysegment.yml** Ansible playbook file located in the **/usr/share/doc/ansible-freeipa/playbooks/topology/** directory:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/topology/delete-topologysegment.yml
delete-topologysegment-copy.yml
```

- Open the **delete-topologysegment-copy.yml** file for editing.
- Adapt the file by setting the following variables in the **ipatopologysegment** task section:
  - Set the **ipaadmin\_password** variable to the password of the IdM **admin**.
  - Set the **suffix** variable to **domain**. Alternatively, if you are ensuring that the **ca** data are not replicated between the left and right nodes, set the variable to **ca**.
  - Set the **left** variable to the name of the IdM server that is the left node of the replication agreement.
  - Set the **right** variable to the name of the IdM server that is the right node of the replication agreement.
  - Ensure that the **state** variable is set to **absent**.

This is the modified Ansible playbook file for the current example:

```
---
- name: Playbook to handle topologysegment
  hosts: ipaserver

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - name: Delete topology segment
    ipatopologysegment:
      ipaadmin_password: "{{ ipaadmin_password }}"
      suffix: domain
      left: replica01.idm.example.com
      right: replica02.idm.example.com:
      state: absent
```

- Save the file.
- Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the **secret.yml** file, and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory delete-
topologysegment-copy.yml
```

### Additional resources

- See [Explaining Replication Agreements, Topology Suffixes, and Topology Segments](#) .
- See the **README-topology.md** file in the **/usr/share/doc/ansible-freeipa/** directory.

- See the sample playbooks in the **/usr/share/doc/ansible-freeipa/playbooks/topology** directory.

## 39.7. ADDITIONAL RESOURCES

- See [Planning the replica topology](#).
- See [Installing an IdM replica](#) .

## CHAPTER 40. CONFIGURING IDM FOR EXTERNAL PROVISIONING OF USERS

As a system administrator, you can configure Identity Management (IdM) to support the provisioning of users by an external solution for managing identities.

Rather than use the **ipa** utility, the administrator of the external provisioning system can access the IdM LDAP using the **ldapmodify** utility. The administrator can add individual stage users [from the CLI using ldapmodify](#) or [using an LDIF file](#).

The assumption is that you, as an IdM administrator, fully trust your external provisioning system to only add validated users. However, at the same time you do not want to assign the administrators of the external provisioning system the IdM role of **User Administrator** to enable them to add new active users directly.

You can [configure a script](#) to automatically move the staged users created by the external provisioning system to active users automatically.

This chapter contains these sections:

1. [Preparing Identity Management \(IdM\)](#) to use an external provisioning system to add stage users to IdM.
2. [Creating a script](#) to move the users added by the external provisioning system from stage to active users.
3. Using an external provisioning system to add an IdM stage user. You can do that in two ways:
  - [Add an IdM stage user using an LDIF file](#)
  - [Add an IdM stage user directly from the CLI using ldapmodify](#)

### 40.1. PREPARING IDM ACCOUNTS FOR AUTOMATIC ACTIVATION OF STAGE USER ACCOUNTS

This procedure shows how to configure two IdM user accounts to be used by an external provisioning system. By adding the accounts to a group with an appropriate password policy, you enable the external provisioning system to manage user provisioning in IdM. In the following, the user account to be used by the external system to add stage users is named **provisionator**. The user account to be used to automatically activate the stage users is named **activator**.

#### Prerequisites

- The host on which you perform the procedure is enrolled into IdM.

#### Procedure

1. Log in as IdM administrator:

```
$ kinit admin
```

2. Create a user named **provisionator** with the privileges to add stage users.
  - a. Add the provisionator user account:

```
$ ipa user-add provisionator --first=provisioning --last=account --password
```

- a. Grant the provisionator user the required privileges.
  - i. Create a custom role, **System Provisioning**, to manage adding stage users:

```
$ ipa role-add --desc "Responsible for provisioning stage users" "System Provisioning"
```

- ii. Add the **Stage User Provisioning** privilege to the role. This privilege provides the ability to add stage users:

```
$ ipa role-add-privilege "System Provisioning" --privileges="Stage User Provisioning"
```

- iii. Add the provisionator user to the role:

```
$ ipa role-add-member --users=provisionator "System Provisioning"
```

- iv. Verify that the provisionator exists in IdM:

```
$ ipa user-find provisionator --all --raw
-----
1 user matched
-----
dn: uid=provisionator,cn=users,cn=accounts,dc=idm,dc=example,dc=com
uid: provisionator
[...]
```

3. Create a user, **activator**, with the privileges to manage user accounts.

- a. Add the activator user account:

```
$ ipa user-add activator --first=activation --last=account --password
```

- b. Grant the activator user the required privileges by adding the user to the default **User Administrator** role:

```
$ ipa role-add-member --users=activator "User Administrator"
```

4. Create a user group for application accounts:

```
$ ipa group-add application-accounts
```

5. Update the password policy for the group. The following policy prevents password expiration and lockout for the account but compensates the potential risks by requiring complex passwords:

```
$ ipa pwpolicy-add application-accounts --maxlife=10000 --minlife=0 --history=0 --minclasses=4 --minlength=8 --priority=1 --maxfail=0 --failinterval=1 --lockouttime=0
```

6. (Optional) Verify that the password policy exists in IdM:

```
$ ipa pwpolicy-show application-accounts
Group: application-accounts
Max lifetime (days): 10000
Min lifetime (hours): 0
History size: 0
[...]
```

7. Add the provisioning and activation accounts to the group for application accounts:

```
$ ipa group-add-member application-accounts --users={provisionator,activator}
```

8. Change the passwords for the user accounts:

```
$ kpasswd provisionator
$ kpasswd activator
```

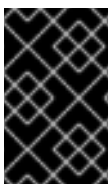
Changing the passwords is necessary because new IdM users passwords expire immediately.

#### Additional resources:

- See [Managing user accounts using the command line](#) .
- See [Delegating Permissions over Users](#) .
- See [Defining IdM Password Policies](#) .

## 40.2. CONFIGURING AUTOMATIC ACTIVATION OF IDM STAGE USER ACCOUNTS

This procedure shows how to create a script for activating stage users. The system runs the script automatically at specified time intervals. This ensures that new user accounts are automatically activated and available for use shortly after they are created.



### IMPORTANT

The procedure assumes that the owner of the external provisioning system has already validated the users and that they do not require additional validation on the IdM side before the script adds them to IdM.

It is sufficient to enable the activation process on only one of your IdM servers.

#### Prerequisites

- The **provisionator** and **activator** accounts exist in IdM. For details, see [Preparing IdM accounts for automatic activation of stage user accounts](#).
- You have root privileges on the IdM server on which you are running the procedure.
- You are logged in as IdM administrator.
- You trust your external provisioning system.

#### Procedure



1. Generate a keytab file for the activation account:

```
# ipa-getkeytab -s server.idm.example.com -p "activator" -k /etc/krb5.ipa-activation.keytab
```

If you want to enable the activation process on more than one IdM server, generate the keytab file on one server only. Then copy the keytab file to the other servers.

2. Create a script, **/usr/local/sbin/ipa-activate-all**, with the following contents to activate all users:

```
#!/bin/bash

kinit -k -i activator

ipa stageuser-find --all --raw | grep " uid:" | cut -d ":" -f 2 | while read uid; do ipa stageuser-activate ${uid}; done
```

3. Edit the permissions and ownership of the **ipa-activate-all** script to make it executable:

```
# chmod 755 /usr/local/sbin/ipa-activate-all
# chown root:root /usr/local/sbin/ipa-activate-all
```

4. Create a systemd unit file, **/etc/systemd/system/ipa-activate-all.service**, with the following contents:

```
[Unit]
Description=Scan IdM every minute for any stage users that must be activated

[Service]
Environment=KRB5_CLIENT_KTNAME=/etc/krb5.ipa-activation.keytab
Environment=KRB5CCNAME=FILE:/tmp/krb5cc_ipa-activate-all
ExecStart=/usr/local/sbin/ipa-activate-all
```

5. Create a systemd timer, **/etc/systemd/system/ipa-activate-all.timer**, with the following contents:

```
[Unit]
Description=Scan IdM every minute for any stage users that must be activated

[Timer]
OnBootSec=15min
OnUnitActiveSec=1min

[Install]
WantedBy=multi-user.target
```

6. Reload the new configuration:

```
# systemctl daemon-reload
```

7. Enable **ipa-activate-all.timer**:

```
# systemctl enable ipa-activate-all.timer
```

8. Start **ipa-activate-all.timer**:

```
# systemctl start ipa-activate-all.timer
```

9. (Optional) Verify that the **ipa-activate-all.timer** daemon is running:

```
# systemctl status ipa-activate-all.timer
• ipa-activate-all.timer - Scan IdM every minute for any stage users that must be activated
  Loaded: loaded (/etc/systemd/system/ipa-activate-all.timer; enabled; vendor preset: disabled)
  Active: active (waiting) since Wed 2020-06-10 16:34:55 CEST; 15s ago
  Trigger: Wed 2020-06-10 16:35:55 CEST; 44s left

Jun 10 16:34:55 server.idm.example.com systemd[1]: Started Scan IdM every minute for any stage users that must be activated.
```

## 40.3. ADDING AN IDM STAGE USER DEFINED IN AN LDIF FILE

Follow this procedure to access IdM LDAP and use an LDIF file to add stage users. While the example below shows adding one single user, multiple users can be added in one file in bulk mode.

### Prerequisites

- IdM administrator has created the **provisionator** account and a password for it. For details, see [Preparing IdM accounts for automatic activation of stage user accounts](#) .
- You as the external administrator know the password of the **provisionator** account.
- You can SSH to the IdM server from your LDAP server.
- You are able to supply the minimal set of attributes that an IdM stage user must have to allow the correct processing of the user life cycle, namely:
  - The **distinguished name** (dn)
  - The **common name** (cn)
  - The **last name** (sn)
  - The **uid**

### Procedure

1. On the external server, create an LDIF file that contains information about the new user:

```
dn: uid=stageidmuser,cn=staged
users,cn=accounts,cn=provisioning,dc=idm,dc=example,dc=com
changetype: add
objectClass: top
objectClass: inetorgperson
uid: stageidmuser
sn: surname
givenName: first_name
cn: full_name
```

2. Transfer the LDIF file from the external server to the IdM server:

```
$ scp add-stageidmuser.ldif provisionator@server.idm.example.com:/provisionator/
Password:
add-stageidmuser.ldif                                100% 364
217.6KB/s  00:00
```

3. Use the **SSH** protocol to connect to the IdM server as **provisionator**:

```
$ ssh provisionator@server.idm.example.com
Password:
[provisionator@server ~]$
```

4. On the IdM server, obtain the Kerberos ticket-granting ticket (TGT) for the provisionator account:

```
[provisionator@server ~]$ kinit provisionator
```

5. Enter the **ldapadd** command with the **-f** option and the name of the LDIF file. Specify the name of the IdM server and the port number:

```
~]$ ldapadd -h server.idm.example.com -p 389 -f add-stageidmuser.ldif
SASL/GSSAPI authentication started
SASL username: provisionator@IDM.EXAMPLE.COM
SASL SSF: 256
SASL data security layer installed.
adding the entry "uid=stageidmuser,cn=staged
users,cn=accounts,cn=provisioning,dc=idm,dc=example,dc=com"
```

## 40.4. ADDING AN IDM STAGE USER DIRECTLY FROM THE CLI USING LDAPMODIFY

Follow this procedure to access access Identity Management (IdM) LDAP and use the **ldapmodify** utility to add a stage user.

### Prerequisites

- The IdM administrator has created the **provisionator** account and a password for it. For details, see [Preparing IdM accounts for automatic activation of stage user accounts](#) .
- You as the external administrator know the password of the **provisionator** account.
- You can SSH to the IdM server from your LDAP server.
- You are able to supply the minimal set of attributes that an IdM stage user must have to allow the correct processing of the user life cycle, namely:
  - The **distinguished name** (dn)
  - The **common name** (cn)
  - The **last name** (sn)
  - The **uid**

## Procedure

1. Use the **SSH** protocol to connect to the IdM server using your IdM identity and credentials:

```
$ ssh provisionator@server.idm.example.com
Password:
[provisionator@server ~]$
```

2. Obtain the TGT of the **provisionator** account, an IdM user with a role to add new stage users:

```
$ kinit provisionator
```

3. Enter the **ldapmodify** command and specify Generic Security Services API (GSSAPI) as the Simple Authentication and Security Layer (SASL) mechanism to use for authentication. Specify the name of the IdM server and the port:

```
# ldapmodify -h server.idm.example.com -p 389 -Y GSSAPI
SASL/GSSAPI authentication started
SASL username: provisionator@IDM.EXAMPLE.COM
SASL SSF: 56
SASL data security layer installed.
```

4. Enter the **dn** of the user you are adding:

```
dn: uid=stageuser,cn=staged
users,cn=accounts,cn=provisioning,dc=idm,dc=example,dc=com
```

5. Enter **add** as the type of change you are performing:

```
changetype: add
```

6. Specify the LDAP object class categories required to allow the correct processing of the user life cycle:

```
objectClass: top
objectClass: inetorgperson
```

You can specify additional object classes.

7. Enter the **uid** of the user:

```
uid: stageuser
```

8. Enter the **cn** of the user:

```
cn: Babs Jensen
```

9. Enter the last name of the user:

```
sn: Jensen
```

10. Press **Enter** again to confirm that this is the end of the entry:

[Enter]

```
adding new entry "uid=stageuser,cn=staged
users,cn=accounts,cn=provisioning,dc=idm,dc=example,dc=com"
```

11. Exit the connection using **Ctrl + C**.

## Verification steps

Verify the contents of the stage entry to make sure your provisioning system added all required POSIX attributes and the stage entry is ready to be activated.

- To display the new stage user's LDAP attributes, enter the **ipa stageuser-show --all --raw** command:

```
$ ipa stageuser-show stageuser --all --raw
dn: uid=stageuser,cn=staged
users,cn=accounts,cn=provisioning,dc=idm,dc=example,dc=com
uid: stageuser
sn: Jensen
cn: Babs Jensen
has_password: FALSE
has_keytab: FALSE
nsaccountlock: TRUE
objectClass: top
objectClass: inetorgperson
objectClass: organizationalPerson
objectClass: person
```

1. Note that the user is explicitly disabled by the **nsaccountlock** attribute.

## 40.5. ADDITIONAL RESOURCES

- See [Using ldapmodify to manage IdM users externally](#) .

## CHAPTER 41. USING LDAPMODIFY TO MANAGE IDM USERS EXTERNALLY

As an IdM administrators you can use the **ipa** commands to manage your directory content. Alternatively, you can use the **ldapmodify** command to achieve similar goals. You can use this command interactively and provide all the data directly in the command line. You also can provide data in the file in the LDAP Data Interchange Format (LDIF) to **ldapmodify** command.

### 41.1. TEMPLATES FOR MANAGING IDM USER ACCOUNTS EXTERNALLY

The following templates can be used for various user management operations in IdM. The templates show which attributes you must modify using **ldapmodify** to achieve the following goals:

- Adding a new stage user
- Modifying a user's attribute
- Enabling a user
- Disabling a user
- Preserving a user

The templates are formatted in the LDAP Data Interchange Format (LDIF). LDIF is a standard plain text data interchange format for representing LDAP directory content and update requests.

Using the templates, you can configure the LDAP provider of your provisioning system to manage IdM user accounts.

For detailed example procedures, see the following sections:

- [Adding an IdM stage user defined in an LDIF file](#)
- [Adding an IdM stage user directly from the CLI using ldapmodify](#)
- [Preserving an IdM user with ldapmodify](#)

#### Templates for adding a new stage user

- A template for adding a user with **UID and GID assigned automatically**. The distinguished name (DN) of the created entry must start with **uid=user\_login**:

```
dn: uid=user_login,cn=staged
users,cn=accounts,cn=provisioning,dc=idm,dc=example,dc=com
changetype: add
objectClass: top
objectClass: inetorgperson
uid: user_login
sn: surname
givenName: first_name
cn: full_name
```

- A template for adding a user with **UID and GID assigned statically**

—

```
dn: uid=user_login,cn=staged
users,cn=accounts,cn=provisioning,dc=idm,dc=example,dc=com
changetype: add
objectClass: top
objectClass: person
objectClass: inetorgperson
objectClass: organizationalperson
objectClass: posixaccount
uid: user_login
uidNumber: UID_number
gidNumber: GID_number
sn: surname
givenName: first_name
cn: full_name
homeDirectory: /home/user_login
```

You are not required to specify any IdM object classes when adding stage users. IdM adds these classes automatically after the users are activated.

### Templates for modifying existing users

- **Modifying a user's attribute**

```
dn: distinguished_name
changetype: modify
replace: attribute_to_modify
attribute_to_modify: new_value
```

- **Disabling a user:**

```
dn: distinguished_name
changetype: modify
replace: nsAccountLock
nsAccountLock: TRUE
```

- **Enabling a user:**

```
dn: distinguished_name
changetype: modify
replace: nsAccountLock
nsAccountLock: FALSE
```

Updating the **nssAccountLock** attribute has no effect on stage and preserved users. Even though the update operation completes successfully, the attribute value remains **nssAccountLock: TRUE**.

- **Preserving a user:**

```
dn: distinguished_name
changetype: modrdn
newrdn: uid=user_login
deleteoldrdn: 0
newsuperior: cn=deleted users,cn=accounts,cn=provisioning,dc=idm,dc=example,dc=com
```



## NOTE

Before modifying a user, obtain the user's distinguished name (DN) by searching using the user's login. In the following example, the `user_allowed_to_modify_user_entries` user is a user allowed to modify user and group information, for example **activator** or IdM administrator. The password in the example is this user's password:

```
[...]
# ldapsearch -LLL -x -D
"uid=user_allowed_to_modify_user_entries,cn=users,cn=accounts,dc=idm,dc=example,dc=com" -w "Secret123" -H ldap://r8server.idm.example.com -b
"cn=users,cn=accounts,dc=idm,dc=example,dc=com" uid=test_user
dn: uid=test_user,cn=users,cn=accounts,dc=idm,dc=example,dc=com
memberOf: cn=ipausers,cn=groups,cn=accounts,dc=idm,dc=example,dc=com
```

## 41.2. TEMPLATES FOR MANAGING IDM GROUP ACCOUNTS EXTERNALLY

The following templates can be used for various user group management operations in IdM. The templates show which attributes you must modify using **ldapmodify** to achieve the following aims:

- Creating a new group
- Deleting an existing group
- Adding a member to a group
- Removing a member from a group

The templates are formatted in the LDAP Data Interchange Format (LDIF). LDIF is a standard plain text data interchange format for representing LDAP directory content and update requests.

Using the templates, you can configure the LDAP provider of your provisioning system to manage IdM group accounts.

### Creating a new group

```
dn: cn=group_name,cn=groups,cn=accounts,dc=idm,dc=example,dc=com
changetype: add
objectClass: top
objectClass: ipaobject
objectClass: ipausergroup
objectClass: groupofnames
objectClass: nestedgroup
objectClass: posixgroup
uid: group_name
cn: group_name
gidNumber: GID_number
```

### Modifying groups

- Deleting an existing group:



```
dn: group_distinguished_name
changetype: delete
```

- **Adding a member to a group**

```
dn: group_distinguished_name
changetype: modify
add: member
member: uid=user_login,cn=users,cn=accounts,dc=idm,dc=example,dc=com
```

Do not add stage or preserved users to groups. Even though the update operation completes successfully, the users will not be updated as members of the group. Only active users can belong to groups.

- **Removing a member from a group**

```
dn: distinguished_name
changetype: modify
delete: member
member: uid=user_login,cn=users,cn=accounts,dc=idm,dc=example,dc=com
```

## NOTE

Before modifying a group, obtain the group's distinguished name (DN) by searching using the group's name.

```
# ldapsearch -Y GSSAPI -H ldap://server.idm.example.com -b
"cn=groups,cn=accounts,dc=idm,dc=example,dc=com" "cn=group_name"
dn: cn=group_name,cn=groups,cn=accounts,dc=idm,dc=example,dc=com
ipaNTSecurityIdentifier: S-1-5-21-1650388524-2605035987-2578146103-11017
cn: testgroup
objectClass: top
objectClass: groupofnames
objectClass: nestedgroup
objectClass: ipausergroup
objectClass: ipaobject
objectClass: posixgroup
objectClass: ipantgroupattrs
ipaUniqueID: 569bf864-9d45-11ea-bea3-525400f6f085
gidNumber: 1997010017
```

## 41.3. USING LDAPMODIFY COMMAND INTERACTIVELY

You can modify Lightweight Directory Access Protocol (LDAP) entries in the interactive mode.

### Procedure

1. In a command line, enter the LDAP Data Interchange Format (LDIF) statement after the **ldapmodify** command.

**Example 41.1. Changing the telephone number for atestuser**

```
# ldapmodify -Y GSSAPI -H ldap://server.example.com
```

```
dn: uid=testuser,cn=users,cn=accounts,dc=example,dc=com
changetype: modify
replace: telephoneNumber
telephonenumber: 88888888
```

Note that you need to obtain a Kerberos ticket for using **-Y** option.

2. Press **Ctrl+D** to exit the interactive mode.
3. Alternatively, provide an LDIF file after **ldapmodify** command:

**Example 41.2. The `ldapmodify` command reads modification data from an LDIF file**

```
# ldapmodify -Y GSSAPI -H ldap://server.example.com -f ~/example.ldif
```

### Additional resources

- For more information about how to use the **ldapmodify** command see **ldapmodify(1)** man page.
- For more information about the **LDIF** structure, see **ldif(5)** man page.

## 41.4. PRESERVING AN IDM USER WITH LDAPMODIFY

Follow this procedure to use **ldapmodify** to preserve an IdM user; that is, how to deactivate a user account after the employee has left the company.

### Prerequisites

- You can authenticate as an IdM user with a role to preserve users.

### Procedure

1. Log in as an IdM user with a role to preserve users:

```
$ kinit admin
```

2. Enter the **ldapmodify** command and specify the Generic Security Services API (GSSAPI) as the Simple Authentication and Security Layer (SASL) mechanism to be used for authentication:

```
# ldapmodify -Y GSSAPI
SASL/GSSAPI authentication started
SASL username: admin@IDM.EXAMPLE.COM
SASL SSF: 256
SASL data security layer installed.
```

3. Enter the **dn** of the user you want to preserve:

```
dn: uid=user1,cn=users,cn=accounts,dc=idm,dc=example,dc=com
```

4. Enter **modrdn** as the type of change you want to perform:

```
changetype: modrdn
```

- Specify the **newrdn** for the user:

```
newrdn: uid=user1
```

- Indicate that you want to preserve the user:

```
deleteoldrdn: 0
```

- Specify the **new superior DN**:

```
newsuperior: cn=deleted users,cn=accounts,cn=provisioning,dc=idm,dc=example,dc=com
```

Preserving a user moves the entry to a new location in the directory information tree (DIT). For this reason, you must specify the DN of the new parent entry as the new superior DN.

- Press **Enter** again to confirm that this is the end of the entry:

```
[Enter]
```

```
modifying rdn of entry "uid=user1,cn=users,cn=accounts,dc=idm,dc=example,dc=com"
```

- Exit the connection using **Ctrl + C**.

### Verification steps

- Verify that the user has been preserved by listing all preserved users:

```
$ ipa user-find --preserved=true
-----
1 user matched
-----
User login: user1
First name: First 1
Last name: Last 1
Home directory: /home/user1
Login shell: /bin/sh
Principal name: user1@IDM.EXAMPLE.COM
Principal alias: user1@IDM.EXAMPLE.COM
Email address: user1@idm.example.com
UID: 1997010003
GID: 1997010003
Account disabled: True
Preserved user: True
-----
Number of entries returned 1
-----
```

## CHAPTER 42. MANAGING HOSTS IN IDM CLI

This chapter introduces [hosts](#) and [host entries](#) in Identity Management (IdM), and the following operations performed when managing hosts and host entries in IdM CLI:

- [Host Enrollment](#)
- [Adding IdM host entries](#)
- [Deleting IdM host entries](#)
- [Re-enrolling hosts](#)
- [Renaming hosts](#)
- [Disabling hosts](#)
- [Re-enabling hosts](#)

The chapter also contains an [overview table](#) of the prerequisites, the context, and the consequences of these operations.

### 42.1. HOSTS IN IDM

Identity Management (IdM) manages these identities:

- Users
- Services
- Hosts

A host represents a machine. As an IdM identity, a host has an entry in the IdM LDAP, that is the 389 Directory Server instance of the IdM server.

The host entry in IdM LDAP is used to establish relationships between other hosts and even services within the domain. These relationships are part of *delegating* authorization and control to hosts within the domain. Any host can be used in **host-based access control** (HBAC) rules.

IdM domain establishes a commonality between machines, with common identity information, common policies, and shared services. Any machine that belongs to a domain functions as a client of the domain, which means it uses the services that the domain provides. IdM domain provides three main services specifically for machines:

- DNS
- Kerberos
- Certificate management

Hosts in IdM are closely connected with the services running on them:

- Service entries are associated with a host.
- A host stores both the host and the service Kerberos principals.

## 42.2. HOST ENROLLMENT

This section describes enrolling hosts as IdM clients and what happens during and after the enrollment. The section compares the enrollment of IdM hosts and IdM users. The section also outlines alternative types of authentication available to hosts.

Enrolling a host consists of:

- Creating a host entry in IdM LDAP: possibly using the [ipa host-add command](#) in IdM CLI, or the equivalent [IdM Web UI operation](#).
- Configuring IdM services on the host, for example the System Security Services Daemon (SSSD), Kerberos, and certmonger, and joining the host to the IdM domain.

The two actions can be performed separately or together.

If performed separately, they allow for dividing the two tasks between two users with different levels of privilege. This is useful for bulk deployments.

The **ipa-client-install** command can perform the two actions together. The command creates a host entry in IdM LDAP if that entry does not exist yet, and configures both the Kerberos and SSSD services for the host. The command brings the host within the IdM domain and allows it to identify the IdM server it will connect to. If the host belongs to a DNS zone managed by IdM, **ipa-client-install** adds DNS records for the host too. The command must be run on the client.

## 42.3. USER PRIVILEGES REQUIRED FOR HOST ENROLLMENT

The host enrollment operation requires authentication to prevent an unprivileged user from adding unwanted machines to the IdM domain. The privileges required depend on several factors, for example:

- If a host entry is created separately from running **ipa-client-install**
- If a one-time password (OTP) is used for enrollment

### User privileges for optionally manually creating a host entry in IdM LDAP

The user privilege required for creating a host entry in IdM LDAP using the **ipa host-add** CLI command or the IdM Web UI is **Host Administrators**. The **Host Administrators** privilege can be obtained through the **IT Specialist** role.

### User privileges for joining the client to the IdM domain

Hosts are configured as IdM clients during the execution of the **ipa-client-install** command. The level of credentials required for executing the **ipa-client-install** command depends on which of the following enrolling scenarios you find yourself in:

- The host entry in IdM LDAP does not exist. For this scenario, you need a full administrator's credentials or the **Host Administrators** role. A full administrator is a member of the **admins** group. The **Host Administrators** role provides privileges to add hosts and enroll hosts. For details about this scenario, see [Installing a client using user credentials: interactive installation](#).
- The host entry in IdM LDAP exists. For this scenario, you need a limited administrator's credentials to execute **ipa-client-install** successfully. The limited administrator in this case has the **Enrollment Administrator** role, which provides the **Host Enrollment** privilege. For details, see [Installing a client using user credentials: interactive installation](#).
- The host entry in IdM LDAP exists, and an OTP has been generated for the host by a full or

limited administrator. For this scenario, you can install an IdM client as an ordinary user if you run the **ipa-client-install** command with the **--password** option, supplying the correct OTP. For details, see [Installing a client by using a one-time password: Interactive installation](#) .

After enrollment, IdM hosts authenticate every new session to be able to access IdM resources. Machine authentication is required for the IdM server to trust the machine and to accept IdM connections from the client software installed on that machine. After authenticating the client, the IdM server can respond to its requests.

## 42.4. ENROLLMENT AND AUTHENTICATION OF IDM HOSTS AND USERS: COMPARISON

There are many similarities between users and hosts in IdM, some of which can be observed during the enrollment stage as well as those that concern authentication during the deployment stage.

- The enrollment stage ([User and host enrollment](#)):
  - An administrator can create an LDAP entry for both a user and a host before the user or host actually join IdM: for the stage user, the command is **ipa stageuser-add**; for the host, the command is **ipa host-add**.
  - A file containing a *key table* or, abbreviated, *keytab*, a symmetric key resembling to some extent a user password, is created during the execution of the **ipa-client-install** command on the host, resulting in the host joining the IdM realm. Analogically, a user is asked to create a password when they activate their account, therefore joining the IdM realm.
  - While the user password is the default authentication method for a user, the keytab is the default authentication method for a host. The keytab is stored in a file on the host.

Table 42.1. User and host enrollment

| Action                    | User   | Host   |
|---------------------------|--|--|
| Pre-enrollment            | \$ ipa stageuser-add <i>user_name</i> [-<br>-password] | \$ ipa host-add <i>host_name</i> [--<br>random]                        |
| Activating the<br>account | \$ ipa stageuser-activate<br><i>user_name</i>          | \$ ipa-client install [--password]<br>(must be run on the host itself) |

- The deployment stage ([User and host session authentication](#)):
  - When a user starts a new session, the user authenticates using a password; similarly, every time it is switched on, the host authenticates by presenting its keytab file. The System Security Services Daemon (SSSD) manages this process in the background.
  - If the authentication is successful, the user or host obtains a Kerberos ticket granting ticket (TGT).
  - The TGT is then used to obtain specific tickets for specific services.

Table 42.2. User and host session authentication

|   | User  | Host  |
|---|---|---|
| Default means of authentication         | <b>Password</b>   | <b>Keytabs</b>  |
| Starting a session (ordinary user)      | <b>\$ kinit <i>user_name</i></b>                            | <i>[switch on the host]</i>                                 |
| The result of successful authentication | <b>TGT</b> to be used to obtain access to specific services | <b>TGT</b> to be used to obtain access to specific services |

TGTs and other Kerberos tickets are generated as part of the Kerberos services and policies defined by the server. The initial granting of a Kerberos ticket, the renewing of the Kerberos credentials, and even the destroying of the Kerberos session are all handled automatically by the IdM services.

### Alternative authentication options for IdM hosts

Apart from keytabs, IdM supports two other types of machine authentication:

- **SSH keys.** The SSH public key for the host is created and uploaded to the host entry. From there, the System Security Services Daemon (SSSD) uses IdM as an identity provider and can work in conjunction with OpenSSH and other services to reference the public keys located centrally in IdM.
- **Machine certificates.** In this case, the machine uses an SSL certificate that is issued by the IdM server's certificate authority and then stored in IdM's Directory Server. The certificate is then sent to the machine to present when it authenticates to the server. On the client, certificates are managed by a service called [certmonger](#).

## 42.5. HOST OPERATIONS

The most common operations related to host enrollment and enablement, and the prerequisites, the context, and the consequences of performing those operations are outlined in the following sections.

**Table 42.3. Host operations part 1**

| Action | What are the prerequisites of the action? | When does it make sense to run the command? | How is the action performed by a system administrator? What command(s) does he run? |
|--------|---|---|---|
|--------|---|---|---|

| Action                       | What are the prerequisites of the action?   | When does it make sense to run the command?  | How is the action performed by a system administrator? What command(s) does he run?  |
|------------------------------|---|--|--|
| <b>Enrolling a client</b>    | see <a href="#">Preparing the system for Identity Management client installation</a> in <i>Installing Identity Management</i> | When you want the host to join the IdM realm.  | Enrolling machines as clients in the IdM domain is a two-part process. A host entry is created for the client (and stored in the 389 Directory Server instance) when the <b>ipa host-add</b> command is run, and then a keytab is created to provision the client. Both parts are performed automatically by the <b>ipa-client-install</b> command. It is also possible to perform those steps separately; this allows for administrators to prepare machines and IdM in advance of actually configuring the clients. This allows more flexible setup scenarios, including bulk deployments. |
| <b>Disabling a client</b>    | The host must have an entry in IdM. The host needs to have an active keytab.  | When you want to remove the host from the IdM realm temporarily, perhaps for maintenance purposes. | <b>ipa host-disable host_name</b>  |
| <b>Enabling a client</b>     | The host must have an entry in IdM.   | When you want the temporarily disabled host to become active again.                                | <b>ipa-getkeytab</b>   |
| <b>Re-enrolling a client</b> | The host must have an entry in IdM.   | When the original host has been lost but you have installed a host with the same host name.        | <b>ipa-client-install --keytab</b> or <b>ipa-client-install --force-join</b>   |
| <b>Un-enrolling a client</b> | The host must have an entry in IdM.   | When you want to remove the host from the IdM realm permanently.                                   | <b>ipa-client-install --uninstall</b>  |

Table 42.4. Host operations part 2



| Action                       | On which machine can the administrator run the command(s)?  | What happens when the action is performed? What are the consequences for the host's functioning in IdM? What limitations are introduced/removed?  |
|------------------------------|---|---|
| <b>Enrolling a client</b>    | In the case of a two-step enrollment: <b>ipa host-add</b> can be run on any IdM client; the second step of <b>ipa-client-install</b> must be run on the client itself | By default this configures SSSD to connect to an IdM server for authentication and authorization. Optionally one can instead configure the Pluggable Authentication Module (PAM) and the Name Switching Service (NSS) to work with an IdM server over Kerberos and LDAP.  |
| <b>Disabling a client</b>    | Any machine in IdM, even the host itself  | The host's Kerberos key and SSL certificate are invalidated, and all services running on the host are disabled.   |
| <b>Enabling a client</b>     | Any machine in IdM. If run on the disabled host, LDAP credentials need to be supplied.  | The host's Kerberos key and the SSL certificate are made valid again, and all IdM services running on the host are re-enabled.  |
| <b>Re-enrolling a client</b> | The host to be re-enrolled. LDAP credentials need to be supplied.   | A new Kerberos key is generated for the host, replacing the previous one.   |
| <b>Un-enrolling a client</b> | The host to be un-enrolled.   | The command unconfigures IdM and attempts to return the machine to its previous state. Part of this process is to unenroll the host from the IdM server. Unenrollment consists of disabling the principal key on the IdM server. The machine principal in <b>/etc/krb5.keytab (host/&lt;fqdn&gt;@REALM)</b> is used to authenticate to the IdM server to unenroll itself. If this principal does not exist then unenrollment will fail and an administrator will need to disable the host principal ( <b>ipa host-disable &lt;fqdn&gt;</b> ). |

## 42.6. HOST ENTRY IN IDM LDAP

An Identity Management (IdM) host entry contains information about the host and what attributes it can contain.

An LDAP host entry contains all relevant information about the client within IdM:

- Service entries associated with the host
- The host and service principal

- Access control rules
- Machine information, such as its physical location and operating system

**NOTE**

Note that the IdM Web UI **Identity** → **Hosts** tab does not show all the information about a particular host stored in the IdM LDAP.

**Host entry configuration properties**

A host entry can contain information about the host that is outside its system configuration, such as its physical location, MAC address, keys, and certificates.

This information can be set when the host entry is created if it is created manually. Alternatively, most of this information can be added to the host entry after the host is enrolled in the domain.

**Table 42.5. Host Configuration Properties**

| UI Field         | Command-Line Option                  | Description  |
|------------------|--------------------------------------|--|
| Description      | <b>--desc</b> = <i>description</i>   | A description of the host.   |
| Locality         | <b>--locality</b> = <i>locality</i>  | The geographic location of the host.   |
| Location         | <b>--location</b> = <i>location</i>  | The physical location of the host, such as its data center rack.   |
| Platform         | <b>--platform</b> = <i>string</i>    | The host hardware or architecture.   |
| Operating system | <b>--os</b> = <i>string</i>          | The operating system and version for the host.   |
| MAC address      | <b>--macaddress</b> = <i>address</i> | The MAC address for the host. This is a multi-valued attribute. The MAC address is used by the NIS plug-in to create a NIS <b>ethers</b> map for the host. |
| SSH public keys  | <b>--sshpkey</b> = <i>string</i>     | The full SSH public key for the host. This is a multi-valued attribute, so multiple keys can be set.   |

| UI Field                      | Command-Line Option                       | Description   |
|-------------------------------|---|---|
| Principal name (not editable) | <b>--principalname</b> = <i>principal</i> | The Kerberos principal name for the host. This defaults to the host name during the client installation, unless a different principal is explicitly set in the <b>-p</b> . This can be changed using the command-line tools, but cannot be changed in the UI. |
| Set One-Time Password         | <b>--password</b> = <i>string</i>         | This option sets a password for the host which can be used in bulk enrollment.  |
| -                             | <b>--random</b>                           | This option generates a random password to be used in bulk enrollment.  |
| -                             | <b>--certificate</b> = <i>string</i>      | A certificate blob for the host.  |
| -                             | <b>--updatedns</b>                        | This sets whether the host can dynamically update its DNS entries if its IP address changes.  |

## 42.7. ADDING IDM HOST ENTRIES FROM IDM CLI

Follow this procedure to add host entries in Identity Management (IdM) using the command-line interface (CLI).

Host entries are created using the **host-add** command. This command adds the host entry to the IdM Directory Server. Consult the **ipa host** manpage by typing **ipa help host** in your CLI to get the full list of options available with **host-add**.

There are a few different scenarios when adding a host to IdM:

- At its most basic, specify only the client host name to add the client to the Kerberos realm and to create an entry in the IdM LDAP server:

```
$ ipa host-add client1.example.com
```

- If the IdM server is configured to manage DNS, add the host to the DNS resource records using the **--ip-address** option.

**Example 42.1. Creating Host Entries with Static IP Addresses**

```
$ ipa host-add --ip-address=192.168.166.31 client1.example.com
```

- If the host to be added does not have a static IP address or if the IP address is not known at the time the client is configured, use the **--force** option with the **ipa host-add** command.

#### Example 42.2. Creating Host Entries with DHCP

```
$ ipa host-add --force client1.example.com
```

For example, laptops may be preconfigured as IdM clients, but they do not have IP addresses at the time they are configured. Using **--force** essentially creates a placeholder entry in the IdM DNS service. When the DNS service dynamically updates its records, the host's current IP address is detected and its DNS record is updated.

## 42.8. DELETING HOST ENTRIES FROM IDM CLI

- Use the **host-del** command to delete host records. If your IdM domain has integrated DNS, use the **--updatedns** option to remove the associated records of any kind for the host from the DNS:

```
$ ipa host-del --updatedns client1.example.com
```

## 42.9. RE-ENROLLING AN IDENTITY MANAGEMENT CLIENT

This section describes the different way you can re-enroll an Identity Management client.

### 42.9.1. Client re-enrollment in IdM

During the re-enrollment, the client generates a new Kerberos key and SSH keys, but the identity of the client in the LDAP database remains unchanged. After the re-enrollment, the host has its keys and other information in the same LDAP object with the same **FQDN** as previously, before the machine's loss of connection with the IdM servers.



#### IMPORTANT

You can only re-enroll clients whose domain entry is still active. If you uninstalled a client (using **ipa-client-install --uninstall**) or disabled its host entry (using **ipa host-disable**), you cannot re-enroll it.

You cannot re-enroll a client after you have renamed it. This is because in Identity Management, the key attribute of the client's entry in LDAP is the client's hostname, its **FQDN**. As opposed to re-enrolling a client, during which the client's LDAP object remains unchanged, the outcome of renaming a client is that the client has its keys and other information in a different LDAP object with a new **FQDN**. Therefore, the only way to rename a client is to uninstall the host from IdM, change the host's hostname, and install it as an IdM client with a new name. For details on how to rename a client, see [Renaming Identity Management client systems](#).

### What happens during client re-enrollment

During re-enrollment, Identity Management:

- Revokes the original host certificate
- Creates new SSH keys

- Generates a new keytab

### 42.9.2. Re-enrolling a client by using user credentials: Interactive re-enrollment

Follow this procedure to re-enroll an Identity Management client interactively by using the credentials of an authorized user.

1. Re-create the client machine with the same host name.
2. Run the **ipa-client-install --force-join** command on the client machine:

```
# ipa-client-install --force-join
```

3. The script prompts for a user whose identity will be used to re-enroll the client. This could be, for example, a **hostadmin** user with the Enrollment Administrator role:

```
User authorized to enroll computers: hostadmin
Password for hostadmin@EXAMPLE.COM:
```

#### Additional resources

- See [Installing a client by using user credentials: Interactive installation](#) in *Installing Identity Management*.

### 42.9.3. Re-enrolling a client by using the client keytab: Non-interactive re-enrollment

#### Prerequisites

- Back up the original client keytab file, for example in the **/tmp** or **/root** directory.

#### Procedure

Follow this procedure to re-enroll an Identity Management (IdM) client non-interactively by using the keytab of the client system. For example, re-enrollment using the client keytab is appropriate for an automated installation.

1. Re-create the client machine with the same host name.
2. Copy the keytab file from the backup location to the **/etc/** directory on the re-created client machine.
3. Use the **ipa-client-install** utility to re-enroll the client, and specify the keytab location with the **-keytab** option:

```
# ipa-client-install --keytab /etc/krb5.keytab
```



#### NOTE

The keytab specified in the **--keytab** option is only used when authenticating to initiate the enrollment. During the re-enrollment, IdM generates a new keytab for the client.

#### 42.9.4. Testing an Identity Management client after installation

The command-line interface informs you that the **ipa-client-install** was successful, but you can also do your own test.

To test that the Identity Management client can obtain information about users defined on the server, check that you are able to resolve a user defined on the server. For example, to check the default **admin** user:

```
[user@client1 ~]$ id admin
uid=1254400000(admin) gid=1254400000(admins) groups=1254400000(admins)
```

To test that authentication works correctly, **su -** as another IdM user:

```
[user@client1 ~]$ su - idm_user
Last login: Thu Oct 18 18:39:11 CEST 2018 from 192.168.122.1 on pts/0
[idm_user@client1 ~]$
```

### 42.10. RENAMING IDENTITY MANAGEMENT CLIENT SYSTEMS

The following sections describe how to change the host name of an Identity Management client system.



#### WARNING

Renaming a client is a manual procedure. Do not perform it unless changing the host name is absolutely required.

Renaming an Identity Management client involves:

1. Preparing the host. For details, see [Preparing an IdM client for its renaming](#).
2. Uninstalling the IdM client from the host. For details, see [Uninstalling an Identity Management client](#).
3. Renaming the host. For details, see [Renaming the host system](#).
4. Installing the IdM client on the host with the new name. For details, see [Installing an Identity Management client](#) in *Installing Identity Management*.
5. Configuring the host after the IdM client installation. For details, see [Re-adding services, re-generating certificates, and re-adding host groups](#).

#### 42.10.1. Preparing an IdM client for its renaming

Before uninstalling the current client, make note of certain settings for the client. You will apply this configuration after re-enrolling the machine with a new host name.

- Identify which services are running on the machine:
  - Use the **ipa service-find** command, and identify services with certificates in the output:

```
$ ipa service-find old-client-name.example.com
```

- In addition, each host has a default *host* service which does not appear in the **ipa service-find** output. The service principal for the host service, also called a *host principal*, is **host/*old-client-name.example.com***.
- For all service principals displayed by **ipa service-find *old-client-name.example.com***, determine the location of the corresponding keytabs on the ***old-client-name.example.com*** system:

```
# find / -name "*.keytab"
```

Each service on the client system has a Kerberos principal in the form *service\_name/host\_name@REALM*, such as **ldap/*old-client-name.example.com*@EXAMPLE.COM**.

- Identify all host groups to which the machine belongs.

```
# ipa hostgroup-find old-client-name.example.com
```

## 42.10.2. Uninstalling an Identity Management client

Uninstalling a client removes the client from the Identity Management domain, along with all of the specific Identity Management configuration of system services, such as System Security Services Daemon (SSSD). This restores the previous configuration of the client system.

### Procedure

1. Run the **ipa-client-install --uninstall** command:

```
[root@client]# ipa-client-install --uninstall
```

2. Remove the DNS entries for the client host manually from the server:

```
[root@server]# ipa dnsrecord-del
Record name: old-client-client
Zone name: idm.example.com
No option to delete specific record provided.
Delete all? Yes/No (default No): yes
-----
Deleted record "old-client-name"
```

3. For each identified keytab other than **/etc/krb5.keytab**, remove the old principals:

```
[root@client ~]# ipa-rmkeytab -k /path/to/keytab -r EXAMPLE.COM
```

4. On an IdM server, remove the host entry. This removes all services and revokes all certificates issued for that host:

```
[root@server ~]# ipa host-del client.example.com
```

## 42.10.3. Renaming the host system

Rename the machine as required. For example:

```
[root@client]# hostnamectl set-hostname new-client-name.example.com
```

You can now re-install the Identity Management client to the Identity Management domain with the new host name.

#### 42.10.4. Re-adding services, re-generating certificates, and re-adding host groups

##### Procedure

1. On the Identity Management (IdM) server, add a new keytab for every service identified in the [Preparing an IdM client for its renaming](#) .

```
[root@server ~]# ipa service-add service_name/new-client-name
```

2. Generate certificates for services that had a certificate assigned in the [Preparing an IdM client for its renaming](#). You can do this:
  - Using the IdM administration tools
  - Using the **certmonger** utility
3. Re-add the client to the host groups identified in the [Preparing an IdM client for its renaming](#) .

### 42.11. DISABLING AND RE-ENABLING HOST ENTRIES

This section describes how to disable and re-enable hosts in Identity Management (IdM).

#### 42.11.1. Disabling Hosts

Complete this procedure to disable a host entry in IdM.

Domain services, hosts, and users can access an active host. There can be situations when it is necessary to remove an active host temporarily, for maintenance reasons, for example. Deleting the host in such situations is not desired as it removes the host entry and all the associated configuration permanently. Instead, choose the option of disabling the host.

Disabling a host prevents domain users from accessing it without permanently removing it from the domain.

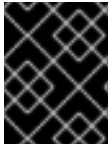
##### Procedure

- Disable a host using the **host-disable** command. Disabling a host kills the host's current, active keytabs. For example:

```
$ kinit admin  
$ ipa host-disable client.example.com
```

As a result of disabling a host, the host becomes unavailable to all IdM users, hosts and services.





## IMPORTANT

Disabling a host not only disables that host. It disables every configured service on that host as well.

### 42.11.2. Re-enabling Hosts

Follow this procedure to re-enable a disabled IdM host.

Disabling a host killed its active keytabs, which removed the host from the IdM domain without otherwise touching its configuration entry.

#### Procedure

- To re-enable a host, use the **ipa-getkeytab** command, adding:
  - the **-s** option to specify which IdM server to request the keytab from
  - the **-p** option to specify the principal name
  - the **-k** option to specify the file to which to save the keytab.

For example, to request a new host keytab from **server.example.com** for **client.example.com**, and store the keytab in the **/etc/krb5.keytab** file:

```
$ ipa-getkeytab -s server.example.com -p host/client.example.com -k /etc/krb5.keytab -D
"cn=directory manager" -w password
```



## NOTE

You can also use the administrator's credentials, specifying **-D "uid=admin,cn=users,cn=accounts,dc=example,dc=com"**. It is important that the credentials correspond to a user allowed to create the keytab for the host.

If the **ipa-getkeytab** command is run on an active IdM client or server, then it can be run without any LDAP credentials (**-D** and **-w**) if the user has a TGT obtained using, for example, **kinit admin**. To run the command directly on the disabled host, supply LDAP credentials to authenticate to the IdM server.

## CHAPTER 43. ADDING HOST ENTRIES FROM IDM WEB UI

This chapter introduces hosts in Identity Management (IdM) and the operation of adding a host entry in the IdM Web UI.

### 43.1. HOSTS IN IDM

Identity Management (IdM) manages these identities:

- Users
- Services
- Hosts

A host represents a machine. As an IdM identity, a host has an entry in the IdM LDAP, that is the 389 Directory Server instance of the IdM server.

The host entry in IdM LDAP is used to establish relationships between other hosts and even services within the domain. These relationships are part of *delegating* authorization and control to hosts within the domain. Any host can be used in **host-based access control** (HBAC) rules.

IdM domain establishes a commonality between machines, with common identity information, common policies, and shared services. Any machine that belongs to a domain functions as a client of the domain, which means it uses the services that the domain provides. IdM domain provides three main services specifically for machines:

- DNS
- Kerberos
- Certificate management

Hosts in IdM are closely connected with the services running on them:

- Service entries are associated with a host.
- A host stores both the host and the service Kerberos principals.

### 43.2. HOST ENROLLMENT

This section describes enrolling hosts as IdM clients and what happens during and after the enrollment. The section compares the enrollment of IdM hosts and IdM users. The section also outlines alternative types of authentication available to hosts.

Enrolling a host consists of:

- Creating a host entry in IdM LDAP: possibly using the [ipa host-add command](#) in IdM CLI, or the equivalent [IdM Web UI operation](#).
- Configuring IdM services on the host, for example the System Security Services Daemon (SSSD), Kerberos, and certmonger, and joining the host to the IdM domain.

The two actions can be performed separately or together.

If performed separately, they allow for dividing the two tasks between two users with different levels of privilege. This is useful for bulk deployments.

The **ipa-client-install** command can perform the two actions together. The command creates a host entry in IdM LDAP if that entry does not exist yet, and configures both the Kerberos and SSSD services for the host. The command brings the host within the IdM domain and allows it to identify the IdM server it will connect to. If the host belongs to a DNS zone managed by IdM, **ipa-client-install** adds DNS records for the host too. The command must be run on the client.

### 43.3. USER PRIVILEGES REQUIRED FOR HOST ENROLLMENT

The host enrollment operation requires authentication to prevent an unprivileged user from adding unwanted machines to the IdM domain. The privileges required depend on several factors, for example:

- If a host entry is created separately from running **ipa-client-install**
- If a one-time password (OTP) is used for enrollment

#### User privileges for optionally manually creating a host entry in IdM LDAP

The user privilege required for creating a host entry in IdM LDAP using the **ipa host-add** CLI command or the IdM Web UI is **Host Administrators**. The **Host Administrators** privilege can be obtained through the **IT Specialist** role.

#### User privileges for joining the client to the IdM domain

Hosts are configured as IdM clients during the execution of the **ipa-client-install** command. The level of credentials required for executing the **ipa-client-install** command depends on which of the following enrolling scenarios you find yourself in:

- The host entry in IdM LDAP does not exist. For this scenario, you need a full administrator's credentials or the **Host Administrators** role. A full administrator is a member of the **admins** group. The **Host Administrators** role provides privileges to add hosts and enroll hosts. For details about this scenario, see [Installing a client using user credentials: interactive installation](#) .
- The host entry in IdM LDAP exists. For this scenario, you need a limited administrator's credentials to execute **ipa-client-install** successfully. The limited administrator in this case has the **Enrollment Administrator** role, which provides the **Host Enrollment** privilege. For details, see [Installing a client using user credentials: interactive installation](#) .
- The host entry in IdM LDAP exists, and an OTP has been generated for the host by a full or limited administrator. For this scenario, you can install an IdM client as an ordinary user if you run the **ipa-client-install** command with the **--password** option, supplying the correct OTP. For details, see [Installing a client by using a one-time password: Interactive installation](#) .

After enrollment, IdM hosts authenticate every new session to be able to access IdM resources. Machine authentication is required for the IdM server to trust the machine and to accept IdM connections from the client software installed on that machine. After authenticating the client, the IdM server can respond to its requests.

### 43.4. ENROLLMENT AND AUTHENTICATION OF IDM HOSTS AND USERS: COMPARISON

There are many similarities between users and hosts in IdM, some of which can be observed during the enrollment stage as well as those that concern authentication during the deployment stage.

- The enrollment stage ([User and host enrollment](#)):
  - An administrator can create an LDAP entry for both a user and a host before the user or host actually join IdM: for the stage user, the command is **ipa stageuser-add**; for the host, the command is **ipa host-add**.
  - A file containing a *key table* or, abbreviated, *keytab*, a symmetric key resembling to some extent a user password, is created during the execution of the **ipa-client-install** command on the host, resulting in the host joining the IdM realm. Analogically, a user is asked to create a password when they activate their account, therefore joining the IdM realm.
  - While the user password is the default authentication method for a user, the keytab is the default authentication method for a host. The keytab is stored in a file on the host.

**Table 43.1. User and host enrollment**

| Action                 | User  | Host  |
|------------------------|---|---|
| Pre-enrollment         | \$ <b>ipa stageuser-add</b> <i>user_name</i> [-<br>-password] | \$ <b>ipa host-add</b> <i>host_name</i> [--<br>random]                        |
| Activating the account | \$ <b>ipa stageuser-activate</b><br><i>user_name</i>          | \$ <b>ipa-client install</b> [--password]<br>(must be run on the host itself) |

- The deployment stage ([User and host session authentication](#)):
  - When a user starts a new session, the user authenticates using a password; similarly, every time it is switched on, the host authenticates by presenting its keytab file. The System Security Services Daemon (SSSD) manages this process in the background.
  - If the authentication is successful, the user or host obtains a Kerberos ticket granting ticket (TGT).
  - The TGT is then used to obtain specific tickets for specific services.

**Table 43.2. User and host session authentication**

|   | User  | Host  |
|---|---|---|
| Default means of authentication         | <b>Password</b>   | <b>Keytabs</b>  |
| Starting a session (ordinary user)      | \$ <b>kinit</b> <i>user_name</i>                            | <i>[switch on the host]</i>                                 |
| The result of successful authentication | <b>TGT</b> to be used to obtain access to specific services | <b>TGT</b> to be used to obtain access to specific services |

TGTs and other Kerberos tickets are generated as part of the Kerberos services and policies defined by the server. The initial granting of a Kerberos ticket, the renewing of the Kerberos credentials, and even the destroying of the Kerberos session are all handled automatically by the IdM services.

## Alternative authentication options for IdM hosts

Apart from keytabs, IdM supports two other types of machine authentication:

- SSH keys. The SSH public key for the host is created and uploaded to the host entry. From there, the System Security Services Daemon (SSSD) uses IdM as an identity provider and can work in conjunction with OpenSSH and other services to reference the public keys located centrally in IdM.
- Machine certificates. In this case, the machine uses an SSL certificate that is issued by the IdM server's certificate authority and then stored in IdM's Directory Server. The certificate is then sent to the machine to present when it authenticates to the server. On the client, certificates are managed by a service called [certmonger](#).

## 43.5. HOST ENTRY IN IDM LDAP

An Identity Management (IdM) host entry contains information about the host and what attributes it can contain.

An LDAP host entry contains all relevant information about the client within IdM:

- Service entries associated with the host
- The host and service principal
- Access control rules
- Machine information, such as its physical location and operating system



### NOTE

Note that the IdM Web UI **Identity** → **Hosts** tab does not show all the information about a particular host stored in the IdM LDAP.

## Host entry configuration properties

A host entry can contain information about the host that is outside its system configuration, such as its physical location, MAC address, keys, and certificates.

This information can be set when the host entry is created if it is created manually. Alternatively, most of this information can be added to the host entry after the host is enrolled in the domain.

**Table 43.3. Host Configuration Properties**

| UI Field    | Command-Line Option                 | Description  |
|-------------|-------------------------------------|--|
| Description | <b>--desc</b> = <i>description</i>  | A description of the host.                                       |
| Locality    | <b>--locality</b> = <i>locality</i> | The geographic location of the host.                             |
| Location    | <b>--location</b> = <i>location</i> | The physical location of the host, such as its data center rack. |

| UI Field                      | Command-Line Option                       | Description   |
|-------------------------------|---|---|
| Platform                      | <b>--platform</b> = <i>string</i>         | The host hardware or architecture.  |
| Operating system              | <b>--os</b> = <i>string</i>               | The operating system and version for the host.  |
| MAC address                   | <b>--macaddress</b> = <i>address</i>      | The MAC address for the host. This is a multi-valued attribute. The MAC address is used by the NIS plug-in to create a NIS <b>ethers</b> map for the host.  |
| SSH public keys               | <b>--sshpubkey</b> = <i>string</i>        | The full SSH public key for the host. This is a multi-valued attribute, so multiple keys can be set.  |
| Principal name (not editable) | <b>--principalname</b> = <i>principal</i> | The Kerberos principal name for the host. This defaults to the host name during the client installation, unless a different principal is explicitly set in the <b>-p</b> . This can be changed using the command-line tools, but cannot be changed in the UI. |
| Set One-Time Password         | <b>--password</b> = <i>string</i>         | This option sets a password for the host which can be used in bulk enrollment.  |
| -                             | <b>--random</b>                           | This option generates a random password to be used in bulk enrollment.  |
| -                             | <b>--certificate</b> = <i>string</i>      | A certificate blob for the host.  |
| -                             | <b>--updatedns</b>                        | This sets whether the host can dynamically update its DNS entries if its IP address changes.  |

## 43.6. ADDING HOST ENTRIES FROM THE WEB UI

1. Open the **Identity** tab, and select the **Hosts** subtab.
2. Click **Add** at the top of the hosts list.

Figure 43.1. Adding Host Entries

The screenshot shows the 'Hosts' management page. At the top, there is a search bar, a 'Refresh' button, a 'Delete' button, and a '+ Add' button which is highlighted with a red rectangle. Below these buttons is a table with the following columns: Host name, Description, and Enrolled. The table contains one entry with the host name 'server.example.com' and the enrolled status 'True'. At the bottom of the table, it says 'Showing 1 to 1 of 1 entries.'

|                          | Host name          | Description | Enrolled |
|--------------------------|--------------------|-------------|----------|
| <input type="checkbox"/> | server.example.com |             | True     |

Showing 1 to 1 of 1 entries.

- Enter the machine name and select the domain from the configured zones in the drop-down list. If the host has already been assigned a static IP address, then include that with the host entry so that the DNS entry is fully created.

The **Class** field has no specific purpose at the moment.

Figure 43.2. Add Host Wizard

The screenshot shows the 'Add Host' wizard. It has a title bar with 'Add Host' and a close button. The form contains the following fields: 'Host Name' (required, marked with an asterisk) with the value 'server'; 'DNS Zone' (required, marked with an asterisk) with a dropdown menu showing 'zone.example.com.'; 'Class' (empty text field); 'IP Address' (text field with the value '192.0.2.1'); and 'Force' (checkbox, checked). At the bottom, there is a legend for '\* Required field' and four buttons: 'Add', 'Add and Add Another', 'Add and Edit', and 'Cancel'.

DNS zones can be created in IdM. If the IdM server does not manage the DNS server, the zone can be entered manually in the menu area, like a regular text field.



#### NOTE

Select the **Force** check box if you want to skip checking whether the host is resolvable via DNS.

- Click the **Add and Edit** button to go directly to the expanded entry page and enter more attribute information. Information about the host hardware and physical location can be included with the host entry.

Figure 43.3. Expanded Entry Page

## Host: server.zone.example.com

server.zone.examp... is a member of:

Settings

Host Groups

Netgroups

Roles

HBAC Rules

Sudo Rules

ser

Refresh

Revert

Save

Actions ▾

### Host Settings

|                |  |
|----------------|--|
| Host name      | server.zone.example.com                  |
| Principal name | host/server.zone.example.com@EXAMPLE.COM |
| Description    | <input type="text"/>                     |
| Class          | <input type="text"/>                     |
| Locality       | <input type="text"/>                     |



## CHAPTER 44. MANAGING HOSTS USING ANSIBLE PLAYBOOKS

Ansible is an automation tool used to configure systems, deploy software, and perform rolling updates. Ansible includes support for Identity Management (IdM), and you can use Ansible modules to automate host management.

The following concepts and operations are performed when managing hosts and host entries using Ansible playbooks:

- Ensuring the presence of IdM host entries that are only defined by their **FQDNs**
- Ensuring the presence of IdM host entries with IP addresses
- Ensuring the presence of multiple IdM host entries with random passwords
- Ensuring the presence of an IdM host entry with multiple IP addresses
- Ensuring the absence of IdM host entries

### 44.1. ENSURING THE PRESENCE OF AN IDM HOST ENTRY WITH FQDN USING ANSIBLE PLAYBOOKS

Follow this procedure to ensure the presence of host entries in Identity Management (IdM) using Ansible playbooks. The host entries are only defined by their **fully-qualified domain names** (FQDNs).

Specifying the **FQDN** name of the host is enough if at least one of the following conditions applies:

- The IdM server is not configured to manage DNS.
- The host does not have a static IP address or the IP address is not known at the time the host is configured. Adding a host defined only by an **FQDN** essentially creates a placeholder entry in the IdM DNS service. For example, laptops may be preconfigured as IdM clients, but they do not have IP addresses at the time they are configured. When the DNS service dynamically updates its records, the host's current IP address is detected and its DNS record is updated.



#### NOTE

Without Ansible, host entries are created in IdM using the **ipa host-add** command. The result of adding a host to IdM is the state of the host being present in IdM. Because of the Ansible reliance on idempotence, to add a host to IdM using Ansible, you must create a playbook in which you define the state of the host as present: **state: present**.

#### Prerequisites

- You know the IdM administrator password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the **ansible-freeipa** package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an **Ansible inventory file** with the fully-qualified domain name (FQDN) of the IdM server.

- The example assumes that the **secret.yml** Ansible vault stores your **ipaadmin\_password**.

## Procedure

1. Create an inventory file, for example **inventory.file**, and define **ipaserver** in it:

```
[ipaserver]
server.idm.example.com
```

2. Create an Ansible playbook file with the **FQDN** of the host whose presence in IdM you want to ensure. To simplify this step, you can copy and modify the example in the **/usr/share/doc/ansible-freeipa/playbooks/host/add-host.yml** file:

```
---
- name: Host present
  hosts: ipaserver

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - name: Host host01.idm.example.com present
    ipahost:
      ipaadmin_password: "{{ ipaadmin_password }}"
      name: host01.idm.example.com
      state: present
      force: yes
```

3. Run the playbook:

```
$ ansible-playbook --vault-password-file=password_file -v -i
path_to_inventory_directory/inventory.file path_to_playbooks_directory/ensure-host-
is-present.yml
```



## NOTE

The procedure results in a host entry in the IdM LDAP server being created but not in enrolling the host into the IdM Kerberos realm. For that, you must deploy the host as an IdM client. For details, see [Installing an Identity Management client using an Ansible playbook](#).

## Verification steps

1. Log in to your IdM server as admin:

```
$ ssh admin@server.idm.example.com
Password:
```

2. Enter the **ipa host-show** command and specify the name of the host:

```
$ ipa host-show host01.idm.example.com
Host name: host01.idm.example.com
Principal name: host/host01.idm.example.com@IDM.EXAMPLE.COM
Principal alias: host/host01.idm.example.com@IDM.EXAMPLE.COM
```

```

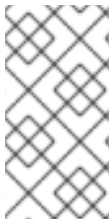
Password: False
Keytab: False
Managed by: host01.idm.example.com

```

The output confirms that **host01.idm.example.com** exists in IdM.

## 44.2. ENSURING THE PRESENCE OF AN IDM HOST ENTRY WITH DNS INFORMATION USING ANSIBLE PLAYBOOKS

Follow this procedure to ensure the presence of host entries in Identity Management (IdM) using Ansible playbooks. The host entries are defined by their **fully-qualified domain names** (FQDNs) and their IP addresses.



### NOTE

Without Ansible, host entries are created in IdM using the **ipa host-add** command. The result of adding a host to IdM is the state of the host being present in IdM. Because of the Ansible reliance on idempotence, to add a host to IdM using Ansible, you must create a playbook in which you define the state of the host as present: **state: present**.

### Prerequisites

- You know the IdM administrator password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the **ansible-freeipa** package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipadmin\_password**.

### Procedure

1. Create an inventory file, for example **inventory.file**, and define **ipaserver** in it:

```

[ipaserver]
server.idm.example.com

```

2. Create an Ansible playbook file with the **fully-qualified domain name** (FQDN) of the host whose presence in IdM you want to ensure. In addition, if the IdM server is configured to manage DNS and you know the IP address of the host, specify a value for the **ip\_address** parameter. The IP address is necessary for the host to exist in the DNS resource records. To simplify this step, you can copy and modify the example in the **/usr/share/doc/ansible-freeipa/playbooks/host/host-present.yml** file. You can also include other, additional information:

```

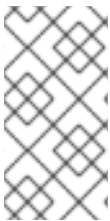
---
- name: Host present
  hosts: ipaserver

```

```
vars_files:
- /home/user_name/MyPlaybooks/secret.yml
tasks:
- name: Ensure host01.idm.example.com is present
  ipahost:
    ipadmin_password: "{{ ipadmin_password }}"
    name: host01.idm.example.com
    description: Example host
    ip_address: 192.168.0.123
    locality: Lab
    ns_host_location: Lab
    ns_os_version: CentOS 7
    ns_hardware_platform: Lenovo T61
    mac_address:
      - "08:00:27:E3:B1:2D"
      - "52:54:00:BD:97:1E"
    state: present
```

3. Run the playbook:

```
$ ansible-playbook --vault-password-file=password_file -v -i
path_to_inventory_directory/inventory.file path_to_playbooks_directory/ensure-host-
is-present.yml
```



## NOTE

The procedure results in a host entry in the IdM LDAP server being created but not in enrolling the host into the IdM Kerberos realm. For that, you must deploy the host as an IdM client. For details, see [Installing an Identity Management client using an Ansible playbook](#).

## Verification steps

1. Log in to your IdM server as admin:

```
$ ssh admin@server.idm.example.com
Password:
```

2. Enter the **ipa host-show** command and specify the name of the host:

```
$ ipa host-show host01.idm.example.com
Host name: host01.idm.example.com
Description: Example host
Locality: Lab
Location: Lab
Platform: Lenovo T61
Operating system: CentOS 7
Principal name: host/host01.idm.example.com@IDM.EXAMPLE.COM
Principal alias: host/host01.idm.example.com@IDM.EXAMPLE.COM
MAC address: 08:00:27:E3:B1:2D, 52:54:00:BD:97:1E
Password: False
Keytab: False
Managed by: host01.idm.example.com
```

The output confirms **host01.idm.example.com** exists in IdM.

## 44.3. ENSURING THE PRESENCE OF MULTIPLE IDM HOST ENTRIES WITH RANDOM PASSWORDS USING ANSIBLE PLAYBOOKS

The **ipahost** module allows the system administrator to ensure the presence or absence of multiple host entries in IdM using just one Ansible task. Follow this procedure to ensure the presence of multiple host entries that are only defined by their **fully-qualified domain names** (FQDNs). Running the Ansible playbook generates random passwords for the hosts.



### NOTE

Without Ansible, host entries are created in IdM using the **ipa host-add** command. The result of adding a host to IdM is the state of the host being present in IdM. Because of the Ansible reliance on idempotence, to add a host to IdM using Ansible, you must create a playbook in which you define the state of the host as present: **state: present**

### Prerequisites

- You know the IdM administrator password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the **ansible-freeipa** package on the Ansible controller.
  - The example assumes that in the **~/MyPlaybooks/** directory, you have created an **Ansible inventory file** with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipadmin\_password**.

### Procedure

1. Create an inventory file, for example **inventory.file**, and define **ipaserver** in it:

```
[ipaserver]
server.idm.example.com
```

2. Create an Ansible playbook file with the **fully-qualified domain name** (FQDN) of the hosts whose presence in IdM you want to ensure. To make the Ansible playbook generate a random password for each host even when the host already exists in IdM and **update\_password** is limited to **on\_create**, add the **random: yes** and **force: yes** options. To simplify this step, you can copy and modify the example from the **/usr/share/doc/ansible-freeipa/README-host.md** Markdown file:

```
---
- name: Ensure hosts with random password
  hosts: ipaserver

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - name: Hosts host01.idm.example.com and host02.idm.example.com present with random
```

```

passwords
  ipahost:
    ipaadmin_password: "{{ ipaadmin_password }}"
    hosts:
      - name: host01.idm.example.com
        random: yes
        force: yes
      - name: host02.idm.example.com
        random: yes
        force: yes
    register: ipahost

```

3. Run the playbook:

```

$ ansible-playbook --vault-password-file=password_file -v -i
path_to_inventory_directory/inventory.file path_to_playbooks_directory/ensure-hosts-
are-present.yml
[...]
TASK [Hosts host01.idm.example.com and host02.idm.example.com present with random
passwords]
changed: [r8server.idm.example.com] => {"changed": true, "host":
{"host01.idm.example.com": {"randompassword": "0HoIRvjUdH0Ycbf6uYdWTxH"},
"host02.idm.example.com": {"randompassword": "5VdLgrf3wvojmACdHC3uA3s"}}}

```



#### NOTE

To deploy the hosts as IdM clients using random, one-time passwords (OTPs), see [Authorization options for IdM client enrollment using an Ansible playbook](#) or [Installing a client by using a one-time password: Interactive installation](#).

#### Verification steps

1. Log in to your IdM server as admin:

```

$ ssh admin@server.idm.example.com
Password:

```

2. Enter the **ipa host-show** command and specify the name of one of the hosts:

```

$ ipa host-show host01.idm.example.com
Host name: host01.idm.example.com
Password: True
Keytab: False
Managed by: host01.idm.example.com

```

The output confirms **host01.idm.example.com** exists in IdM with a random password.

## 44.4. ENSURING THE PRESENCE OF AN IDM HOST ENTRY WITH MULTIPLE IP ADDRESSES USING ANSIBLE PLAYBOOKS

Follow this procedure to ensure the presence of a host entry in Identity Management (IdM) using Ansible playbooks. The host entry is defined by its **fully-qualified domain name** (FQDN) and its multiple IP addresses.



## NOTE

In contrast to the **ipa host** utility, the Ansible **ipahost** module can ensure the presence or absence of several IPv4 and IPv6 addresses for a host. The **ipa host-mod** command cannot handle IP addresses.

## Prerequisites

- You know the IdM administrator password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipaadmin\_password**.

## Procedure

1. Create an inventory file, for example **inventory.file**, and define **ipaserver** in it:

```
[ipaserver]
server.idm.example.com
```

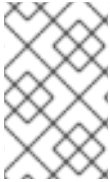
2. Create an Ansible playbook file. Specify, as the **name** of the **ipahost** variable, the **fully-qualified domain name** (FQDN) of the host whose presence in IdM you want to ensure. Specify each of the multiple IPv4 and IPv6 **ip\_address** values on a separate line by using the **- ip\_address** syntax. To simplify this step, you can copy and modify the example in the `/usr/share/doc/ansible-freeipa/playbooks/host/host-member-ipaddresses-present.yml` file. You can also include additional information:

```
---
- name: Host member IP addresses present
  hosts: ipaserver

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - name: Ensure host101.example.com IP addresses present
    ipahost:
      ipaadmin_password: "{{ ipaadmin_password }}"
      name: host01.idm.example.com
      ip_address:
        - 192.168.0.123
        - fe80::20c:29ff:fe02:a1b3
        - 192.168.0.124
        - fe80::20c:29ff:fe02:a1b4
      force: yes
```

3. Run the playbook:

```
$ ansible-playbook --vault-password-file=password_file -v -i
path_to_inventory_directory/inventory.file path_to_playbooks_directory/ensure-host-
with-multiple-IP-addresses-is-present.yml
```



## NOTE

The procedure creates a host entry in the IdM LDAP server but does not enroll the host into the IdM Kerberos realm. For that, you must deploy the host as an IdM client. For details, see [Installing an Identity Management client using an Ansible playbook](#).

## Verification steps

1. Log in to your IdM server as admin:

```
$ ssh admin@server.idm.example.com
Password:
```

2. Enter the **ipa host-show** command and specify the name of the host:

```
$ ipa host-show host01.idm.example.com
Principal name: host/host01.idm.example.com@IDM.EXAMPLE.COM
Principal alias: host/host01.idm.example.com@IDM.EXAMPLE.COM
Password: False
Keytab: False
Managed by: host01.idm.example.com
```

The output confirms that **host01.idm.example.com** exists in IdM.

3. To verify that the multiple IP addresses of the host exist in the IdM DNS records, enter the **ipa dnsrecord-show** command and specify the following information:

- The name of the IdM domain
- The name of the host

```
$ ipa dnsrecord-show idm.example.com host01
[...]
Record name: host01
A record: 192.168.0.123, 192.168.0.124
AAAA record: fe80::20c:29ff:fe02:a1b3, fe80::20c:29ff:fe02:a1b4
```

The output confirms that all the IPv4 and IPv6 addresses specified in the playbook are correctly associated with the **host01.idm.example.com** host entry.

## 44.5. ENSURING THE ABSENCE OF AN IDM HOST ENTRY USING ANSIBLE PLAYBOOKS

Follow this procedure to ensure the absence of host entries in Identity Management (IdM) using Ansible playbooks.

### Prerequisites

- IdM administrator credentials



## Procedure

1. Create an inventory file, for example **inventory.file**, and define **ipaserver** in it:

```
[ipaserver]
server.idm.example.com
```

2. Create an Ansible playbook file with the **fully-qualified domain name** (FQDN) of the host whose absence from IdM you want to ensure. If your IdM domain has integrated DNS, use the **updatedns: yes** option to remove the associated records of any kind for the host from the DNS.

To simplify this step, you can copy and modify the example in the **/usr/share/doc/ansible-freeipa/playbooks/host/delete-host.yml** file:

```
---
- name: Host absent
  hosts: ipaserver

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - name: Host host01.idm.example.com absent
    ipahost:
      ipadmin_password: "{{ ipadmin_password }}"
      name: host01.idm.example.com
      updatedns: yes
      state: absent
```

3. Run the playbook:

```
$ ansible-playbook --vault-password-file=password_file -v -i
path_to_inventory_directory/inventory.file path_to_playbooks_directory/ensure-host-
absent.yml
```

## NOTE

The procedure results in:

- The host not being present in the IdM Kerberos realm.
- The host entry not being present in the IdM LDAP server.

To remove the specific IdM configuration of system services, such as System Security Services Daemon (SSSD), from the client host itself, you must run the **ipa-client-install --uninstall** command on the client. For details, see [Uninstalling an IdM client](#).

## Verification steps

1. Log into **ipaserver** as admin:

```
$ ssh admin@server.idm.example.com
Password:
[admin@server /]$
```

2. Display information about *host01.idm.example.com*:

```
$ ipa host-show host01.idm.example.com  
ipa: ERROR: host01.idm.example.com: host not found
```

The output confirms that the host does not exist in IdM.

## 44.6. ADDITIONAL RESOURCES

- See the **/usr/share/doc/ansible-freeipa/README-host.md** Markdown file.
- See the additional playbooks in the **/usr/share/doc/ansible-freeipa/playbooks/host** directory.

## CHAPTER 45. MANAGING HOST GROUPS USING THE IDM CLI

Learn more about how to manage host groups and their members in the command-line interface (CLI) by using the following operations:

- Viewing host groups and their members
- Creating host groups
- Deleting host groups
- Adding host group members
- Removing host group members
- Adding host group member managers
- Removing host group member managers

### 45.1. HOST GROUPS IN IDM

IdM host groups can be used to centralize control over important management tasks, particularly access control.

#### Definition of host groups

A host group is an entity that contains a set of IdM hosts with common access control rules and other characteristics. For example, you can define host groups based on company departments, physical locations, or access control requirements.

A host group in IdM can include:

- IdM servers and clients
- Other IdM host groups

#### Host groups created by default

By default, the IdM server creates the host group **ipaservers** for all IdM server hosts.

#### Direct and indirect group members

Group attributes in IdM apply to both direct and indirect members: when host group B is a member of host group A, all members of host group B are considered indirect members of host group A.

### 45.2. VIEWING IDM HOST GROUPS USING THE CLI

Follow this procedure to view IdM host groups using the command-line interface (CLI).

#### Prerequisites

- Administrator privileges for managing IdM or User Administrator role.
- An active Kerberos ticket. For details, see [Using kinit to log in to IdM manually](#) .

#### Procedure

1. Find all host groups using the **ipa hostgroup-find** command.

```
$ ipa hostgroup-find
-----
1 hostgroup matched
-----
Host-group: ipaservers
Description: IPA server hosts
-----
Number of entries returned 1
-----
```

To display all attributes of a host group, add the **--all** option. For example:

```
$ ipa hostgroup-find --all
-----
1 hostgroup matched
-----
dn: cn=ipaservers,cn=hostgroups,cn=accounts,dc=idm,dc=local
Host-group: ipaservers
Description: IPA server hosts
Member hosts: xxx.xxx.xxx.xxx
ipauniqueid: xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx
objectclass: top, groupOfNames, nestedGroup, ipaobject, ipahostgroup
-----
Number of entries returned 1
-----
```

## 45.3. CREATING IDM HOST GROUPS USING THE CLI

Follow this procedure to create IdM host groups using the command-line interface (CLI).

### Prerequisites

- Administrator privileges for managing IdM or User Administrator role.
- An active Kerberos ticket. For details, see [Using kinit to log in to IdM manually](#) .

### Procedure

1. Add a host group using the **ipa hostgroup-add** command.  
For example, to create an IdM host group named *group\_name* and give it a description:

```
$ ipa hostgroup-add --desc 'My new host group' group_name
-----
Added hostgroup "group_name"
-----
Host-group: group_name
Description: My new host group
-----
```

## 45.4. DELETING IDM HOST GROUPS USING THE CLI

Follow this procedure to delete IdM host groups using the command-line interface (CLI).

### Prerequisites

- Administrator privileges for managing IdM or User Administrator role.
- An active Kerberos ticket. For details, see [Using kinit to log in to IdM manually](#) .

### Procedure

1. Delete a host group using the **ipa hostgroup-del** command.  
For example, to delete the IdM host group named *group\_name*:

```
$ ipa hostgroup-del group_name
-----
Deleted hostgroup "group_name"
-----
```



### NOTE

Removing a group does not delete the group members from IdM.

## 45.5. ADDING IDM HOST GROUP MEMBERS USING THE CLI

You can add hosts as well as host groups as members to an IdM host group using a single command.

### Prerequisites

- Administrator privileges for managing IdM or User Administrator role.
- An active Kerberos ticket. For details, see [Using kinit to log in to IdM manually](#) .
- *Optional.* Use the **ipa hostgroup-find** command to find hosts and host groups.

### Procedure

1. To add a member to a host group, use the **ipa hostgroup-add-member** and provide the relevant information. You can specify the type of member to add using these options:
  - Use the **--hosts** option to add one or more hosts to an IdM host group.  
For example, to add the host named *example\_member* to the group named *group\_name*:

```
$ ipa hostgroup-add-member group_name --hosts example_member
Host-group: group_name
Description: My host group
Member hosts: example_member
-----
Number of members added 1
-----
```

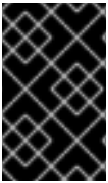
- Use the **--hostgroups** option to add one or more host groups to an IdM host group.  
For example, to add the host group named *nested\_group* to the group named *group\_name*:

```
$ ipa hostgroup-add-member group_name --hostgroups nested_group
```

```
Host-group: group_name
Description: My host group
Member host-groups: nested_group
-----
Number of members added 1
-----
```

- You can add multiple hosts and multiple host groups to an IdM host group in one single command using the following syntax:

```
$ ipa hostgroup-add-member group_name --hosts={host1,host2} --hostgroups=
{group1,group2}
```



### IMPORTANT

When adding a host group as a member of another host group, do not create recursive groups. For example, if Group A is a member of Group B, do not add Group B as a member of Group A. Recursive groups can cause unpredictable behavior.

## 45.6. REMOVING IDM HOST GROUP MEMBERS USING THE CLI

You can remove hosts as well as host groups from an IdM host group using a single command.

### Prerequisites

- Administrator privileges for managing IdM or User Administrator role.
- An active Kerberos ticket. For details, see [Using kinit to log in to IdM manually](#).
- Optional.* Use the **ipa hostgroup-find** command to confirm that the group includes the member you want to remove.

### Procedure

- To remove a host group member, use the **ipa hostgroup-remove-member** command and provide the relevant information. You can specify the type of member to remove using these options:

- Use the **--hosts** option to remove one or more hosts from an IdM host group. For example, to remove the host named *example\_member* from the group named *group\_name*:

```
$ ipa hostgroup-remove-member group_name --hosts example_member
Host-group: group_name
Description: My host group
-----
Number of members removed 1
-----
```

- Use the **--hostgroups** option to remove one or more host groups from an IdM host group. For example, to remove the host group named *nested\_group* from the group named *group\_name*:

```
$ ipa hostgroup-remove-member group_name --hostgroups example_member
```

```
Host-group: group_name
Description: My host group
-----
Number of members removed 1
-----
```



## NOTE

Removing a group does not delete the group members from IdM.

- You can remove multiple hosts and multiple host groups from an IdM host group in one single command using the following syntax:

```
$ ipa hostgroup-remove-member group_name --hosts={host1,host2} --hostgroups=
{group1,group2}
```

## 45.7. ADDING IDM HOST GROUP MEMBER MANAGERS USING THE CLI

You can add hosts as well as host groups as member managers to an IdM host group using a single command. Member managers can add hosts or host groups to IdM host groups but cannot change the attributes of a host group.

### Prerequisites

- Administrator privileges for managing IdM or User Administrator role.
- An active Kerberos ticket. For details, see [Using kinit to log in to IdM manually](#).
- You must have the name of the host or host group you are adding as member managers and the name of the host group you want them to manage.

### Procedure

- Optional.* Use the **ipa hostgroup-find** command to find hosts and host groups.
- To add a member manager to a host group, use the **ipa hostgroup-add-member-manager**. For example, to add the user named *example\_member* as a member manager to the group named *group\_name*:

```
$ ipa hostgroup-add-member-manager group_name --user example_member
Host-group: group_name
Member hosts: server.idm.example.com
Member host-groups: project_admins
Member of netgroups: group_name
Membership managed by users: example_member
-----
Number of members added 1
-----
```

- Use the **--groups** option to add one or more host groups as a member manager to an IdM host group. For example, to add the host group named *admin\_group* as a member manager to the group named *group\_name*:

```
$ ipa hostgroup-add-member-manager group_name --groups admin_group
Host-group: group_name
Member hosts: server.idm.example.com
Member host-groups: project_admins
Member of netgroups: group_name
Membership managed by groups: admin_group
Membership managed by users: example_member
-----
Number of members added 1
-----
```



## NOTE

After you add a member manager to a host group, the update may take some time to spread to all clients in your Identity Management environment.

## Verification steps

- Using the **ipa group-show** command to verify the host user and host group were added as member managers.

```
$ ipa hostgroup-show group_name
Host-group: group_name
Member hosts: server.idm.example.com
Member host-groups: project_admins
Membership managed by groups: admin_group
Membership managed by users: example_member
```

## Additional resources

- See **ipa hostgroup-add-member-manager --help** for more details.
- See **ipa hostgroup-show --help** for more details.

## 45.8. REMOVING IDM HOST GROUP MEMBER MANAGERS USING THE CLI

You can remove hosts as well as host groups as member managers from an IdM host group using a single command. Member managers can remove hosts group member managers from IdM host groups but cannot change the attributes of a host group.

## Prerequisites

- Administrator privileges for managing IdM or User Administrator role.
- An active Kerberos ticket. For details, see [Using kinit to log in to IdM manually](#) .
- You must have the name of the existing member manager host group you are removing and the name of the host group they are managing.

## Procedure

1. *Optional.* Use the **ipa hostgroup-find** command to find hosts and host groups.



- To remove a member manager from a host group, use the **ipa hostgroup-remove-member-manager** command.

For example, to remove the user named *example\_member* as a member manager from the group named *group\_name*:

```
$ ipa hostgroup-remove-member-manager group_name --user example_member
Host-group: group_name
Member hosts: server.idm.example.com
Member host-groups: project_admins
Member of netgroups: group_name
Membership managed by groups: nested_group
-----
Number of members removed 1
-----
```

- Use the **--groups** option to remove one or more host groups as a member manager from an IdM host group.

For example, to remove the host group named *nested\_group* as a member manager from the group named *group\_name*:

```
$ ipa hostgroup-remove-member-manager group_name --groups nested_group
Host-group: group_name
Member hosts: server.idm.example.com
Member host-groups: project_admins
Member of netgroups: group_name
-----
Number of members removed 1
-----
```



## NOTE

After you remove a member manager from a host group, the update may take some time to spread to all clients in your Identity Management environment.

## Verification steps

- Use the **ipa group-show** command to verify that the host user and host group were removed as member managers.

```
$ ipa hostgroup-show group_name
Host-group: group_name
Member hosts: server.idm.example.com
Member host-groups: project_admins
```

## Additional resources

- See **ipa hostgroup-remove-member-manager --help** for more details.
- See **ipa hostgroup-show --help** for more details.

## CHAPTER 46. MANAGING HOST GROUPS USING THE IDM WEB UI

Learn more about how to manage host groups and their members in the Web interface (Web UI) by using the following operations:

- Viewing host groups and their members
- Creating host groups
- Deleting host groups
- Adding host group members
- Removing host group members
- Adding host group member managers
- Removing host group member managers

### 46.1. HOST GROUPS IN IDM

IdM host groups can be used to centralize control over important management tasks, particularly access control.

#### Definition of host groups

A host group is an entity that contains a set of IdM hosts with common access control rules and other characteristics. For example, you can define host groups based on company departments, physical locations, or access control requirements.

A host group in IdM can include:

- IdM servers and clients
- Other IdM host groups

#### Host groups created by default

By default, the IdM server creates the host group **ipaservers** for all IdM server hosts.

#### Direct and indirect group members

Group attributes in IdM apply to both direct and indirect members: when host group B is a member of host group A, all members of host group B are considered indirect members of host group A.

### 46.2. VIEWING HOST GROUPS IN THE IDM WEB UI

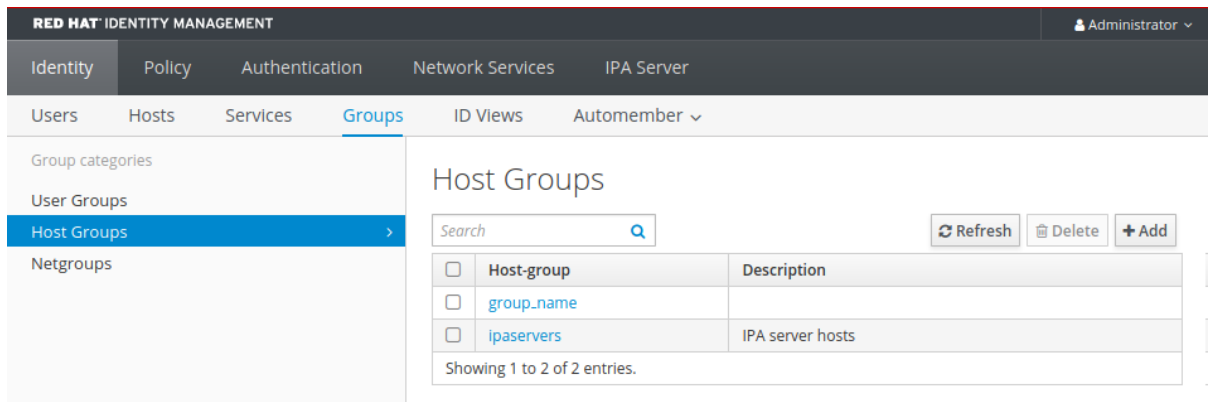
Follow this procedure to view IdM host groups using the Web interface (Web UI).

#### Prerequisites

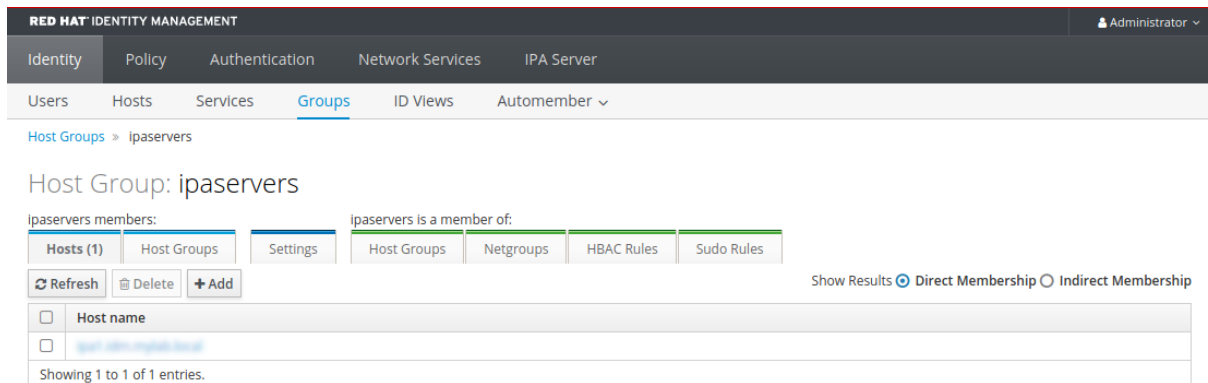
- Administrator privileges for managing IdM or User Administrator role.
- You are logged-in to the IdM Web UI. For details, see [Accessing the IdM Web UI in a web browser](#).

## Procedure

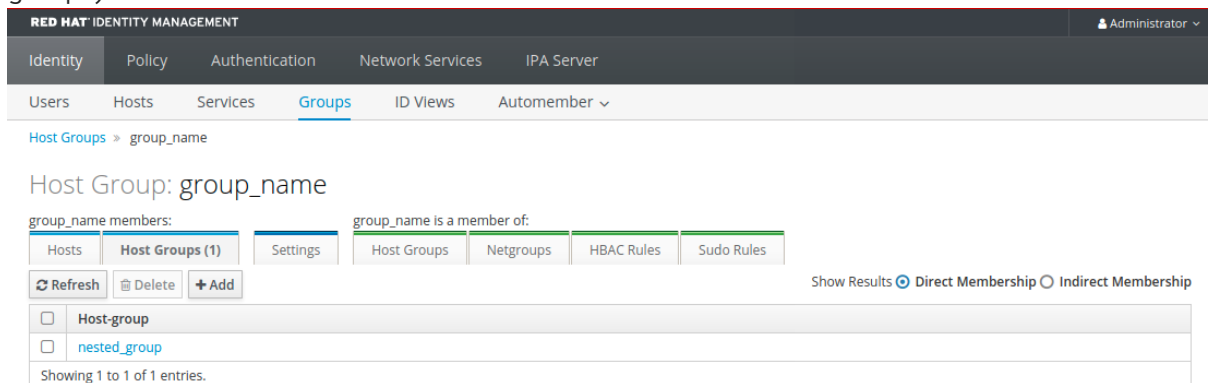
1. Click **Identity** → **Groups**, and select the **Host Groups** tab.
  - The page lists the existing host groups and their descriptions.
  - You can search for a specific host group.



2. Click on a group in the list to display the hosts that belong to this group. You can limit results to direct or indirect members.



3. Select the **Host Groups** tab to display the host groups that belong to this group (nested host groups). You can limit results to direct or indirect members.



## 46.3. CREATING HOST GROUPS IN THE IDM WEB UI

Follow this procedure to create IdM host groups using the Web interface (Web UI).

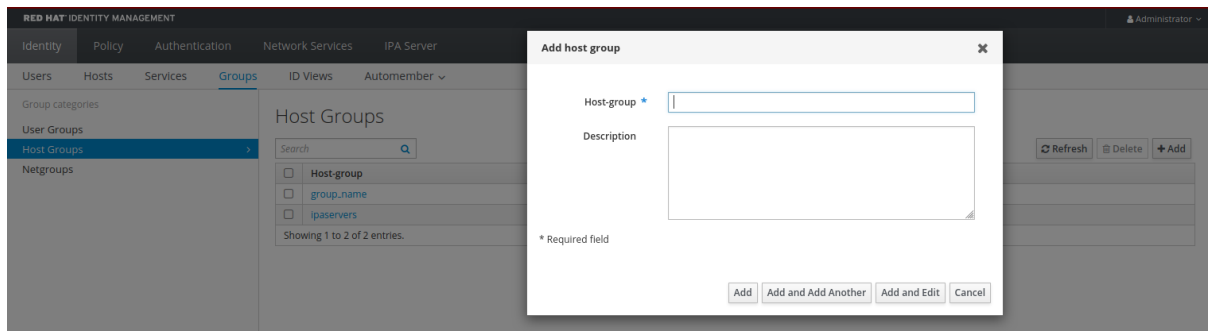
### Prerequisites

- Administrator privileges for managing IdM or User Administrator role.

- You are logged-in to the IdM Web UI. For details, see [Accessing the IdM Web UI in a web browser](#).

## Procedure

1. Click **Identity** → **Groups**, and select the **Host Groups** tab.
2. Click **Add**. The **Add host group** dialog appears.
3. Provide the information about the group: name (required) and description (optional).
4. Click **Add** to confirm.



## 46.4. DELETING HOST GROUPS IN THE IDM WEB UI

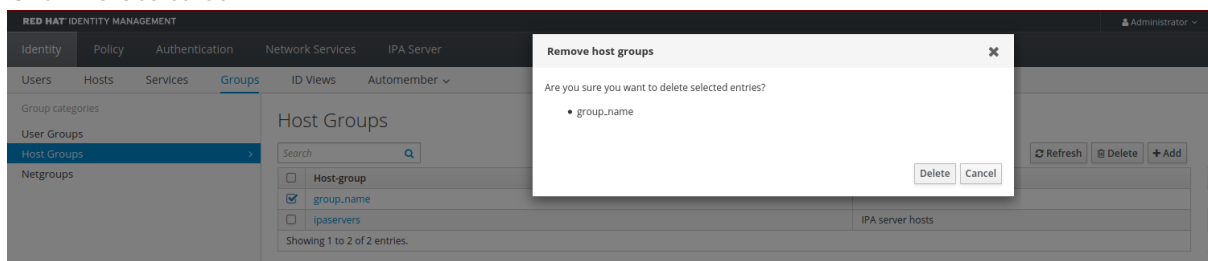
Follow this procedure to delete IdM host groups using the Web interface (Web UI).

### Prerequisites

- Administrator privileges for managing IdM or User Administrator role.
- You are logged-in to the IdM Web UI. For details, see [Accessing the IdM Web UI in a web browser](#).

## Procedure

1. Click **Identity** → **Groups** and select the **Host Groups** tab.
2. Select the IdM host group to remove, and click **Delete**. A confirmation dialog appears.
3. Click **Delete** to confirm



### NOTE

Removing a host group does not delete the group members from IdM.

## 46.5. ADDING HOST GROUP MEMBERS IN THE IDM WEB UI

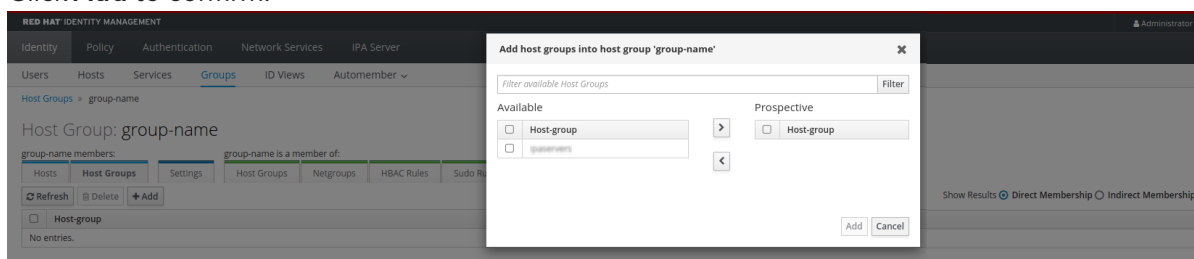
Follow this procedure to add host group members in IdM using the web interface (Web UI).

### Prerequisites

- Administrator privileges for managing IdM or User Administrator role.
- You are logged-in to the IdM Web UI. For details, see [Accessing the IdM Web UI in a web browser](#).

### Procedure

1. Click **Identity** → **Groups** and select the **Host Groups** tab.
2. Click the name of the group to which you want to add members.
3. Click the tab **Hosts** or **Host groups** depending on the type of members you want to add. The corresponding dialog appears.
4. Select the hosts or host groups to add, and click the > arrow button to move them to the **Prospective** column.
5. Click **Add** to confirm.



## 46.6. REMOVING HOST GROUP MEMBERS IN THE IDM WEB UI

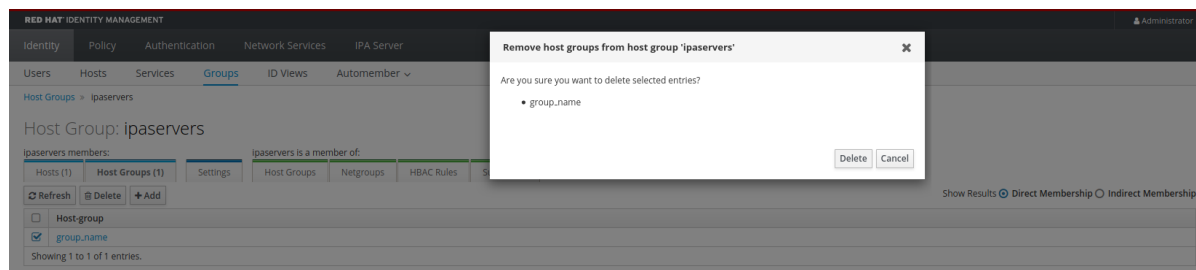
Follow this procedure to remove host group members in IdM using the web interface (Web UI).

### Prerequisites

- Administrator privileges for managing IdM or User Administrator role.
- You are logged-in to the IdM Web UI. For details, see [Accessing the IdM Web UI in a web browser](#).

### Procedure

1. Click **Identity** → **Groups** and select the **Host Groups** tab.
2. Click the name of the group from which you want to remove members.
3. Click the tab **Hosts** or **Host groups** depending on the type of members you want to remove.
4. Select the check box next to the member you want to remove.
5. Click **Delete**. A confirmation dialog appears.



- Click **Delete** to confirm. The selected members are deleted.

## 46.7. ADDING IDM HOST GROUP MEMBER MANAGERS USING THE WEB UI

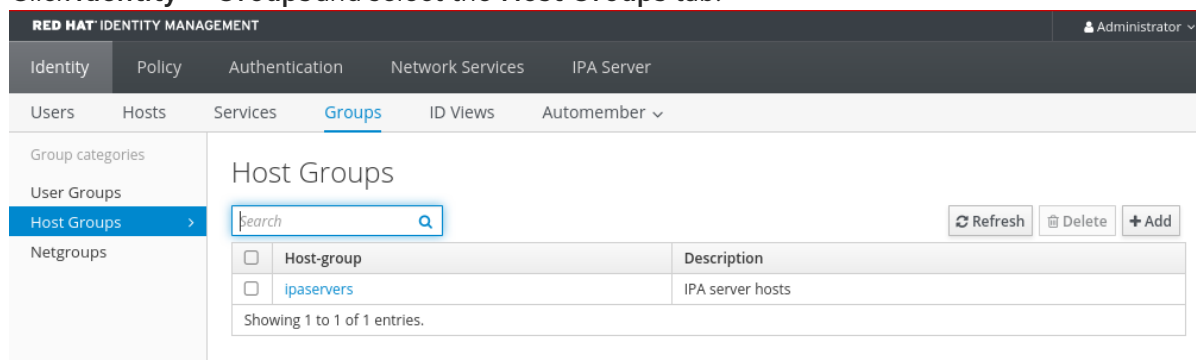
Follow this procedure to add users or user groups as host group member managers in IdM using the web interface (Web UI). Member managers can add hosts group member managers to IdM host groups but cannot change the attributes of a host group.

### Prerequisites

- Administrator privileges for managing IdM or User Administrator role.
- You are logged-in to the IdM Web UI. For details, see [Accessing the IdM Web UI in a web browser](#).
- You must have the name of the host group you are adding as member managers and the name of the host group you want them to manage.

### Procedure

- Click **Identity** → **Groups** and select the **Host Groups** tab.



- Click the name of the group to which you want to add member managers.
- Click the member managers tab **User Groups** or **Users** depending on the type of member managers you want to add. The corresponding dialog appears.
- Click **Add**.

Add groups as member managers for host group 'ipaservers'

Filter available User Groups
Filter

Available

|                          |              |
|--------------------------|--------------|
| <input type="checkbox"/> | Group name   |
| <input type="checkbox"/> | editors      |
| <input type="checkbox"/> | ipausers     |
| <input type="checkbox"/> | trust admins |

>
<

Prospective

|                          |            |
|--------------------------|------------|
| <input type="checkbox"/> | Group name |
|--------------------------|------------|

Add
Cancel

- Select the users or user groups to add, and click the > arrow button to move them to the **Prospective** column.
- Click **Add** to confirm.



## NOTE

After you add a member manager to a host group, the update may take some time to spread to all clients in your Identity Management environment.

## Verification steps

- On the Host Group dialog, verify the user group or user has been added to the member managers list of groups or users.

RED HAT IDENTITY MANAGEMENT
Administrator

Identity
Policy
Authentication
Network Services
IPA Server

Users
Hosts
Services
Groups
ID Views
Automember

Host Groups » ipaservers

Host Group: ipaservers

ipaservers members:

ipaservers is a member of:

ipaservers member managers:

Hosts (1)
Host Groups
Settings
Host Groups
Netgroups
HBAC Rules
Sudo Rules
User Groups (1)
Users

Refresh
Delete
Add

|                          |            |
|--------------------------|------------|
| <input type="checkbox"/> | Group name |
| <input type="checkbox"/> | admins     |

Showing 1 to 1 of 1 entries.

## 46.8. REMOVING IDM HOST GROUP MEMBER MANAGERS USING THE WEB UI

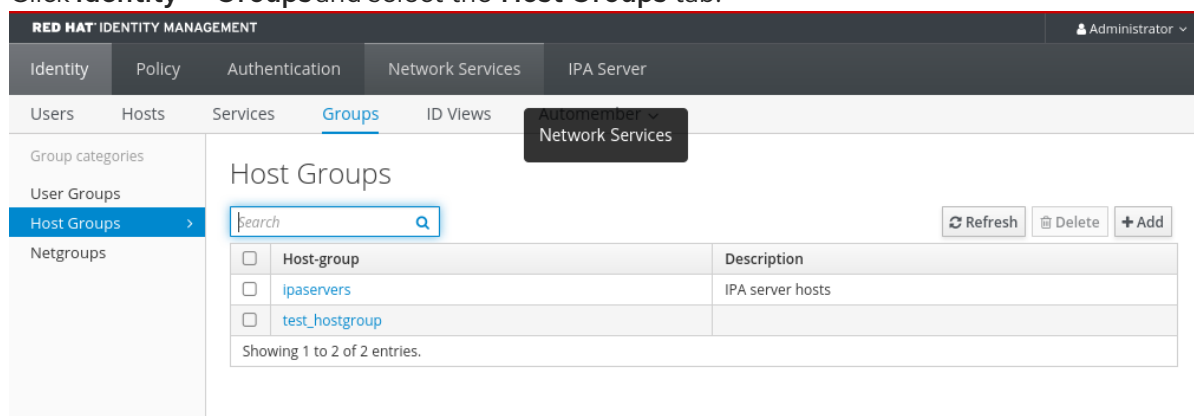
Follow this procedure to remove users or user groups as host group member managers in IdM using the web interface (Web UI). Member managers can remove hosts group member managers from IdM host groups but cannot change the attributes of a host group.

### Prerequisites

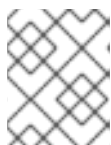
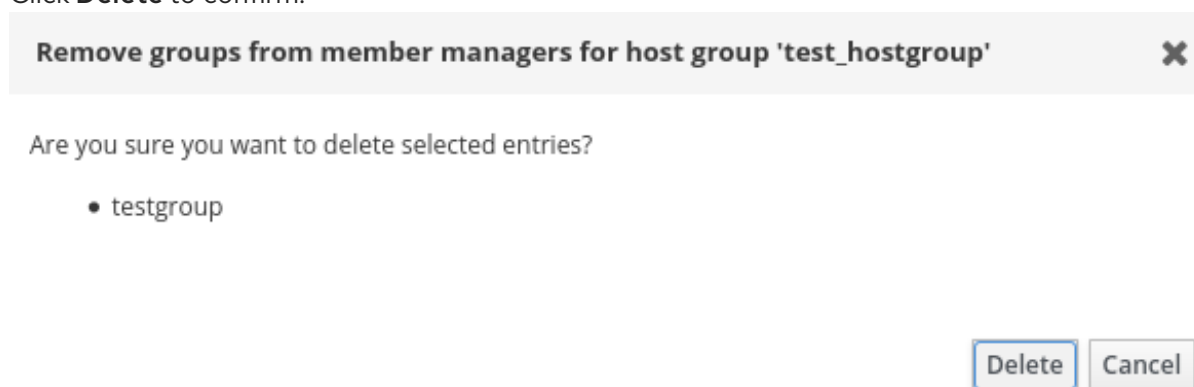
- Administrator privileges for managing IdM or User Administrator role.
- You are logged-in to the IdM Web UI. For details, see [Accessing the IdM Web UI in a web browser](#).
- You must have the name of the existing member manager host group you are removing and the name of the host group they are managing.

## Procedure

1. Click **Identity → Groups** and select the **Host Groups** tab.



2. Click the name of the group from which you want to remove member managers.
3. Click the member managers tab **User Groups** or **Users** depending on the type of member managers you want to remove. The corresponding dialog appears.
4. Select the user or user groups to remove and click **Delete**.
5. Click **Delete** to confirm.



### NOTE

After you remove a member manager from a host group, the update may take some time to spread to all clients in your Identity Management environment.

## Verification steps

- On the Host Group dialog, verify the user group or user has been removed from the member managers list of groups or users.



**RED HAT** IDENTITY MANAGEMENT Administrator ▾

Identity

Policy

Authentication

Network Services

IPA Server

Users

Hosts

Services

**Groups**

ID Views

Automember ▾

[Host Groups](#) » test\_hostgroup

Host Group: test\_hostgroup

test\_hostgroup members:

test\_hostgroup is a member of:

test\_hostgroup member managers:

Hosts

**Host Groups**

Settings

Host Groups

Netgroups

HBAC Rules

Sudo Rules

**User Groups**

Users (1)

↻ Refresh

🗑 Delete

➕ Add

☐ Group name

No entries.

## CHAPTER 47. MANAGING HOST GROUPS USING ANSIBLE PLAYBOOKS

To learn more about [host groups in Identity Management](#) (IdM) and using Ansible to perform operations involving host groups in Identity Management (IdM), see the following:

- [Host groups in IdM](#)
- [Ensuring the presence of IdM host groups](#)
- [Ensuring the presence of hosts in IdM host groups](#)
- [Nesting IdM host groups](#)
- [Ensuring the presence of member managers in IdM host groups](#)
- [Ensuring the absence of hosts from IdM host groups](#)
- [Ensuring the absence of nested host groups from IdM host groups](#)
- [Ensuring the absence of member managers from IdM host groups](#)

### 47.1. HOST GROUPS IN IDM

IdM host groups can be used to centralize control over important management tasks, particularly access control.

#### Definition of host groups

A host group is an entity that contains a set of IdM hosts with common access control rules and other characteristics. For example, you can define host groups based on company departments, physical locations, or access control requirements.

A host group in IdM can include:

- IdM servers and clients
- Other IdM host groups

#### Host groups created by default

By default, the IdM server creates the host group **ipaservers** for all IdM server hosts.

#### Direct and indirect group members

Group attributes in IdM apply to both direct and indirect members: when host group B is a member of host group A, all members of host group B are considered indirect members of host group A.

### 47.2. ENSURING THE PRESENCE OF IDM HOST GROUPS USING ANSIBLE PLAYBOOKS

Follow this procedure to ensure the presence of host groups in Identity Management (IdM) using Ansible playbooks.



## NOTE

Without Ansible, host group entries are created in IdM using the **ipa hostgroup-add** command. The result of adding a host group to IdM is the state of the host group being present in IdM. Because of the Ansible reliance on idempotence, to add a host group to IdM using Ansible, you must create a playbook in which you define the state of the host group as present: **state: present**.

## Prerequisites

- You know the IdM administrator password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the **ansible-freeipa** package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipaadmin\_password**.

## Procedure

1. Create an inventory file, for example **inventory.file**, and define **ipaserver** in it with the list of IdM servers to target:

```
[ipaserver]
server.idm.example.com
```

2. Create an Ansible playbook file with the necessary host group information. For example, to ensure the presence of a host group named **databases**, specify **name: databases** in the **- ipahostgroup** task. To simplify this step, you can copy and modify the example in the `/usr/share/doc/ansible-freeipa/playbooks/user/ensure-hostgroup-is-present.yml` file.

```
---
- name: Playbook to handle hostgroups
  hosts: ipaserver

  vars_files:
    - /home/user_name/MyPlaybooks/secret.yml
  tasks:
    # Ensure host-group databases is present
    - ipahostgroup:
        ipaadmin_password: "{{ ipaadmin_password }}"
        name: databases
        state: present
```

In the playbook, **state: present** signifies a request to add the host group to IdM unless it already exists there.

3. Run the playbook:

```
$ ansible-playbook --vault-password-file=password_file -v -i
path_to_inventory_directory/inventory.file path_to_playbooks_directory/ensure-
hostgroup-is-present.yml
```

### Verification steps

1. Log into **ipaserver** as admin:

```
$ ssh admin@server.idm.example.com
Password:
[admin@server /]$
```

2. Request a Kerberos ticket for admin:

```
$ kinit admin
Password for admin@IDM.EXAMPLE.COM:
```

3. Display information about the host group whose presence in IdM you wanted to ensure:

```
$ ipa hostgroup-show databases
Host-group: databases
```

The **databases** host group exists in IdM.

## 47.3. ENSURING THE PRESENCE OF HOSTS IN IDM HOST GROUPS USING ANSIBLE PLAYBOOKS

Follow this procedure to ensure the presence of hosts in host groups in Identity Management (IdM) using Ansible playbooks.

### Prerequisites

- You know the IdM administrator password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the **ansible-freeipa** package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipadmin\_password**.
- The hosts you want to reference in your Ansible playbook exist in IdM. For details, see [Ensuring the presence of an IdM host entry using Ansible playbooks](#).
- The host groups you reference from the Ansible playbook file have been added to IdM. For details, see [Ensuring the presence of IdM host groups using Ansible playbooks](#).

### Procedure

1. Create an inventory file, for example **inventory.file**, and define **ipaserver** in it with the list of IdM servers to target:

```
[ipaserver]
server.idm.example.com
```

2. Create an Ansible playbook file with the necessary host information. Specify the name of the host group using the **name** parameter of the **ipahostgroup** variable. Specify the name of the host with the **host** parameter of the **ipahostgroup** variable. To simplify this step, you can copy and modify the examples in the **/usr/share/doc/ansible-freeipa/playbooks/hostgroup/ensure-hosts-and-hostgroups-are-present-in-hostgroup.yml** file:

```
---
- name: Playbook to handle hostgroups
  hosts: ipaserver

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  # Ensure host-group databases is present
  - ipahostgroup:
      ipadmin_password: "{{ ipadmin_password }}"
      name: databases
      host:
      - db.idm.example.com
      action: member
```

This playbook adds the **db.idm.example.com** host to the **databases** host group. The **action: member** line indicates that when the playbook is run, no attempt is made to add the **databases** group itself. Instead, only an attempt is made to add **db.idm.example.com** to **databases**.

3. Run the playbook:

```
$ ansible-playbook --vault-password-file=password_file -v -i
path_to_inventory_directory/inventory.file path_to_playbooks_directory/ensure-hosts-
or-hostgroups-are-present-in-hostgroup.yml
```

## Verification steps

1. Log into **ipaserver** as admin:

```
$ ssh admin@server.idm.example.com
Password:
[admin@server /]$
```

2. Request a Kerberos ticket for admin:

```
$ kinit admin
Password for admin@IDM.EXAMPLE.COM:
```

3. Display information about a host group to see which hosts are present in it:

```
$ ipa hostgroup-show databases
Host-group: databases
Member hosts: db.idm.example.com
```

The **db.idm.example.com** host is present as a member of the **databases** host group.

## 47.4. NESTING IDM HOST GROUPS USING ANSIBLE PLAYBOOKS

Follow this procedure to ensure the presence of nested host groups in Identity Management (IdM) host groups using Ansible playbooks.

### Prerequisites

- You know the IdM administrator password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipaadmin\_password**.
- The host groups you reference from the Ansible playbook file exist in IdM. For details, see [Ensuring the presence of IdM host groups using Ansible playbooks](#) .

### Procedure

1. Create an inventory file, for example **inventory.file**, and define **ipaserver** in it with the list of IdM servers to target:

```
[ipaserver]
server.idm.example.com
```

2. Create an Ansible playbook file with the necessary host group information. To ensure that a nested host group *A* exists in a host group *B*: in the Ansible playbook, specify, among the **- ipahostgroup** variables, the name of the host group *B* using the **name** variable. Specify the name of the nested hostgroup *A* with the **hostgroup** variable. To simplify this step, you can copy and modify the examples in the `/usr/share/doc/ansible-freeipa/playbooks/hostgroup/ensure-hosts-and-hostgroups-are-present-in-hostgroup.yml` file:

```
---
- name: Playbook to handle hostgroups
  hosts: ipaserver

  vars_files:
    - /home/user_name/MyPlaybooks/secret.yml
  tasks:
    # Ensure hosts and hostgroups are present in existing databases hostgroup
    - ipahostgroup:
        ipaadmin_password: "{{ ipaadmin_password }}"
```

```

name: databases
hostgroup:
- mysql-server
- oracle-server
action: member

```

This Ansible playbook ensures the presence of the **mysql-server** and **oracle-server** host groups in the **databases** host group. The **action: member** line indicates that when the playbook is run, no attempt is made to add the **databases** group itself to IdM.

3. Run the playbook:

```

$ ansible-playbook --vault-password-file=password_file -v -i
path_to_inventory_directory/inventory.file path_to_playbooks_directory/ensure-hosts-
or-hostgroups-are-present-in-hostgroup.yml

```

### Verification steps

1. Log into **ipaserver** as admin:

```

$ ssh admin@server.idm.example.com
Password:
[admin@server ~]$

```

2. Request a Kerberos ticket for admin:

```

$ kinit admin
Password for admin@IDM.EXAMPLE.COM:

```

3. Display information about the host group in which nested host groups are present:

```

$ ipa hostgroup-show databases
Host-group: databases
Member hosts: db.idm.example.com
Member host-groups: mysql-server, oracle-server

```

The **mysql-server** and **oracle-server** host groups exist in the **databases** host group.

## 47.5. ENSURING THE PRESENCE OF MEMBER MANAGERS IN IDM HOST GROUPS USING ANSIBLE PLAYBOOKS

The following procedure describes ensuring the presence of member managers in IdM hosts and host groups using an Ansible playbook.

### Prerequisites

- You know the IdM administrator password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.

- The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
- The example assumes that the `secret.yml` Ansible vault stores your `ipaadmin_password`.
- You must have the name of the host or host group you are adding as member managers and the name of the host group you want them to manage.

## Procedure

1. Create an inventory file, for example `inventory.file`, and define `ipaserver` in it:

```
[ipaserver]
server.idm.example.com
```

2. Create an Ansible playbook file with the necessary host and host group member management information:

```
---

- name: Playbook to handle host group membership management
  hosts: ipaserver

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - name: Ensure member manager user example_member is present for group_name
    ipahostgroup:
      ipaadmin_password: "{{ ipaadmin_password }}"
      name: group_name
      membermanager_user: example_member

  - name: Ensure member manager group project_admins is present for group_name
    ipahostgroup:
      ipaadmin_password: "{{ ipaadmin_password }}"
      name: group_name
      membermanager_group: project_admins
```

3. Run the playbook:

```
$ ansible-playbook --vault-password-file=password_file -v -i
path_to_inventory_directory/inventory.file path_to_playbooks_directory/add-member-
managers-host-groups.yml
```

## Verification steps

You can verify if the `group_name` group contains `example_member` and `project_admins` as member managers by using the `ipa group-show` command:

1. Log into `ipaserver` as administrator:

```
$ ssh admin@server.idm.example.com
Password:
[admin@server /]$
```



2. Display information about *testhostgroup*:

```
ipaserver]$ ipa hostgroup-show group_name
Host-group: group_name
Member hosts: server.idm.example.com
Member host-groups: testhostgroup2
Membership managed by groups: project_admins
Membership managed by users: example_member
```

### Additional resources

- See **ipa hostgroup-add-member-manager --help**.
- See the **ipa** man page.

## 47.6. ENSURING THE ABSENCE OF HOSTS FROM IDM HOST GROUPS USING ANSIBLE PLAYBOOKS

Follow this procedure to ensure the absence of hosts from host groups in Identity Management (IdM) using Ansible playbooks.

### Prerequisites

- You know the IdM administrator password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the *~/MyPlaybooks/* directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipadmin\_password**.
- The hosts you want to reference in your Ansible playbook exist in IdM. For details, see [Ensuring the presence of an IdM host entry using Ansible playbooks](#).
- The host groups you reference from the Ansible playbook file exist in IdM. For details, see [Ensuring the presence of IdM host groups using Ansible playbooks](#).

### Procedure

1. Create an inventory file, for example **inventory.file**, and define **ipaserver** in it with the list of IdM servers to target:

```
[ipaserver]
server.idm.example.com
```

2. Create an Ansible playbook file with the necessary host and host group information. Specify the name of the host group using the **name** parameter of the **ipahostgroup** variable. Specify the name of the host whose absence from the host group you want to ensure using the **host**

parameter of the **ipahostgroup** variable. To simplify this step, you can copy and modify the examples in the **/usr/share/doc/ansible-freeipa/playbooks/hostgroup/ensure-hosts-and-hostgroups-are-absent-in-hostgroup.yml** file:

```
---
- name: Playbook to handle hostgroups
  hosts: ipaserver

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  # Ensure host-group databases is absent
  - ipahostgroup:
      ipaadmin_password: "{{ ipaadmin_password }}"
      name: databases
      host:
      - db.idm.example.com
      action: member
      state: absent
```

This playbook ensures the absence of the **db.idm.example.com** host from the **databases** host group. The **action: member** line indicates that when the playbook is run, no attempt is made to remove the **databases** group itself.

3. Run the playbook:

```
$ ansible-playbook --vault-password-file=password_file -v -i
path_to_inventory_directory/inventory.file path_to_playbooks_directory/ensure-hosts-
or-hostgroups-are-absent-in-hostgroup.yml
```

### Verification steps

1. Log into **ipaserver** as admin:

```
$ ssh admin@server.idm.example.com
Password:
[admin@server ~]$
```

2. Request a Kerberos ticket for admin:

```
$ kinit admin
Password for admin@IDM.EXAMPLE.COM:
```

3. Display information about the host group and the hosts it contains:

```
$ ipa hostgroup-show databases
Host-group: databases
Member host-groups: mysql-server, oracle-server
```

The **db.idm.example.com** host does not exist in the **databases** host group.

## 47.7. ENSURING THE ABSENCE OF NESTED HOST GROUPS FROM IDM HOST GROUPS USING ANSIBLE PLAYBOOKS

Follow this procedure to ensure the absence of nested host groups from outer host groups in Identity Management (IdM) using Ansible playbooks.

## Prerequisites

- You know the IdM administrator password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the `secret.yml` Ansible vault stores your `ipadmin_password`.
- The host groups you reference from the Ansible playbook file exist in IdM. For details, see [Ensuring the presence of IdM host groups using Ansible playbooks](#) .

## Procedure

1. Create an inventory file, for example **inventory.file**, and define **ipaserver** in it with the list of IdM servers to target:

```
[ipaserver]
server.idm.example.com
```

2. Create an Ansible playbook file with the necessary host group information. Specify, among the **ipahostgroup** variables, the name of the outer host group using the **name** variable. Specify the name of the nested hostgroup with the **hostgroup** variable. To simplify this step, you can copy and modify the examples in the `/usr/share/doc/ansible-freeipa/playbooks/hostgroup/ensure-hosts-and-hostgroups-are-absent-in-hostgroup.yml` file:

```
---
- name: Playbook to handle hostgroups
  hosts: ipaserver

  vars_files:
    - /home/user_name/MyPlaybooks/secret.yml
  tasks:
    # Ensure hosts and hostgroups are absent in existing databases hostgroup
    - ipahostgroup:
        ipadmin_password: "{{ ipadmin_password }}"
        name: databases
        hostgroup:
          - mysql-server
          - oracle-server
        action: member
        state: absent
```

This playbook makes sure that the **mysql-server** and **oracle-server** host groups are absent from the **databases** host group. The **action: member** line indicates that when the playbook is run, no attempt is made to ensure the **databases** group itself is deleted from IdM.

3. Run the playbook:

```
$ ansible-playbook --vault-password-file=password_file -v -i
path_to_inventory_directory/inventory.file path_to_playbooks_directory/ensure-hosts-
or-hostgroups-are-absent-in-hostgroup.yml
```

### Verification steps

1. Log into **ipaserver** as admin:

```
$ ssh admin@server.idm.example.com
Password:
[admin@server /]$
```

2. Request a Kerberos ticket for admin:

```
$ kinit admin
Password for admin@IDM.EXAMPLE.COM:
```

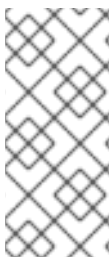
3. Display information about the host group from which nested host groups should be absent:

```
$ ipa hostgroup-show databases
Host-group: databases
```

The output confirms that the **mysql-server** and **oracle-server** nested host groups are absent from the outer **databases** host group.

## 47.8. ENSURING THE ABSENCE OF IDM HOST GROUPS USING ANSIBLE PLAYBOOKS

Follow this procedure to ensure the absence of host groups in Identity Management (IdM) using Ansible playbooks.



### NOTE

Without Ansible, host group entries are removed from IdM using the **ipa hostgroup-del** command. The result of removing a host group from IdM is the state of the host group being absent from IdM. Because of the Ansible reliance on idempotence, to remove a host group from IdM using Ansible, you must create a playbook in which you define the state of the host group as absent: **state: absent**

### Prerequisites

- You know the IdM administrator password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the **ansible-freeipa** package on the Ansible controller.
  - The example assumes that in the **~/MyPlaybooks/** directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.

- The example assumes that the **secret.yml** Ansible vault stores your **ipaadmin\_password**.

## Procedure

1. Create an inventory file, for example **inventory.file**, and define **ipaserver** in it with the list of IdM servers to target:

```
[ipaserver]
server.idm.example.com
```

2. Create an Ansible playbook file with the necessary host group information. To simplify this step, you can copy and modify the example in the **/usr/share/doc/ansible-freeipa/playbooks/user/ensure-hostgroup-is-absent.yml** file.

```
---
- name: Playbook to handle hostgroups
  hosts: ipaserver

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - Ensure host-group databases is absent
    ipahostgroup:
      ipaadmin_password: "{{ ipaadmin_password }}"
      name: databases
      state: absent
```

This playbook ensures the absence of the **databases** host group from IdM. The **state: absent** means a request to delete the host group from IdM unless it is already deleted.

3. Run the playbook:

```
$ ansible-playbook --vault-password-file=password_file -v -i
path_to_inventory_directory/inventory.file path_to_playbooks_directory/ensure-
hostgroup-is-absent.yml
```

## Verification steps

1. Log into **ipaserver** as admin:

```
$ ssh admin@server.idm.example.com
Password:
[admin@server /]$
```

2. Request a Kerberos ticket for admin:

```
$ kinit admin
Password for admin@IDM.EXAMPLE.COM:
```

3. Display information about the host group whose absence you ensured:

```
$ ipa hostgroup-show databases
ipa: ERROR: databases: host group not found
```

The **databases** host group does not exist in IdM.

## 47.9. ENSURING THE ABSENCE OF MEMBER MANAGERS FROM IDM HOST GROUPS USING ANSIBLE PLAYBOOKS

The following procedure describes ensuring the absence of member managers in IdM hosts and host groups using an Ansible playbook.

### Prerequisites

- You know the IdM administrator password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipaadmin\_password**.
- You must have the name of the user or user group you are removing as member managers and the name of the host group they are managing.

### Procedure

1. Create an inventory file, for example **inventory.file**, and define **ipaserver** in it:

```
[ipaserver]
server.idm.example.com
```

2. Create an Ansible playbook file with the necessary host and host group member management information:

```
---

- name: Playbook to handle host group membership management
  hosts: ipaserver

  vars_files:
    - /home/user_name/MyPlaybooks/secret.yml
  tasks:
    - name: Ensure member manager host and host group members are absent for
      group_name
      ipahostgroup:
        ipaadmin_password: "{{ ipaadmin_password }}"
        name: group_name
        membermanager_user: example_member
        membermanager_group: project_admins
        action: member
        state: absent
```

3. Run the playbook:

```
$ ansible-playbook --vault-password-file=password_file -v -i  
path_to_inventory_directory/inventory.file path_to_playbooks_directory/ensure-  
member-managers-host-groups-are-absent.yml
```

## Verification steps

You can verify if the **group\_name** group does not contain **example\_member** or **project\_admins** as member managers by using the **ipa group-show** command:

1. Log into **ipaserver** as administrator:

```
$ ssh admin@server.idm.example.com  
Password:  
[admin@server /]$
```

2. Display information about *testhostgroup*:

```
ipaserver]$ ipa hostgroup-show group_name  
Host-group: group_name  
Member hosts: server.idm.example.com  
Member host-groups: testhostgroup2
```

## Additional resources

- See **ipa hostgroup-add-member-manager --help**.
- See the **ipa** man page.

## CHAPTER 48. STRENGTHENING KERBEROS SECURITY WITH PAC INFORMATION

You can use Identity Management (IdM) with Privilege Attribute Certificate (PAC) information by default since RHEL 8.5. Also, you can enable Security Identifiers (SIDs) in IdM deployments that were installed before RHEL 8.5.

### 48.1. PRIVILEGE ATTRIBUTE CERTIFICATE (PAC) USE IN IDM

To increase security, RHEL Identity Management (IdM) now issues Kerberos tickets with Privilege Attribute Certificate (PAC) information by default in new deployments. A PAC has rich information about a Kerberos principal, including its Security Identifier (SID), group memberships, and home directory information.

SIDs, which Microsoft Active Directory (AD) uses by default, are globally unique identifiers that are never reused. SIDs express multiple namespaces: each domain has a SID, which is a prefix in the SID of each object.

Starting from RHEL 8.5, when you install an IdM server or replica, the installation script generates SIDs for users and groups by default. This allows IdM to work with PAC data. If you installed IdM before RHEL 8.5, and you have not configured a trust with an AD domain, you may not have generated SIDs for your IdM objects. For more information about generating SIDs for your IdM objects, see [Enabling Security Identifiers \(SIDs\) in IdM](#).

By evaluating PAC information in Kerberos tickets, you can control resource access with much greater detail. For example, the Administrator account in one domain has a uniquely different SID than the Administrator account in any other domain. In an IdM environment with a trust to an AD domain, you can set access controls based on globally unique SIDs rather than simple user names or UIDs that might repeat in different locations, such as every Linux **root** account having a UID of 0.

### 48.2. ENABLING SECURITY IDENTIFIERS (SIDS) IN IDM

If you installed IdM before RHEL 8.5, and you have not configured a trust with an AD domain, you might not have generated Security Identifiers (SIDs) for your IdM objects. This is because, before, the only way to generate SIDs was to run the **ipa-adtrust-install** command to add the **Trust Controller** role to an IdM server.

As of RHEL 8.6, Kerberos in IdM requires that your IdM objects have SIDs, which are necessary for security based on Privilege Access Certificate (PAC) information.

#### Prerequisites

- You installed IdM before RHEL 8.5.
- You have not run the **ipa-sidgen** task, which is part of configuring a trust with an Active Directory domain.
- You can authenticate as the IdM admin account.

#### Procedure

- Enable SID usage and trigger the **SIDgen** task to generate SIDs for existing users and groups. This task might be resource-intensive:



```
[root@server ~]# ipa config-mod --enable-sid --add-sids
```

## Verification

- Verify that the IdM **admin** user account entry has an **ipantsecurityidentifier** attribute with a SID that ends with **-500**, the SID reserved for the domain administrator:

```
[root@server ~]# ipa user-show admin --all | grep ipantsecurityidentifier
ipantsecurityidentifier: S-1-5-21-2633809701-976279387-419745629-500
```

## Additional resources

- [Privilege Attribute Certificate \(PAC\) use in IdM](#)
- [Trust Controllers and Trust Agents](#)
- [Integrate SID configuration into base IPA installers](#)

## CHAPTER 49. MANAGING KERBEROS TICKET POLICIES

Kerberos ticket policies in Identity Management (IdM) set restrictions on Kerberos ticket access, duration, and renewal. You can configure Kerberos ticket policies for the Key Distribution Center (KDC) running on your IdM server.

The following concepts and operations are performed when managing Kerberos ticket policies:

- [The role of the IdM KDC](#)
- [IdM Kerberos ticket policy types](#)
- [Kerberos authentication indicators](#)
- [Enforcing authentication indicators for an IdM service](#)
- [Configuring the global ticket lifecycle policy](#)
- [Configuring global ticket policies per authentication indicator](#)
- [Configuring the default ticket policy for a user](#)
- [Configuring individual authentication indicator ticket policies for a user](#)
- [Authentication indicator options for the `krbtpolicy-mod` command](#)

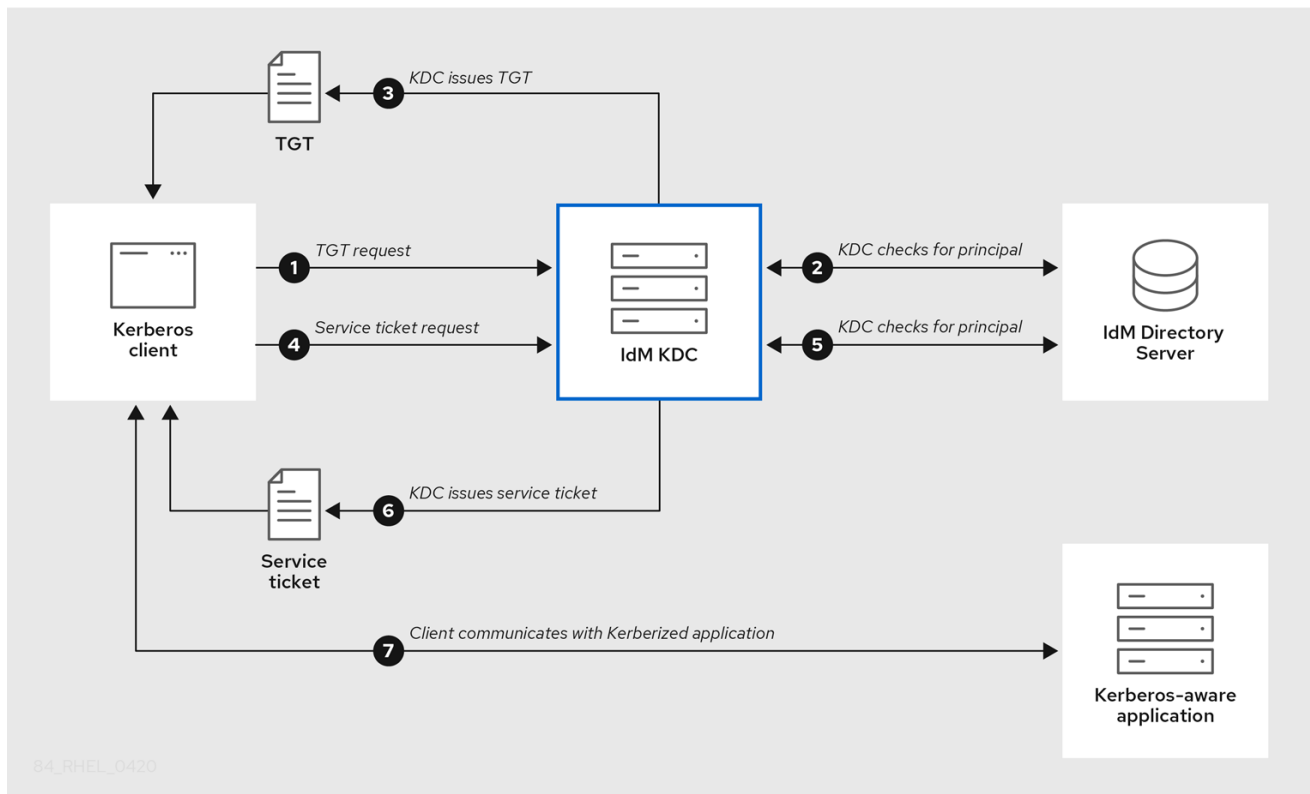
### 49.1. THE ROLE OF THE IDM KDC

Identity Management's authentication mechanisms use the Kerberos infrastructure established by the Key Distribution Center (KDC). The KDC is the trusted authority that stores credential information and ensures the authenticity of data originating from entities within the IdM network.

Each IdM user, service, and host acts as a Kerberos client and is identified by a unique Kerberos *principal*:

- For users: **identifier@REALM**, such as **admin@EXAMPLE.COM**
- For services: **service/fully-qualified-hostname@REALM**, such as **http/server.example.com@EXAMPLE.COM**
- For hosts: **host/fully-qualified-hostname@REALM**, such as **host/client.example.com@EXAMPLE.COM**

The following image is a simplification of the communication between a Kerberos client, the KDC, and a Kerberized application that the client wants to communicate with.



1. A Kerberos client identifies itself to the KDC by authenticating as a Kerberos principal. For example, an IdM user performs **kinit username** and provides their password.
2. The KDC checks for the principal in its database, authenticates the client, and evaluates [Kerberos ticket policies](#) to determine whether to grant the request.
3. The KDC issues the client a ticket-granting ticket (TGT) with a lifecycle and [authentication indicators](#) according to the appropriate ticket policy.
4. With the TGT, the client requests a *service ticket* from the KDC to communicate with a Kerberized service on a target host.
5. The KDC checks if the client's TGT is still valid, and evaluates the service ticket request against ticket policies.
6. The KDC issues the client a *service ticket*.
7. With the service ticket, the client can initiate encrypted communication with the service on the target host.

## 49.2. IDM KERBEROS TICKET POLICY TYPES

IdM Kerberos ticket policies implement the following ticket policy types:

### Connection policy

To protect Kerberized services with different levels of security, you can define connection policies to enforce rules based on which pre-authentication mechanism a client used to retrieve a ticket-granting ticket (TGT).

For example, you can require smart card authentication to connect to **client1.example.com**, and require two-factor authentication to access the **testservice** application on **client2.example.com**.

To enforce connection policies, associate *authentication indicators* with services. Only clients that have the required authentication indicators in their service ticket requests are able to access those services. For more information, see [Kerberos authentication indicators](#).

### Ticket lifecycle policy

Each Kerberos ticket has a *lifetime* and a potential *renewal age*: you can renew a ticket before it reaches its maximum lifetime, but not after it exceeds its maximum renewal age.

The default global ticket lifetime is one day (86400 seconds) and the default global maximum renewal age is one week (604800 seconds). To adjust these global values, see [Configuring the global ticket lifecycle policy](#).

You can also define your own ticket lifecycle policies:

- To configure different global ticket lifecycle values for each authentication indicator, see [Configuring global ticket policies per authentication indicator](#).
- To define ticket lifecycle values for a single user that apply regardless of the authentication method used, see [Configuring the default ticket policy for a user](#).
- To define individual ticket lifecycle values for each authentication indicator that only apply to a single user, see [Configuring individual authentication indicator ticket policies for a user](#).

## 49.3. KERBEROS AUTHENTICATION INDICATORS

The Kerberos Key Distribution Center (KDC) attaches *authentication indicators* to a ticket-granting ticket (TGT) based on which pre-authentication mechanism the client used to prove its identity:

### **otp**

two-factor authentication (password + One-Time Password)

### **radius**

RADIUS authentication (commonly for 802.1x authentication)

### **pkinit**

PKINIT, smart card, or certificate authentication

### **hardened**

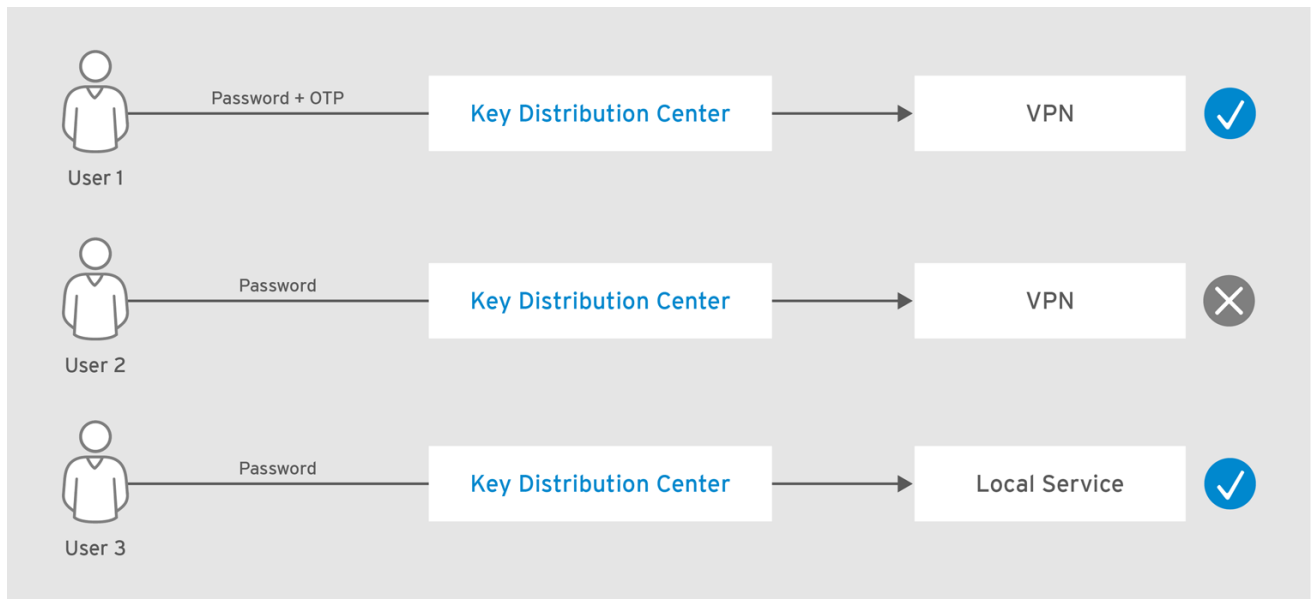
hardened passwords (SPAKE or FAST)<sup>[1]</sup>

The KDC then attaches the authentication indicators from the TGT to any service ticket requests that stem from it. The KDC enforces policies such as service access control, maximum ticket lifetime, and maximum renewable age based on the authentication indicators.

### Authentication indicators and IdM services

If you associate a service or a host with an authentication indicator, only clients that used the corresponding authentication mechanism to obtain a TGT will be able to access it. The KDC, not the application or service, checks for authentication indicators in service ticket requests, and grants or denies requests based on Kerberos connection policies.

For example, to require two-factor authentication to connect to a Virtual Private Network (VPN), associate the **otp** authentication indicator with that service. Only users who used a One-Time password to obtain their initial TGT from the KDC will be able to log in to the VPN:

**Figure 49.1. Example of a VPN service requiring the otp authentication indicator**

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If a service or a host has no authentication indicators assigned to it, it will accept tickets authenticated by any mechanism.

#### Additional resources

- [Enforcing authentication indicators for an IdM service](#)
- [Enabling GSSAPI authentication and enforcing Kerberos authentication indicators for sudo on an IdM client](#)

## 49.4. ENFORCING AUTHENTICATION INDICATORS FOR AN IDM SERVICE

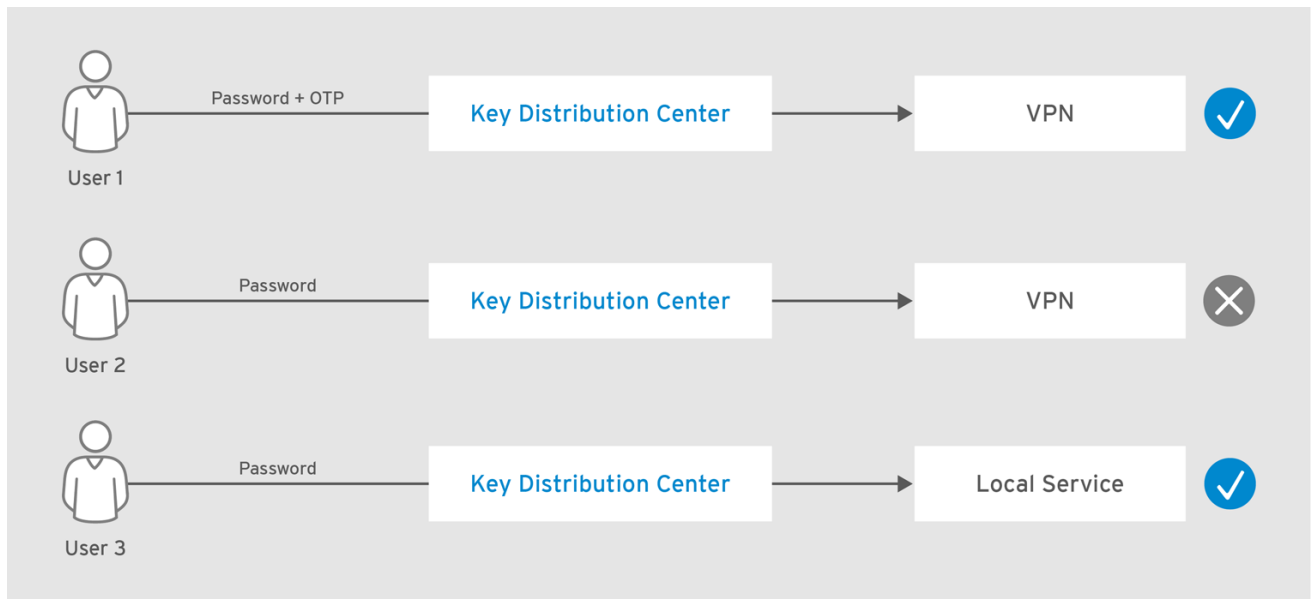
The authentication mechanisms supported by Identity Management (IdM) vary in their authentication strength. For example, obtaining the initial Kerberos ticket-granting ticket (TGT) using a one-time password (OTP) in combination with a standard password is considered more secure than authentication using only a standard password.

By associating authentication indicators with a particular IdM service, you can, as an IdM administrator, configure the service so that only users who used those specific pre-authentication mechanisms to obtain their initial ticket-granting ticket (TGT) will be able to access the service.

In this way, you can configure different IdM services so that:

- Only users who used a stronger authentication method to obtain their initial TGT, such as a one-time password (OTP), can access services critical to security, such as a VPN.
- Users who used simpler authentication methods to obtain their initial TGT, such as a password, can only access non-critical services, such as local logins.

Figure 49.2. Example of authenticating using different technologies



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This procedure describes creating an IdM service and configuring it to require particular Kerberos authentication indicators from incoming service ticket requests.

#### 49.4.1. Creating an IdM service entry and its Kerberos keytab

Adding an *IdM service* entry to IdM for a service running on an IdM host creates a corresponding Kerberos principal, and allows the service to request an SSL certificate, a Kerberos keytab, or both.

The following procedure describes creating an IdM service entry and generating an associated Kerberos keytab for encrypting communication with that service.

##### Prerequisites

- Your service can store a Kerberos principal, an SSL certificate, or both.

##### Procedure

1. Add an IdM service with the **ipa service-add** command to create a Kerberos principal associated with it. For example, to create the IdM service entry for the **testservice** application that runs on host **client.example.com**:

```
[root@client ~]# ipa service-add testservice/client.example.com
-----
Modified service "testservice/client.example.com@EXAMPLE.COM"
-----
Principal name: testservice/client.example.com@EXAMPLE.COM
Principal alias: testservice/client.example.com@EXAMPLE.COM
Managed by: client.example.com
```

2. Generate and store a Kerberos keytab for the service on the client.

```
[root@client ~]# ipa-getkeytab -k /etc/testservice.keytab -p
testservice/client.example.com
Keytab successfully retrieved and stored in: /etc/testservice.keytab
```

## Verification steps

1. Display information about an IdM service with the **ipa service-show** command.

```
[root@server ~]# ipa service-show testservice/client.example.com
Principal name: testservice/client.example.com@EXAMPLE.COM
Principal alias: testservice/client.example.com@EXAMPLE.COM
Keytab: True
Managed by: client.example.com
```

2. Display the contents of the service's Kerberos keytab with the **klist** command.

```
[root@server etc]# klist -ekt /etc/testservice.keytab
Keytab name: FILE:/etc/testservice.keytab
KVNO Timestamp          Principal
-----
2 04/01/2020 17:52:55 testservice/client.example.com@EXAMPLE.COM (aes256-cts-
hmac-sha1-96)
2 04/01/2020 17:52:55 testservice/client.example.com@EXAMPLE.COM (aes128-cts-
hmac-sha1-96)
2 04/01/2020 17:52:55 testservice/client.example.com@EXAMPLE.COM (camellia128-cts-
cmac)
2 04/01/2020 17:52:55 testservice/client.example.com@EXAMPLE.COM (camellia256-cts-
cmac)
```

### 49.4.2. Associating authentication indicators with an IdM service using IdM CLI

As an Identity Management (IdM) administrator, you can configure a host or a service to require that a service ticket presented by the client application contains a specific authentication indicator. For example, you can ensure that only users who used a valid IdM two-factor authentication token with their password when obtaining a Kerberos ticket-granting ticket (TGT) will be able to access that host or service.

Follow this procedure to configure a service to require particular Kerberos authentication indicators from incoming service ticket requests.

#### Prerequisites

- You have created an IdM service entry for a service that runs on an IdM host. See [Creating an IdM service entry and its Kerberos keytab](#).
- You have obtained the ticket-granting ticket of an administrative user in IdM.



**WARNING**

Do **not** assign authentication indicators to internal IdM services. The following IdM services cannot perform the interactive authentication steps required by PKINIT and multi-factor authentication methods:

- host**/server.example.com@EXAMPLE.COM
- HTTP**/server.example.com@EXAMPLE.COM
- ldap**/server.example.com@EXAMPLE.COM
- DNS**/server.example.com@EXAMPLE.COM
- cifs**/server.example.com@EXAMPLE.COM

**Procedure**

- Use the **ipa service-mod** command to specify one or more required authentication indicators for a service, identified with the **--auth-ind** argument.

| Authentication method                             | --auth-ind value |
|---|------------------|
| Two-factor authentication                         | <b>otp</b>       |
| RADIUS authentication                             | <b>radius</b>    |
| PKINIT, smart card, or certificate authentication | <b>pkinit</b>    |
| Hardened passwords (SPAKE or FAST)                | <b>hardened</b>  |

For example, to require that a user was authenticated with smart card or OTP authentication to retrieve a service ticket for the **testservice** principal on host **client.example.com**:

```
[root@server ~]# ipa service-mod testservice/client.example.com@EXAMPLE.COM --
auth-ind otp --auth-ind pkinit
-----
Modified service "testservice/client.example.com@EXAMPLE.COM"
-----
Principal name: testservice/client.example.com@EXAMPLE.COM
Principal alias: testservice/client.example.com@EXAMPLE.COM
Authentication Indicators: otp, pkinit
Managed by: client.example.com
```





## NOTE

To remove all authentication indicators from a service, provide an empty list of indicators:

```
[root@server ~]# ipa service-mod
testservice/client.example.com@EXAMPLE.COM --auth-ind "
-----
Modified service "testservice/client.example.com@EXAMPLE.COM"
-----
Principal name: testservice/client.example.com@EXAMPLE.COM
Principal alias: testservice/client.example.com@EXAMPLE.COM
Managed by: client.example.com
```

## Verification steps

- Display information about an IdM service, including the authentication indicators it requires, with the **ipa service-show** command.

```
[root@server ~]# ipa service-show testservice/client.example.com
Principal name: testservice/client.example.com@EXAMPLE.COM
Principal alias: testservice/client.example.com@EXAMPLE.COM
Authentication Indicators: otp, pkinit
Keytab: True
Managed by: client.example.com
```

## Additional resources

- [Retrieving a Kerberos service ticket for an IdM service](#)
- [Enabling GSSAPI authentication and enforcing Kerberos authentication indicators for sudo on an IdM client](#)

### 49.4.3. Associating authentication indicators with an IdM service using IdM Web UI

As an Identity Management (IdM) administrator, you can configure a host or a service to require a service ticket presented by the client application to contain a specific authentication indicator. For example, you can ensure that only users who used a valid IdM two-factor authentication token with their password when obtaining a Kerberos ticket-granting ticket (TGT) will be able to access that host or service.

Follow this procedure to use the IdM Web UI to configure a host or service to require particular Kerberos authentication indicators from incoming ticket requests.

## Prerequisites

- You have logged in to the IdM Web UI as an administrative user.

## Procedure

1. Select **Identity → Hosts** or **Identity → Services**.
2. Click the name of the required host or service.
3. Under **Authentication indicators**, select the required authentication method.

- For example, selecting **OTP** ensures that only users who used a valid IdM two-factor authentication token with their password when obtaining a Kerberos TGT will be able to access the host or service.
- If you select both **OTP** and **RADIUS**, then both users that used a valid IdM two-factor authentication token with their password when obtaining a Kerberos TGT **and** users that used the RADIUS server for obtaining their Kerberos TGT will be allowed access.

4. Click **Save** at the top of the page.

#### Additional resources

- [Retrieving a Kerberos service ticket for an IdM service](#)
- [Enabling GSSAPI authentication and enforcing Kerberos authentication indicators for sudo on an IdM client](#)

#### 49.4.4. Retrieving a Kerberos service ticket for an IdM service

The following procedure describes retrieving a Kerberos service ticket for an IdM service. You can use this procedure to test Kerberos ticket policies, such as enforcing that certain Kerberos authentication indicators are present in a ticket-granting ticket (TGT).

#### Prerequisites

- If the service you are working with is not an internal IdM service, you have created a corresponding *IdM service* entry for it. See [Creating an IdM service entry and its Kerberos keytab](#).
- You have a Kerberos ticket-granting ticket (TGT).

#### Procedure

- Use the **kvno** command with the **-S** option to retrieve a service ticket, and specify the name of the IdM service and the fully-qualified domain name of the host that manages it.

```
[root@server ~]# kvno -S testservice client.example.com
testservice/client.example.com@EXAMPLE.COM: kvno = 1
```

#### NOTE

If you need to access an IdM service and your current ticket-granting ticket (TGT) does not possess the required Kerberos authentication indicators associated with it, clear your current Kerberos credentials cache with the **kdestroy** command and retrieve a new TGT:

```
[root@server ~]# kdestroy
```

For example, if you initially retrieved a TGT by authenticating with a password, and you need to access an IdM service that has the **pkinit** authentication indicator associated with it, destroy your current credentials cache and re-authenticate with a smart card. See [Kerberos authentication indicators](#).

#### Verification steps

- Use the **klist** command to verify that the service ticket is in the default Kerberos credentials cache.

```
[root@server etc]# klist_
Ticket cache: KCM:1000
Default principal: admin@EXAMPLE.COM

Valid starting    Expires          Service principal
04/01/2020 12:52:42  04/02/2020 12:52:39  krbtgt/EXAMPLE.COM@EXAMPLE.COM
04/01/2020 12:54:07 04/02/2020 12:52:39
testservice/client.example.com@EXAMPLE.COM
```

#### 49.4.5. Additional resources

- See [Kerberos authentication indicators](#).

### 49.5. CONFIGURING THE GLOBAL TICKET LIFECYCLE POLICY

The global ticket policy applies to all service tickets and to users that do not have any per-user ticket policies defined.

The following procedure describes adjusting the maximum ticket lifetime and maximum ticket renewal age for the global Kerberos ticket policy using the **ipa krbtpolicy-mod** command.

While using the **ipa krbtpolicy-mod** command, specify at least one of the following arguments:

- **--maxlife** for the maximum ticket lifetime in seconds
- **--maxrenew** for the maximum renewable age in seconds

#### Procedure

1. To modify the global ticket policy:

```
[root@server ~]# ipa krbtpolicy-mod --maxlife=$((8*60*60)) --maxrenew=$((24*60*60))
Max life: 28800
Max renew: 86400
```

In this example, the maximum lifetime is set to eight hours (8 \* 60 minutes \* 60 seconds) and the maximum renewal age is set to one day (24 \* 60 minutes \* 60 seconds).

2. Optional: To reset the global Kerberos ticket policy to the default installation values:

```
[root@server ~]# ipa krbtpolicy-reset
Max life: 86400
Max renew: 604800
```

#### Verification steps

- Display the global ticket policy:

```
[root@server ~]# ipa krbtpolicy-show
Max life: 28800
Max renew: 86640
```

-

### Additional resources

- See [Configuring the default ticket policy for a user](#) .
- See [Configuring individual authentication indicator ticket policies for a user](#) .

## 49.6. CONFIGURING GLOBAL TICKET POLICIES PER AUTHENTICATION INDICATOR

Follow this procedure to adjust the global maximum ticket lifetime and maximum renewable age for each authentication indicator. These settings apply to users that do not have per-user ticket policies defined.

Use the **ipa krbtpolicy-mod** command to specify the global maximum lifetime or maximum renewable age for Kerberos tickets depending on the [authentication indicators](#) attached to them.

### Procedure

- For example, to set the global two-factor ticket lifetime and renewal age values to one week, and the global smart card ticket lifetime and renewal age values to two weeks:

```
[root@server ~]# ipa krbtpolicy-mod --otp-maxlife=604800 --otp-maxrenew=604800 --pkinit-maxlife=172800 --pkinit-maxrenew=172800
```

### Verification steps

- Display the global ticket policy:

```
[root@server ~]# ipa krbtpolicy-show
Max life: 86400
OTP max life: 604800
PKINIT max life: 172800
Max renew: 604800
OTP max renew: 604800
PKINIT max renew: 172800
```

Notice that the OTP and PKINIT values are different from the global default **Max life** and **Max renew** values.

### Additional resources

- See [Authentication indicator options for the \*\*krbtpolicy-mod\*\* command](#).
- See [Configuring the default ticket policy for a user](#) .
- See [Configuring individual authentication indicator ticket policies for a user](#) .

## 49.7. CONFIGURING THE DEFAULT TICKET POLICY FOR A USER

You can define a unique Kerberos ticket policy that only applies to a single user. These per-user settings override the global ticket policy, for all authentication indicators.

Use the **ipa krbtpolicy-mod *username*** command, and specify at least one of the following arguments:

- **--maxlife** for the maximum ticket lifetime in seconds
- **--maxrenew** for the maximum renewable age in seconds

### Procedure

1. For example, to set the IdM **admin** user's maximum ticket lifetime to two days and maximum renewal age to two weeks:

```
[root@server ~]# ipa krbtpolicy-mod admin --maxlife= 172800 --maxrenew= 1209600
Max life: 172800
Max renew: 1209600
```

2. Optional: To reset the ticket policy for a user:

```
[root@server ~]# ipa krbtpolicy-reset admin
```

### Verification steps

- Display the effective Kerberos ticket policy that applies to a user:

```
[root@server ~]# ipa krbtpolicy-show admin
Max life: 172800
Max renew: 1209600
```

### Additional resources

- See [Configuring the global ticket lifecycle policy](#).
- See [Configuring global ticket policies per authentication indicator](#).

## 49.8. CONFIGURING INDIVIDUAL AUTHENTICATION INDICATOR TICKET POLICIES FOR A USER

As an administrator, you can define Kerberos ticket policies for a user that differ per authentication indicator. For example, you can configure a policy to allow the IdM **admin** user to renew a ticket for two days if it was obtained with OTP authentication, and a week if it was obtained with smart card authentication.

These per-authentication indicator settings will override the *user's* default ticket policy, the *global* default ticket policy, and any *global* authentication indicator ticket policy.

Use the **ipa krbtpolicy-mod *username*** command to set custom maximum lifetime and maximum renewable age values for a user's Kerberos tickets depending on the [authentication indicators](#) attached to them.

### Procedure

1. For example, to allow the IdM **admin** user to renew a Kerberos ticket for two days if it was obtained with One-Time Password authentication, set the **--otp-maxrenew** option:

```
[root@server ~]# ipa krbtpolicy-mod admin --otp-maxrenew=$((2*24*60*60))
OTP max renew: 172800
```

2. Optional: To reset the ticket policy for a user:

```
[root@server ~]# ipa krbtpolicy-reset username
```

Verification steps

- Display the effective Kerberos ticket policy that applies to a user:

```
[root@server ~]# ipa krbtpolicy-show admin  
Max life: 28800  
Max renew: 86640
```

Additional resources

- See [Authentication indicator options for the `krbtpolicy-mod` command.](#)
- See [Configuring the default ticket policy for a user](#) .
- See [Configuring the global ticket lifecycle policy](#) .
- See [Configuring global ticket policies per authentication indicator](#) .

49.9. AUTHENTICATION INDICATOR OPTIONS FOR THE `KRBTPOLICY-MOD` COMMAND

Specify values for authentication indicators with the following arguments.

Table 49.1. Authentication indicator options for the `krbtpolicy-mod` command

| Authentication indicator | Argument for maximum lifetime   | Argument for maximum renewal age |
|--------------------------|---------------------------------|----------------------------------|
| <code>otp</code>         | <code>--otp-maxlife</code>      | <code>--otp-maxrenew</code>      |
| <code>radius</code>      | <code>--radius-maxlife</code>   | <code>--radius-maxrenew</code>   |
| <code>pkinit</code>      | <code>--pkinit-maxlife</code>   | <code>--pkinit-maxrenew</code>   |
| <code>hardened</code>    | <code>--hardened-maxlife</code> | <code>--hardened-maxrenew</code> |

[1] A hardened password is protected against brute-force password dictionary attacks by using Single-Party Public-Key Authenticated Key Exchange (SPAKE) pre-authentication and/or Flexible Authentication via Secure Tunneling (FAST) armoring.

## CHAPTER 50. MAINTAINING IDM KERBEROS KEYTAB FILES

Learn more about what Kerberos keytab files are and how Identity Management (IdM) uses them to allow services to authenticate securely with Kerberos.

You can use this information to understand why you should protect these sensitive files, and to troubleshoot communication issues between IdM services.

For more information, see the following topics:

- [How Identity Management uses Kerberos keytab files](#)
- [Verifying that Kerberos keytab files are in sync with the IdM database](#)
- [List of IdM Kerberos keytab files and their contents](#)
- [Viewing the encryption type of your IdM master key](#)

### 50.1. HOW IDENTITY MANAGEMENT USES KERBEROS KEYTAB FILES

A Kerberos keytab is a file containing Kerberos principals and their corresponding encryption keys. Hosts, services, users, and scripts can use keytabs to authenticate to the Kerberos Key Distribution Center (KDC) securely, without requiring human interaction.

Every IdM service on an IdM server has a unique Kerberos principal stored in the Kerberos database. For example, if IdM servers **east.idm.example.com** and **west.idm.example.com** provide DNS services, IdM creates 2 unique DNS Kerberos principals to identify these services, which follow the naming convention **<service>/host.domain.com@REALM.COM**:

- **DNS/east.idm.example.com@IDM.EXAMPLE.COM**
- **DNS/west.idm.example.com@IDM.EXAMPLE.COM**

IdM creates a keytab on the server for each of these services to store a local copy of the Kerberos keys, along with their Key Version Numbers (KVNO). For example, the default keytab file **/etc/krb5.keytab** stores the **host** principal, which represents that machine in the Kerberos realm and is used for login authentication. The KDC generates encryption keys for the different encryption algorithms it supports, such as **aes256-cts-hmac-sha1-96** and **aes128-cts-hmac-sha1-96**.

You can display the contents of a keytab file with the **klist** command:

```
[root@idmsvr ~]# klist -ekt /etc/krb5.keytab
Keytab name: FILE:/etc/krb5.keytab
KVNO Timestamp      Principal
-----
  2 02/24/2022 20:28:09 host/idmsvr.idm.example.com@IDM.EXAMPLE.COM (aes256-cts-hmac-sha1-96)
  2 02/24/2022 20:28:09 host/idmsvr.idm.example.com@IDM.EXAMPLE.COM (aes128-cts-hmac-sha1-96)
  2 02/24/2022 20:28:09 host/idmsvr.idm.example.com@IDM.EXAMPLE.COM (camellia128-cts-cmac)
  2 02/24/2022 20:28:09 host/idmsvr.idm.example.com@IDM.EXAMPLE.COM (camellia256-cts-cmac)
```

Additional resources

- [Verifying that Kerberos keytab files are in sync with the IdM database](#)
- [List of IdM Kerberos keytab files and their contents](#)

## 50.2. VERIFYING THAT KERBEROS KEYTAB FILES ARE IN SYNC WITH THE IDM DATABASE

When you change a Kerberos password, IdM automatically generates a new corresponding Kerberos key and increments its Key Version Number (KVNO). If a Kerberos keytab is not updated with the new key and KVNO, any services that depend on that keytab to retrieve a valid key might not be able to authenticate to the Kerberos Key Distribution Center (KDC).

If one of your IdM services cannot communicate with another service, use the following procedure to verify that your Kerberos keytab files are in sync with the keys stored in the IdM database. If they are out of sync, retrieve a Kerberos keytab with an updated key and KVNO. This example compares and retrieves an updated **DNS** principal for an IdM server.

### Prerequisites

- You must authenticate as the IdM admin account to retrieve keytab files
- You must authenticate as the **root** account to modify keytab files owned by other users

### Procedure

1. Display the KVNO of the principals in the keytab you are verifying. In the following example, the **/etc/named.keytab** file has the key for the **DNS/server1.idm.example.com@EXAMPLE.COM** principal with a KVNO of 2.

```
[root@server1 ~]# klist -ekt /etc/named.keytab
Keytab name: FILE:/etc/named.keytab
KVNO Timestamp      Principal
-----
2 11/26/2021 13:51:11 DNS/server1.idm.example.com@EXAMPLE.COM (aes256-cts-
hmac-sha1-96)
2 11/26/2021 13:51:11 DNS/server1.idm.example.com@EXAMPLE.COM (aes128-cts-
hmac-sha1-96)
2 11/26/2021 13:51:11 DNS/server1.idm.example.com@EXAMPLE.COM (camellia128-cts-
cmac)
2 11/26/2021 13:51:11 DNS/server1.idm.example.com@EXAMPLE.COM (camellia256-cts-
cmac)
```

2. Display the KVNO of the principal stored in the IdM database. In this example, the KVNO of the key in the IdM database does not match the KVNO in the keytab.

```
[root@server1 ~]# kvno DNS/server1.idm.example.com@EXAMPLE.COM
DNS/server1.idm.example.com@EXAMPLE.COM: kvno = 3
```

3. Authenticate as the IdM admin account.

```
[root@server1 ~]# kinit admin
Password for admin@IDM.EXAMPLE.COM:
```



- Retrieve an updated Kerberos key for the principal and store it in its keytab. Perform this step as the **root** user so you can modify the **/etc/named.keytab** file, which is owned by the **named** user.

```
[root@server1 ~]# ipa-getkeytab -s server1.idm.example.com -p
DNS/server1.idm.example.com -k /etc/named.keytab
```

## Verification

- Display the updated KVNO of the principal in the keytab.

```
[root@server1 ~]# klist -ekt /etc/named.keytab
Keytab name: FILE:/etc/named.keytab
KVNO Timestamp      Principal
-----
  4 08/17/2022 14:42:11 DNS/server1.idm.example.com@EXAMPLE.COM (aes256-cts-
hmac-sha1-96)
  4 08/17/2022 14:42:11 DNS/server1.idm.example.com@EXAMPLE.COM (aes128-cts-
hmac-sha1-96)
  4 08/17/2022 14:42:11 DNS/server1.idm.example.com@EXAMPLE.COM (camellia128-cts-
cmac)
  4 08/17/2022 14:42:11 DNS/server1.idm.example.com@EXAMPLE.COM (camellia256-cts-
cmac)
```

- Display the KVNO of the principal stored in the IdM database and ensure it matches the KVNO from the keytab.

```
[root@server1 ~]# kvno DNS/server1.idm.example.com@EXAMPLE.COM
DNS/server1.idm.example.com@EXAMPLE.COM: kvno = 4
```

## Additional resources

- [How Identity Management uses Kerberos keytab files](#)
- [List of IdM Kerberos keytab files and their contents](#)

## 50.3. LIST OF IDM KERBEROS KEYTAB FILES AND THEIR CONTENTS

The following table displays the location, contents, and purpose of the IdM Kerberos keytab files.

Table 50.1. Table

| Keytab location              | Contents              | Purpose   |
|------------------------------|-----------------------|---|
| <b>/etc/krb5.keytab</b>      | <b>host</b> principal | Verifying user credentials when logging in, used by NFS if there is no <b>nfs</b> principal           |
| <b>/etc/dirsrv/ds.keytab</b> | <b>ldap</b> principal | Authenticating users to the IdM database, securely replicating database contents between IdM replicas |

| Keytab location                                  | Contents   | Purpose   |
|--|--|---|
| <b>/var/lib/ipa/gssproxy/http.keytab</b>         | <b>HTTP</b> principal  | Authenticating to the Apache server               |
| <b>/etc/named.keytab</b>                         | <b>DNS</b> principal   | Securely updating DNS records                     |
| <b>/etc/ipa/dnssec/ipa-dnskeysyncd.keytab</b>    | <b>ipa-dnskeysyncd</b> principal   | Keeping OpenDNSSEC synchronized with LDAP         |
| <b>/etc/pki/pki-tomcat/dogtag.keytab</b>         | <b>dogtag</b> principal  | Communicating with the Certificate Authority (CA) |
| <b>/etc/samba/samba.keytab</b>                   | <b>cifs</b> and <b>host</b> principals   | Communicating with the Samba service              |
| <b>/var/lib/sss/keytabs/ad-domain.com.keytab</b> | Active Directory (AD) domain controller (DCs) principals in the form <b>HOSTNAME\$@AD-DOMAIN.COM</b> | Communicating with AD DCs through an IdM-AD Trust |

#### Additional resources

- [How Identity Management uses Kerberos keytab files](#)
- [Verifying that Kerberos keytab files are in sync with the IdM database](#)

## 50.4. VIEWING THE ENCRYPTION TYPE OF YOUR IDM MASTER KEY

As an Identity Management (IdM) administrator, you can view the encryption type of your IdM master key, which is the key that the IdM Kerberos Distribution Center (KDC) uses to encrypt all other principals when storing them at rest. Knowing the encryption type helps you determine your deployment's compatibility with FIPS standards.

As of RHEL 8.7, the encryption type is **aes256-cts-hmac-sha384-192**. This encryption type is compatible with the default RHEL 9 FIPS cryptographic policy aiming to comply with FIPS 140-3.

The encryption types used on previous RHEL versions are not compatible with RHEL 9 systems that adhere to FIPS 140-3 standards. To make RHEL 9 systems in FIPS mode compatible with a RHEL 8 FIPS 140-2 deployment, enable the **FIPS:AD-SUPPORT** cryptographic policy on the RHEL 9 systems.



#### NOTE

Microsoft's Active Directory implementation does not yet support any of the RFC8009 Kerberos encryption types that use SHA-2 HMAC. If you have an IdM-AD trust configured, FIPS:AD-SUPPORT crypto subpolicy use is therefore required even if the encryption type of your IdM master key is **aes256-cts-hmac-sha384-192**.

#### Prerequisites

- You have **root** access to any of the RHEL 8 replicas in the IdM deployment.

### Procedure

- On the replica, view the encryption type on the command-line interface:

```
# kadmin.local getprinc K/M | grep -E '^Key:'  
Key: vno 1, aes256-cts-hmac-sha1-96
```

The **aes256-cts-hmac-sha1-96** key in the output indicates that the IdM deployment was installed on a server that was running RHEL 8.6 or earlier. The presence of a **aes256-cts-hmac-sha384-192** key in the output would indicate that the IdM deployment was installed on a server that was running RHEL 8.7 or later.

## CHAPTER 51. USING THE KDC PROXY IN IDM

Some administrators might choose to make the default Kerberos ports inaccessible in their deployment. To allow users, hosts, and services to obtain Kerberos credentials, you can use the **HTTPS** service as a proxy that communicates with Kerberos via the **HTTPS** port 443.

In Identity Management (IdM), the **Kerberos Key Distribution Center Proxy** (KKDCP) provides this functionality.

On an IdM server, KKDCP is enabled by default and available at **https://server.idm.example.com/KdcProxy**. On an IdM client, you must change its Kerberos configuration to access the KKDCP.

### 51.1. CONFIGURING AN IDM CLIENT TO USE KKDCP

As an Identity Management (IdM) system administrator, you can configure an IdM client to use the Kerberos Key Distribution Center Proxy (KKDCP) on an IdM server. This is useful if the default Kerberos ports are not accessible on the IdM server and the **HTTPS** port 443 is the only way of accessing the Kerberos service.

#### Prerequisites

- You have **root** access to the IdM client.

#### Procedure

1. Open the **/etc/krb5.conf** file for editing.
2. In the **[realms]** section, enter the URL of the KKDCP for the **kdc**, **admin\_server**, and **kpasswd\_server** options:

```
[realms]
EXAMPLE.COM = {
    kdc = https://kdc.example.com/KdcProxy
    admin_server = https://kdc.example.com/KdcProxy
    kpasswd_server = https://kdc.example.com/KdcProxy
    default_domain = example.com
}
```

For redundancy, you can add the parameters **kdc**, **admin\_server**, and **kpasswd\_server** multiple times to indicate different KKDCP servers.

3. Restart the **sssd** service to make the changes take effect:

```
~]# systemctl restart sssd
```

### 51.2. VERIFYING THAT KKDCP IS ENABLED ON AN IDM SERVER

On an Identity Management (IdM) server, the Kerberos Key Distribution Center Proxy (KKDCP) is automatically enabled each time the Apache web server starts if the attribute and value pair **ipaConfigString=kdcProxyEnabled** exists in the directory. In this situation, the symbolic link **/etc/httpd/conf.d/ipa-kdc-proxy.conf** is created.

You can verify if the KKDCP is enabled on the IdM server, even as an unprivileged user.

## Procedure

- Check that the symbolic link exists:

```
$ ls -l /etc/httpd/conf.d/ipa-kdc-proxy.conf
lrwxrwxrwx. 1 root root 36 Jun 21 2020 /etc/httpd/conf.d/ipa-kdc-proxy.conf -> /etc/ipa/kdcproxy/ipa-kdc-proxy.conf
```

The output confirms that KKDCP is enabled.

## 51.3. DISABLING KKDCP ON AN IDM SERVER

As an Identity Management (IdM) system administrator, you can disable the Kerberos Key Distribution Center Proxy (KKDCP) on an IdM server.

### Prerequisites

- You have **root** access to the IdM server.

## Procedure

1. Remove the **ipaConfigString=kdcProxyEnabled** attribute and value pair from the directory:

```
# ipa-lldap-updater /usr/share/ipa/kdcproxy-disable.uldif
Update complete
The ipa-lldap-updater command was successful
```

2. Restart the **httpd** service:

```
# systemctl restart httpd.service
```

KKDCP is now disabled on the current IdM server.

### Verification steps

- Verify that the symbolic link does not exist:

```
$ ls -l /etc/httpd/conf.d/ipa-kdc-proxy.conf
ls: cannot access '/etc/httpd/conf.d/ipa-kdc-proxy.conf': No such file or directory
```

## 51.4. RE-ENABLING KKDCP ON AN IDM SERVER

On an IdM server, the Kerberos Key Distribution Center Proxy (KKDCP) is enabled by default and available at **https://*server.idm.example.com*/KdcProxy**.

If KKDCP has been disabled on a server, you can re-enable it.

### Prerequisites

- You have **root** access to the IdM server.

## Procedure

1. Add the **ipaConfigString=kdcProxyEnabled** attribute and value pair to the directory:

```
# ipa-lldap-updater /usr/share/ipa/kdcproxy-enable.uldif
Update complete
The ipa-lldap-updater command was successful
```

2. Restart the **httpd** service:

```
# systemctl restart httpd.service
```

KKDCP is now enabled on the current IdM server.

### Verification steps

- Verify that the symbolic link exists:

```
$ ls -l /etc/httpd/conf.d/ipa-kdc-proxy.conf
lrwxrwxrwx. 1 root root 36 Jun 21 2020 /etc/httpd/conf.d/ipa-kdc-proxy.conf ->
/etc/ipa/kdcproxy/ipa-kdc-proxy.conf
```

## 51.5. CONFIGURING THE KKDCP SERVER I

With the following configuration, you can enable TCP to be used as the transport protocol between the IdM KKDCP and the Active Directory (AD) realm, where multiple Kerberos servers are used.

### Prerequisites

- You have **root** access.

### Procedure

1. Set the **use\_dns** parameter in the **[global]** section of the **/etc/ipa/kdcproxy/kdcproxy.conf** file to **false**.

```
[global]
use_dns = false
```

2. Put the proxied realm information into the **/etc/ipa/kdcproxy/kdcproxy.conf** file. For example, for the **[AD.EXAMPLE.COM]** realm with proxy list the realm configuration parameters as follows:

```
[AD.EXAMPLE.COM]
kerberos = kerberos+tcp://1.2.3.4:88 kerberos+tcp://5.6.7.8:88
kpasswd = kpasswd+tcp://1.2.3.4:464 kpasswd+tcp://5.6.7.8:464
```



### IMPORTANT

The realm configuration parameters must list multiple servers separated by a space, as opposed to **/etc/krb5.conf** and **kdc.conf**, in which certain options may be specified multiple times.

3. Restart Identity Management (IdM) services:

```
# ipactl restart
```

### Additional resources

- See [Configure IPA server as a KDC Proxy for AD Kerberos communication](#) in Red Hat Knowledgebase.

## 51.6. CONFIGURING THE KDCP SERVER II

The following server configuration relies on the DNS service records to find Active Directory (AD) servers to communicate with.

### Prerequisites

- You have **root** access.

### Procedure

1. In the `/etc/ipa/kdcproxy/kdcproxy.conf` file, the **[global]** section, set the **use\_dns** parameter to **true**.

```
[global]
configs = mit
use_dns = true
```

The **configs** parameter allows you to load other configuration modules. In this case, the configuration is read from the MIT **libkrb5** library.

2. *Optional:* In case you do not want to use DNS service records, add explicit AD servers to the **[realms]** section of the `/etc/krb5.conf` file. If the realm with proxy is, for example, `AD.EXAMPLE.COM`, you add:

```
[realms]
AD.EXAMPLE.COM = {
    kdc = ad-server.ad.example.com
    kpasswd_server = ad-server.ad.example.com
}
```

3. Restart Identity Management (IdM) services:

```
# ipactl restart
```

### Additional resources

- See [Configure IPA server as a KDC Proxy for AD Kerberos communication](#) in Red Hat Knowledgebase.

## CHAPTER 52. GRANTING SUDO ACCESS TO AN IDM USER ON AN IDM CLIENT

Learn more about granting **sudo** access to users in Identity Management.

### 52.1. SUDO ACCESS ON AN IDM CLIENT

System administrators can grant **sudo** access to allow non-root users to execute administrative commands that are normally reserved for the **root** user. Consequently, when users need to perform an administrative command normally reserved for the **root** user, they precede that command with **sudo**. After entering their password, the command is executed as if they were the **root** user. To execute a **sudo** command as another user or group, such as a database service account, you can configure a *RunAs alias* for a **sudo** rule.

If a Red Hat Enterprise Linux (RHEL) 8 host is enrolled as an Identity Management (IdM) client, you can specify **sudo** rules defining which IdM users can perform which commands on the host in the following ways:

- Locally in the **/etc/sudoers** file
- Centrally in IdM

You can create a **central sudo rule** for an IdM client using the command line interface (CLI) and the IdM Web UI.

In RHEL 8.4 and later, you can also configure password-less authentication for **sudo** using the Generic Security Service Application Programming Interface (GSSAPI), the native way for UNIX-based operating systems to access and authenticate Kerberos services. You can use the **pam\_sss\_gss.so** Pluggable Authentication Module (PAM) to invoke GSSAPI authentication via the SSSD service, allowing users to authenticate to the **sudo** command with a valid Kerberos ticket.

#### Additional resources

- See [Managing sudo access](#).

### 52.2. GRANTING SUDO ACCESS TO AN IDM USER ON AN IDM CLIENT USING THE CLI

In Identity Management (IdM), you can grant **sudo** access for a specific command to an IdM user account on a specific IdM host. First, add a **sudo** command and then create a **sudo** rule for one or more commands.

For example, complete this procedure to create the **idm\_user\_reboot sudo** rule to grant the **idm\_user** account the permission to run the **/usr/sbin/reboot** command on the **idmclient** machine.

#### Prerequisites

- You are logged in as IdM administrator.
- You have created a user account for **idm\_user** in IdM and unlocked the account by creating a password for the user. For details on adding a new IdM user using the CLI, see [Adding users using the command line](#).



- No local **idm\_user** account is present on the **idmclient** host. The **idm\_user** user is not listed in the local **/etc/passwd** file.

## Procedure

1. Retrieve a Kerberos ticket as the IdM **admin**.

```
[root@idmclient ~]# kinit admin
```

2. Add the **/usr/sbin/reboot** command to the IdM database of **sudo** commands:

```
[root@idmclient ~]# ipa sudocmd-add /usr/sbin/reboot
-----
Added Sudo Command "/usr/sbin/reboot"
-----
Sudo Command: /usr/sbin/reboot
```

3. Create a **sudo** rule named **idm\_user\_reboot**:

```
[root@idmclient ~]# ipa sudorule-add idm_user_reboot
-----
Added Sudo Rule "idm_user_reboot"
-----
Rule name: idm_user_reboot
Enabled: TRUE
```

4. Add the **/usr/sbin/reboot** command to the **idm\_user\_reboot** rule:

```
[root@idmclient ~]# ipa sudorule-add-allow-command idm_user_reboot --sudocmds
'/usr/sbin/reboot'
Rule name: idm_user_reboot
Enabled: TRUE
Sudo Allow Commands: /usr/sbin/reboot
-----
Number of members added 1
-----
```

5. Apply the **idm\_user\_reboot** rule to the IdM **idmclient** host:

```
[root@idmclient ~]# ipa sudorule-add-host idm_user_reboot --hosts
idmclient.idm.example.com
Rule name: idm_user_reboot
Enabled: TRUE
Hosts: idmclient.idm.example.com
Sudo Allow Commands: /usr/sbin/reboot
-----
Number of members added 1
-----
```

6. Add the **idm\_user** account to the **idm\_user\_reboot** rule:

```
[root@idmclient ~]# ipa sudorule-add-user idm_user_reboot --users idm_user
Rule name: idm_user_reboot
Enabled: TRUE
```

```

Users: idm_user
Hosts: idmclient.idm.example.com
Sudo Allow Commands: /usr/sbin/reboot
-----
Number of members added 1
-----

```

7. Optionally, define the validity of the **idm\_user\_reboot** rule:

- a. To define the time at which a **sudo** rule starts to be valid, use the **ipa sudorule-mod sudo\_rule\_name** command with the **--setattr sudonotbefore=DATE** option. The *DATE* value must follow the **yyyymmddHHMMSSZ** format, with seconds specified explicitly. For example, to set the start of the validity of the **idm\_user\_reboot** rule to 31 December 2025 12:34:00, enter:

```
[root@idmclient ~]# ipa sudorule-mod idm_user_reboot --setattr
sudonotbefore=20251231123400Z
```

- b. To define the time at which a sudo rule stops being valid, use the **--setattr sudonotafter=DATE** option. For example, to set the end of the **idm\_user\_reboot** rule validity to 31 December 2026 12:34:00, enter:

```
[root@idmclient ~]# ipa sudorule-mod idm_user_reboot --setattr
sudonotafter=20261231123400Z
```



## NOTE

Propagating the changes from the server to the client can take a few minutes.

## Verification steps

1. Log in to the **idmclient** host as the **idm\_user** account.
2. Display which **sudo** rules the **idm\_user** account is allowed to perform.

```
[idm_user@idmclient ~]$ sudo -l
Matching Defaults entries for idm_user on idmclient:
    lvisiblepw, always_set_home, match_group_by_gid, always_query_group_plugin,
    env_reset, env_keep="COLORS DISPLAY HOSTNAME HISTSIZE KDEDIR
LS_COLORS",
    env_keep+="MAIL PS1 PS2 QTDIR USERNAME LANG LC_ADDRESS LC_CTYPE",
    env_keep+="LC_COLLATE LC_IDENTIFICATION LC_MEASUREMENT
LC_MESSAGES",
    env_keep+="LC_MONETARY LC_NAME LC_NUMERIC LC_PAPER LC_TELEPHONE",
    env_keep+="LC_TIME LC_ALL LANGUAGE LINGUAS _XKB_CHARSET XAUTHORITY
KRB5CCNAME",
    secure_path="/sbin\:/bin\:/usr/sbin\:/usr/bin

User idm_user may run the following commands on idmclient:
    (root) /usr/sbin/reboot
```

3. Reboot the machine using **sudo**. Enter the password for **idm\_user** when prompted:

```
[idm_user@idmclient ~]$ sudo /usr/sbin/reboot
[sudo] password for idm_user:
```

## 52.3. GRANTING SUDO ACCESS TO AN AD USER ON AN IDM CLIENT USING THE CLI

Identity Management (IdM) system administrators can use IdM user groups to set access permissions, host-based access control, **sudo** rules, and other controls on IdM users. IdM user groups grant and restrict access to IdM domain resources.

You can add both Active Directory (AD) *users* and AD *groups* to IdM user groups. To do that:

1. Add the AD users or groups to a *non-POSIX* external IdM group.
2. Add the non-POSIX external IdM group to an IdM *POSIX* group.

You can then manage the privileges of the AD users by managing the privileges of the POSIX group. For example, you can grant **sudo** access for a specific command to an IdM POSIX user group on a specific IdM host.



### NOTE

It is also possible to add AD user groups as members to IdM external groups. This might make it easier to define policies for Windows users, by keeping the user and group management within the single AD realm.



### IMPORTANT

Do **not** use ID overrides of AD users for SUDO rules in IdM. ID overrides of AD users represent only POSIX attributes of AD users, not AD users themselves.

You can add ID overrides as group members. However, you can only use this functionality to manage IdM resources in the IdM API. The possibility to add ID overrides as group members is not extended to POSIX environments and you therefore cannot use it for membership in **sudo** or host-based access control (HBAC) rules.

Follow this procedure to create the **ad\_users\_reboot sudo** rule to grant the **administrator@ad-domain.com** AD user the permission to run the **/usr/sbin/reboot** command on the **idmclient** IdM host, which is normally reserved for the **root** user. **administrator@ad-domain.com** is a member of the **ad\_users\_external** non-POSIX group, which is, in turn, a member of the **ad\_users** POSIX group.

### Prerequisites

- You have obtained the IdM **admin** Kerberos ticket-granting ticket (TGT).
- A cross-forest trust exists between the IdM domain and the **ad-domain.com** AD domain.
- No local **administrator** account is present on the **idmclient** host: the **administrator** user is not listed in the local **/etc/passwd** file.

### Procedure

1. Create the **ad\_users** group that contains the **ad\_users\_external** group with the **administrator@ad-domain** member:
  - a. *Optional:* Create or select a corresponding group in the AD domain to use to manage AD users in the IdM realm. You can use multiple AD groups and add them to different groups on the IdM side.
  - b. Create the **ad\_users\_external** group and indicate that it contains members from outside the IdM domain by adding the **--external** option:

```
[root@ipaserver ~]# ipa group-add --desc='AD users external map'
ad_users_external --external
-----
Added group "ad_users_external"
-----
Group name: ad_users_external
Description: AD users external map
```



#### NOTE

Ensure that the external group that you specify here is an AD security group with a **global** or **universal** group scope as defined in the [Active Directory security groups](#) document. For example, the **Domain users** or **Domain admins** AD security groups cannot be used because their group scope is **domain local**.

- c. Create the **ad\_users** group:

```
[root@ipaserver ~]# ipa group-add --desc='AD users' ad_users
-----
Added group "ad_users"
-----
Group name: ad_users
Description: AD users
GID: 129600004
```

- d. Add the **administrator@ad-domain.com** AD user to **ad\_users\_external** as an external member:

```
[root@ipaserver ~]# ipa group-add-member ad_users_external --external
"administrator@ad-domain.com"
[member user]:
[member group]:
Group name: ad_users_external
Description: AD users external map
External member: S-1-5-21-3655990580-1375374850-1633065477-513
-----
Number of members added 1
-----
```

The AD user must be identified by a fully-qualified name, such as **DOMAIN\user\_name** or **user\_name@DOMAIN**. The AD identity is then mapped to the AD SID for the user. The same applies to adding AD groups.

- e. Add **ad\_users\_external** to **ad\_users** as a member:

```
[root@ipaserver ~]# ipa group-add-member ad_users --groups ad_users_external
Group name: ad_users
Description: AD users
GID: 129600004
Member groups: ad_users_external
-----
Number of members added 1
-----
```

2. Grant the members of **ad\_users** the permission to run **/usr/sbin/reboot** on the **idmclient** host:
  - a. Add the **/usr/sbin/reboot** command to the IdM database of **sudo** commands:

```
[root@idmclient ~]# ipa sudocmd-add /usr/sbin/reboot
-----
Added Sudo Command "/usr/sbin/reboot"
-----
Sudo Command: /usr/sbin/reboot
```

- b. Create a **sudo** rule named **ad\_users\_reboot**:

```
[root@idmclient ~]# ipa sudorule-add ad_users_reboot
-----
Added Sudo Rule "ad_users_reboot"
-----
Rule name: ad_users_reboot
Enabled: True
```

- c. Add the **/usr/sbin/reboot** command to the **ad\_users\_reboot** rule:

```
[root@idmclient ~]# ipa sudorule-add-allow-command ad_users_reboot --sudocmds
'/usr/sbin/reboot'
Rule name: ad_users_reboot
Enabled: True
Sudo Allow Commands: /usr/sbin/reboot
-----
Number of members added 1
-----
```

- d. Apply the **ad\_users\_reboot** rule to the IdM **idmclient** host:

```
[root@idmclient ~]# ipa sudorule-add-host ad_users_reboot --hosts
idmclient.idm.example.com
Rule name: ad_users_reboot
Enabled: True
Hosts: idmclient.idm.example.com
Sudo Allow Commands: /usr/sbin/reboot
-----
Number of members added 1
-----
```

- e. Add the **ad\_users** group to the **ad\_users\_reboot** rule:

```
[root@idmclient ~]# ipa sudorule-add-user ad_users_reboot --groups ad_users
```

```
Rule name: ad_users_reboot
Enabled: TRUE
User Groups: ad_users
Hosts: idmclient.idm.example.com
Sudo Allow Commands: /usr/sbin/reboot
-----
```

```
Number of members added 1
-----
```



## NOTE

Propagating the changes from the server to the client can take a few minutes.

## Verification steps

1. Log in to the **idmclient** host as **administrator@ad-domain.com**, an indirect member of the **ad\_users** group:

```
$ ssh administrator@ad-domain.com@ipaclient
Password:
```

2. Optionally, display the **sudo** commands that **administrator@ad-domain.com** is allowed to execute:

```
[administrator@ad-domain.com@idmclient ~]$ sudo -l
Matching Defaults entries for administrator@ad-domain.com on idmclient:
    !visiblepw, always_set_home, match_group_by_gid, always_query_group_plugin,
    env_reset, env_keep="COLORS DISPLAY HOSTNAME HISTSIZE KDEDIR
    LS_COLORS",
    env_keep+="MAIL PS1 PS2 QTDIR USERNAME LANG LC_ADDRESS LC_CTYPE",
    env_keep+="LC_COLLATE LC_IDENTIFICATION LC_MEASUREMENT
    LC_MESSAGES",
    env_keep+="LC_MONETARY LC_NAME LC_NUMERIC LC_PAPER LC_TELEPHONE",
    env_keep+="LC_TIME LC_ALL LANGUAGE LINGUAS _XKB_CHARSET XAUTHORITY
    KRB5CCNAME",
    secure_path="/sbin:/bin:/usr/sbin:/usr/bin
```

User **administrator@ad-domain.com** may run the following commands on **idmclient**:  
(root) **/usr/sbin/reboot**

3. Reboot the machine using **sudo**. Enter the password for **administrator@ad-domain.com** when prompted:

```
[administrator@ad-domain.com@idmclient ~]$ sudo /usr/sbin/reboot
[sudo] password for administrator@ad-domain.com:
```

## Additional resources

- [Active Directory users and Identity Management groups](#)
- [Include users and groups from a trusted Active Directory domain into SUDO rules](#)

## 52.4. GRANTING SUDO ACCESS TO AN IDM USER ON AN IDM CLIENT USING THE IDM WEB UI

In Identity Management (IdM), you can grant **sudo** access for a specific command to an IdM user account on a specific IdM host. First, add a **sudo** command and then create a **sudo** rule for one or more commands.

Complete this procedure to create the **idm\_user\_reboot** sudo rule to grant the **idm\_user** account the permission to run the **/usr/sbin/reboot** command on the **idmclient** machine.

### Prerequisites

- You are logged in as IdM administrator.
- You have created a user account for **idm\_user** in IdM and unlocked the account by creating a password for the user. For details on adding a new IdM user using the command-line interface, see [Adding users using the command line](#).
- No local **idm\_user** account is present on the **idmclient** host. The **idm\_user** user is not listed in the local **/etc/passwd** file.

### Procedure

1. Add the **/usr/sbin/reboot** command to the IdM database of **sudo** commands:
  - a. Navigate to **Policy → Sudo → Sudo Commands**.
  - b. Click **Add** in the upper right corner to open the **Add sudo command** dialog box.
  - c. Enter the command you want the user to be able to perform using **sudo**: **/usr/sbin/reboot**.

Figure 52.1. Adding IdM sudo command

**Add sudo command** [X]

Sudo Command \*

Description

\* Required field

[Add] [Add and Add Another] [Add and Edit] [Cancel]

- d. Click **Add**.

2. Use the new **sudo** command entry to create a sudo rule to allow **idm\_user** to reboot the **idmclient** machine:
  - a. Navigate to **Policy → Sudo → Sudo rules**.
  - b. Click **Add** in the upper right corner to open the **Add sudo rule** dialog box.
  - c. Enter the name of the **sudo** rule: **idm\_user\_reboot**.
  - d. Click **Add and Edit**.
  - e. Specify the user:
    - i. In the **Who** section, check the **Specified Users and Groups** radio button.
    - ii. In the **User category the rule applies to** subsection, click **Add** to open the **Add users into sudo rule "idm\_user\_reboot"** dialog box.
    - iii. In the **Add users into sudo rule "idm\_user\_reboot"** dialog box in the **Available** column, check the **idm\_user** checkbox, and move it to the **Prospective** column.
    - iv. Click **Add**.
  - f. Specify the host:
    - i. In the **Access this host** section, check the **Specified Hosts and Groups** radio button.
    - ii. In the **Host category this rule applies to** subsection, click **Add** to open the **Add hosts into sudo rule "idm\_user\_reboot"** dialog box.
    - iii. In the **Add hosts into sudo rule "idm\_user\_reboot"** dialog box in the **Available** column, check the **idmclient.idm.example.com** checkbox, and move it to the **Prospective** column.
    - iv. Click **Add**.
  - g. Specify the commands:
    - i. In the **Command category the rule applies to** subsection of the **Run Commands** section, check the **Specified Commands and Groups** radio button.
    - ii. In the **Sudo Allow Commands** subsection, click **Add** to open the **Add allow sudo commands into sudo rule "idm\_user\_reboot"** dialog box.
    - iii. In the **Add allow sudo commands into sudo rule "idm\_user\_reboot"** dialog box in the **Available** column, check the **/usr/sbin/reboot** checkbox, and move it to the **Prospective** column.
    - iv. Click **Add** to return to the **idm\_sudo\_reboot** page.



Figure 52.2. Adding IdM sudo rule

Who

User category the rule applies to: ☐ Anyone ☒ Specified Users and Groups

| Users                             | External | Delete | Add |
|-----------------------------------|----------|--------|-----|
| <input type="checkbox"/> idm_user |          |        |     |

User Groups

Access this host

Host category the rule applies to: ☐ Any Host ☒ Specified Hosts and Groups

| Hosts  | External | Delete | Add |
|--|----------|--------|-----|
| <input type="checkbox"/> idmclient.idm.example.com |          |        |     |

Host Groups

Run Commands

Command category the rule applies to: ☐ Any Command ☒ Specified Commands and Groups

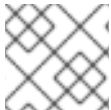
Allow

| Sudo Allow Commands                       | Delete | Add |
|---|--------|-----|
| <input type="checkbox"/> /usr/sbin/reboot |        |     |

Sudo Allow Command Groups

h. Click **Save** in the top left corner.

The new rule is enabled by default.



#### NOTE

Propagating the changes from the server to the client can take a few minutes.

#### Verification steps

1. Log in to **idmclient** as **idm\_user**.
2. Reboot the machine using **sudo**. Enter the password for **idm\_user** when prompted:

```
$ sudo /usr/sbin/reboot
[sudo] password for idm_user:
```

If the **sudo** rule is configured correctly, the machine reboots.

## 52.5. CREATING A SUDO RULE ON THE CLI THAT RUNS A COMMAND AS A SERVICE ACCOUNT ON AN IDM CLIENT

In IdM, you can configure a **sudo** rule with a *RunAs alias* to run a **sudo** command as another user or group. For example, you might have an IdM client that hosts a database application, and you need to run commands as the local service account that corresponds to that application.

Use this example to create a **sudo** rule on the command line called **run\_third-party-app\_report** to allow the **idm\_user** account to run the **/opt/third-party-app/bin/report** command as the **thirdpartyapp** service account on the **idmclient** host.

#### Prerequisites

- You are logged in as IdM administrator.
- You have created a user account for **idm\_user** in IdM and unlocked the account by creating a password for the user. For details on adding a new IdM user using the CLI, see [Adding users using the command line](#).

- No local **idm\_user** account is present on the **idmclient** host. The **idm\_user** user is not listed in the local **/etc/passwd** file.
- You have a custom application named **third-party-app** installed on the **idmclient** host.
- The **report** command for the **third-party-app** application is installed in the **/opt/third-party-app/bin/report** directory.
- You have created a local service account named **thirdpartyapp** to execute commands for the **third-party-app** application.

## Procedure

1. Retrieve a Kerberos ticket as the IdM **admin**.

```
[root@idmclient ~]# kinit admin
```

2. Add the **/opt/third-party-app/bin/report** command to the IdM database of **sudo** commands:

```
[root@idmclient ~]# ipa sudocmd-add /opt/third-party-app/bin/report
-----
Added Sudo Command "/opt/third-party-app/bin/report"
-----
Sudo Command: /opt/third-party-app/bin/report
```

3. Create a **sudo** rule named **run\_third-party-app\_report**:

```
[root@idmclient ~]# ipa sudorule-add run_third-party-app_report
-----
Added Sudo Rule "run_third-party-app_report"
-----
Rule name: run_third-party-app_report
Enabled: TRUE
```

4. Use the **--users=<user>** option to specify the RunAs user for the **sudorule-add-runasuser** command:

```
[root@idmclient ~]# ipa sudorule-add-runasuser run_third-party-app_report --
users=thirdpartyapp
Rule name: run_third-party-app_report
Enabled: TRUE
RunAs External User: thirdpartyapp
-----
Number of members added 1
-----
```

The user (or group specified with the **--groups=\*** option) can be external to IdM, such as a local service account or an Active Directory user. Do not add a **%** prefix for group names.

5. Add the **/opt/third-party-app/bin/report** command to the **run\_third-party-app\_report** rule:

```
[root@idmclient ~]# ipa sudorule-add-allow-command run_third-party-app_report --
sudocmds '/opt/third-party-app/bin/report'
Rule name: run_third-party-app_report
Enabled: TRUE
```

```
Sudo Allow Commands: /opt/third-party-app/bin/report
RunAs External User: thirdpartyapp
-----
```

```
Number of members added 1
-----
```

6. Apply the **run\_third-party-app\_report** rule to the IdM **idmclient** host:

```
[root@idmclient ~]# ipa sudorule-add-host run_third-party-app_report --hosts
idmclient.idm.example.com
```

```
Rule name: run_third-party-app_report
```

```
Enabled: TRUE
```

```
Hosts: idmclient.idm.example.com
```

```
Sudo Allow Commands: /opt/third-party-app/bin/report
```

```
RunAs External User: thirdpartyapp
-----
```

```
Number of members added 1
-----
```

7. Add the **idm\_user** account to the **run\_third-party-app\_report** rule:

```
[root@idmclient ~]# ipa sudorule-add-user run_third-party-app_report --users idm_user
```

```
Rule name: run_third-party-app_report
```

```
Enabled: TRUE
```

```
Users: idm_user
```

```
Hosts: idmclient.idm.example.com
```

```
Sudo Allow Commands: /opt/third-party-app/bin/report
```

```
RunAs External User: thirdpartyapp
-----
```

```
Number of members added 1
```



## NOTE

Propagating the changes from the server to the client can take a few minutes.

## Verification steps

1. Log in to the **idmclient** host as the **idm\_user** account.
2. Test the new sudo rule:
  - a. Display which **sudo** rules the **idm\_user** account is allowed to perform.

```
[idm_user@idmclient ~]$ sudo -l
```

```
Matching Defaults entries for idm_user@idm.example.com on idmclient:
```

```
!visiblepw, always_set_home, match_group_by_gid, always_query_group_plugin,
env_reset, env_keep="COLORS DISPLAY HOSTNAME HISTSIZE KDEDIR
```

```
LS_COLORS",
```

```
env_keep+="MAIL PS1 PS2 QTDIR USERNAME LANG LC_ADDRESS LC_CTYPE",
```

```
env_keep+="LC_COLLATE LC_IDENTIFICATION LC_MEASUREMENT
```

```
LC_MESSAGES",
```

```
env_keep+="LC_MONETARY LC_NAME LC_NUMERIC LC_PAPER
```

```
LC_TELEPHONE",
```

```
env_keep+="LC_TIME LC_ALL LANGUAGE LINGUAS _XKB_CHARSET
```

```
XAUTHORITY KRB5CCNAME",
```

```
secure_path=/sbin\:/bin\:/usr/sbin\:/usr/bin
```

User `idm_user@idm.example.com` may run the following commands on `idmclient`:  
**(thirdpartyapp) /opt/third-party-app/bin/report**

- b. Run the **report** command as the **thirdpartyapp** service account.

```
[idm_user@idmclient ~]$ sudo -u thirdpartyapp /opt/third-party-app/bin/report
[sudo] password for idm_user@idm.example.com:
Executing report...
Report successful.
```

## 52.6. CREATING A SUDO RULE IN THE IDM WEBUI THAT RUNS A COMMAND AS A SERVICE ACCOUNT ON AN IDM CLIENT

In IdM, you can configure a **sudo** rule with a *RunAs alias* to run a **sudo** command as another user or group. For example, you might have an IdM client that hosts a database application, and you need to run commands as the local service account that corresponds to that application.

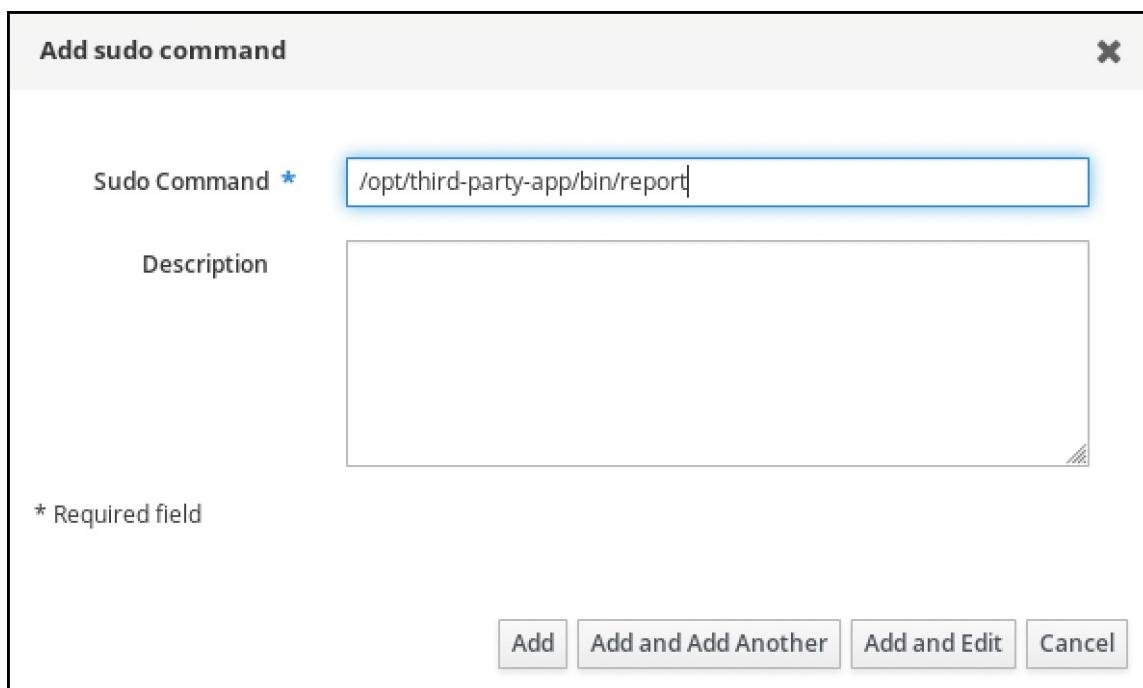
Use this example to create a **sudo** rule in the IdM WebUI called **run\_third-party-app\_report** to allow the **idm\_user** account to run the **/opt/third-party-app/bin/report** command as the **thirdpartyapp** service account on the **idmclient** host.

### Prerequisites

- You are logged in as IdM administrator.
- You have created a user account for **idm\_user** in IdM and unlocked the account by creating a password for the user. For details on adding a new IdM user using the CLI, see [Adding users using the command line](#).
- No local **idm\_user** account is present on the **idmclient** host. The **idm\_user** user is not listed in the local **/etc/passwd** file.
- You have a custom application named **third-party-app** installed on the **idmclient** host.
- The **report** command for the **third-party-app** application is installed in the **/opt/third-party-app/bin/report** directory.
- You have created a local service account named **thirdpartyapp** to execute commands for the **third-party-app** application.

### Procedure

1. Add the **/opt/third-party-app/bin/report** command to the IdM database of **sudo** commands:
  - a. Navigate to **Policy → Sudo → Sudo Commands**.
  - b. Click **Add** in the upper right corner to open the **Add sudo command** dialog box.
  - c. Enter the command: **/opt/third-party-app/bin/report**.



**Add sudo command** [X]

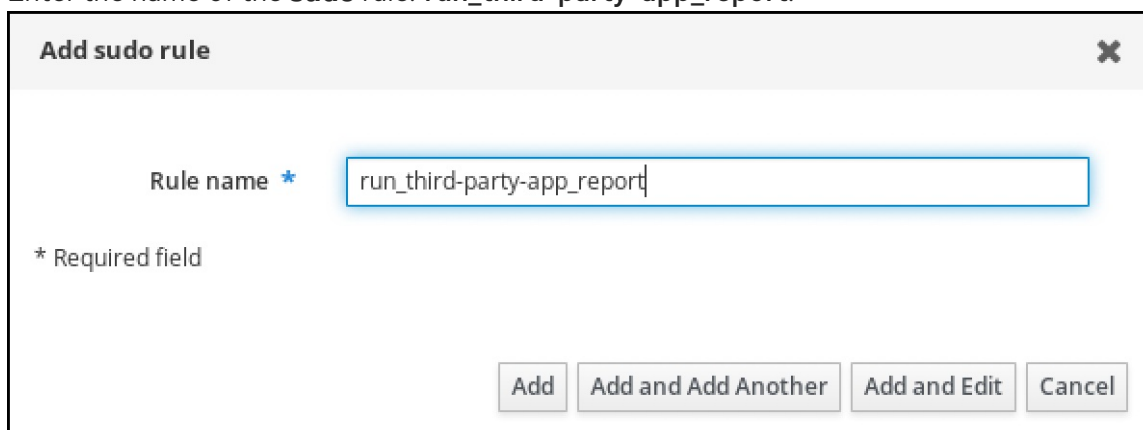
Sudo Command \*

Description

\* Required field

[Add] [Add and Add Another] [Add and Edit] [Cancel]

- d. Click **Add**.
2. Use the new **sudo** command entry to create the new **sudo** rule:
  - a. Navigate to **Policy → Sudo → Sudo rules**.
  - b. Click **Add** in the upper right corner to open the **Add sudo rule** dialog box.
  - c. Enter the name of the **sudo** rule: **run\_third-party-app\_report**.



**Add sudo rule** [X]

Rule name \*

\* Required field

[Add] [Add and Add Another] [Add and Edit] [Cancel]

- d. Click **Add and Edit**
- e. Specify the user:
  - i. In the **Who** section, check the **Specified Users and Groups** radio button.
  - ii. In the **User category the rule applies to** subsection, click **Add** to open the **Add users into sudo rule "run\_third-party-app\_report"** dialog box.
  - iii. In the **Add users into sudo rule "run\_third-party-app\_report"** dialog box in the **Available** column, check the **idm\_user** checkbox, and move it to the **Prospective** column.

iv. Click **Add**.

f. Specify the host:

- i. In the **Access this host** section, check the **Specified Hosts and Groups** radio button.
- ii. In the **Host category this rule applies to** subsection, click **Add** to open the **Add hosts into sudo rule "run\_third-party-app\_report"** dialog box.
- iii. In the **Add hosts into sudo rule "run\_third-party-app\_report"** dialog box in the **Available** column, check the **idmclient.idm.example.com** checkbox, and move it to the **Prospective** column.

iv. Click **Add**.

g. Specify the commands:

- i. In the **Command category the rule applies to** subsection of the **Run Commands** section, check the **Specified Commands and Groups** radio button.

- ii. In the **Sudo Allow Commands** subsection, click **Add** to open the **Add allow sudo commands into sudo rule "run\_third-party-app\_report"** dialog box.
- iii. In the **Add allow sudo commands into sudo rule "run\_third-party-app\_report"** dialog box in the **Available** column, check the **/opt/third-party-app/bin/report** checkbox, and move it to the **Prospective** column.

**Add allow sudo commands into sudo rule 'run\_third-party-app\_report'**

Filter available Sudo Commands Filter

| Available                |               |  | Prospective                         |                                 |
|--------------------------|---------------|--|-------------------------------------|---------------------------------|
| <input type="checkbox"/> | Sudo Commands | <span style="border: 2px solid red; padding: 2px;">&gt;</span> | <input type="checkbox"/>            | Sudo Commands                   |
| <input type="checkbox"/> | help          | <span>&lt;</span>  | <input checked="" type="checkbox"/> | /opt/third-party-app/bin/report |

Add Cancel

- iv. Click **Add** to return to the **run\_third-party-app\_report** page.
- h. Specify the RunAs user:
  - i. In the **As Whom** section, check the **Specified Users and Groups** radio button.
  - ii. In the **RunAs Users** subsection, click **Add** to open the **Add RunAs users into sudo rule "run\_third-party-app\_report"** dialog box.
  - iii. In the **Add RunAs users into sudo rule "run\_third-party-app\_report"** dialog box, enter the **thirdpartyapp** service account in the **External** box and move it to the **Prospective** column.

**Add RunAs users into sudo rule 'run\_third-party-app\_report'**

Filter available Users Filter

| Available                |          |  | Prospective              |       |
|--------------------------|----------|--|--------------------------|-------|
| <input type="checkbox"/> | Users    | <span style="border: 2px solid red; padding: 2px;">&gt;</span> | <input type="checkbox"/> | Users |
| <input type="checkbox"/> | admin    | <span>&lt;</span>  |                          |       |
| <input type="checkbox"/> | employee |  |                          |       |
| <input type="checkbox"/> | helpdesk |  |                          |       |
| <input type="checkbox"/> | manager  |  |                          |       |

External

Add Cancel

- iv. Click **Add** to return to the **run\_third-party-app\_report** page.
- i. Click **Save** in the top left corner.

The new rule is enabled by default.

**Figure 52.3. Details of the sudo rule**

### Who

User category the rule applies to: ☐ Anyone ☒ Specified Users and Groups

|   |          |                              |
|---|----------|------------------------------|
| <input type="checkbox"/> Users                    | External | Delete <a href="#">+ Add</a> |
| <input type="checkbox"/> <a href="#">idm_user</a> |          |                              |

|                                      |                              |
|--------------------------------------|------------------------------|
| <input type="checkbox"/> User Groups | Delete <a href="#">+ Add</a> |
|--------------------------------------|------------------------------|

### Access this host

Host category the rule applies to: ☐ Any Host ☒ Specified Hosts and Groups

|  |          |                              |
|--|----------|------------------------------|
| <input type="checkbox"/> Hosts                                     | External | Delete <a href="#">+ Add</a> |
| <input type="checkbox"/> <a href="#">idmclient.idm.example.com</a> |          |                              |

|                                      |                              |
|--------------------------------------|------------------------------|
| <input type="checkbox"/> Host Groups | Delete <a href="#">+ Add</a> |
|--------------------------------------|------------------------------|

### Run Commands

Command category the rule applies to: ☐ Any Command ☒ Specified Commands and Groups

### Allow

|  |                              |
|--|------------------------------|
| <input type="checkbox"/> Sudo Allow Commands                             | Delete <a href="#">+ Add</a> |
| <input type="checkbox"/> <a href="#">/opt/third-party-app/bin/report</a> |                              |

|  |                              |
|--|------------------------------|
| <input type="checkbox"/> Sudo Allow Command Groups | Delete <a href="#">+ Add</a> |
|--|------------------------------|

### Deny

|   |                              |
|---|------------------------------|
| <input type="checkbox"/> Sudo Deny Commands | Delete <a href="#">+ Add</a> |
|---|------------------------------|

|   |                              |
|---|------------------------------|
| <input type="checkbox"/> Sudo Deny Command Groups | Delete <a href="#">+ Add</a> |
|---|------------------------------|

### As Whom

RunAs User category the rule applies to: ☐ Anyone ☒ Specified Users and Groups

|  |          |                              |
|--|----------|------------------------------|
| <input type="checkbox"/> RunAs Users                   | External | Delete <a href="#">+ Add</a> |
| <input type="checkbox"/> <a href="#">thirdpartyapp</a> | True     |                              |

|  |                              |
|--|------------------------------|
| <input type="checkbox"/> Groups of RunAs Users | Delete <a href="#">+ Add</a> |
|--|------------------------------|

RunAs Group category the rule applies to: ☐ Any Group ☒ Specified Groups

|                                       |          |                              |
|---------------------------------------|----------|------------------------------|
| <input type="checkbox"/> RunAs Groups | External | Delete <a href="#">+ Add</a> |
|---------------------------------------|----------|------------------------------|



## NOTE

Propagating the changes from the server to the client can take a few minutes.

## Verification steps

1. Log in to the **idmclient** host as the **idm\_user** account.
2. Test the new sudo rule:



- a. Display which **sudo** rules the **idm\_user** account is allowed to perform.

```
[idm_user@idmclient ~]$ sudo -l
Matching Defaults entries for idm_user@idm.example.com on idmclient:
    !visiblepw, always_set_home, match_group_by_gid, always_query_group_plugin,
    env_reset, env_keep="COLORS DISPLAY HOSTNAME HISTSIZE KDEDIR
    LS_COLORS",
    env_keep+="MAIL PS1 PS2 QTDIR USERNAME LANG LC_ADDRESS LC_CTYPE",
    env_keep+="LC_COLLATE LC_IDENTIFICATION LC_MEASUREMENT
    LC_MESSAGES",
    env_keep+="LC_MONETARY LC_NAME LC_NUMERIC LC_PAPER
    LC_TELEPHONE",
    env_keep+="LC_TIME LC_ALL LANGUAGE LINGUAS _XKB_CHARSET
    XAUTHORITY KRB5CCNAME",
    secure_path="/sbin:/bin:/usr/sbin:/usr/bin

User idm_user@idm.example.com may run the following commands on idmclient:
    (thirdpartyapp) /opt/third-party-app/bin/report
```

- b. Run the **report** command as the **thirdpartyapp** service account.

```
[idm_user@idmclient ~]$ sudo -u thirdpartyapp /opt/third-party-app/bin/report
[sudo] password for idm_user@idm.example.com:
Executing report...
Report successful.
```

## 52.7. ENABLING GSSAPI AUTHENTICATION FOR SUDO ON AN IDM CLIENT

The following procedure describes enabling Generic Security Service Application Program Interface (GSSAPI) authentication on an IdM client for the **sudo** and **sudo -i** commands via the **pam\_sss\_gss.so** PAM module. With this configuration, IdM users can authenticate to the **sudo** command with their Kerberos ticket.

### Prerequisites

- You have created a **sudo** rule for an IdM user that applies to an IdM host. For this example, you have created the **idm\_user\_reboot sudo** rule to grant the **idm\_user** account the permission to run the **/usr/sbin/reboot** command on the **idmclient** host.
- The **idmclient** host is running RHEL 8.4 or later.
- You need **root** privileges to modify the **/etc/sss/sss.conf** file and PAM files in the **/etc/pam.d/** directory.

### Procedure

1. Open the **/etc/sss/sss.conf** configuration file.
2. Add the following entry to the **[domain/<domain\_name>]** section.

```
[domain/<domain_name>]
pam_gssapi_services = sudo, sudo-i
```

3. Save and close the **/etc/sss/sss.conf** file.
4. Restart the SSSD service to load the configuration changes.

```
[root@idmclient ~]# systemctl restart sssd
```

5. If you are running RHEL 8.8 or later:
  - a. [Optional] Determine if you have selected the **sss authselect** profile:

```
# authselect current
Profile ID: sssd
```

The output says that the **sss authselect** profile is selected.

- b. If the **sss authselect** profile is selected, enable GSSAPI authentication:

```
# authselect enable-feature with-gssapi
```

- c. If the **sss authselect** profile is not selected, select it and enable GSSAPI authentication:

```
# authselect select sssd with-gssapi
```

6. If you are running RHEL 8.7 or earlier:
  - a. Open the **/etc/pam.d/sudo** PAM configuration file.
  - b. Add the following entry as the first line of the **auth** section in the **/etc/pam.d/sudo** file.

```
##PAM-1.0
auth sufficient pam_sss_gss.so
auth include system-auth
account include system-auth
password include system-auth
session include system-auth
```

- c. Save and close the **/etc/pam.d/sudo** file.

## Verification steps

1. Log into the host as the **idm\_user** account.

```
[root@idm-client ~]# ssh -l idm_user@idm.example.com localhost
idm_user@idm.example.com's password:
```

2. Verify that you have a ticket-granting ticket as the **idm\_user** account.

```
[idmuser@idmclient ~]$ klist
Ticket cache: KCM:1366201107
Default principal: idm_user@IDM.EXAMPLE.COM
```

| Valid starting | Expires | Service principal |
|----------------|---------|-------------------|
|----------------|---------|-------------------|

```
01/08/2021 09:11:48 01/08/2021 19:11:48
krbtgt/IDM.EXAMPLE.COM@IDM.EXAMPLE.COM
renew until 01/15/2021 09:11:44
```

3. (Optional) If you do not have Kerberos credentials for the **idm\_user** account, delete your current Kerberos credentials and request the correct ones.

```
[idm_user@idmclient ~]$ kdestroy -A

[idm_user@idmclient ~]$ kinit idm_user@IDM.EXAMPLE.COM
Password for idm_user@idm.example.com:
```

4. Reboot the machine using **sudo**, without specifying a password.

```
[idm_user@idmclient ~]$ sudo /usr/sbin/reboot
```

### Additional resources

- The GSSAPI entry in the [IdM terminology](#) listing
- [Granting sudo access to an IdM user on an IdM client using IdM Web UI](#)
- [Granting sudo access to an IdM user on an IdM client using the CLI](#)
- **pam\_sss\_gss (8)** man page
- **sssd.conf (5)** man page

## 52.8. ENABLING GSSAPI AUTHENTICATION AND ENFORCING KERBEROS AUTHENTICATION INDICATORS FOR SUDO ON AN IDM CLIENT

The following procedure describes enabling Generic Security Service Application Program Interface (GSSAPI) authentication on an IdM client for the **sudo** and **sudo -i** commands via the **pam\_sss\_gss.so** PAM module. Additionally, only users who have logged in with a smart card will authenticate to those commands with their Kerberos ticket.



### NOTE

You can use this procedure as a template to configure GSSAPI authentication with SSSD for other PAM-aware services, and further restrict access to only those users that have a specific authentication indicator attached to their Kerberos ticket.

### Prerequisites

- You have created a **sudo** rule for an IdM user that applies to an IdM host. For this example, you have created the **idm\_user\_reboot sudo** rule to grant the **idm\_user** account the permission to run the **/usr/sbin/reboot** command on the **idmclient** host.
- You have configured smart card authentication for the **idmclient** host.
- The **idmclient** host is running RHEL 8.4 or later.

- You need **root** privileges to modify the **/etc/sss/sss.conf** file and PAM files in the **/etc/pam.d/** directory.

## Procedure

1. Open the **/etc/sss/sss.conf** configuration file.
2. Add the following entries to the **[domain/<domain\_name>]** section.

```
[domain/<domain_name>]
pam_gssapi_services = sudo, sudo-i
pam_gssapi_indicators_map = sudo:pkinit, sudo-i:pkinit
```

3. Save and close the **/etc/sss/sss.conf** file.
4. Restart the SSSD service to load the configuration changes.

```
[root@idmclient ~]# systemctl restart sssd
```

5. Open the **/etc/pam.d/sudo** PAM configuration file.
6. Add the following entry as the first line of the **auth** section in the **/etc/pam.d/sudo** file.

```
 #%PAM-1.0
auth sufficient pam_sss_gss.so
auth include system-auth
account include system-auth
password include system-auth
session include system-auth
```

7. Save and close the **/etc/pam.d/sudo** file.
8. Open the **/etc/pam.d/sudo-i** PAM configuration file.
9. Add the following entry as the first line of the **auth** section in the **/etc/pam.d/sudo-i** file.

```
 #%PAM-1.0
auth sufficient pam_sss_gss.so
auth include sudo
account include sudo
password include sudo
session optional pam_keyinit.so force revoke
session include sudo
```

10. Save and close the **/etc/pam.d/sudo-i** file.

## Verification steps

1. Log into the host as the **idm\_user** account and authenticate with a smart card.

```
[root@idmclient ~]# ssh -l idm_user@idm.example.com localhost
PIN for smart_card
```

2. Verify that you have a ticket-granting ticket as the smart card user.

```
[idm_user@idmclient ~]$ klist
Ticket cache: KEYRING:persistent:1358900015:krb_cache_TObtNMd
Default principal: idm_user@IDM.EXAMPLE.COM
```

```
Valid starting    Expires          Service principal
02/15/2021 16:29:48 02/16/2021 02:29:48
krbtgt/IDM.EXAMPLE.COM@IDM.EXAMPLE.COM
renew until 02/22/2021 16:29:44
```

3. Display which **sudo** rules the **idm\_user** account is allowed to perform.

```
[idm_user@idmclient ~]$ sudo -l
Matching Defaults entries for idmuser on idmclient:
    !visiblepw, always_set_home, match_group_by_gid, always_query_group_plugin,
    env_reset, env_keep="COLORS DISPLAY HOSTNAME HISTSIZE KDEDIR
    LS_COLORS",
    env_keep+="MAIL PS1 PS2 QTDIR USERNAME LANG LC_ADDRESS LC_CTYPE",
    env_keep+="LC_COLLATE LC_IDENTIFICATION LC_MEASUREMENT
    LC_MESSAGES",
    env_keep+="LC_MONETARY LC_NAME LC_NUMERIC LC_PAPER LC_TELEPHONE",
    env_keep+="LC_TIME LC_ALL LANGUAGE LINGUAS _XKB_CHARSET XAUTHORITY
    KRB5CCNAME",
    secure_path="/sbin:/bin:/usr/sbin:/usr/bin

User idm_user may run the following commands on idmclient:
    (root) /usr/sbin/reboot
```

4. Reboot the machine using **sudo**, without specifying a password.

```
[idm_user@idmclient ~]$ sudo /usr/sbin/reboot
```

#### Additional resources

- [SSSD options controlling GSSAPI authentication for PAM services](#)
- The [GSSAPI](#) entry in the [IdM terminology](#) listing
- [Configuring Identity Management for smart card authentication](#)
- [Kerberos authentication indicators](#)
- [Granting sudo access to an IdM user on an IdM client using IdM Web UI](#)
- [Granting sudo access to an IdM user on an IdM client using the CLI](#)
- [pam\\_sss\\_gss \(8\)](#) man page
- [sssd.conf \(5\)](#) man page

## 52.9. SSSD OPTIONS CONTROLLING GSSAPI AUTHENTICATION FOR PAM SERVICES

You can use the following options for the `/etc/sss/sssd.conf` configuration file to adjust the GSSAPI configuration within the SSSD service.

### **pam\_gssapi\_services**

GSSAPI authentication with SSSD is disabled by default. You can use this option to specify a comma-separated list of PAM services that are allowed to try GSSAPI authentication using the **pam\_sss\_gss.so** PAM module. To explicitly disable GSSAPI authentication, set this option to **-**.

### **pam\_gssapi\_indicators\_map**

This option only applies to Identity Management (IdM) domains. Use this option to list Kerberos authentication indicators that are required to grant PAM access to a service. Pairs must be in the format **<PAM\_service>:<required\_authentication\_indicator>\_**.

Valid authentication indicators are:

- **otp** for two-factor authentication
- **radius** for RADIUS authentication
- **pkinit** for PKINIT, smart card, or certificate authentication
- **hardened** for hardened passwords

### **pam\_gssapi\_check\_upn**

This option is enabled and set to **true** by default. If this option is enabled, the SSSD service requires that the user name matches the Kerberos credentials. If **false**, the **pam\_sss\_gss.so** PAM module authenticates every user that is able to obtain the required service ticket.

## **Examples**

The following options enable Kerberos authentication for the **sudo** and **sudo-i** services, requires that **sudo** users authenticated with a one-time password, and user names must match the Kerberos principal. Because these settings are in the **[pam]** section, they apply to all domains:

```
[pam]
pam_gssapi_services = sudo, sudo-i
pam_gssapi_indicators_map = sudo:otp
pam_gssapi_check_upn = true
```

You can also set these options in individual **[domain]** sections to overwrite any global values in the **[pam]** section. The following options apply different GSSAPI settings to each domain:

### **For the `idm.example.com` domain**

- Enable GSSAPI authentication for the **sudo** and **sudo -i** services.
- Require certificate or smart card authentication authenticators for the **sudo** command.
- Require one-time password authentication authenticators for the **sudo -i** command.
- Enforce matching user names and Kerberos principals.

### **For the `ad.example.com` domain**

- Enable GSSAPI authentication only for the **sudo** service.
- Do not enforce matching user names and principals.

```
[domain/idm.example.com]
```

```

pam_gssapi_services = sudo, sudo-i
pam_gssapi_indicators_map = sudo:pkinit, sudo-i:otp
pam_gssapi_check_upn = true
...

[domain/ad.example.com]
pam_gssapi_services = sudo
pam_gssapi_check_upn = false
...

```

### Additional resources

- [Kerberos authentication indicators](#)

## 52.10. TROUBLESHOOTING GSSAPI AUTHENTICATION FOR SUDO

If you are unable to authenticate to the **sudo** service with a Kerberos ticket from IdM, use the following scenarios to troubleshoot your configuration.

### Prerequisites

- You have enabled GSSAPI authentication for the **sudo** service. See [Enabling GSSAPI authentication for sudo on an IdM client](#).
- You need **root** privileges to modify the `/etc/sss/sss.conf` file and PAM files in the `/etc/pam.d/` directory.

### Procedure

- If you see the following error, the Kerberos service might not be able to resolve the correct realm for the service ticket based on the host name:

```
Server not found in Kerberos database
```

In this situation, add the hostname directly to `[domain_realm]` section in the `/etc/krb5.conf` Kerberos configuration file:

```

[idm-user@idm-client ~]$ cat /etc/krb5.conf
...

[domain_realm]
.example.com = EXAMPLE.COM
example.com = EXAMPLE.COM
server.example.com = EXAMPLE.COM

```

- If you see the following error, you do not have any Kerberos credentials:

```
No Kerberos credentials available
```

In this situation, retrieve Kerberos credentials with the **kinit** utility or authenticate with SSSD:

```

[idm-user@idm-client ~]$ kinit idm-user@IDM.EXAMPLE.COM
Password for idm-user@idm.example.com:

```

- If you see either of the following errors in the `/var/log/sss/sss_pam.log` log file, the Kerberos credentials do not match the username of the user currently logged in:

```
User with UPN [<UPN>] was not found.
```

```
UPN [<UPN>] does not match target user [<username>].
```

In this situation, verify that you authenticated with SSSD, or consider disabling the `pam_gssapi_check_upn` option in the `/etc/sss/sss.conf` file:

```
[idm-user@idm-client ~]$ cat /etc/sss/sss.conf
```

```
...
```

```
pam_gssapi_check_upn = false
```

- For additional troubleshooting, you can enable debugging output for the `pam_sss_gss.so` PAM module.
  - Add the **debug** option at the end of all `pam_sss_gss.so` entries in PAM files, such as `/etc/pam.d/sudo` and `/etc/pam.d/sudo-i`:

```
[root@idm-client ~]# cat /etc/pam.d/sudo
#%PAM-1.0
auth    sufficient pam_sss_gss.so  debug
auth    include     system-auth
account include     system-auth
password include     system-auth
session include     system-auth
```

```
[root@idm-client ~]# cat /etc/pam.d/sudo-i
#%PAM-1.0
auth    sufficient pam_sss_gss.so  debug
auth    include     sudo
account include     sudo
password include     sudo
session optional    pam_keyinit.so force revoke
session include     sudo
```

- Try to authenticate with the `pam_sss_gss.so` module and review the console output. In this example, the user did not have any Kerberos credentials.

```
[idm-user@idm-client ~]$ sudo ls -l /etc/sss/sss.conf
pam_sss_gss: Initializing GSSAPI authentication with SSSD
pam_sss_gss: Switching euid from 0 to 1366201107
pam_sss_gss: Trying to establish security context
pam_sss_gss: SSSD User name: idm-user@idm.example.com
pam_sss_gss: User domain: idm.example.com
pam_sss_gss: User principal:
pam_sss_gss: Target name: host@idm.example.com
pam_sss_gss: Using ccache: KCM:
pam_sss_gss: Acquiring credentials, principal name will be derived
pam_sss_gss: Unable to read credentials from [KCM:] [maj:0xd0000, min:0x96c73ac3]
pam_sss_gss: GSSAPI: Unspecified GSS failure.  Minor code may provide more
information
```



```
pam_sss_gss: GSSAPI: No credentials cache found
pam_sss_gss: Switching euid from 1366200907 to 0
pam_sss_gss: System error [5]: Input/output error
```

## 52.11. USING AN ANSIBLE PLAYBOOK TO ENSURE SUDO ACCESS FOR AN IDM USER ON AN IDM CLIENT

In Identity Management (IdM), you can ensure **sudo** access to a specific command is granted to an IdM user account on a specific IdM host.

Complete this procedure to ensure a **sudo** rule named **idm\_user\_reboot** exists. The rule grants **idm\_user** the permission to run the **/usr/sbin/reboot** command on the **idmclient** machine.

### Prerequisites

- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the **~/MyPlaybooks/** directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipaadmin\_password**.
- You have [ensured the presence of a user account for idm\\_user in IdM and unlocked the account by creating a password for the user](#). For details on adding a new IdM user using the command-line interface, see link: [Adding users using the command line](#).
- No local **idm\_user** account exists on **idmclient**. The **idm\_user** user is not listed in the **/etc/passwd** file on **idmclient**.

### Procedure

1. Create an inventory file, for example **inventory.file**, and define **ipaservers** in it:

```
[ipaservers]
server.idm.example.com
```

2. Add one or more **sudo** commands:
  - a. Create an **ensure-reboot-sudocmd-is-present.yml** Ansible playbook that ensures the presence of the **/usr/sbin/reboot** command in the IdM database of **sudo** commands. To simplify this step, you can copy and modify the example in the **/usr/share/doc/ansible-freeipa/playbooks/sudocmd/ensure-sudocmd-is-present.yml** file:

```
---
- name: Playbook to manage sudo command
  hosts: ipaserver

  vars_files:
    - /home/user_name/MyPlaybooks/secret.yml
  tasks:
    # Ensure sudo command is present
```

```
- ipasudocmd:
  ipadmin_password: "{{ ipadmin_password }}"
  name: /usr/sbin/reboot
  state: present
```

- b. Run the playbook:

```
$ ansible-playbook --vault-password-file=password_file -v -i
path_to_inventory_directory/inventory.file path_to_playbooks_directory/ensure-
reboot-sudocmd-is-present.yml
```

3. Create a **sudo** rule that references the commands:

- a. Create an **ensure-sudorule-for-idmuser-on-idmclient-is-present.yml** Ansible playbook that uses the **sudo** command entry to ensure the presence of a sudo rule. The sudo rule allows **idm\_user** to reboot the **idmclient** machine. To simplify this step, you can copy and modify the example in the **/usr/share/doc/ansible-freeipa/playbooks/sudorule/ensure-sudorule-is-present.yml** file:

```
---
- name: Tests
  hosts: ipaserver

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  # Ensure a sudorule is present granting idm_user the permission to run /usr/sbin/reboot
  on idmclient
  - ipasudorule:
    ipadmin_password: "{{ ipadmin_password }}"
    name: idm_user_reboot
    description: A test sudo rule.
    allow_sudocmd: /usr/sbin/reboot
    host: idmclient.idm.example.com
    user: idm_user
    state: present
```

- b. Run the playbook:

```
$ ansible-playbook -v -i path_to_inventory_directory/inventory.file
path_to_playbooks_directory/ensure-sudorule-for-idmuser-on-idmclient-is-
present.yml
```

## Verification steps

Test that the **sudo** rule whose presence you have ensured on the IdM server works on **idmclient** by verifying that **idm\_user** can reboot **idmclient** using **sudo**. Note that it can take a few minutes for the changes made on the server to take effect on the client.

1. Log in to **idmclient** as **idm\_user**.
2. Reboot the machine using **sudo**. Enter the password for **idm\_user** when prompted:

```
$ sudo /usr/sbin/reboot
[sudo] password for idm_user:
```

If **sudo** is configured correctly, the machine reboots.

#### Additional resources

- See the **README-sudocmd.md**, **README-sudocmdgroup.md**, and **README-sudorule.md** files in the **/usr/share/doc/ansible-freeipa/** directory.

## CHAPTER 53. ENSURING THE PRESENCE OF HOST-BASED ACCESS CONTROL RULES IN IDM USING ANSIBLE PLAYBOOKS

Ansible is an automation tool used to configure systems, deploy software, and perform rolling updates. It includes support for Identity Management (IdM).

Learn more about Identity Management (IdM) host-based access policies and how to define them using [Ansible](#).

### 53.1. HOST-BASED ACCESS CONTROL RULES IN IDM

Host-based access control (HBAC) rules define which users or user groups can access which hosts or host groups by using which services or services in a service group. As a system administrator, you can use HBAC rules to achieve the following goals:

- Limit access to a specified system in your domain to members of a specific user group.
- Allow only a specific service to be used to access systems in your domain.

By default, IdM is configured with a default HBAC rule named **allow\_all**, which means universal access to every host for every user via every relevant service in the entire IdM domain.

You can fine-tune access to different hosts by replacing the default **allow\_all** rule with your own set of HBAC rules. For centralized and simplified access control management, you can apply HBAC rules to user groups, host groups, or service groups instead of individual users, hosts, or services.

### 53.2. ENSURING THE PRESENCE OF AN HBAC RULE IN IDM USING AN ANSIBLE PLAYBOOK

Follow this procedure to ensure the presence of a host-based access control (HBAC) rule in Identity Management (IdM) using an Ansible playbook.

#### Prerequisites

- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipaadmin\_password**.
- The users and user groups you want to use for your HBAC rule exist in IdM. See [Managing user accounts using Ansible playbooks](#) and [Ensuring the presence of IdM groups and group members using Ansible playbooks](#) for details.
- The hosts and host groups to which you want to apply your HBAC rule exist in IdM. See [Managing hosts using Ansible playbooks](#) and [Managing host groups using Ansible playbooks](#) for details.

## Procedure

1. Create an inventory file, for example **inventory.file**, and define **ipaserver** in it:

```
[ipaserver]
server.idm.example.com
```

2. Create your Ansible playbook file that defines the HBAC policy whose presence you want to ensure. To simplify this step, you can copy and modify the example in the **/usr/share/doc/ansible-freeipa/playbooks/hbacrule/ensure-hbacrule-allhosts-present.yml** file:

```
---
- name: Playbook to handle hbacrules
  hosts: ipaserver

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  # Ensure idm_user can access client.idm.example.com via the sshd service
  - ipahbacrule:
    ipaadmin_password: "{{ ipaadmin_password }}"
    name: login
    user: idm_user
    host: client.idm.example.com
    hbacsvc:
    - sshd
    state: present
```

3. Run the playbook:

```
$ ansible-playbook --vault-password-file=password_file -v -i
path_to_inventory_directory/inventory.file path_to_playbooks_directory/ensure-new-
hbacrule-present.yml
```

## Verification steps

1. Log in to the IdM Web UI as administrator.
2. Navigate to **Policy → Host-Based-Access-Control → HBAC Test**
3. In the **Who** tab, select **idm\_user**.
4. In the **Accessing** tab, select **client.idm.example.com**.
5. In the **Via service** tab, select **sshd**.
6. In the **Rules** tab, select **login**.
7. In the **Run test** tab, click the **Run test** button. If you see ACCESS GRANTED, the HBAC rule is implemented successfully.

## Additional resources

- See the **README-hbacsvc.md**, **README-hbacsvcgroup.md**, and **README-hbacrule.md** files in the **/usr/share/doc/ansible-freeipa** directory.
- See the playbooks in the subdirectories of the **/usr/share/doc/ansible-freeipa/playbooks** directory.

## CHAPTER 54. MANAGING REPLICATION TOPOLOGY

This chapter describes how to manage replication between servers in an Identity Management (IdM) domain.

### Additional resources

- [Planning the replica topology](#)

### 54.1. EXPLAINING REPLICATION AGREEMENTS, TOPOLOGY SUFFIXES AND TOPOLOGY SEGMENTS

When you create a replica, Identity Management (IdM) creates a replication agreement between the initial server and the replica. The data that is replicated is then stored in topology suffixes and when two replicas have a replication agreement between their suffixes, the suffixes form a topology segment. These concepts are explained in more detail in the following sections:

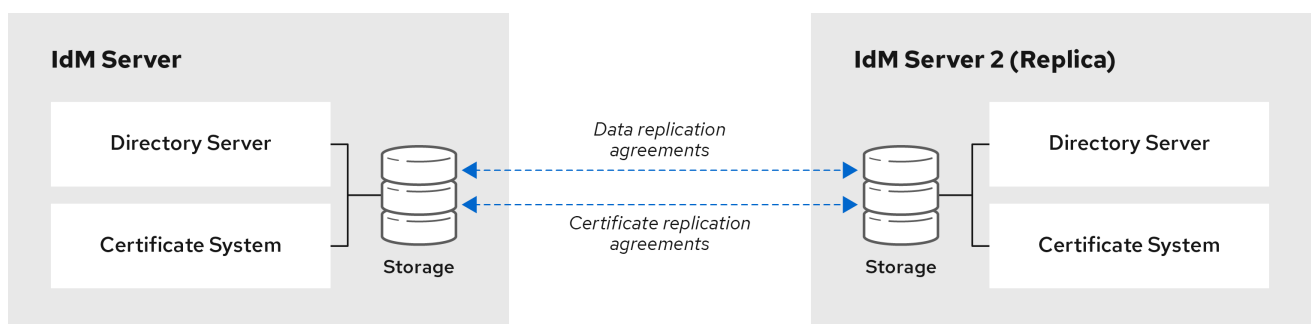
- [Replication agreements](#)
- [Topology suffixes](#)
- [Topology segments](#)

#### 54.1.1. Replication agreements between IdM replicas

When an administrator creates a replica based on an existing server, Identity Management (IdM) creates a *replication agreement* between the initial server and the replica. The replication agreement ensures that the data and configuration is continuously replicated between the two servers.

IdM uses *multiple read/write replica replication*. In this configuration, all replicas joined in a replication agreement receive and provide updates, and are therefore considered suppliers and consumers. Replication agreements are always bilateral.

Figure 54.1. Server and replica agreements



64\_RHEL\_0120

IdM uses two types of replication agreements:

#### Domain replication agreements

These agreements replicate the identity information.

#### Certificate replication agreements

These agreements replicate the certificate information.

Both replication channels are independent. Two servers can have one or both types of replication agreements configured between them. For example, when server A and server B have only domain replication agreement configured, only identity information is replicated between them, not the certificate information.

### 54.1.2. Topology suffixes

*Topology suffixes* store the data that is replicated. IdM supports two types of topology suffixes: **domain** and **ca**. Each suffix represents a separate server, a separate replication topology.

When a replication agreement is configured, it joins two topology suffixes of the same type on two different servers.

#### The **domain** suffix: `dc=example,dc=com`

The **domain** suffix contains all domain-related data.

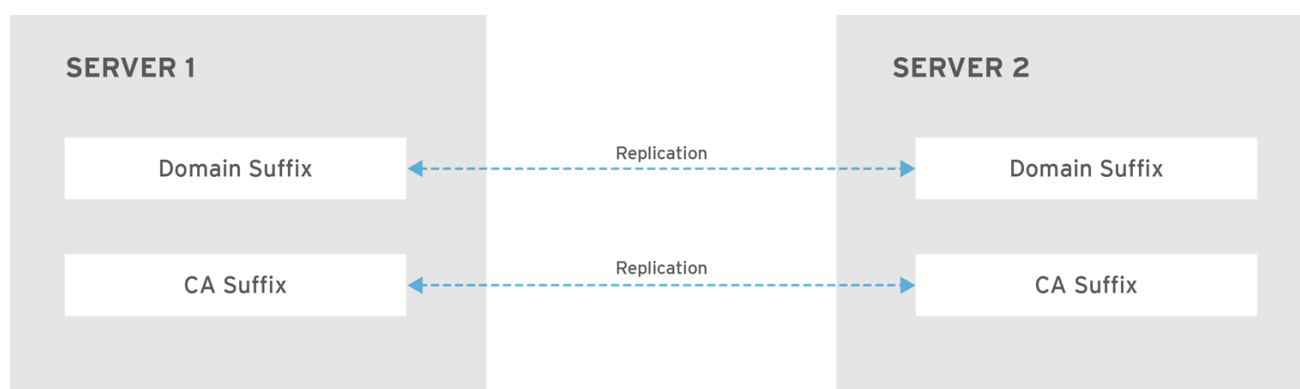
When two replicas have a replication agreement between their **domain** suffixes, they share directory data, such as users, groups, and policies.

#### The **ca** suffix: `o=ipaca`

The **ca** suffix contains data for the Certificate System component. It is only present on servers with a certificate authority (CA) installed.

When two replicas have a replication agreement between their **ca** suffixes, they share certificate data.

Figure 54.2. Topology suffixes



RHEL\_404973\_0916

An initial topology replication agreement is set up between two servers by the **ipa-replica-install** script when installing a new replica.

#### Example 54.1. Viewing topology suffixes

The **ipa topologysuffix-find** command displays a list of topology suffixes:

```

$ ipa topologysuffix-find
-----
2 topology suffixes matched
-----
Suffix name: ca
Managed LDAP suffix DN: o=ipaca

Suffix name: domain
  
```



```
Managed LDAP suffix DN: dc=example,dc=com
```

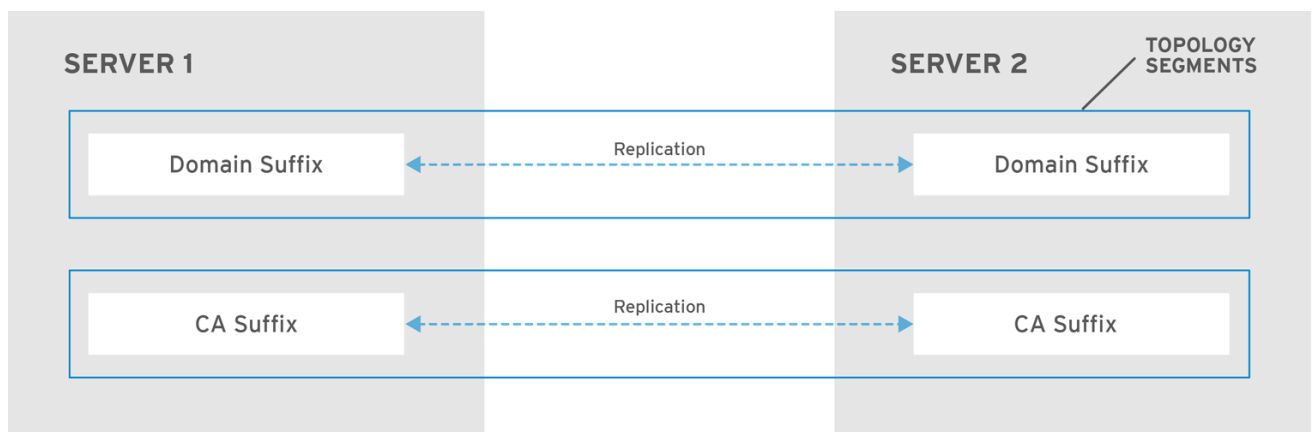
```
-----
Number of entries returned 2
-----
```

### 54.1.3. Topology segments

When two replicas have a replication agreement between their suffixes, the suffixes form a *topology segment*. Each topology segment consists of a *left node* and a *right node*. The nodes represent the servers joined in the replication agreement.

Topology segments in IdM are always bidirectional. Each segment represents two replication agreements: from server A to server B, and from server B to server A. The data is therefore replicated in both directions.

Figure 54.3. Topology segments



RHEL\_404973\_0916

#### Example 54.2. Viewing topology segments

The **ipa topologysegment-find** command shows the current topology segments configured for the domain or CA suffixes. For example, for the domain suffix:

```
$ ipa topologysegment-find
Suffix name: domain
-----
1 segment matched
-----
Segment name: server1.example.com-to-server2.example.com
Left node: server1.example.com
Right node: server2.example.com
Connectivity: both
-----
Number of entries returned 1
-----
```

In this example, domain-related data is only replicated between two servers: **server1.example.com** and **server2.example.com**.

To display details for a particular segment only, use the **ipa topologysegment-show** command:

```
$ ipa topologysegment-show
Suffix name: domain
Segment name: server1.example.com-to-server2.example.com
Segment name: server1.example.com-to-server2.example.com
Left node: server1.example.com
Right node: server2.example.com
Connectivity: both
```

## 54.2. USING THE TOPOLOGY GRAPH TO MANAGE REPLICATION TOPOLOGY

The topology graph in the web UI shows the relationships between the servers in the domain. Using the Web UI, you can manipulate and transform the representation of the topology.

### Accessing the topology graph

To access the topology graph:

1. Select **IPA Server** → **Topology** → **Topology Graph**.
2. If you make any changes to the topology that are not immediately reflected in the graph, click **Refresh**.

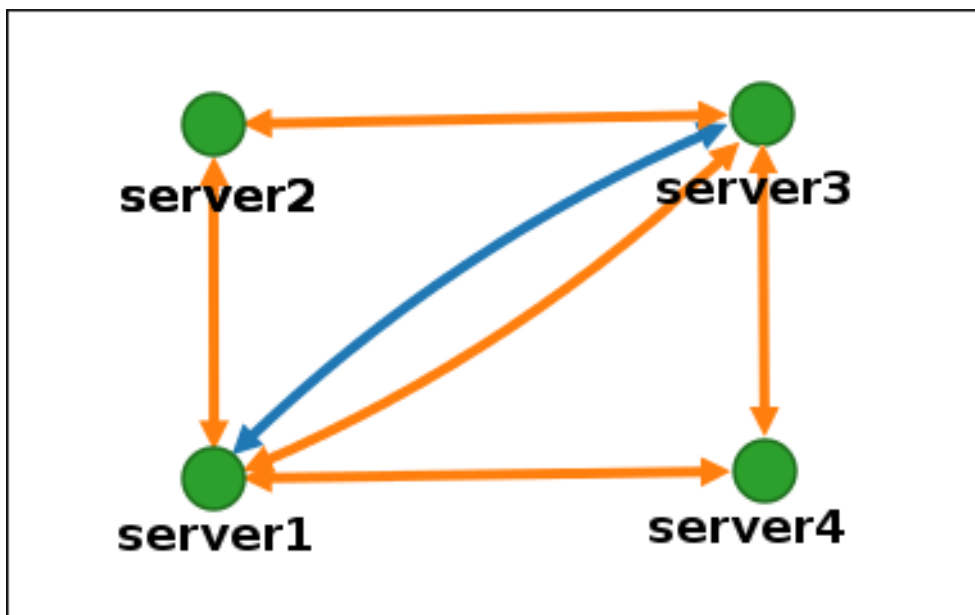
### Interpreting the topology graph

Servers joined in a domain replication agreement are connected by an orange arrow. Servers joined in a CA replication agreement are connected by a blue arrow.

### Topology graph example: recommended topology

The recommended topology example below shows one of the possible recommended topologies for four servers: each server is connected to at least two other servers, and more than one server is a CA server.

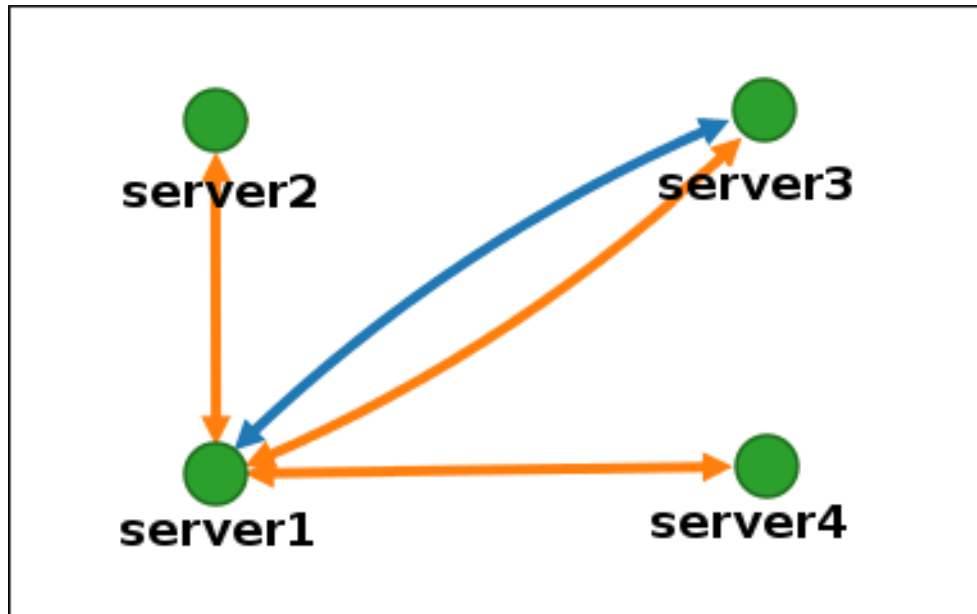
Figure 54.4. Recommended topology example



### Topology graph example: discouraged topology

In the discouraged topology example below, **server1** is a single point of failure. All the other servers have replication agreements with this server, but not with any of the other servers. Therefore, if **server1** fails, all the other servers will become isolated. Avoid creating topologies like this.

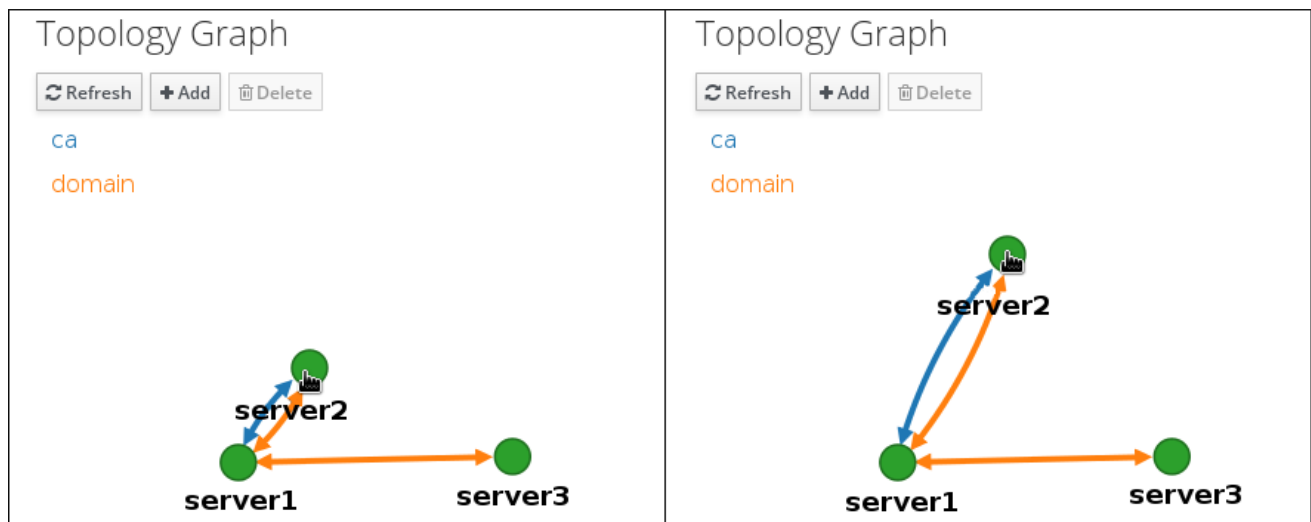
Figure 54.5. Discouraged topology example: Single Point of Failure



### Customizing the topology view

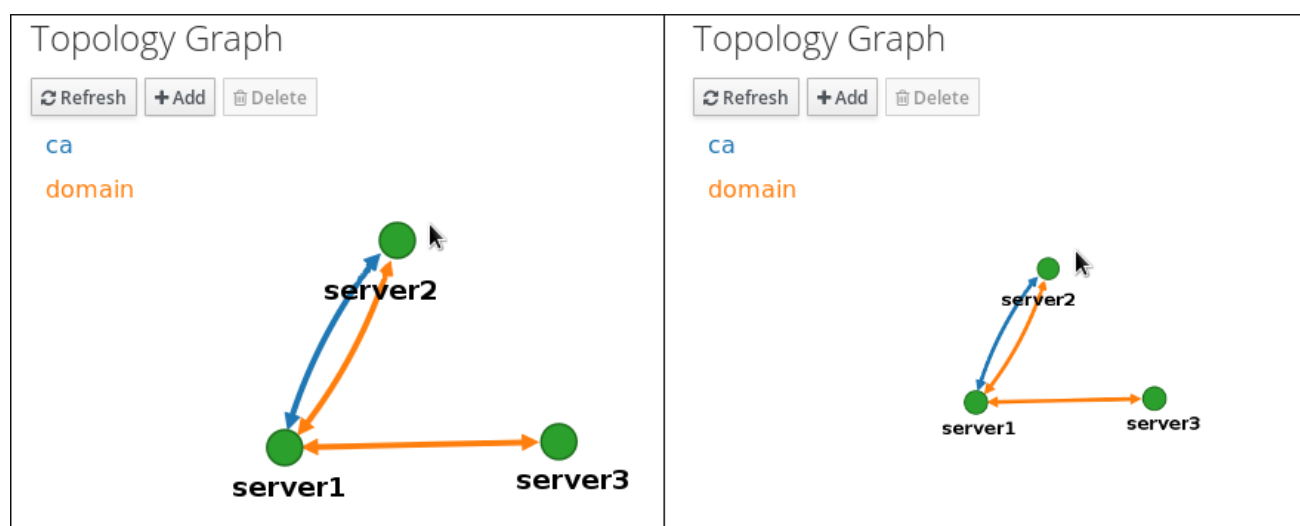
You can move individual topology nodes by dragging the mouse:

Figure 54.6. Moving topology graph nodes



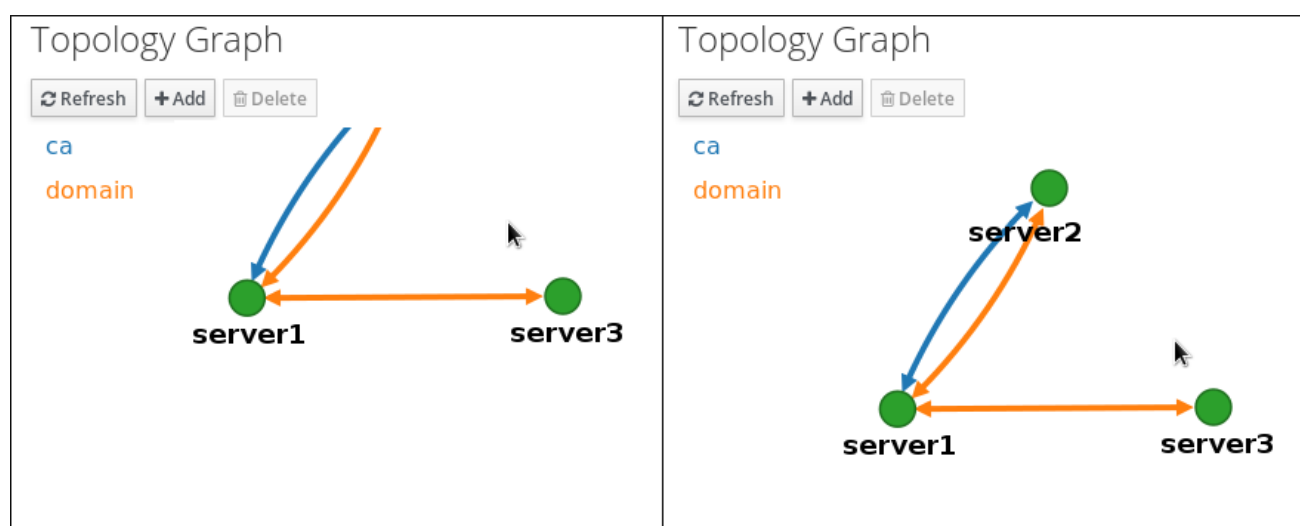
You can zoom in and zoom out the topology graph using the mouse wheel:

Figure 54.7. Zooming the topology graph



You can move the canvas of the topology graph by holding the left mouse button:

Figure 54.8. Moving the topology graph canvas



## 54.3. SETTING UP REPLICATION BETWEEN TWO SERVERS USING THE WEB UI

Using the Web interface of Identity Management (IdM) you can choose two servers and create new replication agreement between them.

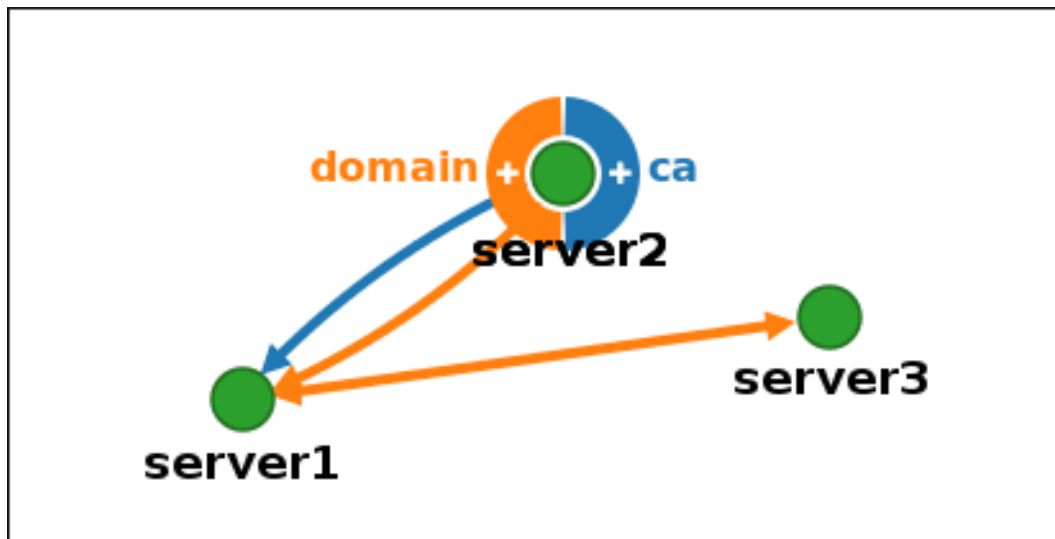
### Prerequisites

- You have the IdM administrator credentials.

### Procedure

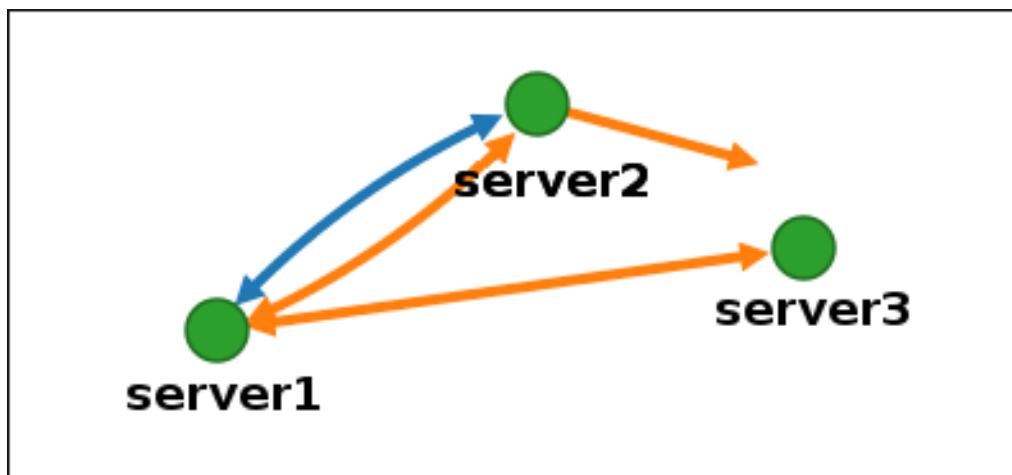
1. In the topology graph, hover your mouse over one of the server nodes.

Figure 54.9. Domain or CA options



2. Click on the **domain** or the **ca** part of the circle depending on what type of topology segment you want to create.
3. A new arrow representing the new replication agreement appears under your mouse pointer. Move your mouse to the other server node, and click on it.

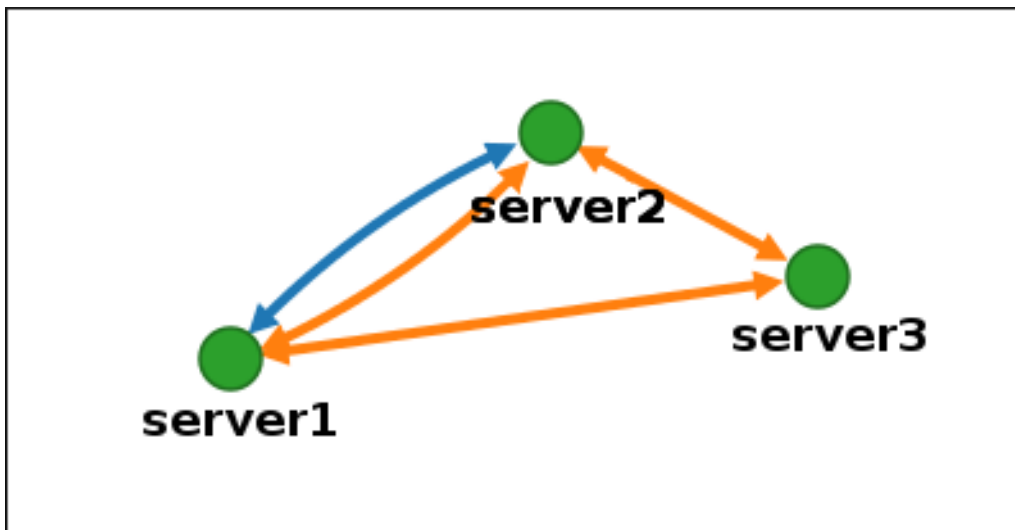
Figure 54.10. Creating a new segment



4. In the **Add topology segment** window, click **Add** to confirm the properties of the new segment.

The new topology segment between the two servers joins them in a replication agreement. The topology graph now shows the updated replication topology:

Figure 54.11. New segment created



## 54.4. STOPPING REPLICATION BETWEEN TWO SERVERS USING THE WEB UI

Using the web interface of Identity Management (IdM) you can remove a replication agreement from servers.

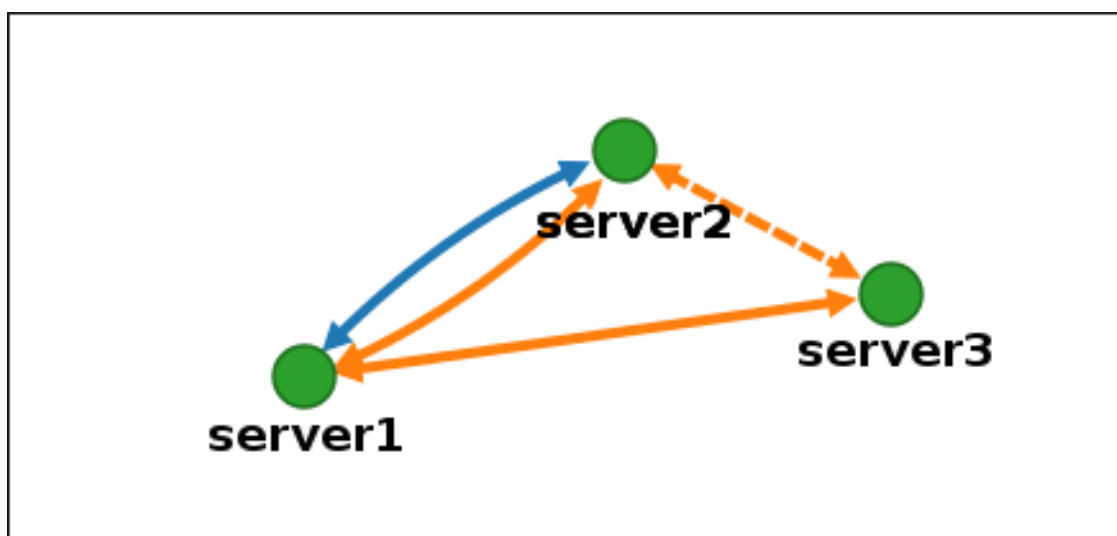
### Prerequisites

- You have the IdM administrator credentials.

### Procedure

1. Click on an arrow representing the replication agreement you want to remove. This highlights the arrow.

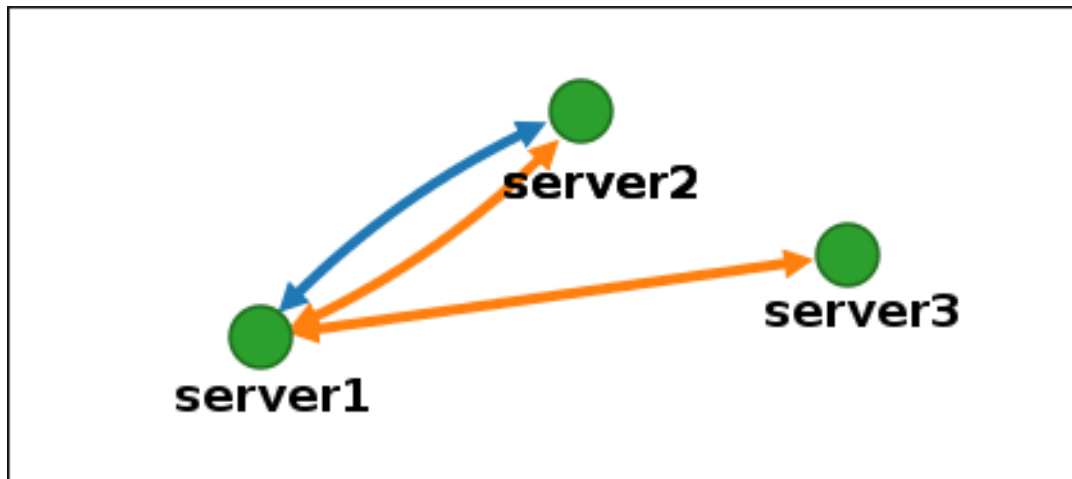
Figure 54.12. Topology segment highlighted



2. Click **Delete**.
3. In the **Confirmation** window, click **OK**.

IdM removes the topology segment between the two servers, which deletes their replication agreement. The topology graph now shows the updated replication topology:

Figure 54.13. Topology segment deleted



## 54.5. SETTING UP REPLICATION BETWEEN TWO SERVERS USING THE CLI

You can configure replication agreements between two servers using the **ipa topologysegment-add** command.

### Prerequisites

- You have the IdM administrator credentials.

### Procedure

1. Use the **ipa topologysegment-add** command to create a topology segment for the two servers. When prompted, provide:
  - the required topology suffix: **domain** or **ca**
  - the left node and the right node, representing the two servers
  - optionally, a custom name for the segment
 For example:

```

$ ipa topologysegment-add
Suffix name: domain
Left node: server1.example.com
Right node: server2.example.com
Segment name [server1.example.com-to-server2.example.com]: new_segment
-----
Added segment "new_segment"
-----
Segment name: new_segment
Left node: server1.example.com
Right node: server2.example.com
Connectivity: both
  
```

Adding the new segment joins the servers in a replication agreement.

2. *Optional.* Use the **ipa topologysegment-show** command to verify that the new segment is configured.

```
$ ipa topologysegment-show
Suffix name: domain
Segment name: new_segment
Segment name: new_segment
Left node: server1.example.com
Right node: server2.example.com
Connectivity: both
```

## 54.6. STOPPING REPLICATION BETWEEN TWO SERVERS USING THE CLI

You can terminate replication agreements from command line using the **ipa topology\_segment-del** command.

### Prerequisites

- You have the IdM administrator credentials.

### Procedure

1. To stop replication, you must delete the corresponding replication segment between the servers. To do that, you need to know the segment name.  
If you do not know the name, use the **ipa topologysegment-find** command to display all segments, and locate the required segment in the output. When prompted, provide the required topology suffix: **domain** or **ca**. For example:

```
$ ipa topologysegment-find
Suffix name: domain
-----
8 segments matched
-----
Segment name: new_segment
Left node: server1.example.com
Right node: server2.example.com
Connectivity: both

...

-----
Number of entries returned 8
-----
```

2. Use the **ipa topologysegment-del** command to remove the topology segment joining the two servers.

```
$ ipa topologysegment-del
Suffix name: domain
Segment name: new_segment
```



```
-----
Deleted segment "new_segment"
-----
```

Deleting the segment removes the replication agreement.

3. *Optional.* Use the **ipa topologysegment-find** command to verify that the segment is no longer listed.

```
$ ipa topologysegment-find
Suffix name: domain
-----
7 segments matched
-----
Segment name: server2.example.com-to-server3.example.com
Left node: server2.example.com
Right node: server3.example.com
Connectivity: both

...

-----
Number of entries returned 7
-----
```

## 54.7. REMOVING SERVER FROM TOPOLOGY USING THE WEB UI

You can use Identity Management (IdM) web interface to remove a server from the topology.

### Prerequisites

- You have the IdM administrator credentials.
- The server you want to remove is **not** the only server connecting other servers with the rest of the topology; this would cause the other servers to become isolated, which is not allowed.
- The server you want to remove is **not** your last CA or DNS server.



### WARNING

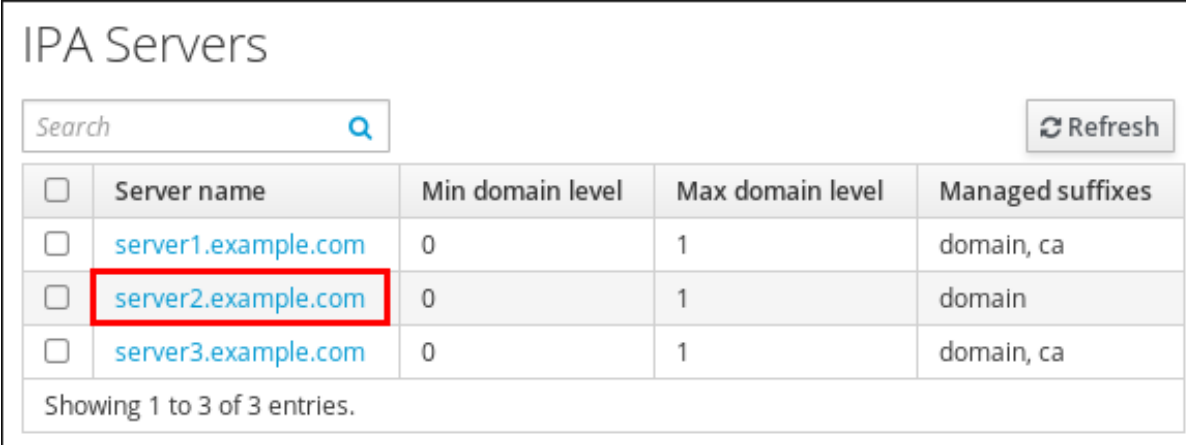
Removing a server is an irreversible action. If you remove a server, the only way to introduce it back into the topology is to install a new replica on the machine.

### Procedure

To remove a server from the topology without uninstalling the server components from the machine:

1. Select **IPA Server → Topology → IPA Servers**.
2. Click on the name of the server you want to delete.

Figure 54.14. Selecting a server



| <input type="checkbox"/> | Server name         | Min domain level | Max domain level | Managed suffixes |
|--------------------------|---------------------|------------------|------------------|------------------|
| <input type="checkbox"/> | server1.example.com | 0                | 1                | domain, ca       |
| <input type="checkbox"/> | server2.example.com | 0                | 1                | domain           |
| <input type="checkbox"/> | server3.example.com | 0                | 1                | domain, ca       |

Showing 1 to 3 of 3 entries.

- Click **Delete Server**.

## 54.8. REMOVING SERVER FROM TOPOLOGY USING THE CLI

You can use the command line interface to remove a server from the topology.

### Prerequisites

- You have the IdM administrator credentials.
- The server you want to remove is **not** the only server connecting other servers with the rest of the topology; this would cause the other servers to become isolated, which is not allowed
- The server you want to remove is **not** your last CA or DNS server.



### IMPORTANT

Removing a server is an irreversible action. If you remove a server, the only way to introduce it back into the topology is to install a new replica on the machine.

### Procedure

To remove **server1.example.com**:

- On another server, run the **ipa server-del** command to remove **server1.example.com**. The command removes all topology segments pointing to the server:

```
[user@server2 ~]$ ipa server-del
Server name: server1.example.com
Removing server1.example.com from replication topology, please wait...
-----
Deleted IPA server "server1.example.com"
-----
```

- Optional:* on **server1.example.com**, run the **ipa server-install --uninstall** command to uninstall the server components from the machine.

```
[root@server1 ~]# ipa server-install --uninstall
```

## 54.9. VIEWING SERVER ROLES ON AN IDM SERVER USING THE WEB UI

Based on the services installed on an IdM server, it can perform various *server roles*. For example:

- CA server
- DNS server
- Key recovery authority (KRA) server.

For a complete list of the supported server roles, see **IPA Server → Topology → Server Roles**.



### NOTE

- Role status **absent** means that no server in the topology is performing the role.
- Role status **enabled** means that one or more servers in the topology are performing the role.

Figure 54.15. Server roles in the web UI

| Server Roles  |             |
|---|-------------|
|  Refresh |             |
| Role name   | Role status |
| AD trust agent  | absent      |
| AD trust controller   | absent      |
| CA server   | enabled     |

## 54.10. VIEWING SERVER ROLES ON AN IDM SERVER USING THE CLI

Based on the services installed on an IdM server, it can perform various *server roles*. For example:

- CA server
- DNS server
- Key recovery authority (KRA) server.

You can view which servers perform which roles in the topology using the following commands.

- The **ipa config-show** command displays all CA servers and the current CA renewal server:

```
$ ipa config-show
```

```
...
```

```
IPA masters: server1.example.com, server2.example.com, server3.example.com
```

```
IPA CA servers: server1.example.com, server2.example.com
```

```
IPA CA renewal master: server1.example.com
```

- The **ipa server-show** command displays a list of roles enabled on a particular server. For example, for a list of roles enabled on *server.example.com*:

```
$ ipa server-show
Server name: server.example.com
...
Enabled server roles: CA server, DNS server, KRA server
```

- The **ipa server-find --servrole** searches for all servers with a particular server role enabled. For example, to search for all CA servers:

```
$ ipa server-find --servrole "CA server"
-----
2 IPA servers matched
-----
Server name: server1.example.com
...
Server name: server2.example.com
...
-----
Number of entries returned 2
-----
```

## 54.11. PROMOTING A REPLICA TO A CA RENEWAL SERVER AND CRL PUBLISHER SERVER

If your IdM deployment uses an embedded certificate authority (CA), one of the IdM CA servers acts as the CA renewal server, a server that manages the renewal of CA subsystem certificates. One of the IdM CA servers also acts as the IdM CRL publisher server, a server that generates certificate revocation lists. By default, the CA renewal server and CRL publisher server roles are installed on the first server on which the system administrator installed the CA role using the **ipa-server-install** or **ipa-ca-install** command.

### Prerequisites

- You have the IdM administrator credentials.

### Procedure

- [Change the current CA renewal server.](#)
- [Configure replica to generate CRLs.](#)

## 54.12. DEMOTING OR PROMOTING HIDDEN REPLICAS

After a replica has been installed, you can configure whether the replica is hidden or visible.

For details about hidden replicas, see [The hidden replica mode](#).

If the replica is a CA renewal server, move the service to another replica before making this replica hidden.

For details, see [Changing and resetting IdM CA renewal server](#).

### Procedure

- To hide the replica, enter:

```
# ipa server-state replica.idm.example.com --state=hidden
```

Alternatively, you can make the replica visible with the following command:

```
# ipa server-state replica.idm.example.com --state=enabled
```

## CHAPTER 55. PUBLIC KEY CERTIFICATES IN IDENTITY MANAGEMENT

X.509 public key certificates are used to authenticate users, hosts and services in Identity Management (IdM). In addition to authentication, X.509 certificates also enable digital signing and encryption to provide privacy, integrity and non-repudiation.

A certificate contains the following information:

- The subject that the certificate authenticates.
- The issuer, that is the CA that has signed the certificate.
- The start and end date of the validity of the certificate.
- The valid uses of the certificate.
- The public key of the subject.

A message encrypted by the public key can only be decrypted by a corresponding private key. While a certificate and the public key it includes can be made publicly available, the user, host or service must keep their private key secret.

### 55.1. CERTIFICATE AUTHORITIES IN IDM

Certificate authorities operate in a hierarchy of trust. In an IdM environment with an internal Certificate Authority (CA), all the IdM hosts, users and services trust certificates that have been signed by the CA. Apart from this root CA, IdM supports sub-CAs to which the root CA has granted the ability to sign certificates in their turn. Frequently, the certificates that such sub-CAs are able to sign are certificates of a specific kind, for example VPN certificates. Finally, IdM supports using external CAs. The table [below](#) presents the specifics of using the individual types of CA in IdM.

**Table 55.1. Comparison of using integrated and external CAs in IdM**

| Name of CA        | Description   | Use   | Useful links  |
|-------------------|---|---|---|
| The <b>ipa</b> CA | An integrated CA based on the Dogtag upstream project                   | Integrated CAs can create, revoke, and issue certificates for users, hosts, and services.   | <a href="#">Using the ipa CA to request a new user certificate and exporting it to the client</a> |
| IdM sub-CAs       | An integrated CA that is subordinate to the <b>ipa</b> CA               | IdM sub-CAs are CAs to which the <b>ipa</b> CA has granted the ability to sign certificates. Frequently, these certificates are of a specific kind, for example VPN certificates. | <a href="#">Restricting an application to trust only a subset of certificates</a>                 |
| External CAs      | An external CA is a CA other than the integrated IdM CA or its sub-CAs. | Using IdM tools, you add certificates issued by these CAs to users, services, or hosts as well as remove them.  | <a href="#">Managing externally signed certificates for IdM users, hosts, and services</a>        |

From the certificate point of view, there is no difference between being signed by a self-signed IdM CA and being signed externally.

The role of the CA includes the following purposes:

- It issues digital certificates.
- By signing a certificate, it certifies that the subject named in the certificate owns a public key. The subject can be a user, host or service.
- It can revoke certificates, and provides revocation status via Certificate Revocation Lists (CRLs) and Online Certificate Status Protocol (OCSP).

#### Additional resources

- See [Planning your CA services](#).

## 55.2. COMPARISON OF CERTIFICATES AND KERBEROS

Certificates perform a similar function to that performed by Kerberos tickets. Kerberos is a computer network authentication protocol that works on the basis of tickets to allow nodes communicating over a non-secure network to prove their identity to one another in a secure manner. The following table shows a comparison of Kerberos and X.509 certificates:

**Table 55.2. Comparison of certificates and Kerberos**

| Characteristic                       | Kerberos      | X.509         |
|--------------------------------------|---------------|---------------|
| <b>Authentication</b>                | Yes           | Yes           |
| <b>Privacy</b>                       | Optional      | Yes           |
| <b>Integrity</b>                     | Optional      | Yes           |
| <b>Type of cryptography involved</b> | Symmetrical   | Asymmetrical  |
| <b>Default validity</b>              | Short (1 day) | Long(2 years) |

By default, Kerberos in Identity Management only ensures the identity of the communicating parties.

## 55.3. THE PROS AND CONS OF USING CERTIFICATES TO AUTHENTICATE USERS IN IDM

The advantages of using certificates to authenticate users in IdM include the following points:

- A PIN that protects the private key on a smart card is typically less complex and easier to remember than a regular password.
- Depending on the device, a private key stored on a smart card cannot be exported. This provides additional security.

- Smart cards can make logout automatic: IdM can be configured to log out users when they remove the smart card from the reader.
- Stealing the private key requires actual physical access to a smart card, making smart cards secure against hacking attacks.
- Smart card authentication is an example of two-factor authentication: it requires both something you have (the card) and something you know (the PIN).
- Smart cards are more flexible than passwords because they provide the keys that can be used for other purposes, such as encrypting email.
- Using smart cards use on shared machines that are IdM clients does not typically pose additional configuration problems for system administrators. In fact, smart card authentication is an ideal choice for shared machines.

The disadvantages of using certificates to authenticate users in IdM include the following points:

- Users might lose or forget to bring their smart card or certificate and be effectively locked out.
- Mistyping a PIN multiple times might result in a card becoming locked.
- There is generally an intermediate step between request and authorization by some sort of security officer or approver. In IdM, the security officer or administrator must run the **ipa cert-request** command.
- Smart cards and readers tend to be vendor and driver specific: although a lot of readers can be used for different cards, a smart card of a specific vendor might not work in the reader of another vendor or in the type of a reader for which it was not designed.
- Certificates and smart cards have a steep learning curve for administrators.



## CHAPTER 56. CONVERTING CERTIFICATE FORMATS TO WORK WITH IDM

This user story describes how to make sure that you as an IdM system administrator are using the correct format of a certificate with specific IdM commands. This is useful, for example, in the following situations:

- You are loading an external certificate into a user profile. For details, see [Converting an external certificate to load into an IdM user account](#).
- You are using an external CA certificate when [configuring the IdM server for smart card authentication](#) or [configuring the IdM client for smart card authentication](#) so that users can authenticate to IdM using smart cards with certificates on them that have been issued by the external certificate authority.
- You are exporting a certificate from an NSS database into a pkcs #12 format that includes both the certificate and the private key. For details, see [Exporting a certificate and private key from an NSS database into a PKCS #12 file](#).

### 56.1. CERTIFICATE FORMATS AND ENCODINGS IN IDM

Certificate authentication including smart card authentication in IdM proceeds by comparing the certificate that the user presents with the certificate, or certificate data, that are stored in the user's IdM profile.

#### System configuration

What is stored in the IdM profile is only the certificate, not the corresponding private key. During authentication, the user must also show that he is in possession of the corresponding private key. The user does that by either presenting a PKCS #12 file that contains both the certificate and the private key or by presenting two files: one that contains the certificate and the other containing the private key.

Therefore, processes such as loading a certificate into a user profile only accept certificate files that do not contain the private key.

Similarly, when a system administrator provides you with an external CA certificate, he will provide only the public data: the certificate without the private key. The **ipa-adviser** utility for configuring the IdM server or the IdM client for smart card authentication expects the input file to contain the certificate of the external CA but not the private key.

#### Certificate encodings

There are two common certificate encodings: Privacy-enhanced Electronic Mail (**PEM**) and Distinguished Encoding Rules (**DER**). The **base64** format is almost identical to the **PEM** format but it does not contain the **-----BEGIN CERTIFICATE-----/-----END CERTIFICATE-----** header and footer.

A certificate that has been encoded using **DER** is a binary X509 digital certificate file. As a binary file, the certificate is not human-readable. **DER** files sometimes use the **.der** filename extension, but files with the **.crt** and **.cer** filename extensions also sometimes contain **DER** certificates. **DER** files containing keys can be named **.key**.

A certificate that has been encoded using **PEM** Base64 is a human-readable file. The file contains ASCII (Base64) armored data prefixed with a **"-----BEGIN ..."** line. **PEM** files sometimes use the **.pem** filename extension, but files with the **.crt** and **.cer** filename extensions also sometimes contain **PEM** certificates. **PEM** files containing keys can be named **.key**.

Different **ipa** commands have different limitations regarding the types of certificates that they accept. For example, the **ipa user-add-cert** command only accepts certificates encoded in the **base64** format but **ipa-server-certinstall** accepts **PEM**, **DER**, **PKCS #7**, **PKCS #8** and **PKCS #12** certificates.

Table 56.1. Certificate encodings

| Encoding format | Human-readable | Common filename extensions | Sample IdM commands accepting the encoding format |
|-----------------|----------------|----------------------------|---|
| PEM/base64      | Yes            | .pem, .crt, .cer           | ipa user-add-cert, ipa-server-certinstall, ...    |
| DER             | No             | .der, .crt, .cer           | ipa-server-certinstall, ...                       |

[Certificate-related commands and formats in IdM](#) lists further **ipa** commands with the certificate formats that the commands accept.

## User authentication

When using the web UI to access IdM, the user proves that he is in possession of the private key corresponding to the certificate by having both stored in the browser's database.

When using the CLI to access IdM, the user proves that he is in possession of the private key corresponding to the certificate by one of the following methods:

- The user adds, as the value of the **X509\_user\_identity** parameter of the **kinit -X** command, the path to the smart card module that is connected to the smart card that contains both the certificate and the key:

```
$ kinit -X X509_user_identity='PKCS11:opensc-pkcs11.so' idm_user
```

- The user adds two files as the values of the **X509\_user\_identity** parameter of the **kinit -X** command, one containing the certificate and the other the private key:

```
$ kinit -X X509_user_identity='FILE: `/path/to/cert.pem,/path/to/cert.key`' idm_user
```

## Useful certificate commands

To view the certificate data, such as the subject and the issuer:

```
$ openssl x509 -noout -text -in ca.pem
```

To compare in which lines two certificates differ:

```
$ diff cert1.crt cert2.crt
```

To compare in which lines two certificates differ with the output displayed in two columns:

```
$ diff cert1.crt cert2.crt -y
```

## 56.2. CONVERTING AN EXTERNAL CERTIFICATE TO LOAD INTO AN IDM USER ACCOUNT

This section describes how to make sure that an external certificate is correctly encoded and formatted before adding it to a user entry.

### 56.2.1. Prerequisites

- If your certificate was issued by an Active Directory certificate authority and uses the **PEM** encoding, make sure that the **PEM** file has been converted into the **UNIX** format. To convert a file, use the **dos2unix** utility provided by the eponymous package.

### 56.2.2. Converting an external certificate in the IdM CLI and loading it into an IdM user account

The **IdM CLI** only accepts a **PEM** certificate from which the first and last lines (-----BEGIN CERTIFICATE----- and -----END CERTIFICATE-----) have been removed.

Follow this procedure to convert an external certificate to **PEM** format and add it to an IdM user account using the IdM CLI.

#### Procedure

1. Convert the certificate to the **PEM** format:

- If your certificate is in the **DER** format:

```
$ openssl x509 -in cert.crt -inform der -outform pem -out cert.pem
```

- If your file is in the **PKCS #12** format, whose common filename extensions are **.pfx** and **.p12**, and contains a certificate, a private key, and possibly other data, extract the certificate using the **openssl pkcs12** utility. When prompted, enter the password protecting the private key stored in the file:

```
$ openssl pkcs12 -in cert_and_key.p12 -clcerts -nokeys -out cert.pem
Enter Import Password:
```

2. Obtain the administrator's credentials:

```
$ kinit admin
```

3. Add the certificate to the user account using the **IdM CLI** following one of the following methods:

- Remove the first and last lines (-----BEGIN CERTIFICATE----- and -----END CERTIFICATE-----) of the **PEM** file using the **sed** utility before adding the string to the **ipa user-add-cert** command:

```
$ ipa user-add-cert some_user --certificate="$(sed -e '/BEGIN
CERTIFICATE/d;/END CERTIFICATE/d' cert.pem)"
```

- Copy and paste the contents of the certificate file without the first and last lines (-----BEGIN CERTIFICATE----- and -----END CERTIFICATE-----) into the **ipa user-add-cert** command:

```
$ ipa user-add-cert some_user --
certificate=MIIIDzCCAn+gAwIBAgIBATANBgkqhki...
```



#### NOTE

You cannot pass a **PEM** file containing the certificate as input to the **ipa user-add-cert** command directly, without first removing the first and last lines (-----BEGIN CERTIFICATE----- and -----END CERTIFICATE-----):

```
$ ipa user-add-cert some_user --cert=some_user_cert.pem
```

This command results in the "ipa: ERROR: Base64 decoding failed: Incorrect padding" error message.

4. Optionally, to check if the certificate was accepted by the system:

```
[idm_user@r8server]$ ipa user-show some_user
```

### 56.2.3. Converting an external certificate in the IdM web UI for loading into an IdM user account

Follow this procedure to convert an external certificate to **PEM** format and add it to an IdM user account in the IdM web UI.

#### Procedure

1. Using the **CLI**, convert the certificate to the **PEM** format:

- If your certificate is in the **DER** format:

```
$ openssl x509 -in cert.crt -inform der -outform pem -out cert.pem
```

- If your file is in the **PKCS #12** format, whose common filename extensions are **.pfx** and **.p12**, and contains a certificate, a private key, and possibly other data, extract the certificate using the **openssl pkcs12** utility. When prompted, enter the password protecting the private key stored in the file:

```
$ openssl pkcs12 -in cert_and_key.p12 -clcerts -nokeys -out cert.pem
Enter Import Password:
```

2. Open the certificate in an editor and copy the contents. You can include the "-----BEGIN CERTIFICATE-----" and "-----END CERTIFICATE-----" header and footer lines but you do not have to, as both the **PEM** and **base64** formats are accepted by the IdM web UI.
3. In the IdM web UI, log in as security officer.
4. Go to **Identity** → **Users** → **some\_user**.
5. Click **Add** next to **Certificates**.

6. Paste the PEM-formatted contents of the certificate into the window that opens.

7. Click **Add**.

If the certificate was accepted by the system, you can see it listed among the **Certificates** in the user profile.

## 56.3. PREPARING TO LOAD A CERTIFICATE INTO THE BROWSER

Before importing a user certificate into the browser, make sure that the certificate and the corresponding private key are in a **PKCS #12** format. There are two common situations requiring extra preparatory work:

- The certificate is located in an NSS database. For details how to proceed in this situation, see [Exporting a certificate and private key from an NSS database into a PKCS #12 file](#).
- The certificate and the private key are in two separate **PEM** files. For details how to proceed in this situation, see [Combining certificate and private key PEM files into a PKCS #12 file](#).

Afterwards, to import both the CA certificate in the **PEM** format and the user certificate in the **PKCS #12** format into the browser, follow the procedures in [Configuring a browser to enable certificate authentication](#) and [Authenticating to the Identity Management Web UI with a Certificate as an Identity Management User](#).

### 56.3.1. Exporting a certificate and private key from an NSS database into a PKCS #12 file

#### Procedure

1. Use the **pk12util** command to export the certificate from the NSS database to the **PKCS12** format. For example, to export the certificate with the **some\_user** nickname from the NSS database stored in the **~/certdb** directory into the **~/some\_user.p12** file:

```
$ pk12util -d ~/certdb -o ~/some_user.p12 -n some_user
Enter Password or Pin for "NSS Certificate DB":
Enter password for PKCS12 file:
Re-enter password:
pk12util: PKCS12 EXPORT SUCCESSFUL
```

2. Set appropriate permissions for the **.p12** file:

```
# chmod 600 ~/some_user.p12
```

Because the **PKCS #12** file also contains the private key, it must be protected to prevent other users from using the file. Otherwise, they would be able to impersonate the user.

### 56.3.2. Combining certificate and private key PEM files into a PKCS #12 file

Follow this procedure to combine a certificate and the corresponding key stored in separate **PEM** files into a **PKCS #12** file.

#### Procedure

- To combine a certificate stored in **certfile.cer** and a key stored in **certfile.key** into a **certfile.p12** file that contains both the certificate and the key:

```
$ openssl pkcs12 -export -in certfile.cer -inkey certfile.key -out certfile.p12
```

## 56.4. CERTIFICATE-RELATED COMMANDS AND FORMATS IN IDM

The following table displays certificate-related commands in IdM with acceptable formats.

Table 56.2. IdM certificate commands and formats

| Command  | Acceptable formats  | Notes   |
|--|---|---|
| <b>ipa user-add-cert some_user --certificate</b>                             | base64 PEM certificate  |   |
| <b>ipa-server-certinstall</b>  | PEM and DER certificate;<br>PKCS#7 certificate chain;<br>PKCS#8 and raw private key;<br>PKCS#12 certificate and private key |   |
| <b>ipa-cacert-manage install</b>   | DER; PEM; PKCS#7  |   |
| <b>ipa-cacert-manage renew --external-cert-file</b>                          | PEM and DER certificate;<br>PKCS#7 certificate chain  |   |
| <b>ipa-ca-install --external-cert-file</b>                                   | PEM and DER certificate;<br>PKCS#7 certificate chain  |   |
| <b>ipa cert-show &lt;cert serial&gt; --certificate-out /path/to/file.pem</b> | N/A   | Creates the PEM-encoded <b>file.pem</b> file with the certificate having the <b>&lt;cert_serial&gt;</b> serial number.  |
| <b>ipa cert-show &lt;cert serial&gt; --certificate-out /path/to/file.pem</b> | N/A   | Creates the PEM-encoded <b>file.pem</b> file with the certificate having the <b>&lt;cert_serial&gt;</b> serial number. If the <b>--chain</b> option is used, the PEM file contains the certificate including the certificate chain. |
| <b>ipa cert-request --certificate-out=FILE /path/to/req.csr</b>              | N/A   | Creates the <b>req.csr</b> file in the PEM format with the new certificate.   |

| Command   | Acceptable formats | Notes  |
|---|--------------------|--|
| <b>ipa cert-request --certificate-out=FILE /path/to/req.csr</b> | N/A                | Creates the <b>req.csr</b> file in the PEM format with the new certificate. If the <b>--chain</b> option is used, the PEM file contains the certificate including the certificate chain. |

## CHAPTER 57. MANAGING CERTIFICATES FOR USERS, HOSTS, AND SERVICES USING THE INTEGRATED IDM CA

To learn more about how to manage certificates in Identity Management (IdM) using the integrated CA, the **ipa** CA, and its sub-CAs, see the following sections:

- [Requesting new certificates for a user, host, or service using the IdM Web UI](#) .
- Requesting new certificates for a user, host, or service from the IdM CA using the IdM CLI:
  - [Requesting new certificates for a user, host, or service from IdM CA using certutil](#)
    - For a specific example of requesting a new user certificate from the IdM CA using the **certutil** utility and exporting it to an IdM client, see [Requesting a new user certificate and exporting it to the client](#).
  - [Requesting new certificates for a user, host, or service from IdM CA using openssl](#)

You can also request new certificates for a service from the IdM CA using the **certmonger** utility. For more information, see [Requesting new certificates for a service from IdM CA using certmonger](#) .

### Prerequisites

- Your IdM deployment contains an integrated CA:
  - For information about how to plan your CA services in IdM, see [Planning your CA services](#) .
  - For information about how to install an IdM server with integrated DNS and integrated CA as the root CA, see [Installing an IdM server: With integrated DNS, with an integrated CA as the root CA](#)
  - For information about how to install an IdM server with integrated DNS and an external CA as the root CA, see [Installing an IdM server: With integrated DNS, with an external CA as the root CA](#)
  - For information about how to install an IdM server without integrated DNS and with an integrated CA as the root CA, see [Installing an IdM server: Without integrated DNS, with an integrated CA as the root CA](#).
  - [Optional] Your IdM deployment supports users authenticating with a certificate:
    - For information about how to configure your IdM deployment to support user authentication with a certificate stored in the IdM client filesystem, see [Configuring authentication with a certificate stored on the desktop of an IdM client](#).
    - For information about how to configure your IdM deployment to support user authentication with a certificate stored on a smart card inserted into an IdM client, see [Configuring Identity Management for smart card authentication](#) .
    - For information about how to configure your IdM deployment to support user authentication with smart cards issued by an Active Directory certificate system, see [Configuring certificates issued by AD CS for smart card authentication in IdM](#) .

### 57.1. REQUESTING NEW CERTIFICATES FOR A USER, HOST, OR SERVICE USING IDM WEB UI



Follow this procedure to use the Identity Management (IdM) Web UI to request a new certificate for any IdM entity from the integrated IdM certificate authorities (CAs): the **ipa** CA or any of its sub-CAs.

IdM entities include:

- Users
- Hosts
- Services



### IMPORTANT

Services typically run on dedicated service nodes on which the private keys are stored. Copying a service's private key to the IdM server is considered insecure. Therefore, when requesting a certificate for a service, create the certificate signing request (CSR) on the service node.

### Prerequisites

- Your IdM deployment contains an integrated CA.
- You are logged into the IdM Web UI as the IdM administrator.

### Procedure

1. Under the **Identity** tab, select the **Users**, **Hosts**, or **Services** subtab.
2. Click the name of the user, host, or service to open its configuration page.

Figure 57.1. List of Hosts

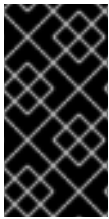
| Hosts                                |                    |  |                                       |
|--------------------------------------|--------------------|--|---------------------------------------|
| <input type="text" value="Search"/>  |                    | <input type="button" value="Refresh"/>   | <input type="button" value="Delete"/> |
| <input type="button" value="+ Add"/> |                    | <input type="button" value="Actions ▾"/> |                                       |
| <input type="checkbox"/>             | Host name          | Description                              | Enrolled                              |
| <input type="checkbox"/>             | server.example.com |  | True                                  |
| Showing 1 to 1 of 1 entries.         |                    |  |                                       |

3. Click **Actions** → **New Certificate**.
4. Optional: Select the issuing CA and profile ID.
5. Follow the instructions for using the **certutil** command-line (CLI) utility on the screen.
6. Click **Issue**.

## 57.2. REQUESTING NEW CERTIFICATES FOR A USER, HOST, OR SERVICE FROM IDM CA USING CERTUTIL

You can use the **certutil** utility to request a certificate for an Identity Management (IdM) user, host or service in standard IdM situations. To ensure that a host or service Kerberos alias can use a certificate, [use the openssl utility to request a certificate](#) instead.

Follow this procedure to request a certificate for an IdM user, host, or service from **ipa**, the IdM certificate authority (CA), using **certutil**.



## IMPORTANT

Services typically run on dedicated service nodes on which the private keys are stored. Copying a service's private key to the IdM server is considered insecure. Therefore, when requesting a certificate for a service, create the certificate signing request (CSR) on the service node.

## Prerequisites

- Your IdM deployment contains an integrated CA.
- You are logged into the IdM command-line interface (CLI) as the IdM administrator.

## Procedure

1. Create a temporary directory for the certificate database:

```
# mkdir ~/certdb/
```

2. Create a new temporary certificate database, for example:

```
# certutil -N -d ~/certdb/
```

3. Create the CSR and redirect the output to a file. For example, to create a CSR for a 4096 bit certificate and to set the subject to *CN=server.example.com,O=EXAMPLE.COM*:

```
# certutil -R -d ~/certdb/ -a -g 4096 -s "CN=server.example.com,O=EXAMPLE.COM" -8  
server.example.com > certificate_request.csr
```

4. Submit the certificate request file to the CA running on the IdM server. Specify the Kerberos principal to associate with the newly-issued certificate:

```
# ipa cert-request certificate_request.csr --principal=host/server.example.com
```

The **ipa cert-request** command in IdM uses the following defaults:

- The **calPAserviceCert** certificate profile  
To select a custom profile, use the **--profile-id** option.
- The integrated IdM root CA, **ipa**  
To select a sub-CA, use the **--ca** option.

## Additional resources

- See the output of the **ipa cert-request --help** command.
- See [Creating and managing certificate profiles in Identity Management](#) .

## 57.3. REQUESTING NEW CERTIFICATES FOR A USER, HOST, OR SERVICE FROM IDM CA USING OPENSSSL

You can use the **openssl** utility to request a certificate for an Identity Management (IdM) host or service if you want to ensure that the Kerberos alias of the host or service can use the certificate. In standard situations, consider [requesting a new certificate using the certutil utility](#) instead.

Follow this procedure to request a certificate for an IdM host, or service from **ipa**, the IdM certificate authority, using **openssl**.



### IMPORTANT

Services typically run on dedicated service nodes on which the private keys are stored. Copying a service's private key to the IdM server is considered insecure. Therefore, when requesting a certificate for a service, create the certificate signing request (CSR) on the service node.

### Prerequisites

- Your IdM deployment contains an integrated CA.
- You are logged into the IdM command-line interface (CLI) as the IdM administrator.

### Procedure

1. Create one or more aliases for your Kerberos principal *test/server.example.com*. For example, *test1/server.example.com* and *test2/server.example.com*.
2. In the CSR, add a subjectAltName for dnsName (*server.example.com*) and otherName (*test2/server.example.com*). To do this, configure the **openssl.conf** file to include the following line specifying the UPN otherName and subjectAltName:

```
otherName=1.3.6.1.4.1.311.20.2.3;UTF8:test2/server.example.com@EXAMPLE.COM
DNS.1 = server.example.com
```

3. Create a certificate request using **openssl**:

```
openssl req -new -newkey rsa:2048 -keyout test2service.key -sha256 -nodes -out
certificate_request.csr -config openssl.conf
```

4. Submit the certificate request file to the CA running on the IdM server. Specify the Kerberos principal to associate with the newly-issued certificate:

```
# ipa cert-request certificate_request.csr --principal=host/server.example.com
```

The **ipa cert-request** command in IdM uses the following defaults:

- The **calPAserviceCert** certificate profile  
To select a custom profile, use the **--profile-id** option.
- The integrated IdM root CA, **ipa**  
To select a sub-CA, use the **--ca** option.

### Additional resources

- See the output of the **ipa cert-request --help** command.
- See [Creating and managing certificate profiles in Identity Management](#) .

## 57.4. ADDITIONAL RESOURCES

- See [Revoking certificates with the integrated IdM CAs](#).
- See [Restoring certificates with the integrated IdM CAs](#).
- See [Restricting an application to trust only a subset of certificates](#) .

## CHAPTER 58. MANAGING EXTERNALLY SIGNED CERTIFICATES FOR IDM USERS, HOSTS, AND SERVICES

This chapter describes how to use the Identity Management (IdM) command-line interface (CLI) and the IdM Web UI to add or remove user, host, or service certificates that were issued by an external certificate authority (CA).

### 58.1. ADDING A CERTIFICATE ISSUED BY AN EXTERNAL CA TO AN IDM USER, HOST, OR SERVICE BY USING THE IDM CLI

As an Identity Management (IdM) administrator, you can add an externally signed certificate to the account of an IdM user, host, or service by using the Identity Management (IdM) CLI.

#### Prerequisites

- You have obtained the ticket-granting ticket of an administrative user.

#### Procedure

- To add a certificate to an IdM user, enter:

```
$ ipa user-add-cert user --certificate=MIQTPrajQAwg...
```

The command requires you to specify the following information:

- The name of the user
- The Base64-encoded DER certificate



#### NOTE

Instead of copying and pasting the certificate contents into the command line, you can convert the certificate to the DER format and then re-encode it to Base64. For example, to add the **user\_cert.pem** certificate to **user**, enter:

```
$ ipa user-add-cert user --certificate="$(openssl x509 -outform der -in  
user_cert.pem | base64 -w 0)"
```

You can run the **ipa user-add-cert** command interactively by executing it without adding any options.

To add a certificate to an IdM host, enter:

- **ipa host-add-cert**

To add a certificate to an IdM service, enter:

- **ipa service-add-cert**

#### Additional resources

- [Managing certificates for users, hosts, and services using the integrated IdM CA](#)

## 58.2. ADDING A CERTIFICATE ISSUED BY AN EXTERNAL CA TO AN IDM USER, HOST, OR SERVICE BY USING THE IDM WEB UI

As an Identity Management (IdM) administrator, you can add an externally signed certificate to the account of an IdM user, host, or service by using the Identity Management (IdM) Web UI.

### Prerequisites

- You are logged in to the Identity Management (IdM) Web UI as an administrative user.

### Procedure

- Open the **Identity** tab, and select the **Users, Hosts**, or **Services** subtab.
- Click the name of the user, host, or service to open its configuration page.
- Click **Add** next to the **Certificates** entry.

**Figure 58.1. Adding a certificate to a user account**

User: demouser  
demouser is a member of:

Settings | User Groups | Netgroups | Roles | HBAC Rules | Sudo Rules

Refresh | Revert | Save | Actions

| Identity Settings |           | Account Settings              |  |
|-------------------|-----------|-------------------------------|--|
| Job Title         |           | User login                    | demouser                                     |
| First name *      | Demo      | Password                      | *****  |
| Last name *       | User      | Password expiration           | 2016-07-14 10:14:41Z                         |
| Full name *       | Demo User | UID                           | 373000005                                    |
| Display name      | Demo User | GID                           | 373000005                                    |
| Initials          | DU        | Principal alias               | demouser@IDM.EXAMPLE.COM <span>Delete</span> |
| GECOS             | Demo User |                               | <span>Add</span>                             |
| Class             |           | Kerberos principal expiration | YYYY-MM-DD hh : mn UTC                       |
|                   |           | Login shell                   | /bin/sh                                      |
|                   |           | Home directory                | /home/demouser                               |
|                   |           | SSH public keys               | <span>Add</span>                             |
|                   |           | Certificates                  | <span>Add</span>                             |

- Paste the certificate in Base64 or PEM encoded format into the text field, and click **Add**.
- Click **Save** to store the changes.

## 58.3. REMOVING A CERTIFICATE ISSUED BY AN EXTERNAL CA FROM AN IDM USER, HOST, OR SERVICE ACCOUNT BY USING THE IDM CLI

As an Identity Management (IdM) administrator, you can remove an externally signed certificate from the account of an IdM user, host, or service by using the Identity Management (IdM) CLI .

### Prerequisites

- You have obtained the ticket-granting ticket of an administrative user.

## Procedure

- To remove a certificate from an IdM user, enter:

```
$ ipa user-remove-cert user --certificate=MIQTPrajQAwg...
```

The command requires you to specify the following information:

- The name of the user
- The Base64-encoded DER certificate



### NOTE

Instead of copying and pasting the certificate contents into the command line, you can convert the certificate to the DER format and then re-encode it to Base64. For example, to remove the **user\_cert.pem** certificate from **user**, enter:

```
$ ipa user-remove-cert user --certificate="$(openssl x509 -outform der -in  
user_cert.pem | base64 -w 0)"
```

You can run the **ipa user-remove-cert** command interactively by executing it without adding any options.

To remove a certificate from an IdM host, enter:

- ipa host-remove-cert**

To remove a certificate from an IdM service, enter:

- ipa service-remove-cert**

## Additional resources

- [Managing certificates for users, hosts, and services using the integrated IdM CA](#)

## 58.4. REMOVING A CERTIFICATE ISSUED BY AN EXTERNAL CA FROM AN IDM USER, HOST, OR SERVICE ACCOUNT BY USING THE IDM WEB UI

As an Identity Management (IdM) administrator, you can remove an externally signed certificate from the account of an IdM user, host, or service by using the Identity Management (IdM) Web UI.

### Prerequisites

- You are logged in to the Identity Management (IdM) Web UI as an administrative user.

## Procedure

- Open the **Identity** tab, and select the **Users, Hosts**, or **Services** subtab.
- Click the name of the user, host, or service to open its configuration page.

3. Click the **Actions** next to the certificate to delete, and select **Delete**.
4. Click **Save** to store the changes.

## 58.5. ADDITIONAL RESOURCES

- [Ensuring the presence of an externally signed certificate in an IdM service entry using an Ansible playbook](#)



## CHAPTER 59. CREATING AND MANAGING CERTIFICATE PROFILES IN IDENTITY MANAGEMENT

Certificate profiles are used by the Certificate Authority (CA) when signing certificates to determine if a certificate signing request (CSR) is acceptable, and if so what features and extensions are present on the certificate. A certificate profile is associated with issuing a particular type of certificate. By combining certificate profiles and CA access control lists (ACLs), you can define and control access to custom certificate profiles.

In describing how to create certificate profiles, the procedures use S/MIME certificates as an example. Some email programs support digitally signed and encrypted email using the Secure Multipurpose Internet Mail Extension (S/MIME) protocol. Using S/MIME to sign or encrypt email messages requires the sender of the message to have an S/MIME certificate.

- [What is a certificate profile](#)
- [Creating a certificate profile](#)
- [What is a CA access control list](#)
- [Defining a CA ACL to control access to certificate profiles](#)
- [Using certificate profiles and CA ACLs to issue certificates](#)
- [Modifying a certificate profile](#)
- [Certificate profile configuration parameters](#)

### 59.1. WHAT IS A CERTIFICATE PROFILE?

You can use certificate profiles to determine the content of certificates, as well as constraints for issuing the certificates, such as the following:

- The signing algorithm to use to encipher the certificate signing request.
- The default validity of the certificate.
- The revocation reasons that can be used to revoke a certificate.
- If the common name of the principal is copied to the subject alternative name field.
- The features and extensions that should be present on the certificate.

A single certificate profile is associated with issuing a particular type of certificate. You can define different certificate profiles for users, services, and hosts in IdM. IdM includes the following certificate profiles by default:

- **calPAserviceCert**
- **IECUserRoles**
- **KDCs\_PKINIT\_Certs** (used internally)

In addition, you can create and import custom profiles, which allow you to issue certificates for specific purposes. For example, you can restrict the use of a particular profile to only one user or one group, preventing other users and groups from using that profile to issue a certificate for authentication. To

create custom certificate profiles, use the **ipa certprofile** command.

### Additional resources

- See the **ipa help certprofile** command.

## 59.2. CREATING A CERTIFICATE PROFILE

Follow this procedure to create a certificate profile through the command line by creating a profile configuration file for requesting S/MIME certificates.

### Procedure

1. Create a custom profile by copying an existing default profile:

```
$ ipa certprofile-show --out smime.cfg calPAserviceCert
-----
Profile configuration stored in file 'smime.cfg'
-----
Profile ID: calPAserviceCert
Profile description: Standard profile for network services
Store issued certificates: TRUE
```

2. Open the newly created profile configuration file in a text editor.

```
$ vi smime.cfg
```

3. Change the **Profile ID** to a name that reflects the usage of the profile, for example **smime**.



#### NOTE

When you are importing a newly created profile, the **profileid** field, if present, must match the ID specified on the command line.

4. Update the Extended Key Usage configuration. The default Extended Key Usage extension configuration is for TLS server and client authentication. For example for S/MIME, the Extended Key Usage must be configured for email protection:

```
policyset.serverCertSet.7.default.params.exKeyUsageOIDs=1.3.6.1.5.5.7.3.4
```

5. Import the new profile:

```
$ ipa certprofile-import smime --file smime.cfg \
--desc "S/MIME certificates" --store TRUE
-----
Imported profile "smime"
-----
Profile ID: smime
Profile description: S/MIME certificates
Store issued certificates: TRUE
```

## Verification steps

- Verify the new certificate profile has been imported:

```
$ ipa certprofile-find
-----
4 profiles matched
-----
Profile ID: caIPAServiceCert
Profile description: Standard profile for network services
Store issued certificates: TRUE

Profile ID: IECUserRoles
Profile description: User profile that includes IECUserRoles extension from request
Store issued certificates: TRUE

Profile ID: KDCs_PKINIT_Certs
Profile description: Profile for PKINIT support by KDCs
Store issued certificates: TRUE

Profile ID: smime
Profile description: S/MIME certificates
Store issued certificates: TRUE
-----
Number of entries returned 4
-----
```

## Additional resources

- See **ipa help certprofile**.
- See [RFC 5280, section 4.2.1.12](#).

## 59.3. WHAT IS A CA ACCESS CONTROL LIST?

Certificate Authority access control list (CA ACL) rules define which profiles can be used to issue certificates to which principals. You can use CA ACLs to do this, for example:

- Determine which user, host, or service can be issued a certificate with a particular profile
- Determine which IdM certificate authority or sub-CA is permitted to issue the certificate

For example, using CA ACLs, you can restrict use of a profile intended for employees working from an office located in London only to users that are members of the London office-related IdM user group.

The **ipa caacl** utility for management of CA ACL rules allows privileged users to add, display, modify, or delete a specified CA ACL.

## Additional resources

- See **ipa help caacl**.

## 59.4. DEFINING A CA ACL TO CONTROL ACCESS TO CERTIFICATE PROFILES

Follow this procedure to use the **caacl** utility to define a CA Access Control List (ACL) rule to allow users in a group access to a custom certificate profile. In this case, the procedure describes how to create an S/MIME user's group and a CA ACL to allow users in that group access to the **smime** certificate profile.

### Prerequisites

- Make sure that you have obtained IdM administrator's credentials.

### Procedure

1. Create a new group for the users of the certificate profile:

```
$ ipa group-add smime_users_group
-----
Added group "smime users group"
-----
Group name: smime_users_group
GID: 75400001
```

2. Create a new user to add to the **smime\_user\_group** group:

```
$ ipa user-add smime_user
First name: smime
Last name: user
-----
Added user "smime_user"
-----
User login: smime_user
First name: smime
Last name: user
Full name: smime user
Display name: smime user
Initials: TU
Home directory: /home/smime_user
GECOS: smime user
Login shell: /bin/sh
Principal name: smime_user@IDM.EXAMPLE.COM
Principal alias: smime_user@IDM.EXAMPLE.COM
Email address: smime_user@idm.example.com
UID: 1505000004
GID: 1505000004
Password: False
Member of groups: ipausers
Kerberos keys available: False
```

3. Add the **smime\_user** to the **smime\_users\_group** group:

```
$ ipa group-add-member smime_users_group --users=smime_user
Group name: smime_users_group
GID: 1505000003
```

```
Member users: smime_user
-----
```

```
Number of members added 1
-----
```

4. Create the CA ACL to allow users in the group to access the certificate profile:

```
$ ipa caacl-add smime_acl
-----
```

```
Added CA ACL "smime_acl"
-----
```

```
ACL name: smime_acl
```

```
Enabled: TRUE
```

5. Add the user group to the CA ACL:

```
$ ipa caacl-add-user smime_acl --group smime_users_group
```

```
ACL name: smime_acl
```

```
Enabled: TRUE
```

```
User Groups: smime_users_group
-----
```

```
Number of members added 1
-----
```

6. Add the certificate profile to the CA ACL:

```
$ ipa caacl-add-profile smime_acl --certprofile smime
```

```
ACL name: smime_acl
```

```
Enabled: TRUE
```

```
Profiles: smime
```

```
User Groups: smime_users_group
-----
```

```
Number of members added 1
-----
```

## Verification steps

- View the details of the CA ACL you created:

```
$ ipa caacl-show smime_acl
```

```
ACL name: smime_acl
```

```
Enabled: TRUE
```

```
Profiles: smime
```

```
User Groups: smime_users_group
```

```
...
```

## Additional resources

- See **ipa** man page.
- See **ipa help caacl**.

## 59.5. USING CERTIFICATE PROFILES AND CA ACLS TO ISSUE CERTIFICATES

You can request certificates using a certificate profile when permitted by the Certificate Authority access control lists (CA ACLs). Follow this procedure to request an S/MIME certificate for a user using a custom certificate profile which has been granted access through a CA ACL.

### Prerequisites

- Your certificate profile has been created.
- An CA ACL has been created which permits the user to use the required certificate profile to request a certificate.



### NOTE

You can bypass the CA ACL check if the user performing the **cert-request** command:

- Is the **admin** user.
- Has the **Request Certificate ignoring CA ACLs** permission.

### Procedure

1. Generate a certificate request for the user. For example, using OpenSSL:

```
$ openssl req -new -newkey rsa:2048 -days 365 -nodes -keyout private.key -out cert.csr -subj '/CN=smime_user'
```

2. Request a new certificate for the user from the IdM CA:

```
$ ipa cert-request cert.csr --principal=smime_user --profile-id=smime
```

Optionally pass the `--ca sub-CA_name` option to the command to request the certificate from a sub-CA instead of the root CA.

### Verification steps

- Verify the newly-issued certificate is assigned to the user:

```
$ ipa user-show user
User login: user
...
Certificate: MIICfzCCAWcCAQA...
...
```

### Additional resources

- See **ipa(a)** man page.
- See the **ipa help user-show** command.
- See the **ipa help cert-request** command.

- See **openssl(1ssl)** man page.

## 59.6. MODIFYING A CERTIFICATE PROFILE

Follow this procedure to modify certificate profiles directly through the command line using the **ipa certprofile-mod** command.

### Procedure

1. Determine the certificate profile ID for the certificate profile you are modifying. To display all certificate profiles currently stored in IdM:

```
# ipa certprofile-find
-----
4 profiles matched
-----
Profile ID: caIPAServiceCert
Profile description: Standard profile for network services
Store issued certificates: TRUE

Profile ID: IECUserRoles
...

Profile ID: smime
Profile description: S/MIME certificates
Store issued certificates: TRUE
-----
Number of entries returned
-----
```

2. Modify the certificate profile description. For example, if you created a custom certificate profile for S/MIME certificates using an existing profile, change the description in line with the new usage:

```
# ipa certprofile-mod smime --desc "New certificate profile description"
-----
Modified Certificate Profile "smime"
-----
Profile ID: smime
Profile description: New certificate profile description
Store issued certificates: TRUE
```

3. Open your customer certificate profile file in a text editor and modify to suit your requirements:

```
# vi smime.cfg
```

For details on the options which can be configured in the certificate profile configuration file, see [Certificate profile configuration parameters](#).

4. Update the existing certificate profile configuration file:

```
# ipa certprofile-mod _profile_ID_ --file=smime.cfg
```

## Verification steps

- Verify the certificate profile has been updated:

```
$ ipa certprofile-show smime
Profile ID: smime
Profile description: New certificate profile description
Store issued certificates: TRUE
```

## Additional resources

- See **ipa(a)** man page.
- See **ipa help certprofile-mod**.

## 59.7. CERTIFICATE PROFILE CONFIGURATION PARAMETERS

Certificate profile configuration parameters are stored in a *profile\_name.cfg* file in the CA profile directory, **/var/lib/pki/pki-tomcat/ca/profiles/ca**. All of the parameters for a profile – defaults, inputs, outputs, and constraints – are configured within a single policy set. A policy set for a certificate profile has the name **policyset.policyName.policyNumber**. For example, for policy set **serverCertSet**:

```
policyset.list=serverCertSet
policyset.serverCertSet.list=1,2,3,4,5,6,7,8
policyset.serverCertSet.1.constraint.class_id=subjectNameConstraintImpl
policyset.serverCertSet.1.constraint.name=Subject Name Constraint
policyset.serverCertSet.1.constraint.params.pattern=CN=[^,]+.+
policyset.serverCertSet.1.constraint.params.accept=true
policyset.serverCertSet.1.default.class_id=subjectNameDefaultImpl
policyset.serverCertSet.1.default.name=Subject Name Default
policyset.serverCertSet.1.default.params.name=CN=$request.req_subject_name.cn$, OU=pki-ipa, O=IPA
policyset.serverCertSet.2.constraint.class_id=validityConstraintImpl
policyset.serverCertSet.2.constraint.name=Validity Constraint
policyset.serverCertSet.2.constraint.params.range=740
policyset.serverCertSet.2.constraint.params.notBeforeCheck=false
policyset.serverCertSet.2.constraint.params.notAfterCheck=false
policyset.serverCertSet.2.default.class_id=validityDefaultImpl
policyset.serverCertSet.2.default.name=Validity Default
policyset.serverCertSet.2.default.params.range=731
policyset.serverCertSet.2.default.params.startTime=0
```

Each policy set contains a list of policies configured for the certificate profile by policy ID number in the order in which they should be evaluated. The server evaluates each policy set for each request it receives. When a single certificate request is received, one set is evaluated, and any other sets in the profile are ignored. When dual key pairs are issued, the first policy set is evaluated for the first certificate request, and the second set is evaluated for the second certificate request. You do not need more than one policy set when issuing single certificates or more than two sets when issuing dual key pairs.

**Table 59.1. Certificate profile configuration file parameters**

| Parameter | Description |
|-----------|-------------|
|-----------|-------------|



| Parameter               | Description   |
|-------------------------|---|
| desc                    | A free text description of the certificate profile, which is shown on the end-entities page. For example, <b>desc=This certificate profile is for enrolling server certificates with agent authentication.</b>  |
| enable                  | Enables the profile so it is accessible through the end-entities page. For example, <b>enable=true.</b>   |
| auth.instance_id        | Sets the authentication manager plug-in to use to authenticate the certificate request. For automatic enrollment, the CA issues a certificate immediately if the authentication is successful. If authentication fails or there is no authentication plug-in specified, the request is queued to be manually approved by an agent. For example, <b>auth.instance_id=AgentCertAuth.</b>  |
| authz.acl               | <p>Specifies the authorization constraint. This is predominantly used to set the group evaluation Access Control List (ACL). For example, the <b>caCMCUserCert</b> parameter requires that the signer of the CMC request belongs to the Certificate Manager Agents group:</p> <p><b>authz.acl=group="Certificate Manager Agents</b></p> <p>In directory-based user certificate renewal, this option is used to ensure that the original requester and the currently-authenticated user are the same. An entity must authenticate (bind or, essentially, log into the system) before authorization can be evaluated.</p> |
| name                    | The name of the certificate profile. For example, <b>name=Agent-Authenticated Server Certificate Enrollment.</b> This name is displayed on the end users enrollment or renewal page.  |
| input.list              | Lists the allowed inputs for the certificate profile by name. For example, <b>input.list=i1,i2.</b>   |
| input.input_id.class_id | Indicates the java class name for the input by input ID (the name of the input listed in input.list). For example, <b>input.i1.class_id=certReqInputImpl.</b>   |

| Parameter  | Description   |
|--|---|
| output.list  | Lists the possible output formats for the certificate profile by name. For example, <b>output.list=o1</b> .   |
| output.output_id.class_id  | Specifies the java class name for the output format named in output.list. For example, <b>output.o1.class_id=certOutputImpl</b> .   |
| policyset.list   | Lists the configured certificate profile rules. For dual certificates, one set of rules applies to the signing key and the other to the encryption key. Single certificates use only one set of certificate profile rules. For example, <b>policyset.list=serverCertSet</b> . |
| policyset.policyset_id.list                                      | Lists the policies within the policy set configured for the certificate profile by policy ID number in the order in which they should be evaluated. For example, <b>policyset.serverCertSet.list=1,2,3,4,5,6,7,8</b> .  |
| policyset.policyset_id.policy_number.constraint.class_id         | Indicates the java class name of the constraint plug-in set for the default configured in the profile rule. For example, <b>policyset.serverCertSet.1.constraint.class_id=subjectNameConstraintImpl</b> .   |
| policyset.policyset_id.policy_number.constraint.name             | Gives the user-defined name of the constraint. For example, <b>policyset.serverCertSet.1.constraint.name=Subject Name Constraint</b> .  |
| policyset.policyset_id.policy_number.constraint.params.attribute | Specifies a value for an allowed attribute for the constraint. The possible attributes vary depending on the type of constraint. For example, <b>policyset.serverCertSet.1.constraint.params.pattern=CN=.*</b> .  |
| policyset.policyset_id.policy_number.default.class_id            | Gives the java class name for the default set in the profile rule. For example, <b>policyset.serverCertSet.1.default.class_id=userSubjectNameDefaultImpl</b> .  |
| policyset.policyset_id.policy_number.default.name                | Gives the user-defined name of the default. For example, <b>policyset.serverCertSet.1.default.name=Subject Name Default</b> .   |

| Parameter   | Description  |
|---|--|
| policyset.policyset_id.policy_number.default.params.attribute | Specifies a value for an allowed attribute for the default. The possible attributes vary depending on the type of default. For example, policyset.serverCertSet.1.default.params.name=CN=(Name)\$request.requestor_name\$. |

## CHAPTER 60. MANAGING THE VALIDITY OF CERTIFICATES IN IDM

In Identity Management (IdM), you can manage the validity of both already existing certificates and certificates you want to issue in the future, but the methods are different.

### 60.1. MANAGING THE VALIDITY OF AN EXISTING CERTIFICATE THAT WAS ISSUED BY IDM CA

In IdM, the following methods of viewing the expiry date of a certificate are available:

- [Viewing the expiry date in IdM WebUI](#) .
- [Viewing the expiry date in the CLI](#) .

You can manage the validity of an already existing certificate that was issued by IdM CA in the following ways:

- Renew a certificate by requesting a new certificate using either the original certificate signing request (CSR) or a new CSR generated from the private key. You can request a new certificate using the following utilities:

#### **certmonger**

You can use **certmonger** to request a service certificate. Before the certificate is due to expire, **certmonger** will automatically renew the certificate, thereby ensuring a continuing validity of the service certificate. For details, see [Obtaining an IdM certificate for a service using certmonger](#);

#### **certutil**

You can use **certutil** to renew user, host, and service certificates. For details on requesting a user certificate, see [Requesting a new user certificate and exporting it to the client](#) ;

#### **openssl**

You can use **openssl** to renew user, host, and service certificates.

- Revoke a certificate. For details, see:
  - [Revoking certificates with the integrated IdM CAs using IdM WebUI](#) ;
  - [Revoking certificates with the integrated IdM CAs using IdM CLI](#) ;
- Restore a certificate if it has been temporarily revoked. For details, see:
  - [Restoring certificates with the integrated IdM CAs using IdM WebUI](#) ;
  - [Restoring certificates with the integrated IdM CAs using IdM CLI](#) .

### 60.2. MANAGING THE VALIDITY OF FUTURE CERTIFICATES ISSUED BY IDM CA

To manage the validity of future certificates issued by IdM CA, modify, import, or create a certificate profile. For details, see [Creating and managing certificate profiles in Identity Management](#) .

### 60.3. VIEWING THE EXPIRY DATE OF A CERTIFICATE IN IDM WEBUI

You can use IdM WebUI to view the expiry date of all the certificates that have been issued by IdM CA.

### Prerequisites

- Ensure that you have obtained the administrator's credentials.

### Procedure

1. In the **Authentication** menu, click **Certificates > Certificates**.
2. Click the serial number of the certificate to open the certificate information page.

Figure 60.1. List of Certificates

| Certificates  |               |  |
|---|---------------|--|
| <div> <div>Subject ▼</div> <div>Search </div> <div>Refresh </div> <div>+ Issue</div> </div> |               |  |
| <input type="checkbox"/>  | Serial Number | Subject                                |
| <input type="checkbox"/>  | 1             | CN=Certificate Authority,O=EXAMPLE.COM |
| <input type="checkbox"/>  | 2             | CN=OCSP Subsystem,O=EXAMPLE.COM        |
| <input type="checkbox"/>  | 3             | CN=server.example.com,O=EXAMPLE.COM    |
| <input type="checkbox"/>  | 4             | CN=CA Subsystem O=EXAMPLE.COM          |

3. In the certificate information page, locate the **Expires On** information.

## 60.4. VIEWING THE EXPIRY DATE OF A CERTIFICATE IN THE CLI

You can use the command-line interface (CLI) to view the expiry date of a certificate.

### Procedure

- Use the **openssl** utility to open the file in a human-readable format:

```
$ openssl x509 -noout -text -in ca.pem
Certificate:
  Data:
    Version: 3 (0x2)
    Serial Number: 1 (0x1)
    Signature Algorithm: sha256WithRSAEncryption
    Issuer: O = IDM.EXAMPLE.COM, CN = Certificate Authority
    Validity
      Not Before: Oct 30 19:39:14 2017 GMT
      Not After : Oct 30 19:39:14 2037 GMT
```

## 60.5. REVOKING CERTIFICATES WITH THE INTEGRATED IDM CAS

### 60.5.1. Certificate revocation reasons

A revoked certificate is invalid and cannot be used for authentication. All revocations are permanent, except for reason 6: **Certificate Hold**.

The default revocation reason is 0: **unspecified**.

**Table 60.1. Revocation Reasons**

| ID | Reason                              | Explanation  |
|----|-------------------------------------|--|
| 0  | Unspecified                         |  |
| 1  | Key Compromised                     | The key that issued the certificate is no longer trusted.<br><br>Possible causes: lost token, improperly accessed file.              |
| 2  | CA Compromised                      | The CA that issued the certificate is no longer trusted.   |
| 3  | Affiliation Changed                 | Possible causes:<br><br>* A person has left the company or moved to another department.<br><br>* A host or service is being retired. |
| 4  | Superseded                          | A newer certificate has replaced the current certificate.  |
| 5  | Cessation of Operation              | The host or service is being decommissioned.   |
| 6  | Certificate Hold                    | The certificate is temporarily revoked. You can restore the certificate later.   |
| 8  | Remove from CRL                     | The certificate is not included in the certificate revocation list (CRL).  |
| 9  | Privilege Withdrawn                 | The user, host, or service is no longer permitted to use the certificate.  |
| 10 | Attribute Authority (AA) Compromise | The AA certificate is no longer trusted.   |



### 60.5.2. Revoking certificates with the integrated IdM CAs using IdM WebUI

If you know you have lost the private key for your certificate, you must revoke the certificate to prevent its abuse. Complete this procedure to use the IdM WebUI to revoke a certificate issued by the IdM CA.

#### Procedure

1. Click **Authentication > Certificates > Certificates**.
2. Click the serial number of the certificate to open the certificate information page.

Figure 60.2. List of Certificates

| Certificates  |               |  |
|---|---------------|--|
| <div> <div>Subject ▼</div> <div>Search </div> <div>Refresh </div> <div>+ Issue</div> </div> |               |  |
| <input type="checkbox"/>  | Serial Number | Subject                                |
| <input type="checkbox"/>  | 1             | CN=Certificate Authority,O=EXAMPLE.COM |
| <input type="checkbox"/>  | 2             | CN=OCSP Subsystem,O=EXAMPLE.COM        |
| <input type="checkbox"/>  | 3             | CN=server.example.com,O=EXAMPLE.COM    |
| <input type="checkbox"/>  | 4             | CN=CA Subsystem,O=EXAMPLE.COM          |

3. In the certificate information page, click **Actions** → **Revoke Certificate**.
4. Select the reason for revoking and click **Revoke**. See [Certificate revocation reasons](#) for details.

### 60.5.3. Revoking certificates with the integrated IdM CAs using IdM CLI

If you know you have lost the private key for your certificate, you must revoke the certificate to prevent its abuse. Complete this procedure to use the IdM CLI to revoke a certificate issued by the IdM CA.

#### Procedure

- Use the **ipa cert-revoke** command, and specify:
  - the certificate serial number
  - the ID number for the revocation reason; see [Certificate revocation reasons](#) for details

For example, to revoke the certificate with serial number **1032** because of reason 1: **Key Compromised**, enter:

```
$ ipa cert-revoke 1032 --revocation-reason=1
```

For details on requesting a new certificate, see the following documentation:

- [Requesting a new user certificate and exporting it to the client](#)
- [Obtaining an IdM certificate for a service using certmonger](#) .

## 60.6. RESTORING CERTIFICATES WITH THE INTEGRATED IDM CAS

If you have revoked a certificate because of reason 6: **Certificate Hold**, you can restore it again if the private key for the certificate has not been compromised. To restore a certificate, use one of the following procedures:

- [Restore certificates with the integrated IdM CAs using IdM WebUI](#) ;
- [Restore certificates with the integrated IdM CAs using IdM CLI](#) .

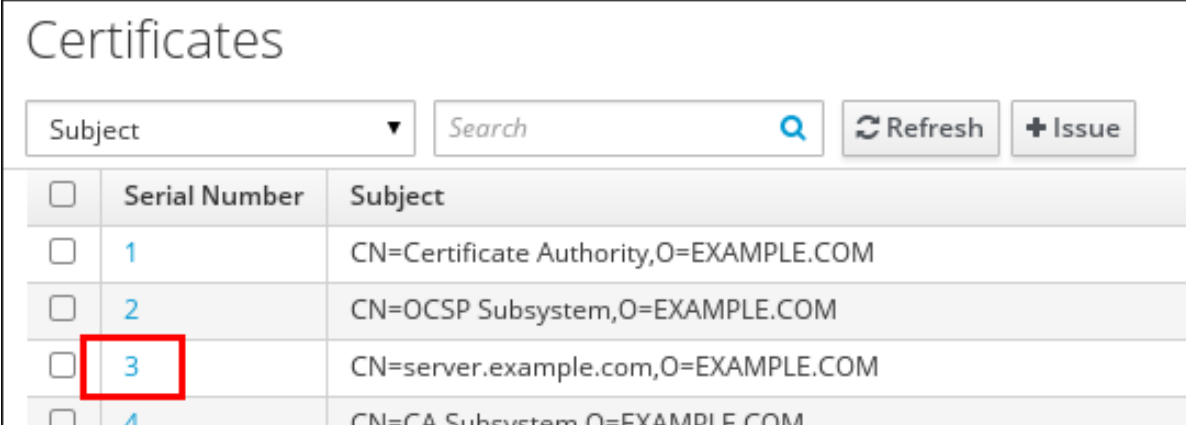
### 60.6.1. Restoring certificates with the integrated IdM CAs using IdM WebUI

Complete this procedure to use the IdM WebUI to restore an IdM certificate that has been revoked because of Reason 6: **Certificate Hold**.

### Procedure

1. In the **Authentication** menu, click **Certificates** > **Certificates**.
2. Click the serial number of the certificate to open the certificate information page.

Figure 60.3. List of Certificates



| <input type="checkbox"/> | Serial Number | Subject                                |
|--------------------------|---------------|--|
| <input type="checkbox"/> | 1             | CN=Certificate Authority,O=EXAMPLE.COM |
| <input type="checkbox"/> | 2             | CN=OCSP Subsystem,O=EXAMPLE.COM        |
| <input type="checkbox"/> | 3             | CN=server.example.com,O=EXAMPLE.COM    |
| <input type="checkbox"/> | 4             | CN=CA Subsystem O=EXAMPLE.COM          |

3. In the certificate information page, click **Actions** → **Restore Certificate**.

### 60.6.2. Restoring certificates with the integrated IdM CAs using IdM CLI

Complete this procedure to use the IdM CLI to restore an IdM certificate that has been revoked because of Reason 6: **Certificate Hold**.

### Procedure

- Use the **ipa cert-remove-hold** command and specify the certificate serial number. For example:

```
$ ipa cert-remove-hold 1032
```



## CHAPTER 61. CONFIGURING IDENTITY MANAGEMENT FOR SMART CARD AUTHENTICATION

Identity Management (IdM) supports smart card authentication with:

- User certificates issued by the IdM certificate authority
- User certificates issued by an external certificate authority

You can configure smart card authentication in IdM for both types of certificates. In this scenario, the **rootca.pem** CA certificate is the file containing the certificate of a trusted external certificate authority.

For information about smart card authentication in IdM, see [Understanding smart card authentication](#).

For more details on configuring smart card authentication:

- [Configuring the IdM server for smart card authentication](#)
- [Configuring the IdM client for smart card authentication](#)
- [Adding a certificate to a user entry in the IdM Web UI](#)
- [Adding a certificate to a user entry in the IdM CLI](#)
- [Installing tools for managing and using smart cards](#)
- [Storing a certificate on a smart card](#)
- [Logging in to IdM with smart cards](#)
- [Configuring GDM access using smart card authentication](#)
- [Configuring su access using smart card authentication](#)

### 61.1. CONFIGURING THE IDM SERVER FOR SMART CARD AUTHENTICATION

If you want to enable smart card authentication for users whose certificates have been issued by the certificate authority (CA) of the <EXAMPLE.ORG> domain that your Identity Management (IdM) CA trusts, you must obtain the following certificates so that you can add them when running the **ipa-adviser** script that configures the IdM server:

- The certificate of the root CA that has either issued the certificate for the <EXAMPLE.ORG> CA directly, or through one or more of its sub-CAs. You can download the certificate chain from a web page whose certificate has been issued by the authority. For details, see Steps 1 – 4a in [Configuring a browser to enable certificate authentication](#).
- The IdM CA certificate. You can obtain the CA certificate from the **/etc/ipa/ca.crt** file on the IdM server on which an IdM CA instance is running.
- The certificates of all of the intermediate CAs; that is, intermediate between the <EXAMPLE.ORG> CA and the IdM CA.

To configure an IdM server for smart card authentication:

1. Obtain files with the CA certificates in the PEM format.

2. Run the built-in **ipa-advice** script.
3. Reload the system configuration.

## Prerequisites

- You have root access to the IdM server.
- You have the root CA certificate and all the intermediate CA certificates.

## Procedure

1. Create a directory in which you will do the configuration:

```
[root@server]# mkdir ~/SmartCard/
```

2. Navigate to the directory:

```
[root@server]# cd ~/SmartCard/
```

3. Obtain the relevant CA certificates stored in files in PEM format. If your CA certificate is stored in a file of a different format, such as DER, convert it to PEM format. The IdM Certificate Authority certificate is in PEM format and is located in the **/etc/ipa/ca.crt** file.  
Convert a DER file to a PEM file:

```
# openssl x509 -in <filename>.der -inform DER -out <filename>.pem -outform PEM
```

4. For convenience, copy the certificates to the directory in which you want to do the configuration:

```
[root@server SmartCard]# cp /tmp/rootca.pem ~/SmartCard/  
[root@server SmartCard]# cp /tmp/subca.pem ~/SmartCard/  
[root@server SmartCard]# cp /tmp/issuingca.pem ~/SmartCard/
```

5. Optionally, if you use certificates of external certificate authorities, use the **openssl x509** utility to view the contents of the files in the **PEM** format to check that the **Issuer** and **Subject** values are correct:

```
[root@server SmartCard]# openssl x509 -noout -text -in rootca.pem | more
```

6. Generate a configuration script with the in-built **ipa-advice** utility, using the administrator's privileges:

```
[root@server SmartCard]# kinit admin  
[root@server SmartCard]# ipa-advice config-server-for-smart-card-auth > config-server-  
for-smart-card-auth.sh
```

The **config-server-for-smart-card-auth.sh** script performs the following actions:

- It configures the IdM Apache HTTP Server.
- It enables Public Key Cryptography for Initial Authentication in Kerberos (PKINIT) on the Key Distribution Center (KDC).

- It configures the IdM Web UI to accept smart card authorization requests.
7. Execute the script, adding the PEM files containing the root CA and sub CA certificates as arguments:

```
[root@server SmartCard]# chmod +x config-server-for-smart-card-auth.sh
[root@server SmartCard]# ./config-server-for-smart-card-auth.sh rootca.pem subca.pem
issuingca.pem
Ticket cache:KEYRING:persistent:0:0
Default principal: admin@IDM.EXAMPLE.COM
[...]
Systemwide CA database updated.
The ipa-certupdate command was successful
```

**NOTE**

Ensure that you add the root CA's certificate as an argument before any sub CA certificates and that the CA or sub CA certificates have not expired.

8. Optionally, if the certificate authority that issued the user certificate does not provide any Online Certificate Status Protocol (OCSP) responder, you may need to disable OCSP check for authentication to the IdM Web UI:

- a. Set the **SSLOCSPEnable** parameter to **off** in the `/etc/httpd/conf.d/ssl.conf` file:

```
SSLOCSPEnable off
```

- b. Restart the Apache daemon (httpd) for the changes to take effect immediately:

```
[root@server SmartCard]# systemctl restart httpd
```

**WARNING**

Do not disable the OCSP check if you only use user certificates issued by the IdM CA. OCSP responders are part of IdM.

For instructions on how to keep the OCSP check enabled, and yet prevent a user certificate from being rejected by the IdM server if it does not contain the information about the location at which the CA that issued the user certificate listens for OCSP service requests, see the **SSLOCSPEnable** directive in [Apache mod\\_ssl configuration options](#).

The server is now configured for smart card authentication.

**NOTE**

To enable smart card authentication in the whole topology, run the procedure on each IdM server.

## 61.2. USING ANSIBLE TO CONFIGURE THE IDM SERVER FOR SMART CARD AUTHENTICATION

You can use Ansible to enable smart card authentication for users whose certificates have been issued by the certificate authority (CA) of the <EXAMPLE.ORG> domain that your Identity Management (IdM) CA trusts. To do that, you must obtain the following certificates so that you can use them when running an Ansible playbook with the **ipasmartcard\_server ansible-freeipa** role script:

- The certificate of the root CA that has either issued the certificate for the <EXAMPLE.ORG> CA directly, or through one or more of its sub-CAs. You can download the certificate chain from a web page whose certificate has been issued by the authority. For details, see Step 4 in [Configuring a browser to enable certificate authentication](#).
- The IdM CA certificate. You can obtain the CA certificate from the **/etc/ipa/ca.crt** file on any IdM CA server.
- The certificates of all of the CAs that are intermediate between the <EXAMPLE.ORG> CA and the IdM CA.

### Prerequisites

- You have **root** access to the IdM server.
- You know the IdM **admin** password.
- You have the root CA certificate, the IdM CA certificate, and all the intermediate CA certificates.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the **ansible-freeipa** package on the Ansible controller.
  - The example assumes that in the **~/MyPlaybooks/** directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipaadmin\_password**.

### Procedure

1. If your CA certificates are stored in files of a different format, such as **DER**, convert them to **PEM** format:

```
# openssl x509 -in <filename>.der -inform DER -out <filename>.pem -outform PEM
```

The IdM Certificate Authority certificate is in **PEM** format and is located in the **/etc/ipa/ca.crt** file.

2. Optionally, use the **openssl x509** utility to view the contents of the files in the **PEM** format to check that the **Issuer** and **Subject** values are correct:

```
# openssl x509 -noout -text -in root-ca.pem | more
```

3. Navigate to your **~/MyPlaybooks/** directory:

—

```
$ cd ~/MyPlaybooks/
```

4. Create a subdirectory dedicated to the CA certificates:

```
$ mkdir SmartCard/
```

5. For convenience, copy all the required certificates to the ~/MyPlaybooks/SmartCard/ directory:

```
# cp /tmp/root-ca.pem ~/MyPlaybooks/SmartCard/
# cp /tmp/intermediate-ca.pem ~/MyPlaybooks/SmartCard/
# cp /etc/ipa/ca.crt ~/MyPlaybooks/SmartCard/ipa-ca.crt
```

6. In your Ansible inventory file, specify the following:

- The IdM servers that you want to configure for smart card authentication.
- The IdM administrator password.
- The paths to the certificates of the CAs in the following order:
  - The root CA certificate file
  - The intermediate CA certificates files
  - The IdM CA certificate file

The file can look as follows:

```
[ipaserver]
ipaserver.idm.example.com

[ipareplicas]
ipareplica1.idm.example.com
ipareplica2.idm.example.com

[ipacluster:children]
ipaserver
ipareplicas

[ipacluster:vars]
ipaadmin_password=SomeADMINpassword
ipasmartcard_server_ca_certs=/home/<user_name>/MyPlaybooks/SmartCard/root-
ca.pem,/home/<user_name>/MyPlaybooks/SmartCard/intermediate-
ca.pem,/home/<user_name>/MyPlaybooks/SmartCard/ipa-ca.crt
```

7. Create an **install-smartcard-server.yml** playbook with the following content:

```
---
- name: Playbook to set up smart card authentication for an IdM server
  hosts: ipaserver
  become: true
```

```
roles:
- role: ipasmartcard_server
  state: present
```

8. Save the file.
9. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the **secret.yml** file, and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory install-smartcard-server.yml
```

The **ipasmartcard\_server** Ansible role performs the following actions:

- It configures the IdM Apache HTTP Server.
  - It enables Public Key Cryptography for Initial Authentication in Kerberos (PKINIT) on the Key Distribution Center (KDC).
  - It configures the IdM Web UI to accept smart card authorization requests.
10. Optionally, if the certificate authority that issued the user certificate does not provide any Online Certificate Status Protocol (OCSP) responder, you may need to disable OCSP check for authentication to the IdM Web UI:

- a. Connect to the IdM server as **root**:

```
ssh root@ipaserver.idm.example.com
```

- b. Set the **SSLOCSPEnable** parameter to **off** in the **/etc/httpd/conf.d/ssl.conf** file:

```
SSLOCSPEnable off
```

- c. Restart the Apache daemon (httpd) for the changes to take effect immediately:

```
# systemctl restart httpd
```



### WARNING

Do not disable the OCSP check if you only use user certificates issued by the IdM CA. OCSP responders are part of IdM.

For instructions on how to keep the OCSP check enabled, and yet prevent a user certificate from being rejected by the IdM server if it does not contain the information about the location at which the CA that issued the user certificate listens for OCSP service requests, see the **SSLOCSPEnable** directive in [Apache mod\\_ssl configuration options](#).

The server listed in the inventory file is now configured for smart card authentication.



## NOTE

To enable smart card authentication in the whole topology, set the **hosts** variable in the Ansible playbook to **ipacluster**:

```
---
- name: Playbook to setup smartcard for IPA server and replicas
  hosts: ipacluster
  [...]
```

## Additional resources

- Sample playbooks using the **ipasmartcard\_server** role in the `/usr/share/doc/ansible-freeipa/playbooks/` directory

## 61.3. CONFIGURING THE IDM CLIENT FOR SMART CARD AUTHENTICATION

Follow this procedure to configure IdM clients for smart card authentication. The procedure needs to be run on each IdM system, a client or a server, to which you want to connect while using a smart card for authentication. For example, to enable an **ssh** connection from host A to host B, the script needs to be run on host B.

As an administrator, run this procedure to enable smart card authentication using

- The **ssh** protocol  
For details see [Configuring SSH access using smart card authentication](#) .
- The console login
- The GNOME Display Manager (GDM)
- The **su** command

This procedure is not required for authenticating to the IdM Web UI. Authenticating to the IdM Web UI involves two hosts, neither of which needs to be an IdM client:

- The machine on which the browser is running. The machine can be outside of the IdM domain.
- The IdM server on which **httpd** is running.

The following procedure assumes that you are configuring smart card authentication on an IdM client, not an IdM server. For this reason you need two computers: an IdM server to generate the configuration script, and the IdM client on which to run the script.

## Prerequisites

- Your IdM server has been configured for smart card authentication, as described in [Configuring the IdM server for smart card authentication](#).
- You have root access to the IdM server and the IdM client.
- You have the root CA certificate and all the intermediate CA certificates.

- You installed the IdM client with the **--mkhomedir** option to ensure remote users can log in successfully. If you do not create a home directory, the default login location is the root of the directory structure, **/**.

## Procedure

1. On an IdM server, generate a configuration script with **ipa-adviser** using the administrator's privileges:

```
[root@server SmartCard]# kinit admin
[root@server SmartCard]# ipa-adviser config-client-for-smart-card-auth > config-client-
for-smart-card-auth.sh
```

The **config-client-for-smart-card-auth.sh** script performs the following actions:

- It configures the smart card daemon.
  - It sets the system-wide truststore.
  - It configures the System Security Services Daemon (SSSD) to allow users to authenticate with either their user name and password or with their smart card. For more details on SSSD profile options for smart card authentication, see [Smart card authentication options in RHEL](#).
2. From the IdM server, copy the script to a directory of your choice on the IdM client machine:

```
[root@server SmartCard]# scp config-client-for-smart-card-auth.sh
root@client.idm.example.com:/root/SmartCard/
Password:
config-client-for-smart-card-auth.sh      100% 2419   3.5MB/s  00:00
```

3. From the IdM server, copy the CA certificate files in PEM format for convenience to the same directory on the IdM client machine as used in the previous step:

```
[root@server SmartCard]# scp {rootca.pem,subca.pem,issuingca.pem}
root@client.idm.example.com:/root/SmartCard/
Password:
rootca.pem                100% 1237   9.6KB/s  00:00
subca.pem                 100% 2514  19.6KB/s  00:00
issuingca.pem             100% 2514  19.6KB/s  00:00
```

4. On the client machine, execute the script, adding the PEM files containing the CA certificates as arguments:

```
[root@client SmartCard]# kinit admin
[root@client SmartCard]# chmod +x config-client-for-smart-card-auth.sh
[root@client SmartCard]# ./config-client-for-smart-card-auth.sh rootca.pem subca.pem
issuingca.pem
Ticket cache:KEYRING:persistent:0:0
Default principal: admin@IDM.EXAMPLE.COM
[...]
Systemwide CA database updated.
The ipa-certupdate command was successful
```



**NOTE**

Ensure that you add the root CA's certificate as an argument before any sub CA certificates and that the CA or sub CA certificates have not expired.

The client is now configured for smart card authentication.

## 61.4. USING ANSIBLE TO CONFIGURE IDM CLIENTS FOR SMART CARD AUTHENTICATION

Follow this procedure to use the **ansible-freeipa ipasmartcard\_client** module to configure specific Identity Management (IdM) clients to permit IdM users to authenticate with a smart card. Run this procedure to enable smart card authentication for IdM users that use any of the following to access IdM:

- The **ssh** protocol  
For details see [Configuring SSH access using smart card authentication](#) .
- The console login
- The GNOME Display Manager (GDM)
- The **su** command

**NOTE**

This procedure is not required for authenticating to the IdM Web UI. Authenticating to the IdM Web UI involves two hosts, neither of which needs to be an IdM client:

- The machine on which the browser is running. The machine can be outside of the IdM domain.
- The IdM server on which **httpd** is running.

### Prerequisites

- Your IdM server has been configured for smart card authentication, as described in [Using Ansible to configure the IdM server for smart card authentication](#).
- You have root access to the IdM server and the IdM client.
- You have the root CA certificate, the IdM CA certificate, and all the intermediate CA certificates.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the **ansible-freeipa** package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipadmin\_password**.

### Procedure

**Procedure**

1. If your CA certificates are stored in files of a different format, such as **DER**, convert them to **PEM** format:

```
# openssl x509 -in <filename>.der -inform DER -out <filename>.pem -outform PEM
```

The IdM CA certificate is in **PEM** format and is located in the `/etc/ipa/ca.crt` file.

2. Optionally, use the **openssl x509** utility to view the contents of the files in the **PEM** format to check that the **Issuer** and **Subject** values are correct:

```
# openssl x509 -noout -text -in root-ca.pem | more
```

3. On your Ansible control node, navigate to your `~/MyPlaybooks/` directory:

```
$ cd ~/MyPlaybooks/
```

4. Create a subdirectory dedicated to the CA certificates:

```
$ mkdir SmartCard/
```

5. For convenience, copy all the required certificates to the `~/MyPlaybooks/SmartCard/` directory, for example:

```
# cp /tmp/root-ca.pem ~/MyPlaybooks/SmartCard/
# cp /tmp/intermediate-ca.pem ~/MyPlaybooks/SmartCard/
# cp /etc/ipa/ca.crt ~/MyPlaybooks/SmartCard/ipa-ca.crt
```

6. In your Ansible inventory file, specify the following:

- The IdM clients that you want to configure for smart card authentication.
- The IdM administrator password.
- The paths to the certificates of the CAs in the following order:
  - The root CA certificate file
  - The intermediate CA certificates files
  - The IdM CA certificate file

The file can look as follows:

```
[ipaclients]
ipaclient1.example.com
ipaclient2.example.com

[ipaclients:vars]
ipaadmin_password=SomeADMINpassword
ipasmartcard_client_ca_certs=/home/<user_name>/MyPlaybooks/SmartCard/root-
ca.pem,/home/<user_name>/MyPlaybooks/SmartCard/intermediate-
ca.pem,/home/<user_name>/MyPlaybooks/SmartCard/ipa-ca.crt
```

7. Create an **install-smartcard-clients.yml** playbook with the following content:

```
---
- name: Playbook to set up smart card authentication for an IdM client
  hosts: ipaclients
  become: true

  roles:
  - role: ipasmartcard_client
    state: present
```

8. Save the file.
9. Run the Ansible playbook. Specify the playbook and inventory files:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory install-smartcard-clients.yml
```

The **ipasmartcard\_client** Ansible role performs the following actions:

- It configures the smart card daemon.
- It sets the system-wide truststore.
- It configures the System Security Services Daemon (SSSD) to allow users to authenticate with either their user name and password or their smart card. For more details on SSSD profile options for smart card authentication, see [Smart card authentication options in RHEL](#).

The clients listed in the **ipaclients** section of the inventory file are now configured for smart card authentication.



#### NOTE

If you have installed the IdM clients with the **--mkhomedir** option, remote users will be able to log in to their home directories. Otherwise, the default login location is the root of the directory structure, **/**.

#### Additional resources

- Sample playbooks using the **ipasmartcard\_server** role in the **/usr/share/doc/ansible-freeipa/playbooks/** directory

## 61.5. ADDING A CERTIFICATE TO A USER ENTRY IN THE IDM WEB UI

Follow this procedure to add an external certificate to a user entry in IdM Web UI.

**NOTE**

Instead of uploading the whole certificate, it is also possible to upload certificate mapping data to a user entry in IdM. User entries containing either full certificates or certificate mapping data can be used in conjunction with corresponding certificate mapping rules to facilitate the configuration of smart card authentication for system administrators. For details, see

[Certificate mapping rules for configuring authentication](#).

**NOTE**

If the user's certificate has been issued by the IdM Certificate Authority, the certificate is already stored in the user entry, and you do not need to follow this procedure.

**Prerequisites**

- You have the certificate that you want to add to the user entry at your disposal.

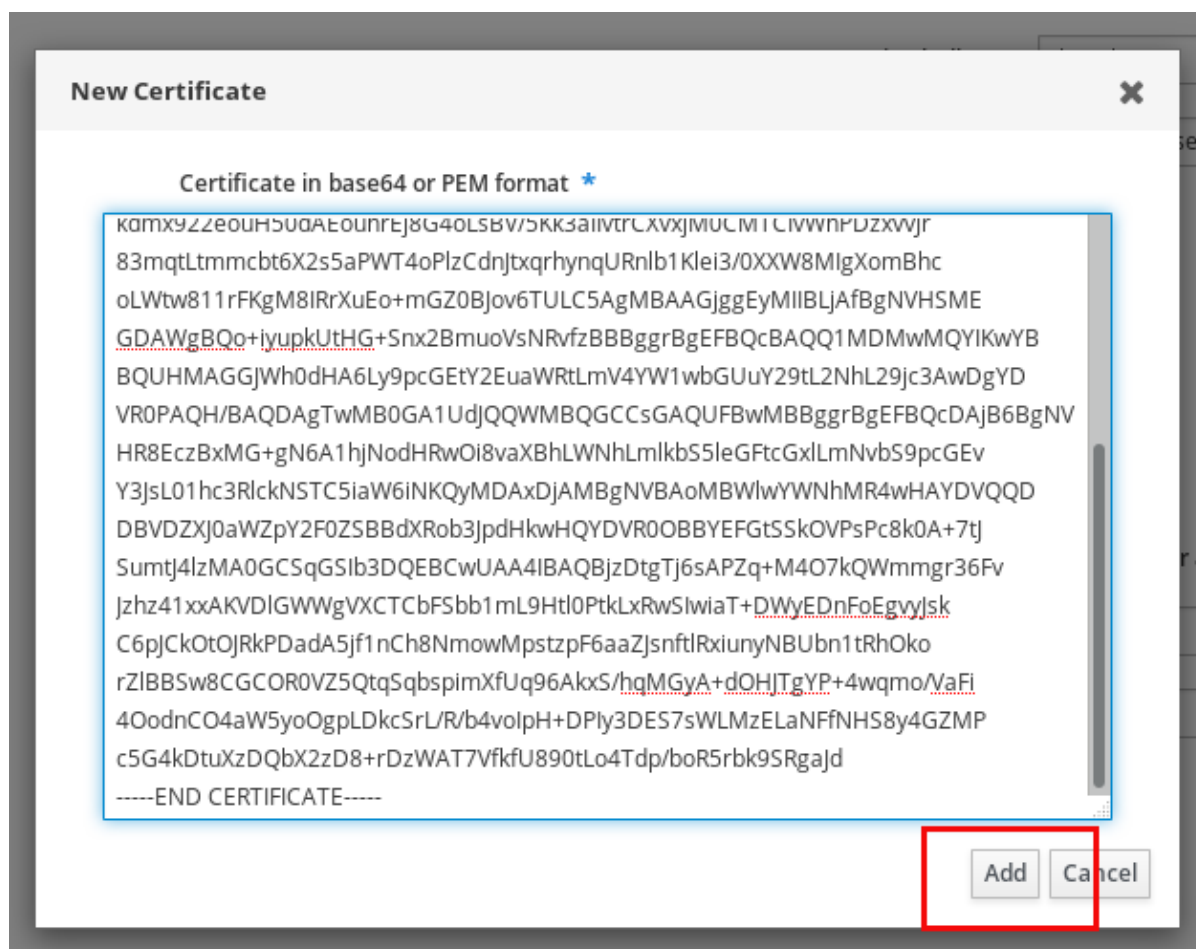
**Procedure**

1. Log into the IdM Web UI as an administrator if you want to add a certificate to another user. For adding a certificate to your own profile, you do not need the administrator's credentials.
2. Navigate to **Users** → **Active users** → **sc\_user**.
3. Find the **Certificate** option and click **Add**.
4. In the command-line interface, display the certificate in the **PEM** format using the **cat** utility or a text editor:

```
[user@client SmartCard]$ cat testuser.crt
```

5. Copy and paste the certificate from the CLI into the window that has opened in the Web UI.
6. Click **Add**.

Figure 61.1. Adding a new certificate in the IdM Web UI



The **sc\_user** entry now contains an external certificate.

## 61.6. ADDING A CERTIFICATE TO A USER ENTRY IN THE IDM CLI

Follow this procedure to add an external certificate to a user entry in IdM CLI.



### NOTE

Instead of uploading the whole certificate, it is also possible to upload certificate mapping data to a user entry in IdM. User entries containing either full certificates or certificate mapping data can be used in conjunction with corresponding certificate mapping rules to facilitate the configuration of smart card authentication for system administrators. For details, see [Certificate mapping rules for configuring authentication](#).



### NOTE

If the user's certificate has been issued by the IdM Certificate Authority, the certificate is already stored in the user entry, and you do not need to follow this procedure.

### Prerequisites

- You have the certificate that you want to add to the user entry at your disposal.

### Procedure

1. Log into the IdM CLI as an administrator if you want to add a certificate to another user:

```
[user@client SmartCard]$ kinit admin
```

For adding a certificate to your own profile, you do not need the administrator's credentials:

```
[user@client SmartCard]$ kinit sc_user
```

2. Create an environment variable containing the certificate with the header and footer removed and concatenated into a single line, which is the format expected by the **ipa user-add-cert** command:

```
[user@client SmartCard]$ export CERT=`openssl x509 -outform der -in testuser.crt |  
base64 -w0 -`
```

Note that certificate in the **testuser.crt** file must be in the **PEM** format.

3. Add the certificate to the profile of **sc\_user** using the **ipa user-add-cert** command:

```
[user@client SmartCard]$ ipa user-add-cert sc_user --certificate=$CERT
```

The **sc\_user** entry now contains an external certificate.

## 61.7. INSTALLING TOOLS FOR MANAGING AND USING SMART CARDS

To configure your smart card, you need tools which can generate certificates and store them on a smart card.

You must:

- Install the **gnutls-utils** package, which helps you to manage certificates.
- Install the **opensc** package, which provides a set of libraries and utilities to work with smart cards.
- Start the **pcscd** service, which communicates with the smart card reader.

### Procedure

1. Install the **opensc** and **gnutls-utils** packages:

```
# dnf -y install opensc gnutls-utils
```

2. Start the **pcscd** service.

```
# systemctl start pcscd
```

Verify that the **pcscd** service is up and running.

## 61.8. PREPARING YOUR SMART CARD AND UPLOADING YOUR CERTIFICATES AND KEYS TO YOUR SMART CARD

Follow this procedure to configure your smart card with the **pkcs15-init** tool, which helps you to configure:

- Erasing your smart card
- Setting new PINs and optional PIN Unblocking Keys (PUKs)
- Creating a new slot on the smart card
- Storing the certificate, private key, and public key in the slot
- If required, locking the smart card settings as certain smart cards require this type of finalization



## NOTE

The **pkcs15-init** tool may not work with all smart cards. You must use the tools that work with the smart card you are using.

## Prerequisites

- The **opensc** package, which includes the **pkcs15-init** tool, is installed. For details, see [Installing tools for managing and using smart cards](#).
- The card is inserted in the reader and connected to the computer.
- You have the private key, public key, and certificate to store on the smart card. In this procedure, **testuser.key**, **testuserpublic.key**, and **testuser.crt** are the names used for the private key, public key, and the certificate.
- You have your current smart card user PIN and Security Officer PIN (SO-PIN).

## Procedure

1. Erase your smart card and authenticate yourself with your PIN:

```
$ pkcs15-init --erase-card --use-default-transport-keys
Using reader with a card: Reader name
PIN [Security Officer PIN] required.
Please enter PIN [Security Officer PIN]:
```

The card has been erased.

2. Initialize your smart card, set your user PIN and PUK, and your Security Officer PIN and PUK:

```
$ pkcs15-init --create-pkcs15 --use-default-transport-keys \
  --pin 963214 --puk 321478 --so-pin 65498714 --so-puk 784123
Using reader with a card: Reader name
```

The **pkcs15-init** tool creates a new slot on the smart card.

3. Set the label and the authentication ID for the slot:

```
$ pkcs15-init --store-pin --label testuser \
  --auth-id 01 --so-pin 65498714 --pin 963214 --puk 321478
Using reader with a card: Reader name
```

The label is set to a human-readable value, in this case, **testuser**. The **auth-id** must be two hexadecimal values, in this case it is set to **01**.

4. Store and label the private key in the new slot on the smart card:

```
$ pkcs15-init --store-private-key testuser.key --label testuser_key \
  --auth-id 01 --id 01 --pin 963214
Using reader with a card: Reader name
```



#### NOTE

The value you specify for **--id** must be the same when storing your private key and storing your certificate in the next step. Specifying your own value for **--id** is recommended as otherwise a more complicated value is calculated by the tool.

5. Store and label the certificate in the new slot on the smart card:

```
$ pkcs15-init --store-certificate testuser.crt --label testuser_cert \
  --auth-id 01 --id 01 --format pem --pin 963214
Using reader with a card: Reader name
```

6. (Optional) Store and label the public key in the new slot on the smart card:

```
$ pkcs15-init --store-public-key testuserpublic.key
  --label testuserpublic_key --auth-id 01 --id 01 --pin 963214
Using reader with a card: Reader name
```



#### NOTE

If the public key corresponds to a private key or certificate, specify the same ID as the ID of the private key or certificate.

7. (Optional) Certain smart cards require you to finalize the card by locking the settings:

```
$ pkcs15-init -F
```

At this stage, your smart card includes the certificate, private key, and public key in the newly created slot. You have also created your user PIN and PUK and the Security Officer PIN and PUK.

## 61.9. LOGGING IN TO IDM WITH SMART CARDS

Follow this procedure to use smart cards for logging in to the IdM Web UI.

### Prerequisites

- The web browser is configured for using smart card authentication.
- The IdM server is configured for smart card authentication.
- The certificate installed on your smart card is either issued by the IdM server or has been added to the user entry in IdM.



- You know the PIN required to unlock the smart card.
- The smart card has been inserted into the reader.

## Procedure

1. Open the IdM Web UI in the browser.
2. Click **Log In Using Certificate**

3. If the **Password Required** dialog box opens, add the PIN to unlock the smart card and click the **OK** button.  
The **User Identification Request** dialog box opens.

If the smart card contains more than one certificate, select the certificate you want to use for authentication in the drop down list below **Choose a certificate to present as identification**

4. Click the **OK** button.

Now you are successfully logged in to the IdM Web UI.

|                          | User login | First name | Last name     | Status    | UID       | Email address | Telephone Number | Job Title |
|--------------------------|------------|------------|---------------|-----------|-----------|---------------|------------------|-----------|
| <input type="checkbox"/> | admin      |            | Administrator | ✓ Enabled | 427200000 |               |                  |           |

Showing 1 to 1 of 1 entries.

## 61.10. LOGGING IN TO GDM USING SMART CARD AUTHENTICATION ON AN IDM CLIENT

The GNOME Desktop Manager (GDM) requires authentication. You can use your password; however, you can also use a smart card for authentication.

Follow this procedure to use smart card authentication to access GDM.

### Prerequisites

- The system has been configured for smart card authentication. For details, see [Configuring the IdM client for smart card authentication](#).
- The smart card contains your certificate and private key.
- The user account is a member of the IdM domain.
- The certificate on the smart card maps to the user entry through:
  - Assigning the certificate to a particular user entry. For details, see, [Adding a certificate to a user entry in the IdM Web UI](#) or [Adding a certificate to a user entry in the IdM CLI](#) .
  - The certificate mapping data being applied to the account. For details, see [Certificate mapping rules for configuring authentication on smart cards](#).

### Procedure

1. Insert the smart card in the reader.
2. Enter the smart card PIN.
3. Click **Sign In**.

You are successfully logged in to the RHEL system and you have a TGT provided by the IdM server.

### Verification steps

- In the **Terminal** window, enter **klist** and check the result:

```
$ klist
Ticket cache: KEYRING:persistent:1358900015:krb_cache_TObtNMd
Default principal: example.user@REDHAT.COM

Valid starting    Expires          Service principal
04/20/2020 13:58:24 04/20/2020 23:58:24 krbtgt/EXAMPLE.COM@EXAMPLE.COM
renew until 04/27/2020 08:58:15
```

## 61.11. USING SMART CARD AUTHENTICATION WITH THE SU COMMAND

Changing to a different user requires authentication. You can use a password or a certificate. Follow this procedure to use your smart card with the **su** command. It means that after entering the **su** command, you are prompted for the smart card PIN.

### Prerequisites

- Your IdM server and client have been configured for smart card authentication.
  - See [Configuring the IdM server for smart card authentication](#)
  - See [Configuring the IdM client for smart card authentication](#)

- The smart card contains your certificate and private key. See [Storing a certificate on a smart card](#)
- The card is inserted in the reader and connected to the computer.

### Procedure

- In a terminal window, change to a different user with the **su** command:

```
$ su - example.user  
PIN for smart_card
```

If the configuration is correct, you are prompted to enter the smart card PIN.

## CHAPTER 62. CONFIGURING CERTIFICATES ISSUED BY ADCS FOR SMART CARD AUTHENTICATION IN IDM

To configure smart card authentication in IdM for users whose certificates are issued by Active Directory (AD) certificate services:

- Your deployment is based on cross-forest trust between Identity Management (IdM) and Active Directory (AD).
- You want to allow smart card authentication for users whose accounts are stored in AD.
- Certificates are created and stored in Active Directory Certificate Services (ADCS).

For an overview of smart card authentication, see [Understanding smart card authentication](#).

Configuration will be accomplished in the following steps:

- [Copying CA and user certificates from Active Directory to the IdM server and client](#)
- [Configuring the IdM server and clients for smart card authentication using ADCS certificates](#)
- [Converting a PFX \(PKCS#12\) file to be able to store the certificate and private key into the smart card](#)
- [Configuring timeouts in the sssd.conf file](#)
- [Creating certificate mapping rules for smart card authentication](#)

### Prerequisites

- Identity Management (IdM) and Active Directory (AD) trust is installed  
For details, see [Installing trust between IdM and AD](#).
- Active Directory Certificate Services (ADCS) is installed and certificates for users are generated

## 62.1. WINDOWS SERVER SETTINGS REQUIRED FOR TRUST CONFIGURATION AND CERTIFICATE USAGE

You must configure the following on the Windows Server:

- Active Directory Certificate Services (ADCS) is installed
- Certificate Authority is created
- [Optional] If you are using Certificate Authority Web Enrollment, the Internet Information Services (IIS) must be configured

Export the certificate:

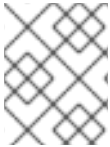
- Key must have **2048** bits or more
- Include a private key
- You will need a certificate in the following format: Personal Information Exchange – **PKCS #12(.PFX)**

- Enable certificate privacy

## 62.2. COPYING CERTIFICATES FROM ACTIVE DIRECTORY USING SFTP

To be able to use smart card authentication, you need to copy the following certificate files:

- A root CA certificate in the **CER** format: **adcs-winsrvr-ca.cer** on your IdM server.
- A user certificate with a private key in the **PFX** format: **aduser1.pfx** on an IdM client.



### NOTE

This procedure expects SSH access is allowed. If SSH is unavailable the user must copy the file from the AD Server to the IdM server and client.

### Procedure

1. Connect from **the IdM server** and copy the **adcs-winsrvr-ca.cer** root certificate to the IdM server:

```
root@idmsrvr ~]# sftp Administrator@winsrvr.ad.example.com
Administrator@winsrvr.ad.example.com's password:
Connected to Administrator@winsrvr.ad.example.com.
sftp> cd <Path to certificates>
sftp> ls
adcs-winsrvr-ca.cer  aduser1.pfx
sftp>
sftp> get adcs-winsrvr-ca.cer
Fetching <Path to certificates>/adcs-winsrvr-ca.cer to adcs-winsrvr-ca.cer
<Path to certificates>/adcs-winsrvr-ca.cer      100% 1254  15KB/s 00:00
sftp quit
```

2. Connect from **the IdM client** and copy the **aduser1.pfx** user certificate to the client:

```
[root@client1 ~]# sftp Administrator@winsrvr.ad.example.com
Administrator@winsrvr.ad.example.com's password:
Connected to Administrator@winsrvr.ad.example.com.
sftp> cd /<Path to certificates>
sftp> get aduser1.pfx
Fetching <Path to certificates>/aduser1.pfx to aduser1.pfx
<Path to certificates>/aduser1.pfx      100% 1254  15KB/s 00:00
sftp quit
```

Now the CA certificate is stored in the IdM server and the user certificates is stored on the client machine.

## 62.3. CONFIGURING THE IDM SERVER AND CLIENTS FOR SMART CARD AUTHENTICATION USING ADCS CERTIFICATES

You must configure the IdM (Identity Management) server and clients to be able to use smart card authentication in the IdM environment. IdM includes the **ipa-adviser** scripts which makes all necessary changes:

- install necessary packages
- configure IdM server and clients
- copy the CA certificates into the expected locations

You can run **ipa-adviser** on your IdM server.

Follow this procedure to configure your server and clients for smart card authentication:

- On an IdM server: Preparing the **ipa-adviser** script to configure your IdM server for smart card authentication.
- On an IdM server: Preparing the **ipa-adviser** script to configure your IdM client for smart card authentication.
- On an IdM server: Applying the the **ipa-adviser** server script on the IdM server using the AD certificate.
- Moving the client script to the IdM client machine.
- On an IdM client: Applying the the **ipa-adviser** client script on the IdM client using the AD certificate.

### Prerequisites

- The certificate has been copied to the IdM server.
- Obtain the Kerberos ticket.
- Log in as a user with administration rights.

### Procedure

1. On the IdM server, use the **ipa-adviser** script for configuring a client:

```
[root@idmsrvr ~]# ipa-adviser config-client-for-smart-card-auth > sc_client.sh
```

2. On the IdM server, use the **ipa-adviser** script for configuring a server:

```
[root@idmsrvr ~]# ipa-adviser config-server-for-smart-card-auth > sc_server.sh
```

3. On the IdM server, execute the script:

```
[root@idmsrvr ~]# sh -x sc_server.sh adcs-winsrvr-ca.cer
```

- It configures the IdM Apache HTTP Server.
  - It enables Public Key Cryptography for Initial Authentication in Kerberos (PKINIT) on the Key Distribution Center (KDC).
  - It configures the IdM Web UI to accept smart card authorization requests.
4. Copy the **sc\_client.sh** script to the client system:

```
[root@idmserver ~]# scp sc_client.sh root@client1.idm.example.com:/root
Password:
sc_client.sh          100% 2857  1.6MB/s  00:00
```

5. Copy the Windows certificate to the client system:

```
[root@idmserver ~]# scp adcs-winserver-ca.cer root@client1.idm.example.com:/root
Password:
adcs-winserver-ca.cer 100% 1254  952.0KB/s  00:00
```

6. On the client system, run the client script:

```
[root@idmclient1 ~]# sh -x sc_client.sh adcs-winserver-ca.cer
```

The CA certificate is installed in the correct format on the IdM server and client systems and next step is to copy the user certificates onto the smart card itself.

## 62.4. CONVERTING THE PFX FILE

Before you store the PFX (PKCS#12) file into the smart card, you must:

- convert the file to the PEM format
- extract the private key and the certificate to two different files

### Prerequisites

- The PFX file is copied into the IdM client machine.

### Procedure

1. On the IdM client, into the PEM format:

```
[root@idmclient1 ~]# openssl pkcs12 -in aduser1.pfx -out aduser1_cert_only.pem -clcerts -
nodes
Enter Import Password:
```

2. Extract the key into the separate file:

```
[root@idmclient1 ~]# openssl pkcs12 -in adduser1.pfx -nocerts -out adduser1.pem >
aduser1.key
```

3. Extract the public certificate into the separate file:

```
[root@idmclient1 ~]# openssl pkcs12 -in adduser1.pfx -clcerts -nokeys -out
aduser1_cert_only.pem > aduser1.crt
```

At this point, you can store the **aduser1.key** and **aduser1.crt** into the smart card.

## 62.5. INSTALLING TOOLS FOR MANAGING AND USING SMART CARDS

To configure your smart card, you need tools which can generate certificates and store them on a smart card.

You must:

- Install the **gnutls-utils** package, which helps you to manage certificates.
- Install the **opensc** package, which provides a set of libraries and utilities to work with smart cards.
- Start the **pcscd** service, which communicates with the smart card reader.

### Procedure

1. Install the **opensc** and **gnutls-utils** packages:

```
# dnf -y install opensc gnutls-utils
```

2. Start the **pcscd** service.

```
# systemctl start pcscd
```

Verify that the **pcscd** service is up and running.

## 62.6. PREPARING YOUR SMART CARD AND UPLOADING YOUR CERTIFICATES AND KEYS TO YOUR SMART CARD

Follow this procedure to configure your smart card with the **pkcs15-init** tool, which helps you to configure:

- Erasing your smart card
- Setting new PINs and optional PIN Unblocking Keys (PUKs)
- Creating a new slot on the smart card
- Storing the certificate, private key, and public key in the slot
- If required, locking the smart card settings as certain smart cards require this type of finalization



### NOTE

The **pkcs15-init** tool may not work with all smart cards. You must use the tools that work with the smart card you are using.

### Prerequisites

- The **opensc** package, which includes the **pkcs15-init** tool, is installed. For details, see [Installing tools for managing and using smart cards](#).
- The card is inserted in the reader and connected to the computer.



- You have the private key, public key, and certificate to store on the smart card. In this procedure, **testuser.key**, **testuserpublic.key**, and **testuser.crt** are the names used for the private key, public key, and the certificate.
- You have your current smart card user PIN and Security Officer PIN (SO-PIN).

## Procedure

1. Erase your smart card and authenticate yourself with your PIN:

```
$ pkcs15-init --erase-card --use-default-transport-keys
Using reader with a card: Reader name
PIN [Security Officer PIN] required.
Please enter PIN [Security Officer PIN]:
```

The card has been erased.

2. Initialize your smart card, set your user PIN and PUK, and your Security Officer PIN and PUK:

```
$ pkcs15-init --create-pkcs15 --use-default-transport-keys \
  --pin 963214 --puk 321478 --so-pin 65498714 --so-puk 784123
Using reader with a card: Reader name
```

The **pkcs15-init** tool creates a new slot on the smart card.

3. Set the label and the authentication ID for the slot:

```
$ pkcs15-init --store-pin --label testuser \
  --auth-id 01 --so-pin 65498714 --pin 963214 --puk 321478
Using reader with a card: Reader name
```

The label is set to a human-readable value, in this case, **testuser**. The **auth-id** must be two hexadecimal values, in this case it is set to **01**.

4. Store and label the private key in the new slot on the smart card:

```
$ pkcs15-init --store-private-key testuser.key --label testuser_key \
  --auth-id 01 --id 01 --pin 963214
Using reader with a card: Reader name
```



### NOTE

The value you specify for **--id** must be the same when storing your private key and storing your certificate in the next step. Specifying your own value for **--id** is recommended as otherwise a more complicated value is calculated by the tool.

5. Store and label the certificate in the new slot on the smart card:

```
$ pkcs15-init --store-certificate testuser.crt --label testuser_cert \
  --auth-id 01 --id 01 --format pem --pin 963214
Using reader with a card: Reader name
```

6. (Optional) Store and label the public key in the new slot on the smart card:

```
$ pkcs15-init --store-public-key testuserpublic.key
--label testuserpublic_key --auth-id 01 --id 01 --pin 963214
Using reader with a card: Reader name
```

**NOTE**

If the public key corresponds to a private key or certificate, specify the same ID as the ID of the private key or certificate.

7. (Optional) Certain smart cards require you to finalize the card by locking the settings:

```
$ pkcs15-init -F
```

At this stage, your smart card includes the certificate, private key, and public key in the newly created slot. You have also created your user PIN and PUK and the Security Officer PIN and PUK.

## 62.7. CONFIGURING TIMEOUTS IN SSSD.CONF

Authentication with a smart card certificate might take longer than the default timeouts used by SSSD. Time out expiration can be caused by:

- slow reader
- a forwarding from a physical device into a virtual environment
- too many certificates stored on the smart card
- slow response from the OCSP (Online Certificate Status Protocol) responder if OCSP is used to verify the certificates

In this case you can prolong the following timeouts in the **sssd.conf** file, for example, to 60 seconds:

- **p11\_child\_timeout**
- **krb5\_auth\_timeout**

### Prerequisites

- You must be logged in as root.

### Procedure

1. Open the **sssd.conf** file:

```
[root@idmclient1 ~]# vim /etc/sss/sss.conf
```

2. Change the value of **p11\_child\_timeout**:

```
[pam]
p11_child_timeout = 60
```

3. Change the value of **krb5\_auth\_timeout**:

```
[domain/IDM.EXAMPLE.COM]  
krb5_auth_timeout = 60
```

4. Save the settings.

Now, the interaction with the smart card is allowed to run for 1 minute (60 seconds) before authentication will fail with a timeout.

## 62.8. CREATING CERTIFICATE MAPPING RULES FOR SMART CARD AUTHENTICATION

If you want to use one certificate for a user who has accounts in AD (Active Directory) and in IdM (Identity Management), you can create a certificate mapping rule on the IdM server.

After creating such a rule, the user is able to authenticate with their smart card in both domains.

For details about certificate mapping rules, see [Certificate mapping rules for configuring authentication](#).

## CHAPTER 63. CONFIGURING CERTIFICATE MAPPING RULES IN IDENTITY MANAGEMENT

Certificate mapping rules are a convenient way of allowing users to authenticate using certificates in scenarios when the Identity Management (IdM) administrator does not have access to certain users' certificates. This is typically because the certificates have been issued by an external certificate authority.

### 63.1. CERTIFICATE MAPPING RULES FOR CONFIGURING AUTHENTICATION

You might need to configure certificate mapping rules in the following scenarios:

- Certificates have been issued by the Certificate System of the Active Directory (AD) with which the IdM domain is in a trust relationship.
- Certificates have been issued by an external certificate authority.
- The IdM environment is large with many users using smart cards. In this case, adding full certificates can be complicated. The subject and issuer are predictable in most scenarios and therefore easier to add ahead of time than the full certificate.

As a system administrator, you can create a certificate mapping rule and add certificate mapping data to a user entry even before a certificate is issued to a particular user. Once the certificate is issued, the user can log in using the certificate even though the full certificate has not yet been uploaded to the user entry.

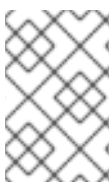
In addition, as certificates are renewed at regular intervals, certificate mapping rules reduce administrative overhead. When a user's certificate is renewed, the administrator does not have to update the user entry. For example, if the mapping is based on the **Subject** and **Issuer** values, and if the new certificate has the same subject and issuer as the old one, the mapping still applies. If, in contrast, the full certificate was used, then the administrator would have to upload the new certificate to the user entry to replace the old one.

To set up certificate mapping:

1. An administrator has to load the certificate mapping data or the full certificate into a user account.
2. An administrator has to create a certificate mapping rule to allow successful logging into IdM for a user whose account contains a certificate mapping data entry that matches the information on the certificate.

Once the certificate mapping rules have been created, when the end-user presents the certificate, stored either on a [filesystem](#) or a [smart card](#), authentication is successful.

For details on the individual components that make up a mapping rule and how to obtain and use them, see [Components of an identity mapping rule in IdM](#) and [Obtaining the issuer from a certificate for use in a matching rule](#).



#### NOTE

Your certificate mapping rules can depend on the use case for which you are using the certificate. For example, if you are using SSH with certificates, you must have the full certificate to extract the public key from the certificate.

## 63.2. COMPONENTS OF AN IDENTITY MAPPING RULE IN IDM

You configure different components when creating an *identity mapping rule* in IdM. Each component has a default value that you can override. You can define the components in either the web UI or the CLI. In the CLI, the identity mapping rule is created using the **ipa certmaprule-add** command.

### Mapping rule

The mapping rule component associates (or *maps*) a certificate with one or more user accounts. The rule defines an LDAP search filter that associates a certificate with the intended user account. Certificates issued by different certificate authorities (CAs) might have different properties and might be used in different domains. Therefore, IdM does not apply mapping rules unconditionally, but only to the appropriate certificates. The appropriate certificates are defined using *matching rules*.

Note that if you leave the mapping rule option empty, the certificates are searched in the **userCertificate** attribute as a DER encoded binary file.

Define the mapping rule in the CLI using the **--maprule** option.

### Matching rule

The matching rule component selects a certificate to which you want to apply the mapping rule. The default matching rule matches certificates with the **digitalSignature key** usage and **clientAuth extended key** usage.

Define the matching rule in the CLI using the **--matchrule** option.

### Domain list

The domain list specifies the identity domains in which you want IdM to search the users when processing identity mapping rules. If you leave the option unspecified, IdM searches the users only in the local domain to which the IdM client belongs.

Define the domain in the CLI using the **--domain** option.

### Priority

When multiple rules are applicable to a certificate, the rule with the highest priority takes precedence. All other rules are ignored.

- The lower the numerical value, the higher the priority of the identity mapping rule. For example, a rule with a priority 1 has higher priority than a rule with a priority 2.
- If a rule has no priority value defined, it has the lowest priority.

Define the mapping rule priority in the CLI using the **--priority** option.

### Certificate mapping rule example

To define, using the CLI, a certificate mapping rule called **simple\_rule** that allows authentication for a certificate issued by the **Smart Card CA** of the **EXAMPLE.ORG** organization if the **Subject** on that certificate matches a **certmapdata** entry in a user account in IdM:

```
# ipa certmaprule-add simple_rule --matchrule '<ISSUER>CN=Smart Card
CA,O=EXAMPLE.ORG' --maprule '(ipacertmapdata=X509:<I>{issuer_dn!nss_x500}<S>
{subject_dn!nss_x500})'
```

## 63.3. OBTAINING DATA FROM A CERTIFICATE FOR USE IN A MATCHING RULE

This procedure describes how to obtain data from a certificate so that you can copy and paste it into the matching rule of a certificate mapping rule. To get data required by a matching rule, use the **sssctl cert-show** or **sssctl cert-eval-rule** commands.

### Prerequisites

- You have the user certificate in PEM format.

### Procedure

1. Create a variable pointing to your certificate that also ensures it is correctly encoded so you can retrieve the required data.

```
# CERT=$(openssl x509 -in /path/to/certificate -outform der|base64 -w0)
```

2. Use the **sssctl cert-eval-rule** to determine the matching data. In the following example the certificate serial number is used.

```
# sssctl cert-eval-rule $CERT --match='<ISSUER>CN=adcs19-WIN1-CA,DC=AD,DC=EXAMPLE,DC=COM' --map='LDAPU1:(altSecurityIdentities=X509:<l>{issuer_dn!ad_x500}<SR>{serial_number!hex_ur})'
Certificate matches rule.
Mapping filter:
```

```
(altSecurityIdentities=X509:<l>DC=com,DC=example,DC=ad,CN=adcs19-WIN1-CA<SR>0F0000000000DB8852DD7B246C9C0F0000003B)
```

In this case, add everything after **altSecurityIdentities=** to the **altSecurityIdentities** attribute in AD for the user. If using SKI mapping, use **--map='LDAPU1:(altSecurityIdentities=X509:<SKI>{subject\_key\_id!hex\_u})'**.

3. Optionally, to create a new mapping rule in the CLI based on a matching rule which specifies that the certificate issuer must match **adcs19-WIN1-CA** of the **ad.example.com** domain and the serial number of the certificate must match the **altSecurityIdentities** entry in a user account:

```
# ipa certmaprule-add simple_rule --matchrule '<ISSUER>CN=adcs19-WIN1-CA,DC=AD,DC=EXAMPLE,DC=COM' --maprule 'LDAPU1:(altSecurityIdentities=X509:<l>{issuer_dn!ad_x500}<SR>{serial_number!hex_ur})'
```

## 63.4. CONFIGURING CERTIFICATE MAPPING FOR USERS STORED IN IDM

To enable certificate mapping in IdM if the user for whom certificate authentication is being configured is stored in IdM, a system administrator must complete the following tasks:

- Set up a certificate mapping rule so that IdM users with certificates that match the conditions specified in the mapping rule and in their certificate mapping data entries can authenticate to IdM.

- Enter certificate mapping data to an IdM user entry so that the user can authenticate using multiple certificates provided that they all contain the values specified in the certificate mapping data entry.

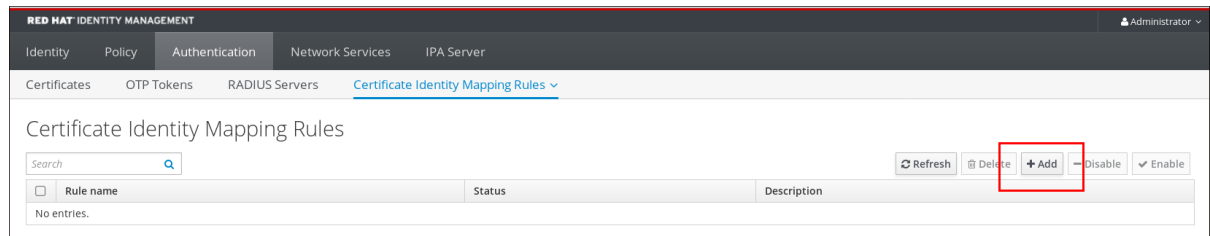
## Prerequisites

- The user has an account in IdM.
- The administrator has either the whole certificate or the certificate mapping data to add to the user entry.

### 63.4.1. Adding a certificate mapping rule in the IdM web UI

1. Log in to the IdM web UI as an administrator.
2. Navigate to **Authentication** → **Certificate Identity Mapping Rules** → **Certificate Identity Mapping Rules**.
3. Click **Add**.

Figure 63.1. Adding a new certificate mapping rule in the IdM web UI



4. Enter the rule name.
5. Enter the mapping rule. For example, to make IdM search for the **Issuer** and **Subject** entries in any certificate presented to them, and base its decision to authenticate or not on the information found in these two entries of the presented certificate:

```
(ipacertmapdata=X509:<I>{issuer_dn!nss_x500}<S>{subject_dn!nss_x500})
```

6. Enter the matching rule. For example, to only allow certificates issued by the **Smart Card CA** of the **EXAMPLE.ORG** organization to authenticate users to IdM:

```
<ISSUER>CN=Smart Card CA,O=EXAMPLE.ORG
```

Figure 63.2. Entering the details for a certificate mapping rule in the IdM web UI

- Click **Add** at the bottom of the dialog box to add the rule and close the box.
- The System Security Services Daemon (SSSD) periodically re-reads the certificate mapping rules. To force the newly-created rule to be loaded immediately, restart SSSD:

```
# systemctl restart sssd
```

Now you have a certificate mapping rule set up that compares the type of data specified in the mapping rule that it finds on a smart card certificate with the certificate mapping data in your IdM user entries. Once it finds a match, it authenticates the matching user.

### 63.4.2. Adding a certificate mapping rule in the IdM CLI

- Obtain the administrator's credentials:

```
# kinit admin
```

- Enter the mapping rule and the matching rule the mapping rule is based on. For example, to make IdM search for the **Issuer** and **Subject** entries in any certificate presented, and base its decision to authenticate or not on the information found in these two entries of the presented certificate, recognizing only certificates issued by the **Smart Card CA** of the **EXAMPLE.ORG** organization:

```
# ipa certmaprule-add rule_name --matchrule '<ISSUER>CN=Smart Card
CA,O=EXAMPLE.ORG' --maprule '(ipacertmapdata=X509:<I>{issuer_dn!nss_x500}<S>
{subject_dn!nss_x500})'
-----
Added Certificate Identity Mapping Rule "rule_name"
-----
Rule name: rule_name
Mapping rule: (ipacertmapdata=X509:<I>{issuer_dn!nss_x500}<S>{subject_dn!nss_x500})
Matching rule: <ISSUER>CN=Smart Card CA,O=EXAMPLE.ORG
Enabled: TRUE
```

- The System Security Services Daemon (SSSD) periodically re-reads the certificate mapping rules. To force the newly-created rule to be loaded immediately, restart SSSD:



```
# systemctl restart sssd
```

Now you have a certificate mapping rule set up that compares the type of data specified in the mapping rule that it finds on a smart card certificate with the certificate mapping data in your IdM user entries. Once it finds a match, it authenticates the matching user.

### 63.4.3. Adding certificate mapping data to a user entry in the IdM web UI

1. Log into the IdM web UI as an administrator.
2. Navigate to **Users** → **Active users** → **idm\_user**.
3. Find the **Certificate mapping data** option and click **Add**.
4. Choose one of the following options:
  - If you have the certificate of **idm\_user**:
    - a. In the command-line interface, display the certificate using the **cat** utility or a text editor:

```
[root@server ~]# cat idm_user_certificate.pem
-----BEGIN CERTIFICATE-----
MIIFTCCA/2gAwIBAgIBejANBgkqhkiG9w0BAQsFADA6MRgwFgYDVQQKDA9JRE0
u
RVhBTvBMRS5DT00xHjAcBgNVBAMMFUNcnRpZmljYXRlIEF1dGhvcmI0eTAeFw0x
ODA5MDIxODE1MzlaFw0yMDA5MDIxODE1MzlaMCwxGDAWBgNVBAoMD0IETS5F
WEFN
[...output truncated...]
```

- b. Copy the certificate.
- c. In the IdM web UI, click **Add** next to **Certificate** and paste the certificate into the window that opens up.

Figure 63.3. Adding a user's certificate mapping data: certificate

User: demouser  
demouser is a member of:

Settings | User Groups | Netgroups | Roles | HBAC Rules | Sudo Rules

Refresh Revert Save Actions

**Identity Settings**

Job Title  
First name \* Demo  
Last name \* User  
Full name \* Demo User  
Display name Demo User  
Initials DU  
GECOS Demo User  
Class

**Account Settings**

User login demouser  
Password \*\*\*\*\*  
Password expiration 2016-07-14 10:14:41Z  
UID 373000005  
GID 373000005  
Principal alias demouser@IDM.EXAMPLE.COM Delete  
Add  
Kerberos principal expiration YYYY-MM-DD hh : mn UTC  
Login shell /bin/sh  
Home directory /home/demouser  
SSH public keys Add  
Certificates **Add**

- If you do not have the certificate of **idm\_user** at your disposal but know the **Issuer** and the **Subject** of the certificate, check the radio button of **Issuer and subject** and enter the values in the two respective boxes.

Figure 63.4. Adding a user's certificate mapping data: issuer and subject

GID 1997000009

**Add Certificate Mapping Data**

☐ Certificate mapping data  
Certificate mapping data

Certificate ⓘ

☒ **Issuer and subject**

Issuer ⓘ \* O=EXAMPLE.ORG,CN=Smart Card CA

Subject ⓘ \* CN=test,O=EXAMPLE.ORG

Add Cancel

Certificate mapping Add

5. Click **Add**.

## Verification steps

If you have access to the whole certificate in the **.pem** format, verify that the user and certificate are linked:

1. Use the **sss\_cache** utility to invalidate the record of **idm\_user** in the SSSD cache and force a reload of the **idm\_user** information:

```
# sss_cache -u idm_user
```

- Run the **ipa certmap-match** command with the name of the file containing the certificate of the IdM user:

```
# ipa certmap-match idm_user_cert.pem
-----
1 user matched
-----
Domain: IDM.EXAMPLE.COM
User logins: idm_user
-----
Number of entries returned 1
-----
```

The output confirms that now you have certificate mapping data added to **idm\_user** and that a corresponding mapping rule exists. This means that you can use any certificate that matches the defined certificate mapping data to authenticate as **idm\_user**.

#### 63.4.4. Adding certificate mapping data to a user entry in the IdM CLI

- Obtain the administrator's credentials:

```
# kinit admin
```

- Choose one of the following options:

- If you have the certificate of **idm\_user**, add the certificate to the user account using the **ipa user-add-cert** command:

```
# CERT=$(openssl x509 -in idm_user_cert.pem -outform der|base64 -w0)
# ipa user-add-certmapdata idm_user --certificate $CERT
```

- If you do not have the certificate of **idm\_user** but know the **Issuer** and the **Subject** of the user's certificate:

```
# ipa user-add-certmapdata idm_user --subject "O=EXAMPLE.ORG,CN=test" --
issuer "CN=Smart Card CA,O=EXAMPLE.ORG"
-----
Added certificate mappings to user "idm_user"
-----
User login: idm_user
Certificate mapping data: X509:<|>O=EXAMPLE.ORG,CN=Smart Card
CA<S>CN=test,O=EXAMPLE.ORG
```

#### Verification steps

If you have access to the whole certificate in the **.pem** format, verify that the user and certificate are linked:

- Use the **sss\_cache** utility to invalidate the record of **idm\_user** in the SSSD cache and force a reload of the **idm\_user** information:

```
# sss_cache -u idm_user
```

2. Run the **ipa certmap-match** command with the name of the file containing the certificate of the IdM user:

```
# ipa certmap-match idm_user_cert.pem
-----
1 user matched
-----
Domain: IDM.EXAMPLE.COM
User logins: idm_user
-----
Number of entries returned 1
-----
```

The output confirms that now you have certificate mapping data added to **idm\_user** and that a corresponding mapping rule exists. This means that you can use any certificate that matches the defined certificate mapping data to authenticate as **idm\_user**.

## 63.5. CERTIFICATE MAPPING RULES FOR TRUSTS WITH ACTIVE DIRECTORY DOMAINS

Different certificate mapping use cases are possible if an IdM deployment is in a trust relationship with an Active Directory (AD) domain.

Depending on the AD configuration, the following scenarios are possible:

- If the certificate is issued by AD Certificate System but the user and the certificate are stored in IdM, the mapping and the whole processing of the authentication request takes place on the IdM side. For details of configuring this scenario, see [Configuring certificate mapping for users stored in IdM](#)
- If the user is stored in AD, the processing of the authentication request takes place in AD. There are three different subcases:
  - The AD user entry contains the whole certificate. For details how to configure IdM in this scenario, see [Configuring certificate mapping for users whose AD user entry contains the whole certificate](#).
  - AD is configured to map user certificates to user accounts. In this case, the AD user entry does not contain the whole certificate but instead contains an attribute called **altSecurityIdentities**. For details how to configure IdM in this scenario, see [Configuring certificate mapping if AD is configured to map user certificates to user accounts](#).
  - The AD user entry contains neither the whole certificate nor the mapping data. In this case, there are two options:
    - If the user certificate is issued by AD Certificate System, the certificate either contains the user principal name as the Subject Alternative Name (SAN) or, if the latest updates are applied to AD, the SID of the user in the SID extension of the certificate. Both of these can be used to map the certificate to the user.
    - If the user certificate is on a smart card, to enable SSH with smart cards, SSSD must derive the public SSH key from the certificate and therefore the full certificate is required. The only solution is to use the **ipa idoverrideuser-add** command to add the whole certificate to the AD user's ID override in IdM. For details, see [Configuring certificate mapping if AD user entry contains no certificate or mapping data](#).

AD domain administrators can manually map certificates to a user in AD using the **altSecurityIdentities** attribute. There are six supported values for this attribute, though three mappings are considered insecure. As part of [May 10, 2022 security update](#), once it is installed, all devices are in compatibility mode and if a certificate is weakly mapped to a user, authentication occurs as expected. However, warning messages are logged identifying any certificates that are not compatible with full enforcement mode. As of November 14, 2023 or later, all devices will be updated to full enforcement mode and if a certificate fails the strong mapping criteria, authentication will be denied.

For example, when an AD user requests an IdM Kerberos ticket with a certificate (PKINIT), AD needs to map the certificate to a user internally and uses the new mapping rules for this. However in IdM, the previous rules continue to work if IdM is used to map a certificate to a user on an IdM client, .

IdM supports the new mapping templates, making it easier for an AD administrator to use the new rules and not maintain both. IdM now supports the new mapping templates added to Active Directory to include:

- Serial Number: LDAPU1:(altSecurityIdentities=X509:<I>{issuer\_dn!ad\_x500}<SR>{serial\_number!hex\_ur})
- Subject Key Id: LDAPU1:(altSecurityIdentities=X509:<SKI>{subject\_key\_id!hex\_u})
- User SID: LDAPU1:(objectsid={sid})

If you do not want to reissue certificates with the new SID extension, you can create a manual mapping by adding the appropriate mapping string to a user's **altSecurityIdentities** attribute in AD.

## 63.6. CONFIGURING CERTIFICATE MAPPING FOR USERS WHOSE AD USER ENTRY CONTAINS THE WHOLE CERTIFICATE

This user story describes the steps necessary for enabling certificate mapping in IdM if the IdM deployment is in trust with Active Directory (AD), the user is stored in AD and the user entry in AD contains the whole certificate.

### Prerequisites

- The user does not have an account in IdM.
- The user has an account in AD which contains a certificate.
- The IdM administrator has access to data on which the IdM certificate mapping rule can be based.



### NOTE

To ensure PKINIT works for a user, one of the following conditions must apply:

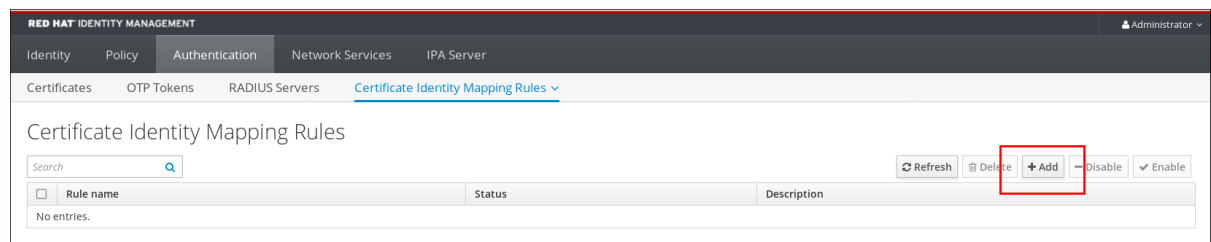
- The certificate in the user entry includes the user principal name or the SID extension for the user.
- The user entry in AD has a suitable entry in the **altSecurityIdentities** attribute.

### 63.6.1. Adding a certificate mapping rule in the IdM web UI

1. Log into the IdM web UI as an administrator.

2. Navigate to **Authentication** → **Certificate Identity Mapping Rules** → **Certificate Identity Mapping Rules**.
3. Click **Add**.

Figure 63.5. Adding a new certificate mapping rule in the IdM web UI



4. Enter the rule name.
5. Enter the mapping rule. To have the whole certificate that is presented to IdM for authentication compared to what is available in AD:

```
(userCertificate;binary={cert!bin})
```



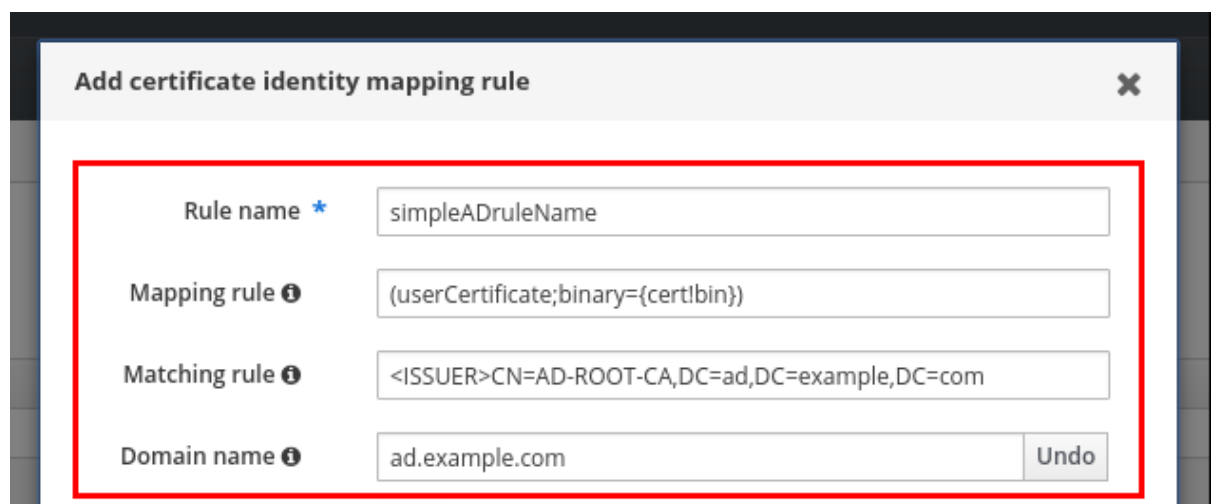
#### NOTE

If mapping using the full certificate, if you renew the certificate, you must ensure that you add the new certificate to the AD user object.

6. Enter the matching rule. For example, to only allow certificates issued by the **AD-ROOT-CA** of the **AD.EXAMPLE.COM** domain to authenticate:

```
<ISSUER>CN=AD-ROOT-CA,DC=ad,DC=example,DC=com
```

Figure 63.6. Certificate mapping rule for a user with a certificate stored in AD



7. Click **Add**.
8. The System Security Services Daemon (SSSD) periodically re-reads the certificate mapping rules. To force the newly-created rule to be loaded immediately, restart SSSD in the CLI::

```
# systemctl restart sssd
```

### 63.6.2. Adding a certificate mapping rule in the IdM CLI

1. Obtain the administrator's credentials:

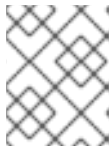
```
# kinit admin
```

2. Enter the mapping rule and the matching rule the mapping rule is based on. To have the whole certificate that is presented for authentication compared to what is available in AD, only allowing certificates issued by the **AD-ROOT-CA** of the **AD.EXAMPLE.COM** domain to authenticate:

```
# ipa certmaprule-add simpleADrule --matchrule '<ISSUER>CN=AD-ROOT-CA,DC=ad,DC=example,DC=com' --maprule '(userCertificate;binary={cert!bin})' --domain ad.example.com
```

```
-----
Added Certificate Identity Mapping Rule "simpleADrule"
-----
```

```
Rule name: simpleADrule
Mapping rule: (userCertificate;binary={cert!bin})
Matching rule: <ISSUER>CN=AD-ROOT-CA,DC=ad,DC=example,DC=com
Domain name: ad.example.com
Enabled: TRUE
```



#### NOTE

If mapping using the full certificate, if you renew the certificate, you must ensure that you add the new certificate to the AD user object.

3. The System Security Services Daemon (SSSD) periodically re-reads the certificate mapping rules. To force the newly-created rule to be loaded immediately, restart SSSD:

```
# systemctl restart sssd
```

## 63.7. CONFIGURING CERTIFICATE MAPPING IF AD IS CONFIGURED TO MAP USER CERTIFICATES TO USER ACCOUNTS

This user story describes the steps necessary for enabling certificate mapping in IdM if the IdM deployment is in trust with Active Directory (AD), the user is stored in AD, and the user entry in AD contains certificate mapping data.

### Prerequisites

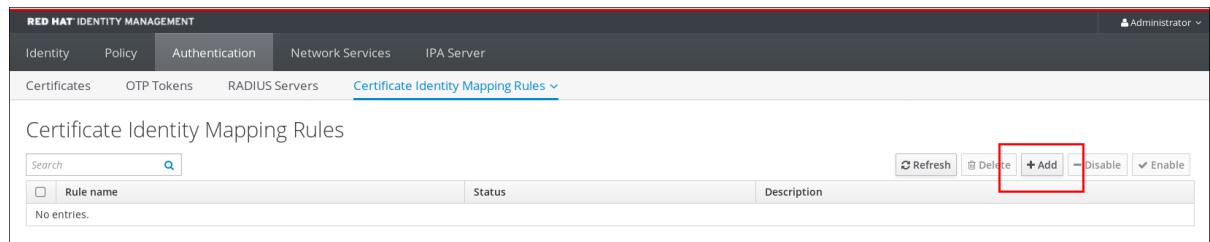
- The user does not have an account in IdM.
- The user has an account in AD which contains the **altSecurityIdentities** attribute, the AD equivalent of the IdM **certmapdata** attribute.
- The IdM administrator has access to data on which the IdM certificate mapping rule can be based.

### 63.7.1. Adding a certificate mapping rule in the IdM web UI

1. Log into the IdM web UI as an administrator.

2. Navigate to **Authentication** → **Certificate Identity Mapping Rules** → **Certificate Identity Mapping Rules**.
3. Click **Add**.

Figure 63.7. Adding a new certificate mapping rule in the IdM web UI



4. Enter the rule name.
5. Enter the mapping rule. For example, to make AD DC search for the **Issuer** and **Subject** entries in any certificate presented, and base its decision to authenticate or not on the information found in these two entries of the presented certificate:

```
(altSecurityIdentities=X509:<I>{issuer_dn!ad_x500}<S>{subject_dn!ad_x500})
```

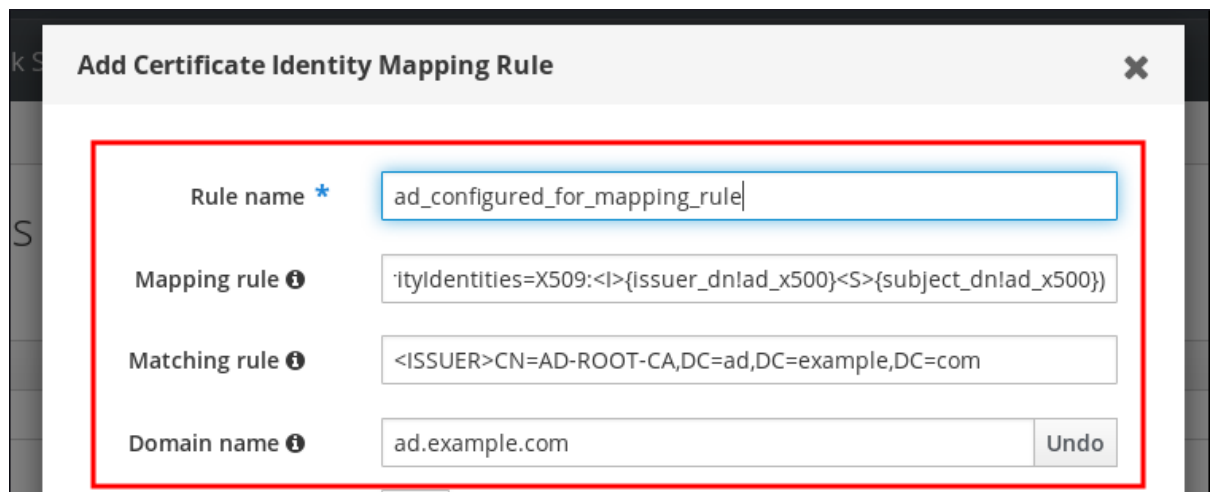
6. Enter the matching rule. For example, to only allow certificates issued by the **AD-ROOT-CA** of the **AD.EXAMPLE.COM** domain to authenticate users to IdM:

```
<ISSUER>CN=AD-ROOT-CA,DC=ad,DC=example,DC=com
```

7. Enter the domain:

```
ad.example.com
```

Figure 63.8. Certificate mapping rule if AD is configured for mapping



8. Click **Add**.
9. The System Security Services Daemon (SSSD) periodically re-reads the certificate mapping rules. To force the newly-created rule to be loaded immediately, restart SSSD in the CLI::

```
# systemctl restart sssd
```



### 63.7.2. Adding a certificate mapping rule in the IdM CLI

1. Obtain the administrator's credentials:

```
# kinit admin
```

2. Enter the mapping rule and the matching rule the mapping rule is based on. For example, to make AD search for the **Issuer** and **Subject** entries in any certificate presented, and only allow certificates issued by the **AD-ROOT-CA** of the **AD.EXAMPLE.COM** domain:

```
# ipa certmaprule-add ad_configured_for_mapping_rule --matchrule
'<ISSUER>CN=AD-ROOT-CA,DC=ad,DC=example,DC=com' --maprule
'(altSecurityIdentities=X509:<I>{issuer_dn!ad_x500}<S>{subject_dn!ad_x500})' --
domain=ad.example.com
```

```
-----
Added Certificate Identity Mapping Rule "ad_configured_for_mapping_rule"
-----
```

```
Rule name: ad_configured_for_mapping_rule
Mapping rule: (altSecurityIdentities=X509:<I>{issuer_dn!ad_x500}<S>
{subject_dn!ad_x500})
Matching rule: <ISSUER>CN=AD-ROOT-CA,DC=ad,DC=example,DC=com
Domain name: ad.example.com
Enabled: TRUE
```

3. The System Security Services Daemon (SSSD) periodically re-reads the certificate mapping rules. To force the newly-created rule to be loaded immediately, restart SSSD:

```
# systemctl restart sssd
```

### 63.7.3. Checking certificate mapping data on the AD side

The **altSecurityIdentities** attribute is the Active Directory (AD) equivalent of **certmapdata** user attribute in IdM. When configuring certificate mapping in IdM in the scenario when a trusted AD domain is configured to map user certificates to user accounts, the IdM system administrator needs to check that the **altSecurityIdentities** attribute is set correctly in the user entries in AD.

#### Prerequisites

- The user account must have user administration access.

#### Procedure

- To check that AD contains the right information for the user stored in AD, use the **ldapsearch** command. For example, enter the command below to check with the **adserver.ad.example.com** server that the following conditions apply:
  - The **altSecurityIdentities** attribute is set in the user entry of **ad\_user**.
  - The matchrule stipulates that the following conditions apply:
    - The certificate that **ad\_user** uses to authenticate to AD was issued by **AD-ROOT-CA** of the **ad.example.com** domain.
    - The subject is **<S>DC=com,DC=example,DC=ad,CN=Users,CN=ad\_user**:

```
$ ldapsearch -o ldif-wrap=no -LLL -h adserver.ad.example.com \
-p 389 -D cn=Administrator,cn=users,dc=ad,dc=example,dc=com \
-W -b cn=users,dc=ad,dc=example,dc=com "(cn=ad_user)" \
altSecurityIdentities
Enter LDAP Password:
dn: CN=ad_user,CN=Users,DC=ad,DC=example,DC=com
altSecurityIdentities: X509:<|>DC=com,DC=example,DC=ad,CN=AD-ROOT-
CA<S>DC=com,DC=example,DC=ad,CN=Users,CN=ad_user
```

## 63.8. CONFIGURING CERTIFICATE MAPPING IF AD USER ENTRY CONTAINS NO CERTIFICATE OR MAPPING DATA

This user story describes the steps necessary for enabling certificate mapping in IdM if the IdM deployment is in trust with Active Directory (AD), the user is stored in AD and the user entry in AD contains neither the whole certificate nor certificate mapping data.

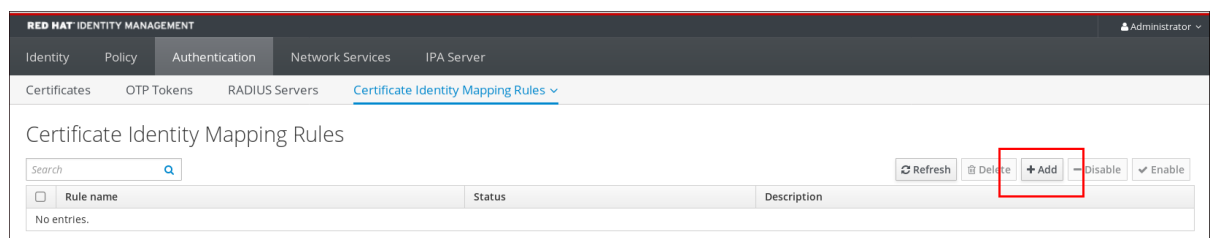
### Prerequisites

- The user does not have an account in IdM.
- The user has an account in AD which contains neither the whole certificate nor the **altSecurityIdentities** attribute, the AD equivalent of the IdM **certmapdata** attribute.
- The IdM administrator has done one of the following:
  - Added the whole AD user certificate to the AD user's **user ID override** in IdM.
  - Created a certificate mapping rule that maps to an alternative field in the certificate, such as Subject Alternative Name or the SID of the user.

### 63.8.1. Adding a certificate mapping rule in the IdM web UI

1. Log into the IdM web UI as an administrator.
2. Navigate to **Authentication** → **Certificate Identity Mapping Rules** → **Certificate Identity Mapping Rules**.
3. Click **Add**.

Figure 63.9. Adding a new certificate mapping rule in the IdM web UI



4. Enter the rule name.
5. Enter the mapping rule. To have the whole certificate that is presented to IdM for authentication compared to the certificate stored in the user ID override entry of the AD user entry in IdM:

```
(userCertificate;binary={cert!bin})
```

**NOTE**

As the certificate also contains the user principal name as the SAN, or with the latest updates, the SID of the user in the SID extension of the certificate, you can also use these fields to map the certificate to the user. For example, if using the SID of the user, replace this mapping rule with **LDAPU1:(objectsid={sid})**. For more information on certificate mapping, see the **sss-certmap** man page.

- Enter the matching rule. For example, to only allow certificates issued by the **AD-ROOT-CA** of the **AD.EXAMPLE.COM** domain to authenticate:

```
<ISSUER>CN=AD-ROOT-CA,DC=ad,DC=example,DC=com
```

- Enter the domain name. For example, to search for users in the **ad.example.com** domain:

Figure 63.10. Certificate mapping rule for a user with no certificate or mapping data stored in AD

- Click **Add**.
- The System Security Services Daemon (SSSD) periodically re-reads the certificate mapping rules. To force the newly-created rule to be loaded immediately, restart SSSD in the CLI:

```
# systemctl restart sssd
```

### 63.8.2. Adding a certificate mapping rule in the IdM CLI

- Obtain the administrator's credentials:

```
# kinit admin
```

- Enter the mapping rule and the matching rule the mapping rule is based on. To have the whole certificate that is presented for authentication compared to the certificate stored in the user ID override entry of the AD user entry in IdM, only allowing certificates issued by the **AD-ROOT-CA** of the **AD.EXAMPLE.COM** domain to authenticate:

```
# ipa certmaprule-add simpleADrule --matchrule '<ISSUER>CN=AD-ROOT-CA,DC=ad,DC=example,DC=com' --maprule '(userCertificate;binary={cert!bin})' --
```

**domain ad.example.com**

-----  
 Added Certificate Identity Mapping Rule "simpleADrule"  
 -----

Rule name: simpleADrule

Mapping rule: (userCertificate;binary={cert!bin})

Matching rule: <ISSUER>CN=AD-ROOT-CA,DC=ad,DC=example,DC=com

Domain name: ad.example.com

Enabled: TRUE

**NOTE**

As the certificate also contains the user principal name as the SAN, or with the latest updates, the SID of the user in the SID extension of the certificate, you can also use these fields to map the certificate to the user. For example, if using the SID of the user, replace this mapping rule with **LDAPU1:(objectsid={sid})**. For more information on certificate mapping, see the **sss-certmap** man page.

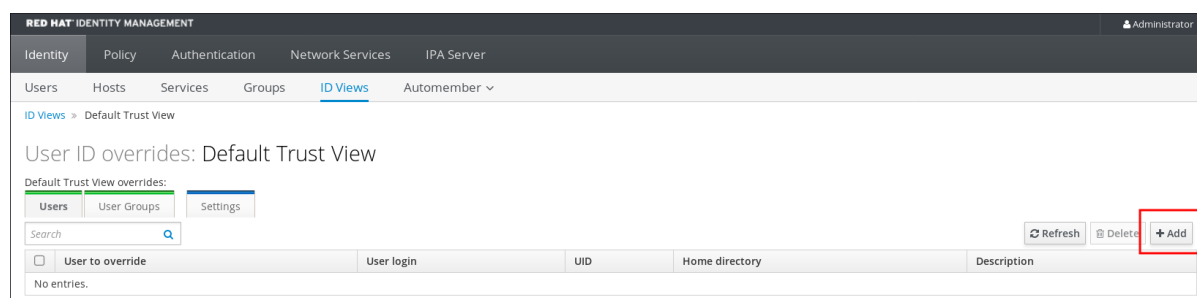
3. The System Security Services Daemon (SSSD) periodically re-reads the certificate mapping rules. To force the newly-created rule to be loaded immediately, restart SSSD:

```
# systemctl restart sssd
```

**63.8.3. Adding a certificate to an AD user's ID override in the IdM web UI**

1. Navigate to **Identity** → **ID Views** → **Default Trust View**.
2. Click **Add**.

**Figure 63.11. Adding a new user ID override in the IdM web UI**



3. In the **User to override** field, enter **ad\_user@ad.example.com**.
4. Copy and paste the certificate of **ad\_user** into the **Certificate** field.

Figure 63.12. Configuring the User ID override for an AD user

**Add User ID override**

User to override \*

User login

GECOS

UID

GID

Certificate

5. Click **Add**.

## Verification steps

Verify that the user and certificate are linked:

1. Use the **sss\_cache** utility to invalidate the record of **ad\_user@ad.example.com** in the SSSD cache and force a reload of the **ad\_user@ad.example.com** information:

```
# sss_cache -u ad_user@ad.example.com
```

2. Run the **ipa certmap-match** command with the name of the file containing the certificate of the AD user:

```
# ipa certmap-match ad_user_cert.pem
-----
1 user matched
-----
Domain: AD.EXAMPLE.COM
User logins: ad_user@ad.example.com
-----
Number of entries returned 1
-----
```

The output confirms that you have certificate mapping data added to **ad\_user@ad.example.com** and that a corresponding mapping rule defined in [Adding a certificate mapping rule if the AD user entry contains no certificate or mapping data](#) exists. This means that you can use any certificate that matches the defined certificate mapping data to authenticate as **ad\_user@ad.example.com**.

## Additional resources

- [Using ID views for Active Directory users](#)

### 63.8.4. Adding a certificate to an AD user's ID override in the IdM CLI

1. Obtain the administrator's credentials:

```
# kinit admin
```

2. Store the certificate blob in a new variable called **CERT**:

```
# CERT=$(openssl x509 -in /path/to/certificate -outform der|base64 -w0)
```

3. Add the certificate of **ad\_user@ad.example.com** to the user account using the **ipa idoverrideuser-add-cert** command:

```
# ipa idoverrideuser-add-cert ad_user@ad.example.com --certificate $CERT
```

## Verification steps

Verify that the user and certificate are linked:

1. Use the **sss\_cache** utility to invalidate the record of **ad\_user@ad.example.com** in the SSSD cache and force a reload of the **ad\_user@ad.example.com** information:

```
# sss_cache -u ad_user@ad.example.com
```

2. Run the **ipa certmap-match** command with the name of the file containing the certificate of the AD user:

```
# ipa certmap-match ad_user_cert.pem
-----
1 user matched
-----
Domain: AD.EXAMPLE.COM
User logins: ad_user@ad.example.com
-----
Number of entries returned 1
-----
```

The output confirms that you have certificate mapping data added to **ad\_user@ad.example.com** and that a corresponding mapping rule defined in [Adding a certificate mapping rule if the AD user entry contains no certificate or mapping data](#) exists. This means that you can use any certificate that matches the defined certificate mapping data to authenticate as **ad\_user@ad.example.com**.

## Additional resources

- [Using ID views for Active Directory users](#)

## 63.9. COMBINING SEVERAL IDENTITY MAPPING RULES INTO ONE

To combine several identity mapping rules into one combined rule, use the `|` (or) character to precede the individual mapping rules, and separate them using `()` brackets, for example:

### Certificate mapping filter example 1

```
$ ipa certmaprule-add ad_cert_for_ipa_and_ad_users \
--maprule='(|(ipacertmapdata=X509:<I>
{issuer_dn!nss_x500}<S>{subject_dn!nss_x500})(altSecurityIdentities=X509:<I>
{issuer_dn!ad_x500}<S>{subject_dn!ad_x500}))' \
--matchrule='<ISSUER>CN=AD-ROOT-CA,DC=ad,DC=example,DC=com' \
--domain=ad.example.com
```

In the above example, the filter definition in the `--maprule` option includes these criteria:

- **ipacertmapdata=X509:<I>{issuer\_dn!nss\_x500}<S>{subject\_dn!nss\_x500}** is a filter that links the subject and issuer from a smart card certificate to the value of the **ipacertmapdata** attribute in an IdM user account, as described in [Adding a certificate mapping rule in IdM](#)
- **altSecurityIdentities=X509:<I>{issuer\_dn!ad\_x500}<S>{subject\_dn!ad\_x500}** is a filter that links the subject and issuer from a smart card certificate to the value of the **altSecurityIdentities** attribute in an AD user account, as described in [Adding a certificate mapping rule if the trusted AD domain is configured to map user certificates](#)
- The addition of the `--domain=ad.example.com` option means that users mapped to a given certificate are not only searched in the local **idm.example.com** domain but also in the **ad.example.com** domain

The filter definition in the `--maprule` option accepts the logical operator `|` (or), so that you can specify multiple criteria. In this case, the rule maps all user accounts that meet at least one of the criteria.

### Certificate mapping filter example 2

```
$ ipa certmaprule-add ipa_cert_for_ad_users \
--maprule='(|(userCertificate;binary={cert!bin})(ipacertmapdata=X509:<I>
{issuer_dn!nss_x500}<S>{subject_dn!nss_x500})(altSecurityIdentities=X509:<I>
{issuer_dn!ad_x500}<S>{subject_dn!ad_x500}))' \
--matchrule='<ISSUER>CN=Certificate Authority,O=REALM.EXAMPLE.COM' \
--domain=idm.example.com --domain=ad.example.com
```

In the above example, the filter definition in the `--maprule` option includes these criteria:

- **userCertificate;binary={cert!bin}** is a filter that returns user entries that include the whole certificate. For AD users, creating this type of filter is described in detail in [Adding a certificate mapping rule if the AD user entry contains no certificate or mapping data](#).
- **ipacertmapdata=X509:<I>{issuer\_dn!nss\_x500}<S>{subject\_dn!nss\_x500}** is a filter that links the subject and issuer from a smart card certificate to the value of the **ipacertmapdata** attribute in an IdM user account, as described in [Adding a certificate mapping rule in IdM](#).
- **altSecurityIdentities=X509:<I>{issuer\_dn!ad\_x500}<S>{subject\_dn!ad\_x500}** is a filter that links the subject and issuer from a smart card certificate to the value of the **altSecurityIdentities** attribute in an AD user account, as described in [Adding a certificate mapping rule if the trusted AD domain is configured to map user certificates](#).

The filter definition in the `--maprule` option accepts the logical operator `|` (or), so that you can specify multiple criteria. In this case, the rule maps all user accounts that meet at least one of the criteria.

## 63.10. ADDITIONAL RESOURCES

- See the **sss-certmap(5)** man page.



## CHAPTER 64. CONFIGURING AUTHENTICATION WITH A CERTIFICATE STORED ON THE DESKTOP OF AN IDM CLIENT

By configuring Identity Management (IdM), IdM system administrators can enable users to authenticate to the IdM web UI and command-line interface (CLI) using a certificate that a Certificate Authority (CA) has issued to the users. The certificate is stored on the desktop of an IdM client.

The web browser can run on a system that is not part of the IdM domain.

Note the following while configuring authentication with a certificate:

- you can skip [Requesting a new user certificate and exporting it to the client](#) if the user you want to authenticate using a certificate already has a certificate;
- you can skip [Making sure the certificate and user are linked together](#) if the user's certificate has been issued by the IdM CA.



### NOTE

Only Identity Management users can log into the web UI using a certificate. Active Directory users can log in with their user name and password.

### 64.1. CONFIGURING THE IDENTITY MANAGEMENT SERVER FOR CERTIFICATE AUTHENTICATION IN THE WEB UI

As an Identity Management (IdM) administrator, you can allow users to use certificates to authenticate to your IdM environment.

#### Procedure

As the Identity Management administrator:

1. On an Identity Management server, obtain administrator privileges and create a shell script to configure the server.
  - a. Run the **ipa-adviser config-server-for-smart-card-auth** command, and save its output to a file, for example **server\_certificate\_script.sh**:

```
# kinit admin
# ipa-adviser config-server-for-smart-card-auth > server_certificate_script.sh
```

- b. Add execute permissions to the file using the **chmod** utility:

```
# chmod +x server_certificate_script.sh
```

2. On all the servers in the Identity Management domain, run the **server\_certificate\_script.sh** script
  - a. with the path of the IdM Certificate Authority certificate, **/etc/ipa/ca.crt**, as input if the IdM CA is the only certificate authority that has issued the certificates of the users you want to enable certificate authentication for:

```
# ./server_certificate_script.sh /etc/ipa/ca.crt
```

- b. with the paths leading to the relevant CA certificates as input if different external CAs signed the certificates of the users who you want to enable certificate authentication for:

```
# ./server_certificate_script.sh /tmp/ca1.pem /tmp/ca2.pem
```



#### NOTE

Do not forget to run the script on each new replica that you add to the system in the future if you want to have certificate authentication for users enabled in the whole topology.

## 64.2. REQUESTING A NEW USER CERTIFICATE AND EXPORTING IT TO THE CLIENT

As an Identity Management (IdM) administrator, you can create certificates for users in your IdM environment and export them to the IdM clients on which you want to enable certificate authentication for users.



#### NOTE

You do not need to follow this procedure if the user you want to authenticate using a certificate already has a certificate.

### Procedure

1. Optionally, create a new directory, for example `~/certdb/`, and make it a temporary certificate database. When asked, create an NSS Certificate DB password to encrypt the keys to the certificate to be generated in a subsequent step:

```
# mkdir ~/certdb/
# certutil -N -d ~/certdb/
Enter a password which will be used to encrypt your keys.
The password should be at least 8 characters long,
and should contain at least one non-alphabetic character.
```

```
Enter new password:
Re-enter password:
```

2. Create the certificate signing request (CSR) and redirect the output to a file. For example, to create a CSR with the name **certificate\_request.csr** for a **4096** bit certificate for the **idm\_user** user in the **IDM.EXAMPLE.COM** realm, setting the nickname of the certificate private keys to **idm\_user** for easy findability, and setting the subject to **CN=idm\_user,O=IDM.EXAMPLE.COM**:

```
# certutil -R -d ~/certdb/ -a -g 4096 -n idm_user -s "CN=idm_user,O=IDM.EXAMPLE.COM"
> certificate_request.csr
```

3. When prompted, enter the same password that you entered when using **certutil** to create the temporary database. Then continue typing randomly until told to stop:

```
Enter Password or Pin for "NSS Certificate DB":
```

```
A random seed must be generated that will be used in the
```

creation of your key. One of the easiest ways to create a random seed is to use the timing of keystrokes on a keyboard.

To begin, type keys on the keyboard until this progress meter is full. DO NOT USE THE AUTOREPEAT FUNCTION ON YOUR KEYBOARD!

Continue typing until the progress meter is full:

4. Submit the certificate request file to the server. Specify the Kerberos principal to associate with the newly-issued certificate, the output file to store the certificate, and optionally the certificate profile. For example, to obtain a certificate of the **IECUserRoles** profile, a profile with added user roles extension, for the **idm\_user@IDM.EXAMPLE.COM** principal, and save it in the **~/idm\_user.pem** file:

```
# ipa cert-request certificate_request.csr --principal=idm_user@IDM.EXAMPLE.COM --
profile-id=IECUserRoles --certificate-out=~/idm_user.pem
```

5. Add the certificate to the NSS database. Use the **-n** option to set the same nickname that you used when creating the CSR previously so that the certificate matches the private key in the NSS database. The **-t** option sets the trust level. For details, see the `certutil(1)` man page. The **-i** option specifies the input certificate file. For example, to add to the NSS database a certificate with the **idm\_user** nickname that is stored in the **~/idm\_user.pem** file in the **~/certdb/** database:

```
# certutil -A -d ~/certdb/ -n idm_user -t "P,," -i ~/idm_user.pem
```

6. Verify that the key in the NSS database does not show (**orphan**) as its nickname. For example, to verify that the certificate stored in the **~/certdb/** database is not orphaned:

```
# certutil -K -d ~/certdb/
< 0> rsa      5ad14d41463b87a095b1896cf0068ccc467df395  NSS Certificate
DB:idm_user
```

7. Use the **pk12util** command to export the certificate from the NSS database to the PKCS12 format. For example, to export the certificate with the **idm\_user** nickname from the **/root/certdb** NSS database into the **~/idm\_user.p12** file:

```
# pk12util -d ~/certdb -o ~/idm_user.p12 -n idm_user
Enter Password or Pin for "NSS Certificate DB":
Enter password for PKCS12 file:
Re-enter password:
pk12util: PKCS12 EXPORT SUCCESSFUL
```

8. Transfer the certificate to the host on which you want the certificate authentication for **idm\_user** to be enabled:

```
# scp ~/idm_user.p12 idm_user@client.idm.example.com:/home/idm_user/
```

9. On the host to which the certificate has been transferred, make the directory in which the **.pkcs12** file is stored inaccessible to the 'other' group for security reasons:

```
# chmod o-rwx /home/idm_user/
```

10. For security reasons, remove the temporary NSS database and the .pkcs12 file from the server:

```
# rm ~/certdb/  
# rm ~/idm_user.p12
```

## 64.3. MAKING SURE THE CERTIFICATE AND USER ARE LINKED TOGETHER



### NOTE

You do not need to follow this procedure if the user's certificate has been issued by the IdM CA.

For certificate authentication to work, you need to make sure that the certificate is linked to the user that will use it to authenticate to Identity Management (IdM).

- If the certificate is provided by a Certificate Authority that is not part of your Identity Management environment, link the user and the certificate following the procedure described in [Linking User Accounts to Certificates](#).
- If the certificate is provided by Identity Management CA, the certificate is already automatically added in the user entry and you do not have to link the certificate to the user account. For details on creating a new certificate in IdM, see [Requesting a new user certificate and exporting it to the client](#).

## 64.4. CONFIGURING A BROWSER TO ENABLE CERTIFICATE AUTHENTICATION

To be able to authenticate with a certificate when using the WebUI to log into Identity Management (IdM), you need to import the user and the relevant certificate authority (CA) certificates into the Mozilla Firefox or Google Chrome browser. The host itself on which the browser is running does not have to be part of the IdM domain.

IdM supports the following browsers for connecting to the WebUI:

- Mozilla Firefox 38 and later
- Google Chrome 46 and later

The following procedure shows how to configure the Mozilla Firefox 57.0.1 browser.

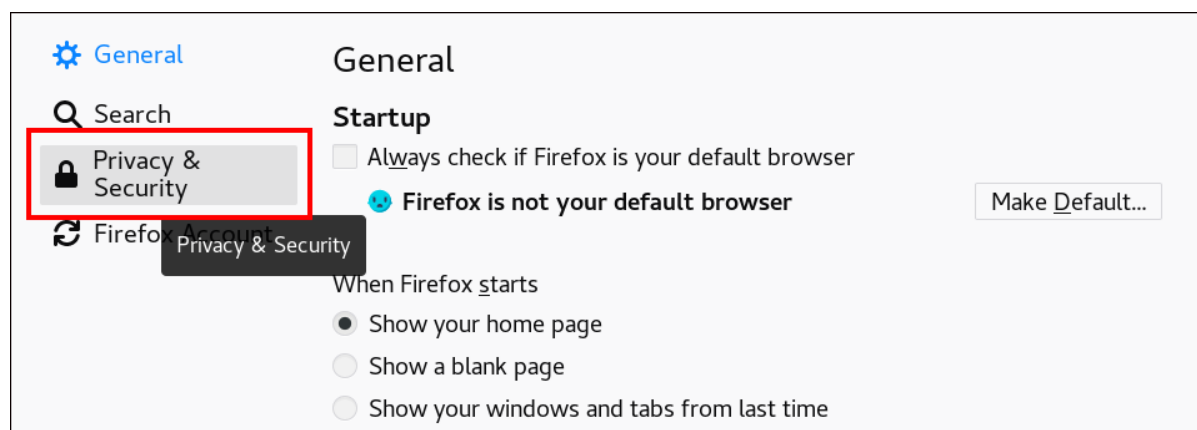
### Prerequisites

- You have the [user certificate](#) that you want to import to the browser at your disposal in the PKCS#12 format.

### Procedure

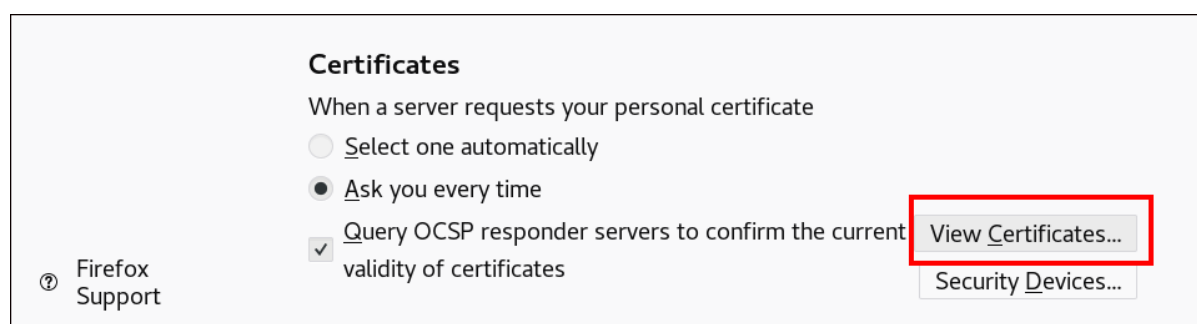
1. Open Firefox, then navigate to **Preferences → Privacy & Security**.

Figure 64.1. Privacy and Security section in Preferences



2. Click **View Certificates**.

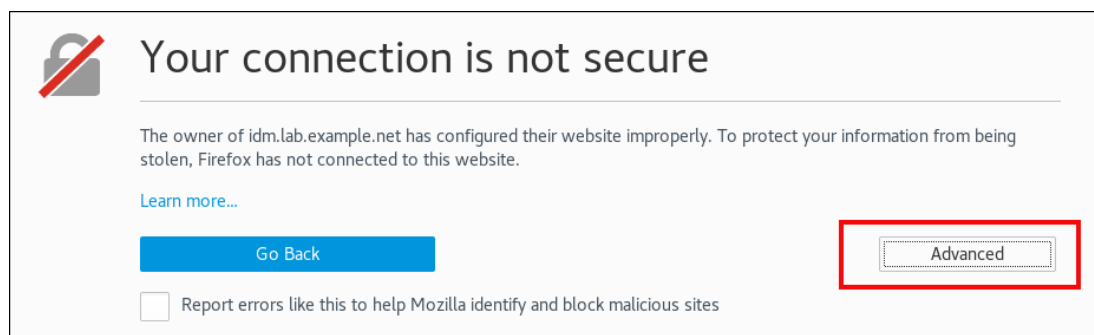
Figure 64.2. View Certificates in Privacy and Security



3. In the **Your Certificates** tab, click **Import**. Locate and open the certificate of the user in the PKCS12 format, then click **OK** and **OK**.
4. Make sure that the Identity Management Certificate Authority is recognized by Firefox as a trusted authority:
  - a. Save the IdM CA certificate locally:

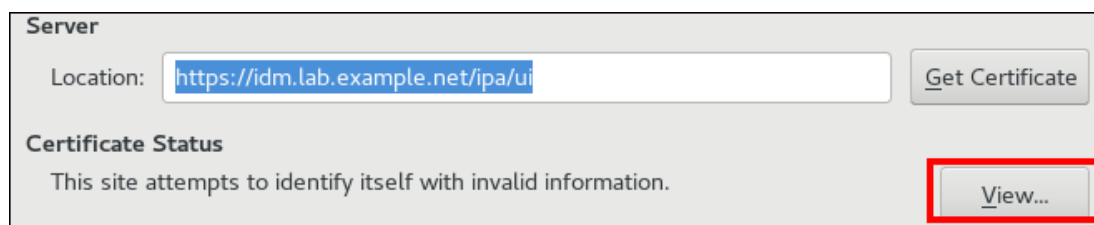
- Navigate to the IdM web UI by writing the name of your IdM server in the Firefox address bar. Click **Advanced** on the Insecure Connection warning page.

Figure 64.3. Insecure Connection



- **Add Exception.** Click **View**.

Figure 64.4. View the Details of a Certificate



**Server**

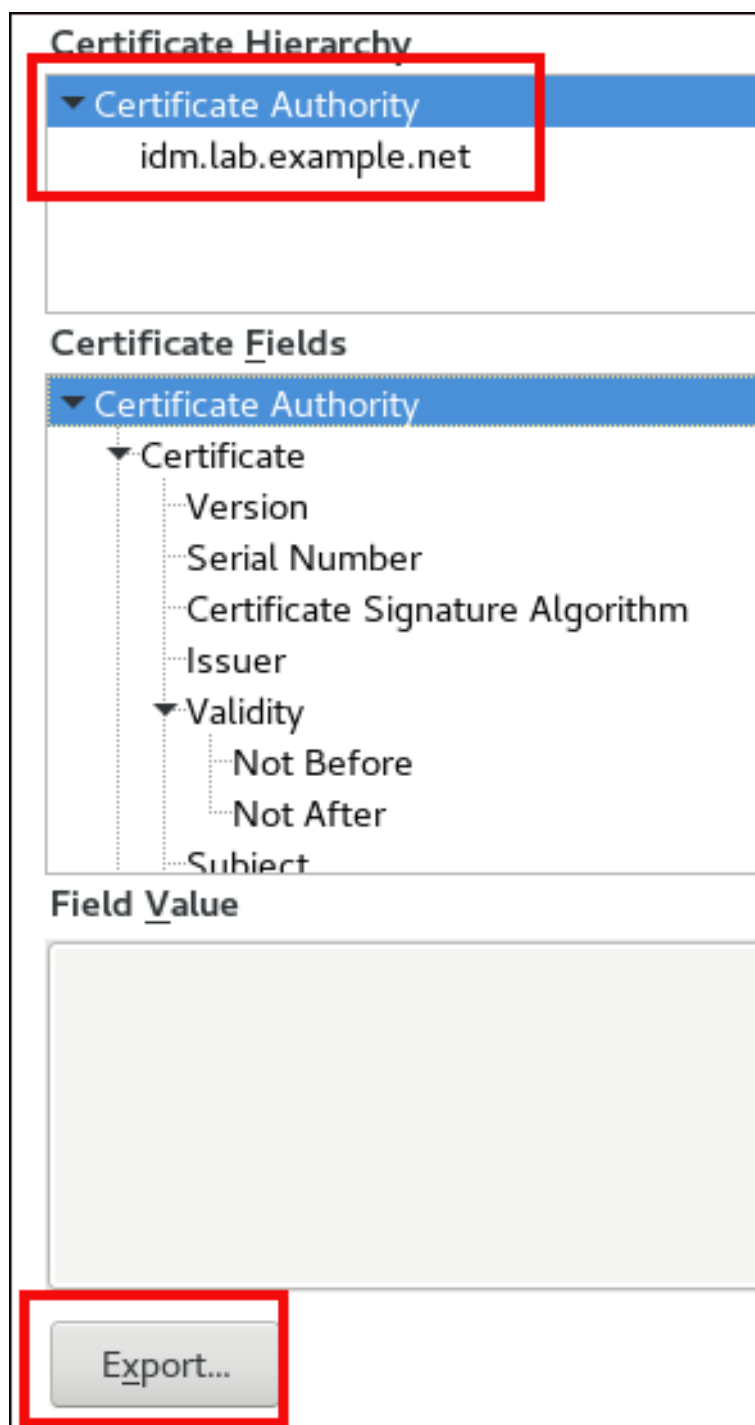
Location:

**Certificate Status**

This site attempts to identify itself with invalid information.

- In the **Details** tab, highlight the **Certificate Authority** fields.

Figure 64.5. Exporting the CA Certificate



**Certificate Hierarchy**

▼ Certificate Authority  
idm.lab.example.net

**Certificate Fields**

▼ Certificate Authority

- ▼ Certificate
  - Version
  - Serial Number
  - Certificate Signature Algorithm
  - Issuer
  - ▼ Validity
    - Not Before
    - Not After
  - Subject

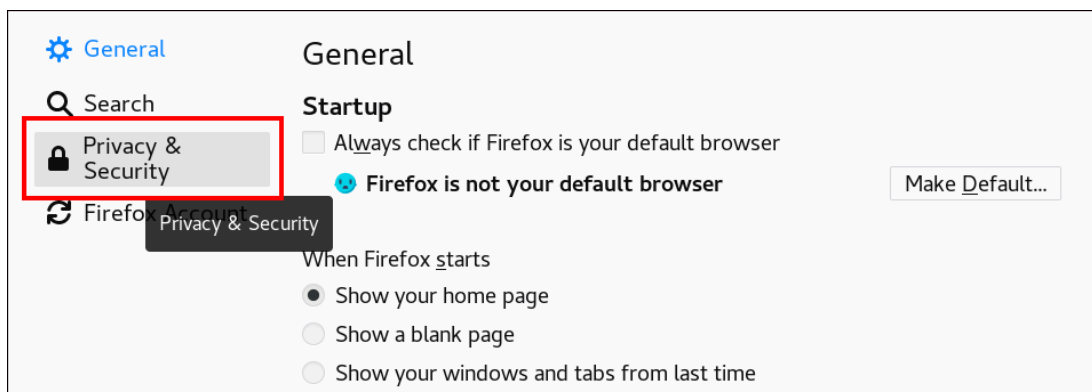
**Field Value**

- Click **Export**. Save the CA certificate, for example as the **CertificateAuthority.crt** file, then click **Close**, and **Cancel**.

b. Import the IdM CA certificate to Firefox as a trusted certificate authority certificate:

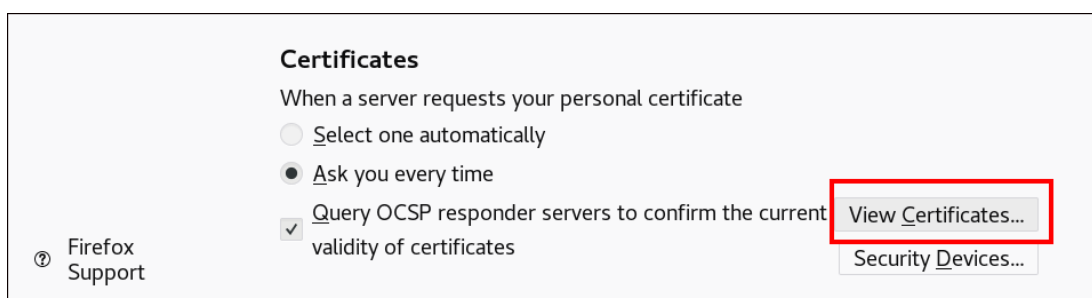
- Open Firefox, navigate to Preferences and click **Privacy & Security**.

Figure 64.6. Privacy and Security section in Preferences



- Click **View Certificates**.

Figure 64.7. View Certificates in Privacy and Security



- In the **Authorities** tab, click **Import**. Locate and open the CA certificate that you saved in the previous step in the **CertificateAuthority.crt** file. Trust the certificate to identify websites, then click **OK** and **OK**.

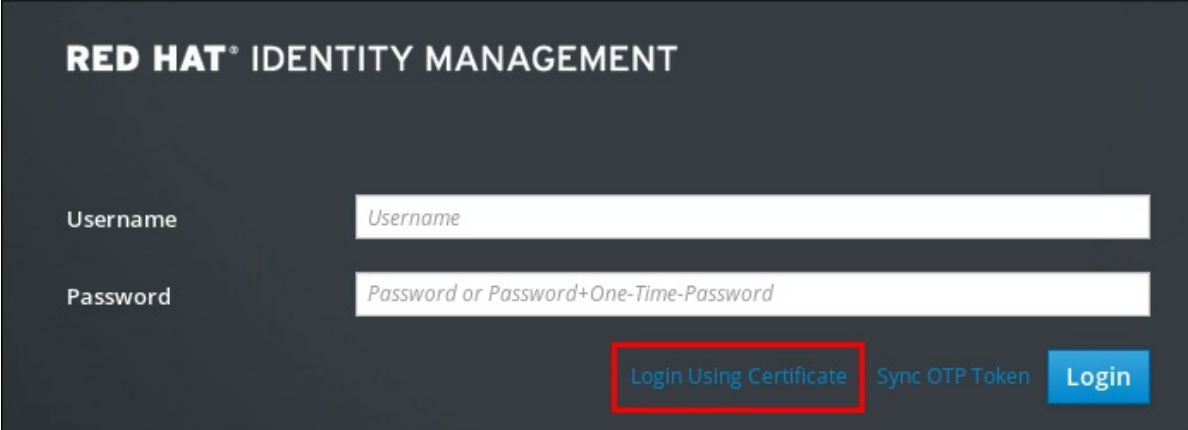
5. Continue to [Authenticating to the Identity Management Web UI with a Certificate as an Identity Management User](#).

## 64.5. AUTHENTICATING TO THE IDENTITY MANAGEMENT WEB UI WITH A CERTIFICATE AS AN IDENTITY MANAGEMENT USER

Follow this procedure to authenticate as a user to the Identity Management (IdM) web UI using a certificate stored on the desktop of an Identity Management client.

### Procedure

1. In the browser, navigate to the Identity Management web UI at, for example, **https://server.idm.example.com/ipa/ui**.
2. Click **Login Using Certificate**.  
**Login Using Certificate** in the Identity Management web UI



The image shows the Red Hat Identity Management login page. It has a dark background with the title 'RED HAT® IDENTITY MANAGEMENT' at the top. Below the title are two input fields: 'Username' with a placeholder 'Username' and 'Password' with a placeholder 'Password or Password+One-Time-Password'. At the bottom right, there are three buttons: 'Login Using Certificate' (highlighted with a red rectangle), 'Sync OTP Token', and 'Login'.

3. The user's certificate should already be selected. Uncheck **Remember this decision**, then click **OK**.

You are now authenticated as the user who corresponds to the certificate.

#### Additional resources

- See [Configuring Identity Management for smart card authentication](#) .

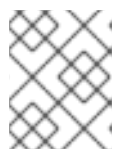
## 64.6. CONFIGURING AN IDM CLIENT TO ENABLE AUTHENTICATING TO THE CLI USING A CERTIFICATE

To make certificate authentication work for an IdM user in the Command Line Interface (CLI) of your IdM client, import the IdM user's certificate and the private key to the IdM client. For details on creating and transferring the user certificate, see [Requesting a new user certificate and exporting it to the client](#) .

#### Procedure

- Log into the IdM client and have the .p12 file containing the user's certificate and the private key ready. To obtain and cache the Kerberos ticket granting ticket (TGT), run the **kinit** command with the user's principal, using the **-X** option with the **X509\_username:/path/to/file.p12** attribute to specify where to find the user's X509 identity information. For example, to obtain the TGT for **idm\_user** using the user's identity information stored in the **~/idm\_user.p12** file:

```
$ kinit -X X509_idm_user='PKCS12:~/idm_user.p12' idm_user
```



#### NOTE

The command also supports the .pem file format: **kinit -X X509\_username='FILE:/path/to/cert.pem,/path/to/key' user\_principal**



## CHAPTER 65. USING IDM CA RENEWAL SERVER

### 65.1. EXPLANATION OF IDM CA RENEWAL SERVER

In an Identity Management (IdM) deployment that uses an embedded certificate authority (CA), the CA renewal server maintains and renews IdM system certificates. It ensures robust IdM deployments.

IdM system certificates include:

- **IdM CA** certificate
- **OCSP** signing certificate
- **IdM CA subsystem** certificates
- **IdM CA audit signing** certificate
- **IdM renewal agent** (RA) certificate
- **KRA** transport and storage certificates

What characterizes system certificates is that their keys are shared by all CA replicas. In contrast, the IdM service certificates (for example, **LDAP**, **HTTP** and **PKINIT** certificates), have different keypairs and subject names on different IdM CA servers.

In IdM topology, by default, the first IdM CA server is the CA renewal server.



#### NOTE

In upstream documentation, the IdM CA is called **Dogtag**.

#### The role of the CA renewal server

The **IdM CA**, **IdM CA subsystem**, and **IdM RA** certificates are crucial for IdM deployment. Each certificate is stored in an NSS database in the `/etc/pki/pki-tomcat/` directory and also as an LDAP database entry. The certificate stored in LDAP must match the certificate stored in the NSS database. If they do not match, authentication failures occur between the IdM framework and IdM CA, and between IdM CA and LDAP.

All IdM CA replicas have tracking requests for every system certificate. If an IdM deployment with integrated CA does not contain a CA renewal server, each IdM CA server requests the renewal of system certificates independently. This results in different CA replicas having various system certificates and authentication failures occurring.

Appointing one CA replica as the renewal server allows the system certificates to be renewed exactly once, when required, and thus prevents authentication failures.

#### The role of the **certmonger** service on CA replicas

The **certmonger** service running on all IdM CA replicas uses the **dogtag-ipa-ca-renew-agent** renewal helper to keep track of IdM system certificates. The renewal helper program reads the CA renewal server configuration. On each CA replica that is not the CA renewal server, the renewal helper retrieves the latest system certificates from the **ca\_renewal** LDAP entries. Due to non-determinism in when exactly **certmonger** renewal attempts occur, the **dogtag-ipa-ca-renew-agent** helper sometimes attempts to update a system certificate before the CA renewal server has actually renewed the certificate. If this happens, the old, soon-to-expire certificate is returned to the **certmonger** service on

the CA replica. The **certmonger** service, realizing it is the same certificate that is already stored in its database, keeps attempting to renew the certificate with some delay between individual attempts until it can retrieve the updated certificate from the CA renewal server.

### The correct functioning of IdM CA renewal server

An IdM deployment with an embedded CA is an IdM deployment that was installed with an IdM CA – or whose IdM CA server was installed later. An IdM deployment with an embedded CA must at all times have exactly one CA replica configured as the renewal server. The renewal server must be online and fully functional, and must replicate properly with the other servers.

If the current CA renewal server is being deleted using the **ipa server-del**, **ipa-replica-manage del**, **ipa-csreplica-manage del** or **ipa-server-install --uninstall** commands, another CA replica is automatically assigned as the CA renewal server. This policy ensures that the renewal server configuration remains valid.

This policy does not cover the following situations:

- **Offline renewal server**

If the renewal server is offline for an extended duration, it may miss a renewal window. In this situation, all nonrenewal CA servers keep reinstalling the current system certificates until the certificates expire. When this occurs, the IdM deployment is disrupted because even one expired certificate can cause renewal failures for other certificates.

To prevent this situation: if your current renewal server is offline and unavailable for an extended period of time, consider [assigning a new CA renewal server manually](#).

- **Replication problems**

If replication problems exist between the renewal server and other CA replicas, renewal might succeed, but the other CA replicas might not be able to retrieve the updated certificates before they expire.

To prevent this situation, make sure that your replication agreements are working correctly. For details, see [general](#) or [specific](#) replication troubleshooting guidelines in the RHEL 7 *Linux Domain Identity, Authentication, and Policy Guide*.

## 65.2. CHANGING AND RESETTING IDM CA RENEWAL SERVER

When a certificate authority (CA) renewal server is being decommissioned, Identity Management (IdM) automatically selects a new CA renewal server from the list of IdM CA servers. The system administrator cannot influence the selection.

To be able to select the new IdM CA renewal server, the system administrator must perform the replacement manually. Choose the new CA renewal server before starting the process of decommissioning the current renewal server.

If the current CA renewal server configuration is invalid, reset the IdM CA renewal server.

Complete this procedure to change or reset the CA renewal server.

### Prerequisites

- You have the IdM administrator credentials.

### Procedure

1. Obtain the IdM administrator credentials:

```
~]$ kinit admin
Password for admin@IDM.EXAMPLE.COM:
```

2. Optionally, to find out which IdM servers in the deployment have the CA role necessary to be eligible to become the new CA renewal server:

```
~]$ ipa server-role-find --role 'CA server'
-----
2 server roles matched
-----
Server name: server.idm.example.com
Role name: CA server
Role status: enabled

Server name: replica.idm.example.com
Role name: CA server
Role status: enabled
-----
Number of entries returned 2
-----
```

There are two CA servers in the deployment.

3. Optionally, to find out which CA server is the current CA renewal server, enter:

```
~]$ ipa config-show | grep 'CA renewal'
IPA CA renewal master: server.idm.example.com
```

The current renewal server is **server.idm.example.com**.

4. To change the renewal server configuration, use the **ipa config-mod** utility with the **--ca-renewal-master-server** option:

```
~]$ ipa config-mod --ca-renewal-master-server replica.idm.example.com | grep 'CA renewal'
IPA CA renewal master: replica.idm.example.com
```



## IMPORTANT

You can also switch to a new CA renewal server using:

- the **ipa-cacert-manage --renew** command. This command both renews the CA certificate *and* makes the CA server on which you execute the command the new CA renewal server.
  - the **ipa-cert-fix** command. This command recovers the deployment when expired certificates are causing failures. It also makes the CA server on which you execute the command the new CA renewal server.
- For details, see [Renewing expired system certificates when IdM is offline](#) .

## 65.3. SWITCHING FROM AN EXTERNALLY TO SELF-SIGNED CA IN IDM

Complete this procedure to switch from an externally-signed to a self-signed certificate of the Identity Management (IdM) certificate authority (CA). With a self-signed CA, the renewal of the CA certificate is managed automatically: a system administrator does not need to submit a certificate signing request (CSR) to an external authority.

Switching from an externally-signed to a self-signed CA replaces only the CA certificate. The certificates signed by the previous CA are still valid and still in use. For example, the certificate chain for the **LDAP** certificate remains unchanged even after you have moved to a self-signed CA:

**external\_CA** certificate > **IdM CA** certificate > **LDAP** certificate

## Prerequisites

- You have **root** access to the IdM CA renewal server and all IdM clients and servers.

## Procedure

- On the IdM CA renewal server, renew the CA certificate as self-signed:

```
# ipa-cacert-manage renew --self-signed
Renewing CA certificate, please wait
CA certificate successfully renewed
The ipa-cacert-manage command was successful
```

- SSH** to all the remaining IdM servers and clients as **root**. For example:

```
# ssh root@idmclient01.idm.example.com
```

- On the IdM client, update the local IdM certificate databases with the certificates from the server:

```
[idmclient01 ~]# ipa-certupdate
Systemwide CA database updated.
Systemwide CA database updated.
The ipa-certupdate command was successful
```

- Optionally, to check if your update has been successful and the new CA certificate has been added to the **/etc/ipa/ca.crt** file:

```
[idmclient01 ~]$ openssl crl2pkcs7 -nocrl -certfile /etc/ipa/ca.crt | openssl pkcs7 -
print_certs -text -noout
[...]
Certificate:
  Data:
    Version: 3 (0x2)
    Serial Number: 39 (0x27)
    Signature Algorithm: sha256WithRSAEncryption
    Issuer: O=IDM.EXAMPLE.COM, CN=Certificate Authority
    Validity
      Not Before: Jul  1 16:32:45 2019 GMT
      Not After : Jul  1 16:32:45 2039 GMT
    Subject: O=IDM.EXAMPLE.COM, CN=Certificate Authority
  [...]

```

The output shows that the update has been successful as the new CA certificate is listed with the older CA certificates.

## 65.4. RENEWING THE IDM CA RENEWAL SERVER CERTIFICATE USING AN EXTERNAL CA

Follow this procedure to renew the Identity Management (IdM) certificate authority (CA) certificate using an external CA to sign the certificate signing request (CSR). In this configuration, your IdM CA server is a subCA of the external CA. The external CA can, but does not have to, be an Active Directory Certificate Server (AD CS).

If the external certificate authority is AD CS, you can specify the template you want for the IdM CA certificate in the CSR. A certificate template defines the policies and rules that a CA uses when a certificate request is received. Certificate templates in AD correspond to certificate profiles in IdM.

You can define a specific AD CS template by its Object Identifier (OID). OIDs are unique numeric values issued by various issuing authorities to uniquely identify data elements, syntaxes, and other parts of distributed applications.

Alternatively, you can define a specific AD CS template by its name. For example, the name of the default profile used in a CSR submitted by an IdM CA to an AD CS is **subCA**.

To define a profile by specifying its OID or name in the CSR, use the **external-ca-profile** option. For details, see the **ipa-cacert-manage** man page.

Apart from using a ready-made certificate template, you can also create a custom certificate template in the AD CS, and use it in the CSR.

### Prerequisites

- You have root access to the IdM CA renewal server.

### Procedure

Complete this procedure to renew the certificate of the IdM CA with external signing, regardless of whether current CA certificate is self-signed or externally-signed.

1. Create a CSR to be submitted to the external CA:

- If the external CA is an AD CS, use the **--external-ca-type=ms-cs** option. If you want a different template than the default **subCA** template, specify it using the **--external-ca-profile** option:

```
~]# ipa-cacert-manage renew --external-ca --external-ca-type=ms-cs [--external-ca-profile=PROFILE]
Exporting CA certificate signing request, please wait
The next step is to get /var/lib/ipa/ca.csr signed by your CA and re-run ipa-cacert-manage
as:
ipa-cacert-manage renew --external-cert-file=/path/to/signed_certificate --external-cert-
file=/path/to/external_ca_certificate
The ipa-cacert-manage command was successful
```

- If the external CA is not an AD CS:

```
~]# ipa-cacert-manage renew --external-ca
```

```
Exporting CA certificate signing request, please wait
The next step is to get /var/lib/ipa/ca.csr signed by your CA and re-run ipa-cacert-manage
as:
ipa-cacert-manage renew --external-cert-file=/path/to/signed_certificate --external-cert-
file=/path/to/external_ca_certificate
The ipa-cacert-manage command was successful
```

The output shows that a CSR has been created and is stored in the **/var/lib/ipa/ca.csr** file.

2. Submit the CSR located in **/var/lib/ipa/ca.csr** to the external CA. The process differs depending on the service to be used as the external CA.
3. Retrieve the issued certificate and the CA certificate chain for the issuing CA in a base 64-encoded blob, which is:

- a PEM file if the external CA is not an AD CS.
- a Base\_64 certificate if the external CA is an AD CS.

The process differs for every certificate service. Usually, a download link on a web page or in the notification email allows the administrator to download all the required certificates.

If the external CA is an AD CS and you have submitted the CSR with a known template through the Microsoft Windows Certification Authority management window, the AD CS issues the certificate immediately and the Save Certificate dialog appears in the AD CS web interface, asking where to save the issued certificate.

4. Run the **ipa-cacert-manage renew** command again, adding all the CA certificate files required to supply a full certificate chain. Specify as many files as you need, using the **--external-cert-file** option multiple times:

```
~]# ipa-cacert-manage renew --external-cert-file=/path/to/signed_certificate --external-
cert-file=/path/to/external_ca_certificate_1 --external-cert-
file=/path/to/external_ca_certificate_2
```

5. On all the IdM servers and clients, update the local IdM certificate databases with the certificates from the server:

```
[client ~]$ ipa-certupdate
Systemwide CA database updated.
Systemwide CA database updated.
The ipa-certupdate command was successful
```

6. Optionally, to check if your update has been successful and the new CA certificate has been added to the **/etc/ipa/ca.crt** file:

```
[client ~]$ openssl crl2pkcs7 -nocrl -certfile /etc/ipa/ca.crt | openssl pkcs7 -print_certs -
text -noout
[...]
Certificate:
  Data:
    Version: 3 (0x2)
    Serial Number: 39 (0x27)
    Signature Algorithm: sha256WithRSAEncryption
    Issuer: O=IDM.EXAMPLE.COM, CN=Certificate Authority
    Validity
      Not Before: Jul  1 16:32:45 2019 GMT
```

```
Not After : Jul  1 16:32:45 2039 GMT
Subject: O=IDM.EXAMPLE.COM, CN=Certificate Authority
[...]
```

The output shows that the update has been successful as the new CA certificate is listed with the older CA certificates.

## CHAPTER 66. RENEWING EXPIRED SYSTEM CERTIFICATES WHEN IDM IS OFFLINE

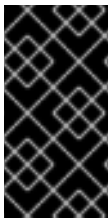
If a system certificate has expired, Identity Management (IdM) fails to start. IdM supports renewing system certificates even in this situation by using the **ipa-cert-fix** tool.

### Prerequisites

- IdM is installed only on Red Hat Enterprise Linux 8.1 or later.
- Ensure that the LDAP service is running by entering the **ipactl start --ignore-service-failures** command on the host.

### 66.1. RENEWING EXPIRED SYSTEM CERTIFICATES ON A CA RENEWAL SERVER

Follow this procedure to apply the **ipa-cert-fix** tool on expired IdM certificates.



#### IMPORTANT

If you run the **ipa-cert-fix** tool on a CA (Certificate Authority) host that is not the CA renewal server, and the utility renews shared certificates, that host automatically becomes the new CA renewal server in the domain. There must always be only one CA renewal server in the domain to avoid inconsistencies.

### Prerequisites

- Log in to the server with administration rights

### Procedure

1. (Optional) Backup the system. This is heavily recommended, as **ipa-cert-fix** makes irreversible changes to **nssdbs**. Because **ipa-cert-fix** also makes changes to the LDAP, it is recommended to backup the entire cluster as well.
2. Start the **ipa-cert-fix** tool to analyze the system and list expired certificates that require renewal:

```
# ipa-cert-fix
...
The following certificates will be renewed:

Dogtag sslserver certificate:
  Subject: CN=ca1.example.com,O=EXAMPLE.COM 201905222205
  Serial: 13
  Expires: 2019-05-12 05:55:47
...
Enter "yes" to proceed:
```

3. Enter **yes** to start the renewal process:

```
Enter "yes" to proceed: yes
Proceeding.
```



```
Renewed Dogtag sslserver certificate:
Subject: CN=ca1.example.com,O=EXAMPLE.COM 201905222205
Serial: 268369925
Expires: 2021-08-14 02:19:33
...

Becoming renewal master.
The ipa-cert-fix command was successful
```

It can take up to one minute before **ipa-cert-fix** renews all expired certificates.

4. Optionally, verify that all services are now running:

```
# ipactl status
Directory Service: RUNNING
krb5kdc Service: RUNNING
kadmin Service: RUNNING
httpd Service: RUNNING
ipa-custodia Service: RUNNING
pki-tomcatd Service: RUNNING
ipa-otpd Service: RUNNING
ipa: INFO: The ipactl command was successful
```

At this point, certificates have been renewed and services are running. The next step is to check other servers in the IdM domain.



## NOTE

If you need to repair certificates across multiple CA servers:

1. After ensuring that LDAP replication is working across the topology, first run **ipa-cert-fix** on one CA server, according to the above procedure.
2. Before you run **ipa-cert-fix** on another CA server, trigger Certmonger renewals for shared certificates via **getcert-resubmit** (on the other CA server), to avoid unnecessary renewal of shared certificates.

## 66.2. VERIFYING OTHER IDM SERVERS IN THE IDM DOMAIN AFTER RENEWAL

After the renewing the CA renewal server's certificates with the **ipa-cert-fix** tool, you must:

- Restart all other Identity Management (IdM) servers in the domain.
- Check if certmonger renewed certificates.
- If there are other Certificate Authority (CA) replicas with expired system certificates, renew those certificates with the **ipa-cert-fix** tool as well.

### Prerequisites

- Log in to the server with administration rights.

### Procedure

1. Restart IdM with the **--force** parameter:

```
# ipactl restart --force
```

With the **--force** parameter, the **ipactl** utility ignores individual service startup failures. For example, if the server is also a CA with expired certificates, the **pki-tomcat** service fails to start. This is expected and ignored because of using the **--force** parameter.

2. After the restart, verify that the **certmonger** service renewed the certificates (certificate status says MONITORING):

```
# getcert list | egrep '^Request|status:|subject:'
Request ID '20190522120745':
    status: MONITORING
    subject: CN=IPA RA,O=EXAMPLE.COM 201905222205
Request ID '20190522120834':
    status: MONITORING
    subject: CN=Certificate Authority,O=EXAMPLE.COM 201905222205
...
```

It can take some time before **certmonger** renews the shared certificates on the replica.

3. If the server is also a CA, the previous command reports **CA\_UNREACHABLE** for the certificate the **pki-tomcat** service uses:

```
Request ID '20190522120835':
    status: CA_UNREACHABLE
    subject: CN=ca2.example.com,O=EXAMPLE.COM 201905222205
...
```

4. To renew this certificate, use the **ipa-cert-fix** utility:

```
# ipa-cert-fix
Dogtag sslserver certificate:
  Subject: CN=ca2.example.com,O=EXAMPLE.COM
  Serial: 3
  Expires: 2019-05-11 12:07:11

Enter "yes" to proceed: yes
Proceeding.
Renewed Dogtag sslserver certificate:
  Subject: CN=ca2.example.com,O=EXAMPLE.COM 201905222205
  Serial: 15
  Expires: 2019-08-14 04:25:05

The ipa-cert-fix command was successful
```

Now, all IdM certificates have been renewed and work correctly.

## CHAPTER 67. REPLACING THE WEB SERVER AND LDAP SERVER CERTIFICATES IF THEY HAVE NOT YET EXPIRED ON AN IDM REPLICA

As an Identity Management (IdM) system administrator, you can manually replace the certificates for the web (or **httpd**) and LDAP (or **Directory**) services running on an IdM server. For example, this might be necessary if the certificates are nearing expiration and if the **certmonger** utility is either not configured to renew the certificates automatically or if the certificates are signed by an external certificate authority (CA).

The example installs the certificates for the services running on the **server.idm.example.com** IdM server. You obtain the certificates from an external CA.



### NOTE

The HTTP and LDAP service certificates have different keypairs and subject names on different IdM servers and so you must renew the certificates on each IdM server individually.

### Prerequisites

- On at least one other IdM replica in the topology with which the IdM server has a replication agreement, the web and LDAP certificates are still valid. This is a prerequisite for the **ipa-server-certinstall** command. The command requires a **TLS** connection to communicate with other IdM replicas. However, with invalid certificates, such a connection could not be established, and the **ipa-server-certinstall** command would fail. In that case, see [Replacing the web server and LDAP server certificates if they have expired in the whole IdM deployment](#).
- You have **root** access to the IdM server.
- You know the **Directory Manager** password.
- You have access to a file storing the CA certificate chain of the external CA, *ca\_certificate\_chain\_file.crt*.

### Procedure

1. Install the certificates contained in *ca\_certificate\_chain\_file.crt* as additional CA certificates to IdM:

```
# ipa-cacert-manage install
```

2. Update the local IdM certificate databases with certificates from *ca\_certificate\_chain\_file.crt*:

```
# ipa-certupdate
```

3. Generate a private key and a certificate signing request (CSR) using the **OpenSSL** utility:

```
$ openssl req -new -newkey rsa:2048 -days 365 -nodes -keyout new.key -out new.csr -
addext "subjectAltName = DNS:ipa-ca.idm.example.test" -subj
'/CN=server.idm.example.com,O=IDM.EXAMPLE.COM'
```

Submit the CSR to the external CA. The process differs depending on the service to be used as the external CA. After the CA signs the certificate, import the certificate to the IdM server.

4. On the IdM server, replace the Apache web server's old private key and certificate with the new key and the newly-signed certificate:

```
# ipa-server-certinstall -w --pin=password new.key new.crt
```

In the command above:

- The **-w** option specifies that you are installing a certificate into the web server.
  - The **--pin** option specifies the password protecting the private key.
5. When prompted, enter the **Directory Manager** password.
  6. Replace the LDAP server's old private key and certificate with the new key and the newly-signed certificate:

```
# ipa-server-certinstall -d --pin=password new.key new.cert
```

In the command above:

- The **-d** option specifies that you are installing a certificate into the LDAP server.
  - The **--pin** option specifies the password protecting the private key.
7. When prompted, enter the **Directory Manager** password.
  8. Restart the **httpd** service:

```
# systemctl restart httpd.service
```

9. Restart the **Directory** service:

```
# systemctl restart dirsrv@IDM.EXAMPLE.COM.service
```

#### Additional resources

- [Converting certificate formats to work with IdM](#)
- The **ipa-server-certinstall(1)** man page

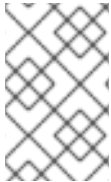
## CHAPTER 68. REPLACING THE WEB SERVER AND LDAP SERVER CERTIFICATES IF THEY HAVE EXPIRED IN THE WHOLE IDM DEPLOYMENT

Identity Management (IdM) uses the following service certificates:

- The LDAP (or **Directory**) server certificate
- The web (or **httpd**) server certificate
- The PKINIT certificate

In an IdM deployment without a CA, **certmonger** does not by default track IdM service certificates or notify of their expiration. If the IdM system administrator does not manually set up notifications for these certificates, or configure **certmonger** to track them, the certificates will expire without notice.

Follow this procedure to manually replace expired certificates for the **httpd** and LDAP services running on the **server.idm.example.com** IdM server.



### NOTE

The HTTP and LDAP service certificates have different keypairs and subject names on different IdM servers. Therefore, you must renew the certificates on each IdM server individually.

### Prerequisites

- The HTTP and LDAP certificates have expired on *all* IdM replicas in the topology. If not, see [Replacing the web server and LDAP server certificates if they have not yet expired on an IdM replica](#).
- You have **root** access to the IdM server and replicas.
- You know the **Directory Manager** password.
- You have created backups of the following directories and files:
  - **/etc/dirsrv/slaped-IDM-EXAMPLE-COM/**
  - **/etc/httpd/alias**
  - **/var/lib/certmonger**
  - **/var/lib/ipa/certs/**

### Procedure

1. If you are not using the same CA to sign the new certificates or if the already installed CA certificate is no longer valid, update the information about the external CA in your local database with a file that contains a valid CA certificate chain of the external CA. The file is accepted in PEM and DER certificate, PKCS#7 certificate chain, PKCS#8 and raw private key and PKCS#12 formats.
  - a. Install the certificates available in *ca\_certificate\_chain\_file.crt* as additional CA certificates into IdM:

```
# ipa-cacert-manage install ca_certificate_chain_file.crt
```

- b. Update the local IdM certificate databases with certificates from `ca_certificate_chain_file.crt`:

```
# ipa-certupdate
```

2. Request the certificates for **httpd** and LDAP:

- a. Create a certificate signing request (CSR) for the Apache web server running on your IdM instances to your third party CA using the **OpenSSL** utility:

```
$ openssl req -new -newkey rsa:2048 -nodes -keyout /var/lib/ipa/private/httpd.key -
out /tmp/http.csr -addext 'subjectAltName = DNS:server.idm.example.com,
otherName:1.3.6.1.4.1.311.20.2.3;UTF8:HTTP/server.idm.example.com@IDM.EXAM
PLE.COM' -subj '/O=IDM.EXAMPLE.COM/CN=server.idm.example.com'
```

The creation of a new private key is optional. If you still have the original private key, you can use the **-in** option with the **openssl req** command to specify the input file name to read the request from.

- b. Create a certificate signing request (CSR) for the LDAP server running on your IdM instances to your third party CA using the **OpenSSL** utility:

```
$ openssl req -new -newkey rsa:2048 -nodes -keyout ~/ldap.key -out /tmp/ldap.csr -
addext 'subjectAltName = DNS:server.idm.example.com,
otherName:1.3.6.1.4.1.311.20.2.3;UTF8:ldap/server.idm.example.com@IDM.EXAMP
LE.COM' -subj '/O=IDM.EXAMPLE.COM/CN=server.idm.example.com'
```

The creation of a new private key is optional. If you still have the original private key, you can use the **-in** option with the **openssl req** command to specify the input file name to read the request from.

- c. Submit the CSRs, `/tmp/http.csr` and `tmp/ldap.csr`, to the external CA, and obtain a certificate for **httpd** and a certificate for LDAP. The process differs depending on the service to be used as the external CA.

3. Install the certificate for **httpd** :

```
# cp /path/to/httpd.crt /var/lib/ipa/certs/
```

4. Install the LDAP certificate into an NSS database:

- a. [Optional] List the available certificates:

```
# certutil -d /etc/dirsrv/slappd-IDM-EXAMPLE-COM/ -L
Certificate Nickname                               Trust Attributes
                                                SSL,S/MIME,JAR/XPI

Server-Cert                                         u,u,u
```

The default certificate nickname is **Server-Cert**, but it is possible that a different name was applied.

- b. Remove the old invalid certificate from the NSS database (**NSSDB**) by using the certificate nickname from the previous step:

```
# certutil -D -d /etc/dirsrv/slapped-IDM-EXAMPLE-COM -n 'Server-Cert' -f
/etc/dirsrv/slapped-IDM-EXAMPLE-COM/pwdfile.txt
```

- c. Create a PKCS12 file to ease the import process into **NSSDB**:

```
# openssl pkcs12 -export -in ldap.crt -inkey ldap.key -out ldap.p12 -name Server-
Cert
```

- d. Install the created PKCS#12 file into the **NSSDB**:

```
# pk12util -i ldap.p12 -d /etc/dirsrv/slapped-IDM-EXAMPLE-COM -k
/etc/dirsrv/slapped-IDM-EXAMPLE-COM/pwdfile.txt
```

- e. Check that the new certificate has been successfully imported:

```
# certutil -L -d /etc/dirsrv/slapped-IDM-EXAMPLE-COM
```

5. Restart the **httpd** service:

```
# systemctl restart httpd.service
```

6. Restart the **Directory** service:

```
# systemctl restart dirsrv@IDM-EXAMPLE-COM.service
```

7. Perform all the previous steps on all your IdM replicas. This is a prerequisite for establishing **TLS** connections between the replicas.

8. Enroll the new certificates to LDAP storage:

- a. Replace the Apache web server's old private key and certificate with the new key and the newly-signed certificate:

```
# ipa-server-certinstall -w --pin=password /var/lib/ipa/private/httpd.key
/var/lib/ipa/certs/httpd.crt
```

In the command above:

- The **-w** option specifies that you are installing a certificate into the web server.
- The **--pin** option specifies the password protecting the private key.

- b. When prompted, enter the **Directory Manager** password.

- c. Replace the LDAP server's old private key and certificate with the new key and the newly-signed certificate:

```
# ipa-server-certinstall -d --pin=password /etc/dirsrv/slapped-IDM-EXAMPLE-
COM/ldap.key /path/to/ldap.crt
```

In the command above:

- The **-d** option specifies that you are installing a certificate into the LDAP server.

- The **--pin** option specifies the password protecting the private key.
- d. When prompted, enter the **Directory Manager** password.
- e. Restart the **httpd** service:

```
# systemctl restart httpd.service
```

- f. Restart the **Directory** service:

```
# systemctl restart dirsrv@IDM-EXAMPLE-COM.service
```

9. Execute the commands from the previous step on all the other affected replicas.

### Additional resources

[Converting certificate formats to work with IdM](#) \* `man ipa-server-certinstall(1)` \* [How do I manually renew Identity Management \(IPA\) certificates on RHEL 8 after they have expired? \(CA-less IPA\)](#)



## CHAPTER 69. GENERATING CRL ON THE IDM CA SERVER

If your IdM deployment uses an embedded certificate authority (CA), you may need to move generating the Certificate Revocation List (CRL) from one Identity Management (IdM) server to another. It can be necessary, for example, when you want to migrate the server to another system.

Only configure one server to generate the CRL. The IdM server that performs the CRL publisher role is usually the same server that performs the CA renewal server role, but this is not mandatory. Before you decommission the CRL publisher server, select and configure another server to perform the CRL publisher server role.

### 69.1. STOPPING CRL GENERATION ON AN IDM SERVER

To stop generating the Certificate Revocation List (CRL) on the IdM CRL publisher server, use the **ipa-crlgen-manage** command. Before you disable the generation, verify that the server really generates CRL. You can then disable it.

#### Prerequisites

- Identity Management (IdM) server is installed on the RHEL 8.1 system or newer.
- You must be logged in as root.

#### Procedure

1. Check if your server is generating the CRL:

```
[root@server ~]# ipa-crlgen-manage status
CRL generation: enabled
Last CRL update: 2019-10-31 12:00:00
Last CRL Number: 6
The ipa-crlgen-manage command was successful
```

2. Stop generating the CRL on the server:

```
[root@server ~]# ipa-crlgen-manage disable
Stopping pki-tomcatd
Editing /var/lib/pki/pki-tomcat/conf/ca/CS.cfg
Starting pki-tomcatd
Editing /etc/httpd/conf.d/ipa-pki-proxy.conf
Restarting httpd
CRL generation disabled on the local host. Please make sure to configure CRL generation on
another master with ipa-crlgen-manage enable.
The ipa-crlgen-manage command was successful
```

3. Check if the server stopped generating CRL:

```
[root@server ~]# ipa-crlgen-manage status
```

The server stopped generating the CRL. The next step is to enable CRL generation on the IdM replica.

### 69.2. STARTING CRL GENERATION ON AN IDM REPLICA SERVER

You can start generating the Certificate Revocation List (CRL) on an IdM CA server with the **ipa-crlgen-manage** command.

### Prerequisites

- Identity Management (IdM) server is installed on the RHEL 8.1 system or newer.
- The RHEL system must be an IdM Certificate Authority server.
- You must be logged in as root.

### Procedure

1. Start generating the CRL:

```
[root@replica1 ~]# ipa-crlgen-manage enable
Stopping pki-tomcatd
Editing /var/lib/pki/pki-tomcat/conf/ca/CS.cfg
Starting pki-tomcatd
Editing /etc/httpd/conf.d/ipa-pki-proxy.conf
Restarting httpd
Forcing CRL update
CRL generation enabled on the local host. Please make sure to have only a single CRL
generation master.
The ipa-crlgen-manage command was successful
```

2. Check if the CRL is generated:

```
[root@replica1 ~]# ipa-crlgen-manage status
CRL generation: enabled
Last CRL update: 2019-10-31 12:10:00
Last CRL Number: 7
The ipa-crlgen-manage command was successful
```

## CHAPTER 70. DECOMMISSIONING A SERVER THAT PERFORMS THE CA RENEWAL SERVER AND CRL PUBLISHER ROLES

You might have one server performing both the Certificate Authority (CA) renewal server role and the Certificate Revocation List (CRL) publisher role. If you need to take this server offline or decommission it, select and configure another CA server to perform these roles.

In this example, the host **server.idm.example.com**, which fulfills the CA renewal server and CRL publisher roles, must be decommissioned. This procedure transfers the CA renewal server and CRL publisher roles to the host **replica.idm.example.com** and removes **server.idm.example.com** from the IdM environment.



### NOTE

You do not need to configure the same server to perform both CA renewal server and CRL publisher roles.

### Prerequisites

- You have the IdM administrator credentials.
- You have the root password for the server you are decommissioning.
- You have at least two CA replicas in your IdM environment.

### Procedure

1. Obtain the IdM administrator credentials:

```
[user@server ~]$ kinit admin
Password for admin@IDM.EXAMPLE.COM:
```

2. (Optional) If you are not sure which servers perform the CA renewal server and CRL publisher roles:

- a. Display the current CA renewal server. You can run the following command from any IdM server:

```
[user@server ~]$ ipa config-show | grep 'CA renewal'
IPA CA renewal master: server.idm.example.com
```

- b. Test if a host is the current CRL publisher.

```
[user@server ~]$ ipa-crlgen-manage status
CRL generation: enabled
Last CRL update: 2019-10-31 12:00:00
Last CRL Number: 6
The ipa-crlgen-manage command was successful
```

A CA server that does not generate the CRL displays **CRL generation: disabled**.

```
[user@replica ~]$ ipa-crlgen-manage status
CRL generation: disabled
The ipa-crlgen-manage command was successful
```

Continue entering this command on CA servers until you find the CRL publisher server.

- c. Display all other CA servers you can promote to fulfill these roles. This environment has two CA servers.

```
[user@server ~]$ ipa server-role-find --role 'CA server'
-----
2 server roles matched
-----
Server name: server.idm.example.com
Role name: CA server
Role status: enabled
Server name: replica.idm.example.com
Role name: CA server
Role status: enabled
-----
Number of entries returned 2
-----
```

3. Set **replica.idm.example.com** as the CA renewal server.

```
[user@server ~]$ ipa config-mod --ca-renewal-master-server replica.idm.example.com
```

4. On **server.idm.example.com**:

- a. Disable the certificate updater task:

```
[root@server ~]# pki-server ca-config-set ca.certStatusUpdateInterval 0
```

- b. Restart IdM services:

```
[user@server ~]$ ipactl restart
```

5. On **replica.idm.example.com**:

- a. Enable the certificate updater task:

```
[root@server ~]# pki-server ca-config-unset ca.certStatusUpdateInterval
```

- b. Restart IdM services:

```
[user@replica ~]$ ipactl restart
```

6. On **server.idm.example.com**, stop generating the CRL.

```
[user@server ~]$ ipa-crlgen-manage disable
Stopping pki-tomcatd
Editing /var/lib/pki/pki-tomcat/conf/ca/CS.cfg
Starting pki-tomcatd
```

```

Editing /etc/httpd/conf.d/ipa-pki-proxy.conf
Restarting httpd
CRL generation disabled on the local host. Please make sure to configure CRL generation on
another master with ipa-crlgen-manage enable.
The ipa-crlgen-manage command was successful

```

- On **replica.idm.example.com**, start generating the CRL.

```

[user@replica ~]$ ipa-crlgen-manage enable
Stopping pki-tomcatd
Editing /var/lib/pki/pki-tomcat/conf/ca/CS.cfg
Starting pki-tomcatd
Editing /etc/httpd/conf.d/ipa-pki-proxy.conf
Restarting httpd
Forcing CRL update
CRL generation enabled on the local host. Please make sure to have only a single CRL
generation master.
The ipa-crlgen-manage command was successful

```

- Stop IdM services on **server.idm.example.com**:

```

[user@server ~]$ ipactl stop

```

- On **replica.idm.example.com**, delete **server.idm.example.com** from the IdM environment.

```

[user@replica ~]$ ipa server-del server.idm.example.com

```

- On **server.idm.example.com**, use the **ipa-server-install --uninstall** command as the root account:

```

[root@server ~]# ipa-server-install --uninstall
...
Are you sure you want to continue with the uninstall procedure? [no]: yes

```

## Verification steps

- Display the current CA renewal server.

```

[user@replica ~]$ ipa config-show | grep 'CA renewal'
IPA CA renewal master: replica.idm.example.com

```

- Confirm that the **replica.idm.example.com** host is generating the CRL.

```

[user@replica ~]$ ipa-crlgen-manage status
CRL generation: enabled
Last CRL update: 2019-10-31 12:10:00
Last CRL Number: 7
The ipa-crlgen-manage command was successful

```

## Additional resources

- [Changing and resetting IdM CA renewal server](#)

- [Generating CRL on the IdM CA server](#)
- [Uninstalling an IdM replica](#)

# CHAPTER 71. OBTAINING AN IDM CERTIFICATE FOR A SERVICE USING CERTMONGER

## 71.1. CERTMONGER OVERVIEW

When Identity Management (IdM) is installed with an integrated IdM Certificate Authority (CA), it uses the **certmonger** service to track and renew system and service certificates. When the certificate is reaching its expiration date, **certmonger** manages the renewal process by:

- regenerating a certificate-signing request (CSR) using the options provided in the original request.
- submitting the CSR to the IdM CA using the IdM API **cert-request** command.
- receiving the certificate from the IdM CA.
- executing a pre-save command if specified by the original request.
- installing the new certificate in the location specified in the renewal request: either in an **NSS** database or in a file.
- executing a post-save command if specified by the original request. For example, the post-save command can instruct **certmonger** to restart a relevant service, so that the service picks up the new certificate.

### Types of certificates **certmonger** tracks

Certificates can be divided into system and service certificates.

Unlike service certificates (for example, for **HTTP**, **LDAP** and **PKINIT**), which have different keypairs and subject names on different servers, IdM system certificates and their keys are shared by all CA replicas. The IdM system certificates include:

- **IdM CA** certificate
- **OCSP** signing certificate
- **IdM CA subsystem** certificates
- **IdM CA audit signing** certificate
- **IdM renewal agent** (RA) certificate
- **KRA** transport and storage certificates

The **certmonger** service tracks the IdM system and service certificates that were requested during the installation of IdM environment with an integrated CA. **Certmonger** also tracks certificates that have been requested manually by the system administrator for other services running on the IdM host. **Certmonger** does not track external CA certificates or user certificates.

### Certmonger components

The **certmonger** service consists of two main components:

- The **certmonger daemon**, which is the engine tracking the list of certificates and launching renewal commands

- The **getcert** utility for the **command-line interface** (CLI), which allows the system administrator to actively send commands to the **certmonger** daemon.

More specifically, the system administrator can use the **getcert** utility to:

- [Request a new certificate](#)
- [View the list of certificates that \*\*certmonger\*\* tracks](#)
- [Start or stop tracking a certificate](#)
- [Renew a certificate](#)

## 71.2. OBTAINING AN IDM CERTIFICATE FOR A SERVICE USING CERTMONGER

To ensure that communication between browsers and the web service running on your Identity Management (IdM) client is secure and encrypted, use a TLS certificate. Obtain the TLS certificate for your web service from the IdM Certificate Authority (CA).

Follow this procedure to use **certmonger** to obtain an IdM certificate for a service (**HTTP/my\_company.idm.example.com@IDM.EXAMPLE.COM**) running on an IdM client.

Using **certmonger** to request the certificate automatically means that **certmonger** manages and renews the certificate when it is due for a renewal.

For a visual representation of what happens when **certmonger** requests a service certificate, see [Communication flow for certmonger requesting a service certificate](#).

### Prerequisites

- The web server is enrolled as an IdM client.
- You have root access to the IdM client on which you are running the procedure.
- The service for which you are requesting a certificate does not have to pre-exist in IdM.

### Procedure

1. On the **my\_company.idm.example.com** IdM client on which the **HTTP** service is running, request a certificate for the service corresponding to the **HTTP/my\_company.idm.example.com@IDM.EXAMPLE.COM** principal, and specify that
  - The certificate is to be stored in the local **/etc/pki/tls/certs/httpd.pem** file
  - The private key is to be stored in the local **/etc/pki/tls/private/httpd.key** file
  - That an extensionRequest for a **SubjectAltName** be added to the signing request with the DNS name of **my\_company.idm.example.com**:

```
# ipa-getcert request -K HTTP/my_company.idm.example.com -k
/etc/pki/tls/private/httpd.key -f /etc/pki/tls/certs/httpd.pem -g 2048 -D
my_company.idm.example.com -C "systemctl restart httpd"
New signing request "20190604065735" added.
```

In the command above:



- The **ipa-getcert request** command specifies that the certificate is to be obtained from the IdM CA. The **ipa-getcert request** command is a shortcut for **getcert request -c IPA**.
- The **-g** option specifies the size of key to be generated if one is not already in place.
- The **-D** option specifies the **SubjectAltName** DNS value to be added to the request.
- The **-C** option instructs **certmonger** to restart the **httpd** service after obtaining the certificate.
- To specify that the certificate be issued with a particular profile, use the **-T** option.
- To request a certificate using the named issuer from the specified CA, use the **-X ISSUER** option.



#### NOTE

RHEL 8 uses a different SSL module in Apache than the one used in RHEL 7. The SSL module relies on OpenSSL rather than NSS. For this reason, in RHEL 8 you cannot use an NSS database to store the **HTTPS** certificate and the private key.

2. Optionally, to check the status of your request:

```
# ipa-getcert list -f /etc/pki/tls/certs/httpd.pem
Number of certificates and requests being tracked: 3.
Request ID '20190604065735':
  status: MONITORING
  stuck: no
  key pair storage: type=FILE,location='/etc/pki/tls/private/httpd.key'
  certificate: type=FILE,location='/etc/pki/tls/certs/httpd.crt'
  CA: IPA
[...]
```

The output shows that the request is in the **MONITORING** status, which means that a certificate has been obtained. The locations of the key pair and the certificate are those requested.

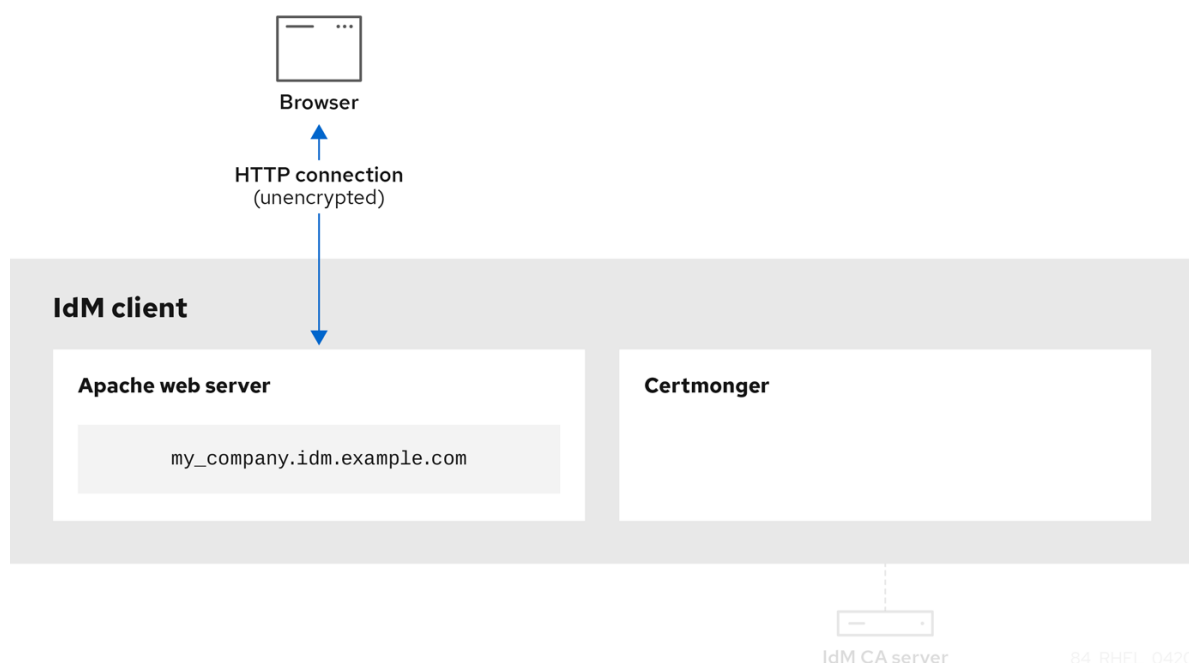
## 71.3. COMMUNICATION FLOW FOR CERTMONGER REQUESTING A SERVICE CERTIFICATE

These diagrams show the stages of what happens when **certmonger** requests a service certificate from Identity Management (IdM) certificate authority (CA) server. The sequence consists of these diagrams:

- [Unencrypted communication](#)
- [Certmonger requesting a service certificate](#)
- [IdM CA issuing the service certificate](#)
- [Certmonger applying the service certificate](#)
- [Certmonger requesting a new certificate when the old one is nearing expiration](#)

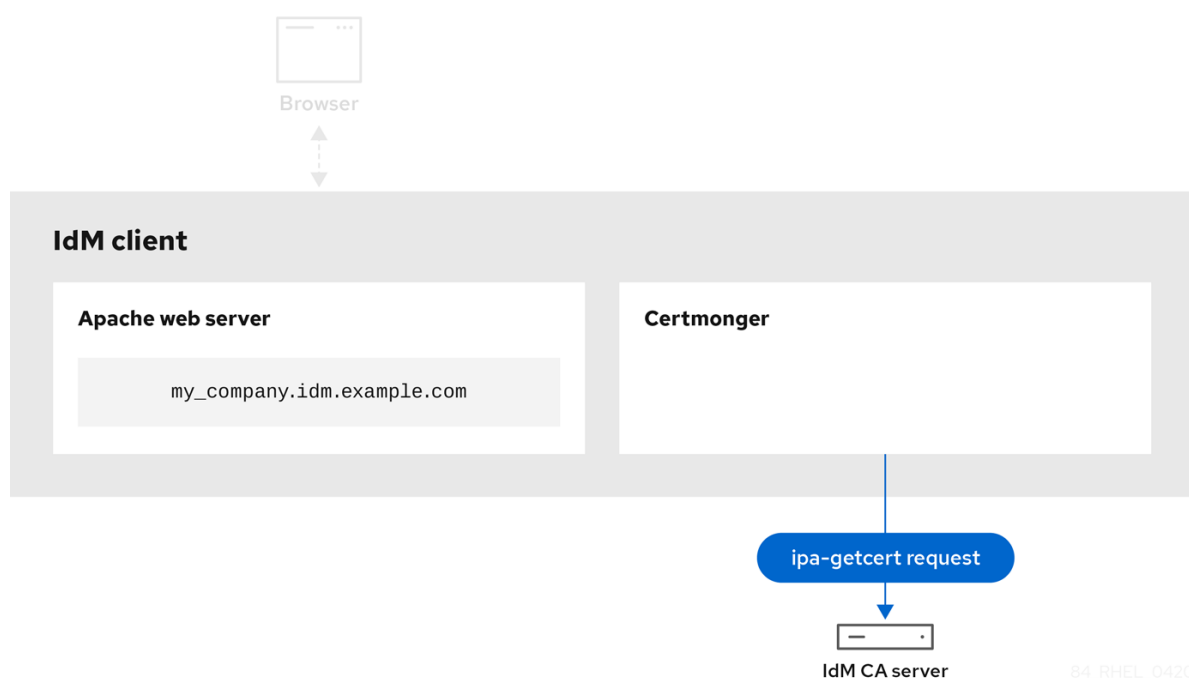
[Unencrypted communication](#) shows the initial situation: without an HTTPS certificate, the communication between the web server and the browser is unencrypted.

Figure 71.1. Unencrypted communication



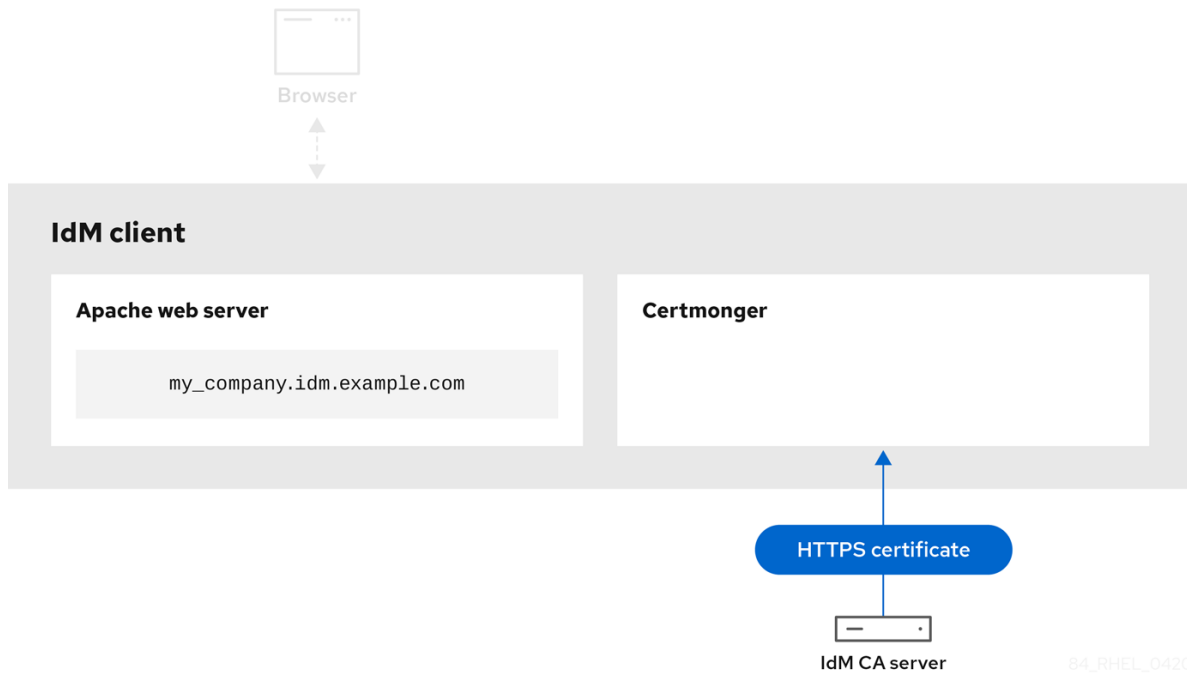
[Certmonger requesting a service certificate](#) shows the system administrator using **certmonger** to manually request an HTTPS certificate for the Apache web server. Note that when requesting a web server certificate, certmonger does not communicate directly with the CA. It proxies through IdM.

Figure 71.2. Certmonger requesting a service certificate



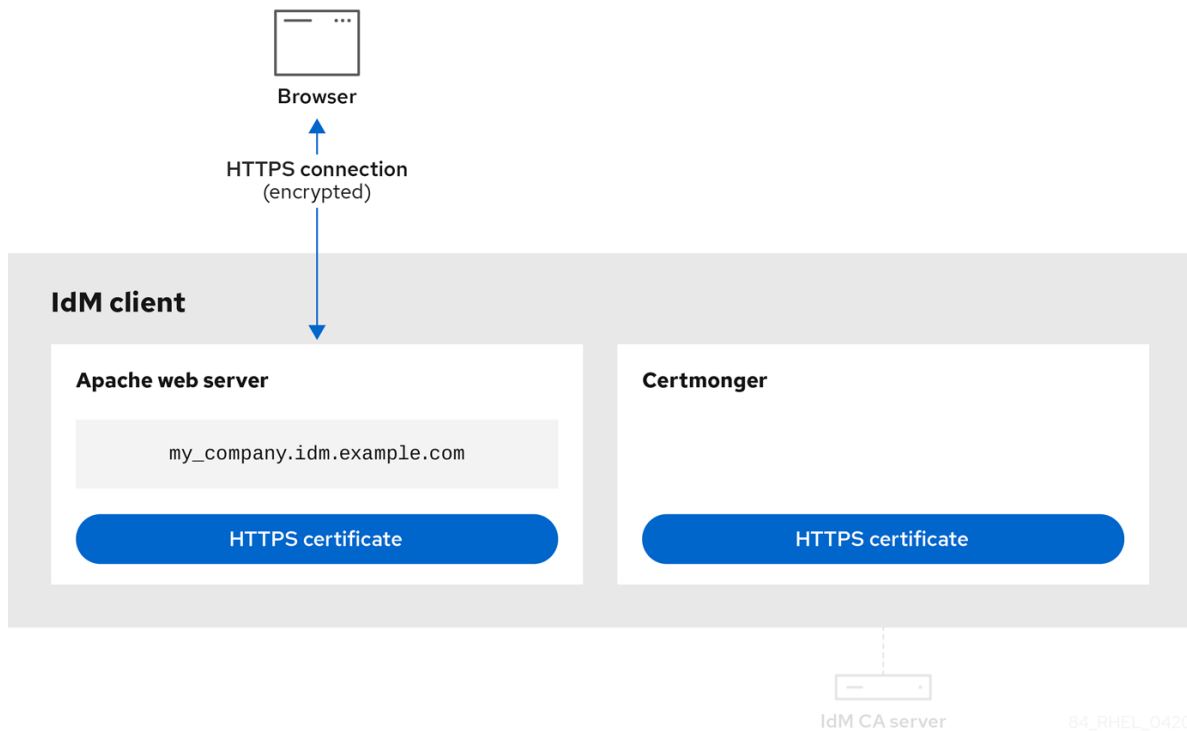
[IdM CA issuing the service certificate](#) shows an IdM CA issuing an HTTPS certificate for the web server.

Figure 71.3. IdM CA issuing the service certificate



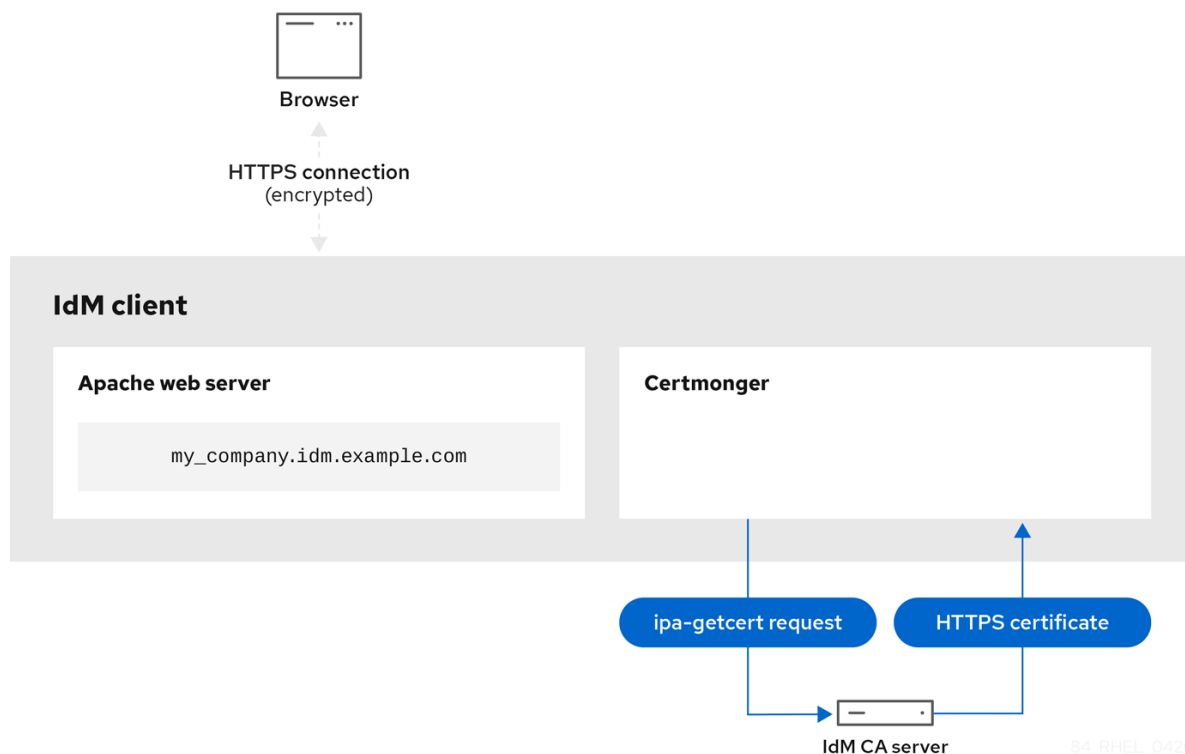
[Certmonger applying the service certificate](#) shows **certmonger** placing the HTTPS certificate in appropriate locations on the IdM client and, if instructed to do so, restarting the **httpd** service. The Apache server subsequently uses the HTTPS certificate to encrypt the traffic between itself and the browser.

Figure 71.4. Certmonger applying the service certificate



[Certmonger requesting a new certificate when the old one is nearing expiration](#) shows **certmonger** automatically requesting a renewal of the service certificate from the IdM CA before the expiration of the certificate. The IdM CA issues a new certificate.

**Figure 71.5. Certmonger requesting a new certificate when the old one is nearing expiration**



## 71.4. VIEWING THE DETAILS OF A CERTIFICATE REQUEST TRACKED BY CERTMONGER

The **certmonger** service monitors certificate requests. When a request for a certificate is successfully signed, it results in a certificate. **Certmonger** manages certificate requests including the resulting certificates. Follow this procedure to view the details of a particular certificate request managed by **certmonger**.

### Procedure

- If you know how to specify the certificate request, list the details of only that particular certificate request. You can, for example, specify:
  - The request ID
  - The location of the certificate
  - The certificate nickname

For example, to view the details of the certificate whose request ID is 20190408143846, using the **-v** option to view all the details of errors in case your request for a certificate was unsuccessful:

```
# getcert list -i 20190408143846 -v
Number of certificates and requests being tracked: 16.
```

```

Request ID '20190408143846':
status: MONITORING
stuck: no
key pair storage: type=NSSDB,location='/etc/dirsrv/slapd-IDM-EXAMPLE-
COM',nickname='Server-Cert',token='NSS Certificate DB',pinfile='/etc/dirsrv/slapd-IDM-
EXAMPLE-COM/pwdfile.txt'
certificate: type=NSSDB,location='/etc/dirsrv/slapd-IDM-EXAMPLE-
COM',nickname='Server-Cert',token='NSS Certificate DB'
CA: IPA
issuer: CN=Certificate Authority,O=IDM.EXAMPLE.COM
subject: CN=r8server.idm.example.com,O=IDM.EXAMPLE.COM
expires: 2021-04-08 16:38:47 CEST
dns: r8server.idm.example.com
principal name: ldap/server.idm.example.com@IDM.EXAMPLE.COM
key usage: digitalSignature,nonRepudiation,keyEncipherment,dataEncipherment
eku: id-kp-serverAuth,id-kp-clientAuth
pre-save command:
post-save command: /usr/libexec/ipa/certmonger/restart_dirsrv IDM-EXAMPLE-COM
track: yes
auto-renew: yes

```

The output displays several pieces of information about the certificate, for example:

- the certificate location; in the example above, it is the NSS database in the **/etc/dirsrv/slapd-IDM-EXAMPLE-COM** directory
- the certificate nickname; in the example above, it is **Server-Cert**
- the file storing the pin; in the example above, it is **/etc/dirsrv/slapd-IDM-EXAMPLE-COM/pwdfile.txt**
- the Certificate Authority (CA) that will be used to renew the certificate; in the example above, it is the **IPA** CA
- the expiration date; in the example above, it is **2021-04-08 16:38:47 CEST**
- the status of the certificate; in the example above, the **MONITORING** status means that the certificate is valid and it is being tracked
- the post-save command; in the example above, it is the restart of the **LDAP** service
- If you do not know how to specify the certificate request, list the details of all the certificates that **certmonger** is monitoring or attempting to obtain:

```
# getcert list
```

## Additional resources

- See the **getcert list** man page.

## 71.5. STARTING AND STOPPING CERTIFICATE TRACKING

Follow this procedure to use the **getcert stop-tracking** and **getcert start-tracking** commands to monitor certificates. The two commands are provided by the **certmonger** service. Enabling certificate tracking is especially useful if you have imported a certificate issued by the Identity Management (IdM)

certificate authority (CA) onto the machine from a different IdM client. Enabling certificate tracking can also be the final step of the following provisioning scenario:

1. On the IdM server, you create a certificate for a system that does not exist yet.
2. You create the new system.
3. You enroll the new system as an IdM client.
4. You import the certificate and the key from the IdM server on to the IdM client.
5. You start tracking the certificate using **certmonger** to ensure that it gets renewed when it is due to expire.

## Procedure

- To disable the monitoring of a certificate with the Request ID of 20190408143846:

```
# getcert stop-tracking -i 20190408143846
```

For more options, see the **getcert stop-tracking** man page.

- To enable the monitoring of a certificate stored in the `/tmp/some_cert.crt` file, whose private key is stored in the `/tmp/some_key.key` file:

```
# getcert start-tracking -c IPA -f /tmp/some_cert.crt -k /tmp/some_key.key
```

**Certmonger** cannot automatically identify the CA type that issued the certificate. For this reason, add the **-c** option with the **IPA** value to the **getcert start-tracking** command if the certificate was issued by the IdM CA. Omitting to add the **-c** option results in **certmonger** entering the `NEED_CA` state.

For more options, see the **getcert start-tracking** man page.



## NOTE

The two commands do not manipulate the certificate. For example, **getcert stop-tracking** does not delete the certificate or remove it from the NSS database or from the filesystem but simply removes the certificate from the list of monitored certificates. Similarly, **getcert start-tracking** only adds a certificate to the list of monitored certificates.

## 71.6. RENEWING A CERTIFICATE MANUALLY

When a certificate is near its expiration date, the **certmonger** daemon automatically issues a renewal command using the certificate authority (CA) helper, obtains a renewed certificate and replaces the previous certificate with the new one.

It is also possible to manually renew a certificate in advance by using the **getcert resubmit** command. This way, you can update the information the certificate contains, e.g. by adding a Subject Alternative Name (SAN).

Follow this procedure to renew a certificate manually.

## Procedure

- To renew a certificate with the Request ID of 20190408143846:

```
# getcert resubmit -i 20190408143846
```

To obtain the Request ID for a specific certificate, use the **getcert list** command. For details, see the **getcert list** man page.

## 71.7. MAKING CERTMONGER RESUME TRACKING OF IDM CERTIFICATES ON A CA REPLICA

This procedure shows how to make **certmonger** resume the tracking of Identity Management (IdM) system certificates that are crucial for an IdM deployment with an integrated certificate authority after the tracking of certificates was interrupted. The interruption may have been caused by the IdM host being unenrolled from IdM during the renewal of the system certificates or by replication topology not working properly. The procedure also shows how to make **certmonger** resume the tracking of the IdM service certificates, namely the **HTTP**, **LDAP** and **PKINIT** certificates.

### Prerequisites

- The host on which you want to resume tracking system certificates is an IdM server that is also an IdM certificate authority (CA) but not the IdM CA renewal server.

### Procedure

1. Get the PIN for the subsystem CA certificates:

```
# grep 'internal=' /var/lib/pki/pki-tomcat/conf/password.conf
```

2. Add tracking to the subsystem CA certificates, replacing **[internal PIN]** in the commands below with the PIN obtained in the previous step:

```
# getcert start-tracking -d /etc/pki/pki-tomcat/alias -n "caSigningCert cert-pki-ca" -c
'dogtag-ipa-ca-renew-agent' -P [internal PIN] -B
/usr/libexec/ipa/certmonger/stop_pkicad -C '/usr/libexec/ipa/certmonger/renew_ca_cert
"caSigningCert cert-pki-ca"' -T caCACert
```

```
# getcert start-tracking -d /etc/pki/pki-tomcat/alias -n "auditSigningCert cert-pki-ca" -c
'dogtag-ipa-ca-renew-agent' -P [internal PIN] -B
/usr/libexec/ipa/certmonger/stop_pkicad -C '/usr/libexec/ipa/certmonger/renew_ca_cert
"auditSigningCert cert-pki-ca"' -T caSignedLogCert
```

```
# getcert start-tracking -d /etc/pki/pki-tomcat/alias -n "ocspSigningCert cert-pki-ca" -c
'dogtag-ipa-ca-renew-agent' -P [internal PIN] -B
/usr/libexec/ipa/certmonger/stop_pkicad -C '/usr/libexec/ipa/certmonger/renew_ca_cert
"ocspSigningCert cert-pki-ca"' -T caOCSPCert
```

```
# getcert start-tracking -d /etc/pki/pki-tomcat/alias -n "subsystemCert cert-pki-ca" -c
'dogtag-ipa-ca-renew-agent' -P [internal PIN] -B
/usr/libexec/ipa/certmonger/stop_pkicad -C '/usr/libexec/ipa/certmonger/renew_ca_cert
"subsystemCert cert-pki-ca"' -T caSubsystemCert
```

```
# getcert start-tracking -d /etc/pki/pki-tomcat/alias -n "Server-Cert cert-pki-ca" -c
```

```
'dogtag-ipa-ca-renew-agent' -P [internal PIN] -B
/usr/libexec/ipa/certmonger/stop_pkicad -C '/usr/libexec/ipa/certmonger/renew_ca_cert
"Server-Cert cert-pki-ca"' -T caServerCert
```

3. Add tracking for the remaining IdM certificates, the **HTTP**, **LDAP**, **IPA renewal agent** and **PKINIT** certificates:

```
# getcert start-tracking -f /var/lib/ipa/certs/httpd.crt -k /var/lib/ipa/private/httpd.key -p
/var/lib/ipa/passwds/idm.example.com-443-RSA -c IPA -C
/usr/libexec/ipa/certmonger/restart_httpd -T caIPAServiceCert

# getcert start-tracking -d /etc/dirsrv/slapd-IDM-EXAMPLE-COM -n "Server-Cert" -c IPA
-p /etc/dirsrv/slapd-IDM-EXAMPLE-COM/pwdfile.txt -C
'/usr/libexec/ipa/certmonger/restart_dirsrv "IDM-EXAMPLE-COM"' -T caIPAServiceCert

# getcert start-tracking -f /var/lib/ipa/ra-agent.pem -k /var/lib/ipa/ra-agent.key -c
dogtag-ipa-ca-renew-agent -B /usr/libexec/ipa/certmonger/renew_ra_cert_pre -C
/usr/libexec/ipa/certmonger/renew_ra_cert -T caSubsystemCert

# getcert start-tracking -f /var/kerberos/krb5kdc/kdc.crt -k
/var/kerberos/krb5kdc/kdc.key -c dogtag-ipa-ca-renew-agent -B
/usr/libexec/ipa/certmonger/renew_ra_cert_pre -C
/usr/libexec/ipa/certmonger/renew_kdc_cert -T KDCs_PKINIT_Certs
```

4. Restart **certmonger**:

```
# systemctl restart certmonger
```

5. Wait for one minute after **certmonger** has started and then check the statuses of the new certificates:

```
# getcert list
```

## Additional resources

- If your IdM system certificates have all expired, see [this Knowledge Centered Support \(KCS\) solution](#) to manually renew IdM system certificates on the IdM CA server that is also the CA renewal server and the CRL publisher server. Then follow the procedure described in [this KCS solution](#) to manually renew IdM system certificates on all the other CA servers in the topology.

## 71.8. USING SCEP WITH CERTMONGER

The Simple Certificate Enrollment Protocol (SCEP) is a certificate management protocol that you can use across different devices and operating systems. If you are using a SCEP server as an external certificate authority (CA) in your environment, you can use **certmonger** to obtain a certificate for an Identity Management (IdM) client.

### 71.8.1. SCEP overview

The Simple Certificate Enrollment Protocol (SCEP) is a certificate management protocol that you can use across different devices and operating systems. You can use a SCEP server as an external certificate authority (CA).



You can configure an Identity Management (IdM) client to request and retrieve a certificate over HTTP directly from the CA SCEP service. This process is secured by a shared secret that is usually valid only for a limited time.

On the client side, SCEP requires you to provide the following components:

- SCEP URL: the URL of the CA SCEP interface.
- SCEP shared secret: a **challengePassword** PIN shared between the CA and the SCEP client, used to obtain the certificate.

The client then retrieves the CA certificate chain over SCEP and sends a certificate signing request to the CA.

When configuring SCEP with **certmonger**, you create a new CA configuration profile that specifies the issued certificate parameters.

### 71.8.2. Requesting an IdM CA-signed certificate through SCEP

The following example adds a **SCEP\_example** SCEP CA configuration to **certmonger** and requests a new certificate on the **client.idm.example.com** IdM client. **certmonger** supports both the NSS certificate database format and file-based (PEM) formats, such as OpenSSL.

#### Prerequisites

- You know the SCEP URL.
- You have the **challengePassword** PIN shared secret.

#### Procedure

1. Add the CA configuration to **certmonger**:

```
[root@client.idm.example.com ~]# getcert add-scep-ca -c SCEP_example -u SCEP_URL
```

- **-c**: Mandatory nickname for the CA configuration. The same value can later be used with other **getcert** commands.
- **-u**: URL of the server's SCEP interface.



#### IMPORTANT

When using an HTTPS URL, you must also specify the location of the PEM-formatted copy of the SCEP server CA certificate using the **-R** option.

2. Verify that the CA configuration has been successfully added:

```
[root@client.idm.example.com ~]# getcert list-cas -c SCEP_example
CA 'SCEP_example':
  is-default: no
  ca-type: EXTERNAL
  helper-location: /usr/libexec/certmonger/scep-submit -u
  http://SCEP_server_enrollment_interface_URL
```

```
SCEP CA certificate thumbprint (MD5): A67C2D4B 771AC186 FCCA654A 5E55AAF7
SCEP CA certificate thumbprint (SHA1): FBFF096C 6455E8E9 BD55F4A5 5787C43F
1F512279
```

If the configuration was successfully added, certmonger retrieves the CA chain from the remote CA. The CA chain then appears as thumbprints in the command output. When accessing the server over unencrypted HTTP, manually compare the thumbprints with the ones displayed at the SCEP server to prevent a man-in-the-middle attack.

### 3. Request a certificate from the CA:

- If you are using NSS:

```
[root@client.idm.example.com ~]# getcert request -I Example_Task -c SCEP_example -
d /etc/pki/nssdb -n ExampleCert -N cn="client.idm.example.com" -L one-time_PIN -D
client.idm.example.com
```

You can use the options to specify the following parameters of the certificate request:

- **-I:** (*Optional*) Name of the task: the tracking ID for the request. The same value can later be used with the **getcert list** command.
- **-c:** CA configuration to submit the request to.
- **-d:** Directory with the NSS database to store the certificate and key.
- **-n:** Nickname of the certificate, used in the NSS database.
- **-N:** Subject name in the CSR.
- **-L:** Time-limited one-time **challengePassword** PIN issued by the CA.
- **-D:** Subject Alternative Name for the certificate, usually the same as the host name.
- If you are using OpenSSL:

```
[root@client.idm.example.com ~]# getcert request -I Example_Task -c SCEP_example -f
/etc/pki/tls/certs/server.crt -k /etc/pki/tls/private/private.key -N
cn="client.idm.example.com" -L one-time_PIN -D client.idm.example.com
```

You can use the options to specify the following parameters of the certificate request:

- **-I:** (*Optional*) Name of the task: the tracking ID for the request. The same value can later be used with the **getcert list** command.
- **-c:** CA configuration to submit the request to.
- **-f:** Storage path to the certificate.
- **-k:** Storage path to the key.
- **-N:** Subject name in the CSR.
- **-L:** Time-limited one-time **challengePassword** PIN issued by the CA.
- **-D:** Subject Alternative Name for the certificate, usually the same as the host name.

## Verification

1. Verify that a certificate was issued and correctly stored in the local database:

- If you used NSS, enter:

```
[root@client.idm.example.com ~]# getcert list -l Example_Task
Request ID 'Example_Task':
  status: MONITORING
  stuck: no
  key pair storage:
type=NSSDB,location='/etc/pki/nssdb',nickname='ExampleCert',token='NSS Certificate
DB'
  certificate:
type=NSSDB,location='/etc/pki/nssdb',nickname='ExampleCert',token='NSS Certificate
DB'
  signing request thumbprint (MD5): 503A8EDD DE2BE17E 5BAA3A57 D68C9C1B
  signing request thumbprint (SHA1): B411ECE4 D45B883A 75A6F14D 7E3037F1
D53625F4
  CA: IPA
  issuer: CN=Certificate Authority,O=EXAMPLE.COM
  subject: CN=client.idm.example.com,O=EXAMPLE.COM
  expires: 2018-05-06 10:28:06 UTC
  key usage: digitalSignature,keyEncipherment
  eku: iso.org.dod.internet.security.mechanisms.8.2.2
  certificate template/profile: IPSECIntermediateOffline
  pre-save command:
  post-save command:
  track: yes
  auto-renew: yes
```

- If you used OpenSSL, enter:

```
[root@client.idm.example.com ~]# getcert list -l Example_Task
Request ID 'Example_Task':
  status: MONITORING
  stuck: no
  key pair storage: type=FILE,location='/etc/pki/tls/private/private.key'
  certificate: type=FILE,location='/etc/pki/tls/certs/server.crt'
  CA: IPA
  issuer: CN=Certificate Authority,O=EXAMPLE.COM
  subject: CN=client.idm.example.com,O=EXAMPLE.COM
  expires: 2018-05-06 10:28:06 UTC
  eku: id-kp-serverAuth,id-kp-clientAuth
  pre-save command:
  post-save command:
  track: yes
  auto-renew: yes
```

The status **MONITORING** signifies a successful retrieval of the issued certificate. The **getcert-list(1)** man page lists other possible states and their meanings.

## Additional resources

- For more options when requesting a certificate, see the **getcert-request(1)** man page.

### 71.8.3. Automatically renewing AD SCEP certificates with certmonger

When **certmonger** sends a SCEP certificate renewal request, this request is signed using the existing certificate private key. However, renewal requests sent by **certmonger** by default also include the **challengePassword** PIN that was used to originally obtain the certificates.

An Active Directory (AD) Network Device Enrollment Service (NDES) server that works as the SCEP server automatically rejects any requests for renewal that contain the original **challengePassword** PIN. Consequently, the renewal fails.

For renewal with AD to work, you need to configure **certmonger** to send the signed renewal requests without the **challengePassword** PIN. You also need to configure the AD server so that it does not compare the subject name at renewal.



#### NOTE

There may be SCEP servers other than AD that also refuse requests containing the **challengePassword**. In those cases, you may also need to change the **certmonger** configuration in this way.

#### Prerequisites

- The RHEL server has to be running RHEL 8.6 or newer.

#### Procedure

1. Open **regedit** on the AD server.
2. In the **HKEY\_LOCAL\_MACHINE\SOFTWARE\Microsoft\Cryptography\MSCEP** subkey, add a new 32-bit REG\_DWORD entry **DisableRenewalSubjectNameMatch** and set its value to **1**.
3. On the server where **certmonger** is running, open the **/etc/certmonger/certmonger.conf** file and add the following section:

```
[scep]
challenge_password_otp = yes
```

4. Restart certmonger:

```
# systemctl restart certmonger
```

## CHAPTER 72. REQUESTING CERTIFICATES USING RHEL SYSTEM ROLES

With the **certificate** System Role, you can use Red Hat Ansible Core to issue and manage certificates.

This chapter covers the following topics:

- [The \*\*certificate\*\* System Role](#)
- [Requesting a new self-signed certificate using the \*\*certificate\*\* System Role](#)
- [Requesting a new certificate from IdM CA using the \*\*certificate\*\* System Role](#)

### 72.1. THE CERTIFICATE SYSTEM ROLE

Using the **certificate** System Role, you can manage issuing and renewing TLS and SSL certificates using Ansible Core.

The role uses **certmonger** as the certificate provider, and currently supports issuing and renewing self-signed certificates and using the IdM integrated certificate authority (CA).

You can use the following variables in your Ansible playbook with the **certificate** System Role:

#### **certificate\_wait**

to specify if the task should wait for the certificate to be issued.

#### **certificate\_requests**

to represent each certificate to be issued and its parameters.

#### Additional resources

- See the `/usr/share/ansible/roles/rhel-system-roles.certificate/README.md` file.
- [Preparing a control node and managed nodes to use RHEL System Roles](#)

### 72.2. REQUESTING A NEW SELF-SIGNED CERTIFICATE USING THE CERTIFICATE SYSTEM ROLE

With the **certificate** System Role, you can use Ansible Core to issue self-signed certificates.

This process uses the **certmonger** provider and requests the certificate through the **getcert** command.



#### NOTE

By default, **certmonger** automatically tries to renew the certificate before it expires. You can disable this by setting the **auto\_renew** parameter in the Ansible playbook to **no**.

#### Prerequisites

- The Ansible Core package is installed on the control machine.
- You have the **rhel-system-roles** package installed on the system from which you want to run the playbook.

## Procedure

1. *Optional:* Create an inventory file, for example **inventory.file**:

```
$ *touch inventory.file*
```

2. Open your inventory file and define the hosts on which you want to request the certificate, for example:

```
[webserver]
server.idm.example.com
```

3. Create a playbook file, for example **request-certificate.yml**:

- Set **hosts** to include the hosts on which you want to request the certificate, such as **webserver**.
- Set the **certificate\_requests** variable to include the following:
  - Set the **name** parameter to the desired name of the certificate, such as **mycert**.
  - Set the **dns** parameter to the domain to be included in the certificate, such as **\*.example.com**.
  - Set the **ca** parameter to **self-sign**.
- Set the **rhel-system-roles.certificate** role under **roles**.  
This is the playbook file for this example:

```
---
- hosts: webserver

vars:
  certificate_requests:
    - name: mycert
      dns: "*.example.com"
      ca: self-sign

roles:
  - rhel-system-roles.certificate
```

4. Save the file.
5. Run the playbook:

```
$ *ansible-playbook -i inventory.file request-certificate.yml*
```

## Additional resources

- See the **/usr/share/ansible/roles/rhel-system-roles.certificate/README.md** file.
- See the **ansible-playbook(1)** man page.

## 72.3. REQUESTING A NEW CERTIFICATE FROM IDM CA USING THE CERTIFICATE SYSTEM ROLE

With the **certificate** System Role, you can use **ansible-core** to issue certificates while using an IdM server with an integrated certificate authority (CA). Therefore, you can efficiently and consistently manage the certificate trust chain for multiple systems when using IdM as the CA.

This process uses the **certmonger** provider and requests the certificate through the **getcert** command.



### NOTE

By default, **certmonger** automatically tries to renew the certificate before it expires. You can disable this by setting the **auto\_renew** parameter in the Ansible playbook to **no**.

### Prerequisites

- The Ansible Core package is installed on the control machine.
- You have the **rhel-system-roles** package installed on the system from which you want to run the playbook.

### Procedure

1. *Optional:* Create an inventory file, for example **inventory.file**:

```
$ *touch inventory.file*
```

2. Open your inventory file and define the hosts on which you want to request the certificate, for example:

```
[webserver]
server.idm.example.com
```

3. Create a playbook file, for example **request-certificate.yml**:

- Set **hosts** to include the hosts on which you want to request the certificate, such as **webserver**.
- Set the **certificate\_requests** variable to include the following:
  - Set the **name** parameter to the desired name of the certificate, such as **mycert**.
  - Set the **dns** parameter to the domain to be included in the certificate, such as **www.example.com**.
  - Set the **principal** parameter to specify the Kerberos principal, such as **HTTP/www.example.com@EXAMPLE.COM**.
  - Set the **ca** parameter to **ipa**.
- Set the **rhel-system-roles.certificate** role under **roles**. This is the playbook file for this example:

```
---
- hosts: webserver
```

```
vars:
  certificate_requests:
    - name: mycert
      dns: www.example.com
      principal: HTTP/www.example.com@EXAMPLE.COM
      ca: ipa

roles:
  - rhel-system-roles.certificate
```

4. Save the file.
5. Run the playbook:

```
$ *ansible-playbook -i inventory.file request-certificate.yml*
```

### Additional resources

- See the `/usr/share/ansible/roles/rhel-system-roles.certificate/README.md` file.
- See the **ansible-playbook(1)** man page.

## 72.4. SPECIFYING COMMANDS TO RUN BEFORE OR AFTER CERTIFICATE ISSUANCE USING THE **CERTIFICATE SYSTEM** ROLE

With the **certificate** Role, you can use Ansible Core to execute a command before and after a certificate is issued or renewed.

In the following example, the administrator ensures stopping the **httpd** service before a self-signed certificate for **www.example.com** is issued or renewed, and restarting it afterwards.



### NOTE

By default, **certmonger** automatically tries to renew the certificate before it expires. You can disable this by setting the **auto\_renew** parameter in the Ansible playbook to **no**.

### Prerequisites

- The Ansible Core package is installed on the control machine.
- You have the **rhel-system-roles** package installed on the system from which you want to run the playbook.

### Procedure

1. *Optional:* Create an inventory file, for example **inventory.file**:

```
$ *touch inventory.file*
```

2. Open your inventory file and define the hosts on which you want to request the certificate, for example:



```
[webserver]
server.idm.example.com
```

3. Create a playbook file, for example **request-certificate.yml**:

- Set **hosts** to include the hosts on which you want to request the certificate, such as **webserver**.
- Set the **certificate\_requests** variable to include the following:
  - Set the **name** parameter to the desired name of the certificate, such as **mycert**.
  - Set the **dns** parameter to the domain to be included in the certificate, such as **www.example.com**.
  - Set the **ca** parameter to the CA you want to use to issue the certificate, such as **self-sign**.
  - Set the **run\_before** parameter to the command you want to execute before this certificate is issued or renewed, such as **systemctl stop httpd.service**.
  - Set the **run\_after** parameter to the command you want to execute after this certificate is issued or renewed, such as **systemctl start httpd.service**.
- Set the **rhel-system-roles.certificate** role under **roles**.  
This is the playbook file for this example:

```
---
- hosts: webserver
  vars:
    certificate_requests:
      - name: mycert
        dns: www.example.com
        ca: self-sign
        run_before: systemctl stop httpd.service
        run_after: systemctl start httpd.service

  roles:
    - rhel-system-roles.certificate
```

4. Save the file.

5. Run the playbook:

```
$ *ansible-playbook -i inventory.file request-certificate.yml*
```

#### Additional resources

- See the **/usr/share/ansible/roles/rhel-system-roles.certificate/README.md** file.
- See the **ansible-playbook(1)** man page.

## CHAPTER 73. RESTRICTING AN APPLICATION TO TRUST ONLY A SUBSET OF CERTIFICATES

If your Identity Management (IdM) installation is configured with the integrated Certificate System (CS) certificate authority (CA), you are able to create lightweight sub-CAs. All sub-CAs you create are subordinated to the primary CA of the certificate system, the **ipa** CA.

A *lightweight sub-CA* in this context means *a sub-CA issuing certificates for a specific purpose*. For example, a lightweight sub-CA enables you to configure a service, such as a virtual private network (VPN) gateway and a web browser, to accept only certificates issued by *sub-CA A*. By configuring other services to accept certificates only issued by *sub-CA B*, you prevent them from accepting certificates issued by *sub-CA A*, the primary CA, that is the **ipa** CA, and any intermediate sub-CA between the two.

If you revoke the intermediate certificate of a sub-CA, [all certificates issued by this sub-CA are automatically considered invalid](#) by correctly configured clients. All the other certificates issued directly by the root CA, **ipa**, or another sub-CA, remain valid.

This section uses the example of the Apache web server to illustrate how to restrict an application to trust only a subset of certificates. Complete this section to restrict the web server running on your IdM client to use a certificate issued by the **webserver-ca** IdM sub-CA, and to require the users to authenticate to the web server using user certificates issued by the **webclient-ca** IdM sub-CA.

The steps you need to take are:

1. [Create an IdM sub-CA](#)
2. [Download the sub-CA certificate from IdM WebUI](#)
3. [Create a CA ACL specifying the correct combination of users, services and CAs, and the certificate profile used](#)
4. [Request a certificate for the web service running on an IdM client from the IdM sub-CA](#)
5. [Set up a single-instance Apache HTTP Server](#)
6. [Add TLS encryption to the Apache HTTP Server](#)
7. [Set the supported TLS protocol versions on an Apache HTTP Server](#)
8. [Set the supported ciphers on the Apache HTTP Server](#)
9. [Configure TLS client certificate authentication on the web server](#)
10. [Request a certificate for the user from the IdM sub-CA and export it to the client](#)
11. [Import the user certificate into the browser and configure the browser to trust the sub-CA certificate](#)

### 73.1. MANAGING LIGHTWEIGHT SUB-CAS

This section describes how to manage lightweight subordinate certificate authorities (sub-CAs). All sub-CAs you create are subordinated to the primary CA of the certificate system, the **ipa** CA. You can also disable and delete sub-CAs.



## NOTE

- If you delete a sub-CA, revocation checking for that sub-CA will no longer work. Only delete a sub-CA when there are no more certificates that were issued by that sub-CA whose **notAfter** expiration time is in the future.
- You should only disable sub-CAs while there are still non-expired certificates that were issued by that sub-CA. If all certificates that were issued by a sub-CA have expired, you can delete that sub-CA.
- You cannot disable or delete the IdM CA.

For details on managing sub-CAs, see:

- [Creating a sub-CA from the IdM WebUI](#)
- [Deleting a sub-CA from the IdM WebUI](#)
- [Creating a sub-CA from the IdM CLI](#)
- [Disabling a sub-CA from the IdM CLI](#)
- [Deleting a sub-CA from the IdM CLI](#)

### 73.1.1. Creating a sub-CA from the IdM WebUI

Follow this procedure to use the IdM WebUI to create new sub-CAs named **webserver-ca** and **webclient-ca**.

#### Prerequisites

- Make sure you have obtained the administrator's credentials.

#### Procedure

1. In the **Authentication** menu, click **Certificates**.
2. Select **Certificate Authorities** and click **Add**.
3. Enter the name of the **webserver-ca** sub-CA. Enter the Subject DN, for example **CN=WEBSERVER,O=IDM.EXAMPLE.COM**, in the Subject DN field. Note that the Subject DN must be unique in the IdM CA infrastructure.
4. Enter the name of the **webclient-ca** sub-CA. Enter the Subject DN **CN=WEBCLIENT,O=IDM.EXAMPLE.COM** in the Subject DN field.
5. In the command-line interface, run the **ipa-certupdate** command to create a **certmonger** tracking request for the **webserver-ca** and **webclient-ca** sub-CA certificates:

```
[root@ipaserver ~]# ipa-certupdate
```



IMPORTANT

Forgetting to run the **ipa-certupdate** command after creating a sub-CA means that if the sub-CA certificate expires, end-entity certificates issued by the sub-CA are considered invalid even if the end-entity certificate has not expired.

Verification

- Verify that the signing certificate of the new sub-CA has been added to the IdM database:

```
[root@ipaserver ~]# certutil -d /etc/pki/pki-tomcat/alias/ -L

Certificate Nickname           Trust Attributes
                               SSL,S/MIME,JAR/XPI

caSigningCert cert-pki-ca      CTu,Cu,Cu
Server-Cert cert-pki-ca       u,u,u
auditSigningCert cert-pki-ca   u,u,Pu
caSigningCert cert-pki-ca ba83f324-5e50-4114-b109-acca05d6f1dc u,u,u
ocspSigningCert cert-pki-ca    u,u,u
subsystemCert cert-pki-ca      u,u,u
```



NOTE

The new sub-CA certificate is automatically transferred to all the replicas that have a certificate system instance installed.

73.1.2. Deleting a sub-CA from the IdM WebUI

Follow this procedure to delete lightweight sub-CAs in the IdM WebUI.



NOTE

- If you delete a sub-CA, revocation checking for that sub-CA will no longer work. Only delete a sub-CA when there are no more certificates that were issued by that sub-CA whose **notAfter** expiration time is in the future.
- You should only disable sub-CAs while there are still non-expired certificates that were issued by that sub-CA. If all certificates that were issued by a sub-CA have expired, you can delete that sub-CA.
- You cannot disable or delete the IdM CA.

Prerequisites

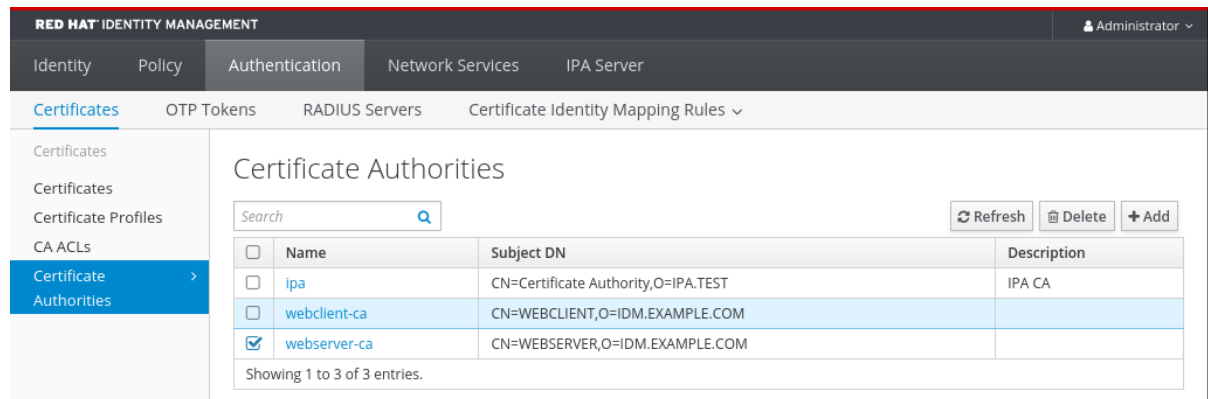
- Make sure you have obtained the administrator’s credentials.
- You have disabled the sub-CA in the IdM CLI. See [Disabling a sub-CA from the IdM CLI](#)

Procedure

1. In the IdM WebUI, open the **Authentication** tab, and select the **Certificates** subtab.
2. Select **Certificate Authorities**.

3. Select the sub-CA to remove and click **Delete**.

**Figure 73.1. Deleting a sub-CA in the IdM Web UI**



4. Click **Delete** to confirm.

The sub-CA is removed from the list of **Certificate Authorities**.

### 73.1.3. Creating a sub-CA from the IdM CLI

Follow this procedure to use the IdM CLI to create new sub-CAs named **webserver-ca** and **webclient-ca**.

#### Prerequisites

- Make sure that you have obtained the administrator's credentials.
- Make sure you are logged in to an IdM server that is a CA server.

#### Procedure

1. Enter the **ipa ca-add** command, and specify the name of the **webserver-ca** sub-CA and its Subject Distinguished Name (DN):

```
[root@ipaserver ~]# ipa ca-add webserver-ca --
subject="CN=WEBSERVER,O=IDM.EXAMPLE.COM"
-----
Created CA "webserver-ca"
-----
Name: webserver-ca
Authority ID: ba83f324-5e50-4114-b109-acc05d6f1dc
Subject DN: CN=WEBSERVER,O=IDM.EXAMPLE.COM
Issuer DN: CN=Certificate Authority,O=IDM.EXAMPLE.COM
```

#### Name

Name of the CA.

#### Authority ID

Automatically created, individual ID for the CA.

#### Subject DN

Subject Distinguished Name (DN). The Subject DN must be unique in the IdM CA infrastructure.

## Issuer DN

Parent CA that issued the sub-CA certificate. All sub-CAs are created as a child of the IdM root CA.

2. Create the **webclient-ca** sub-CA for issuing certificates to web clients:

```
[root@ipaserver ~]# ipa ca-add webclient-ca --
subject="CN=WEBCLIENT,O=IDM.EXAMPLE.COM"
-----
Created CA "webclient-ca"
-----
Name: webclient-ca
Authority ID: 8a479f3a-0454-4a4d-8ade-fd3b5a54ab2e
Subject DN: CN=WEBCLIENT,O=IDM.EXAMPLE.COM
Issuer DN: CN=Certificate Authority,O=IDM.EXAMPLE.COM
```

3. Run the **ipa-certupdate** command to create a **certmonger** tracking request for the **webserver-ca** and **webclient-ca** sub-CAs certificates:

```
[root@ipaserver ~]# ipa-certupdate
```



### IMPORTANT

If you forget to run the **ipa-certupdate** command after creating a sub-CA and the sub-CA certificate expires, end-entity certificates issued by that sub-CA are considered invalid even though the end-entity certificate has not expired.

## Verification steps

- Verify that the signing certificate of the new sub-CA has been added to the IdM database:

```
[root@ipaserver ~]# certutil -d /etc/pki/pki-tomcat/alias/ -L
```

| Certificate Nickname  | Trust Attributes   |
|---|--------------------|
|   | SSL,S/MIME,JAR/XPI |
| caSigningCert cert-pki-ca   | CTu,Cu,Cu          |
| Server-Cert cert-pki-ca   | u,u,u              |
| auditSigningCert cert-pki-ca  | u,u,Pu             |
| <b>caSigningCert cert-pki-ca ba83f324-5e50-4114-b109-acca05d6f1dc</b> | <b>u,u,u</b>       |
| ocspSigningCert cert-pki-ca   | u,u,u              |
| subsystemCert cert-pki-ca   | u,u,u              |



### NOTE

The new sub-CA certificate is automatically transferred to all the replicas that have a certificate system instance installed.

## 73.1.4. Disabling a sub-CA from the IdM CLI

Follow this procedure to disable a sub-CA from the IdM CLI. If there are still non-expired certificates that were issued by a sub-CA, you should not delete it but you can disable it. If you delete the sub-CA, revocation checking for that sub-CA will no longer work.

## Prerequisites

- Make sure you have obtained the administrator's credentials.

## Procedure

1. Run the **ipa ca-find** command to determine the name of the sub-CA you are deleting:

```
[root@ipaserver ~]# ipa ca-find
-----
3 CAs matched
-----
Name: ipa
Description: IPA CA
Authority ID: 5195deaf-3b61-4aab-b608-317aff38497c
Subject DN: CN=Certificate Authority,O=IPA.TEST
Issuer DN: CN=Certificate Authority,O=IPA.TEST

Name: webclient-ca
Authority ID: 605a472c-9c6e-425e-b959-f1955209b092
Subject DN: CN=WEBCLIENT,O=IDM.EXAMPLE.COM
Issuer DN: CN=Certificate Authority,O=IPA.TEST

Name: webserver-ca
Authority ID: 02d537f9-c178-4433-98ea-53aa92126fc3
Subject DN: CN=WEBSERVER,O=IDM.EXAMPLE.COM
Issuer DN: CN=Certificate Authority,O=IPA.TEST
-----
Number of entries returned 3
-----
```

2. Run the **ipa ca-disable** command to disable your sub-CA, in this example, the **webserver-ca**:

```
ipa ca-disable webserver-ca
-----
Disabled CA "webserver-ca"
-----
```

### 73.1.5. Deleting a sub-CA from the IdM CLI

Follow this procedure to delete lightweight sub-CAs from the IdM CLI.



#### NOTE

- If you delete a sub-CA, revocation checking for that sub-CA will no longer work. Only delete a sub-CA when there are no more certificates that were issued by that sub-CA whose **notAfter** expiration time is in the future.
- You should only disable sub-CAs while there are still non-expired certificates that were issued by that sub-CA. If all certificates that were issued by a sub-CA have expired, you can delete that sub-CA.
- You cannot disable or delete the IdM CA.

## Prerequisites

- Make sure you have obtained the administrator's credentials.

## Procedure

1. To display a list of sub-CAs and CAs, run the **ipa ca-find** command:

```
# ipa ca-find
-----
3 CAs matched
-----
Name: ipa
Description: IPA CA
Authority ID: 5195deaf-3b61-4aab-b608-317aff38497c
Subject DN: CN=Certificate Authority,O=IPA.TEST
Issuer DN: CN=Certificate Authority,O=IPA.TEST

Name: webclient-ca
Authority ID: 605a472c-9c6e-425e-b959-f1955209b092
Subject DN: CN=WEBCCLIENT,O=IDM.EXAMPLE.COM
Issuer DN: CN=Certificate Authority,O=IPA.TEST

Name: webserver-ca
Authority ID: 02d537f9-c178-4433-98ea-53aa92126fc3
Subject DN: CN=WEBSERVER,O=IDM.EXAMPLE.COM
Issuer DN: CN=Certificate Authority,O=IPA.TEST
-----
Number of entries returned 3
-----
```

2. Run the **ipa ca-disable** command to disable your sub-CA, in this example, the **webserver-ca**:

```
# ipa ca-disable webserver-ca
-----
Disabled CA "webserver-ca"
-----
```

3. Delete the sub-CA, in this example, the **webserver-ca**:

```
# ipa ca-del webserver-ca
-----
Deleted CA "webserver-ca"
-----
```

## Verification

- Run **ipa ca-find** to display the list of CAs and sub-CAs. The **webserver-ca** is no longer on the list.

```
# ipa ca-find
-----
2 CAs matched
-----
```



```
Name: ipa
Description: IPA CA
Authority ID: 5195deaf-3b61-4aab-b608-317aff38497c
Subject DN: CN=Certificate Authority,O=IPA.TEST
Issuer DN: CN=Certificate Authority,O=IPA.TEST
```

```
Name: webclient-ca
Authority ID: 605a472c-9c6e-425e-b959-f1955209b092
Subject DN: CN=WEBCLIENT,O=IDM.EXAMPLE.COM
Issuer DN: CN=Certificate Authority,O=IPA.TEST
```

```
-----
Number of entries returned 2
-----
```

## 73.2. DOWNLOADING THE SUB-CA CERTIFICATE FROM IDM WEBUI

### Prerequisites

- Make sure that you have obtained the IdM administrator's credentials.

### Procedure

1. In the **Authentication** menu, click **Certificates > Certificates**.

**Figure 73.2. sub-CA certificate in the list of certificates**

|                          |                           |                                |     |       |
|--------------------------|---------------------------|--------------------------------|-----|-------|
| <input type="checkbox"/> | <a href="#">268173326</a> | CN=WEBSERVER,O=IDM.EXAMPLE.COM | ipa | VALID |
| <input type="checkbox"/> | <a href="#">268238849</a> | CN=idm_user,O=IDM.EXAMPLE.COM  | ipa | VALID |

2. Click the serial number of the sub-CA certificate to open the certificate information page.
3. In the certificate information page, click **Actions > Download**.
4. In the CLI, move the sub-CA certificate to the `/etc/pki/tls/private/` directory:

```
# mv path/to/the/downloaded/certificate /etc/pki/tls/private/sub-ca.crt
```

## 73.3. CREATING CA ACLS FOR WEB SERVER AND CLIENT AUTHENTICATION

Certificate authority access control list (CA ACL) rules define which profiles can be used to issue certificates to which users, services, or hosts. By associating profiles, principals, and groups, CA ACLs permit principals or groups to request certificates using particular profiles.

For example, using CA ACLs, the administrator can restrict the use of a profile intended for employees working from an office located in London only to users that are members of the London office-related group.

### 73.3.1. Viewing CA ACLs in IdM CLI

Follow this procedure to view the list of certificate authority access control lists (CA ACLs) available in your IdM deployment and the details of a specific CA ACL.

## Procedure

1. To view all the CA ACLs in your IdM environment, enter the **ipa caacl-find** command:

```
$ ipa caacl-find
-----
1 CA ACL matched
-----
ACL name: hosts_services_calPAserviceCert
Enabled: TRUE
```

2. To view the details of a CA ACL, enter the **ipa caacl-show** command, and specify the CA ACL name. For example, to view the details of the **hosts\_services\_calPAserviceCert** CA ACL, enter:

```
$ ipa caacl-show hosts_services_calPAserviceCert
ACL name: hosts_services_calPAserviceCert
Enabled: TRUE
Host category: all
Service category: all
CAs: ipa
Profiles: calPAserviceCert
Users: admin
```

### 73.3.2. Creating a CA ACL for web servers authenticating to web clients using certificates issued by webserver-ca

Follow this procedure to create a CA ACL that requires the system administrator to use the **webserver-ca** sub-CA and the **calPAserviceCert** profile when requesting a certificate for the **HTTP/my\_company.idm.example.com@IDM.EXAMPLE.COM** service. If the user requests a certificate from a different sub-CA or of a different profile, the request fails. The only exception is when there is another matching CA ACL that is enabled. To view the available CA ACLs, see [Viewing CA ACLs in IdM CLI](#).

## Prerequisites

- Make sure that the **HTTP/my\_company.idm.example.com@IDM.EXAMPLE.COM** service is part of IdM.
- Make sure you have obtained IdM administrator's credentials.

## Procedure

1. Create a CA ACL using the **ipa caacl** command, and specify its name:

```
$ ipa caacl-add TLS_web_server_authentication
-----
Added CA ACL "TLS_web_server_authentication"
-----
ACL name: TLS_web_server_authentication
Enabled: TRUE
```

2. Modify the CA ACL using the **ipa caacl-mod** command to specify the description of the CA ACL:

```
$ ipa caacl-mod TLS_web_server_authentication --desc="CAACL for web servers
authenticating to web clients using certificates issued by webserver-ca"
```

```
-----
Modified CA ACL "TLS_web_server_authentication"
-----
```

```
ACL name: TLS_web_server_authentication
```

```
Description: CAACL for web servers authenticating to web clients using certificates issued
by webserver-ca
```

```
Enabled: TRUE
```

3. Add the **webserver-ca** sub-CA to the CA ACL:

```
$ ipa caacl-add-ca TLS_web_server_authentication --ca=webserver-ca
```

```
ACL name: TLS_web_server_authentication
```

```
Description: CAACL for web servers authenticating to web clients using certificates issued
by webserver-ca
```

```
Enabled: TRUE
```

```
CAs: webserver-ca
```

```
-----
Number of members added 1
-----
```

4. Use the **ipa caacl-add-service** to specify the service whose principal will be able to request a certificate:

```
$ ipa caacl-add-service TLS_web_server_authentication --
service=HTTP/my_company.idm.example.com@IDM.EXAMPLE.COM
```

```
ACL name: TLS_web_server_authentication
```

```
Description: CAACL for web servers authenticating to web clients using certificates issued
by webserver-ca
```

```
Enabled: TRUE
```

```
CAs: webserver-ca
```

```
Services: HTTP/my_company.idm.example.com@IDM.EXAMPLE.COM
```

```
-----
Number of members added 1
-----
```

5. Use the **ipa caacl-add-profile** command to specify the certificate profile for the requested certificate:

```
$ ipa caacl-add-profile TLS_web_server_authentication --
certprofiles=calPAserviceCert
```

```
ACL name: TLS_web_server_authentication
```

```
Description: CAACL for web servers authenticating to web clients using certificates issued
by webserver-ca
```

```
Enabled: TRUE
```

```
CAs: webserver-ca
```

```
Profiles: calPAserviceCert
```

```
Services: HTTP/my_company.idm.example.com@IDM.EXAMPLE.COM
```

```
-----
Number of members added 1
-----
```

You can use the newly-created CA ACL straight away. It is enabled after its creation by default.

**NOTE**

The point of CA ACLs is to specify which CA and profile combinations are allowed for requests coming from particular principals or groups. CA ACLs do not affect certificate validation or trust. They do not affect how the issued certificates will be used.

### 73.3.3. Creating a CA ACL for user web browsers authenticating to web servers using certificates issued by webclient-ca

Follow this procedure to create a CA ACL that requires the system administrator to use the **webclient-ca** sub-CA and the **IECUserRoles** profile when requesting a certificate. If the user requests a certificate from a different sub-CA or of a different profile, the request fails. The only exception is when there is another matching CA ACL that is enabled. To view the available CA ACLs, see [Viewing CA ACLs in IdM CLI](#).

**Prerequisites**

- Make sure that you have obtained IdM administrator's credentials.

**Procedure**

1. Create a CA ACL using the **ipa caacl** command and specify its name:

```
$ ipa caacl-add TLS_web_client_authentication
-----
Added CA ACL "TLS_web_client_authentication"
-----
ACL name: TLS_web_client_authentication
Enabled: TRUE
```

2. Modify the CA ACL using the **ipa caacl-mod** command to specify the description of the CA ACL:

```
$ ipa caacl-mod TLS_web_client_authentication --desc="CAACL for user web
browsers authenticating to web servers using certificates issued by webclient-ca"
-----
Modified CA ACL "TLS_web_client_authentication"
-----
ACL name: TLS_web_client_authentication
Description: CAACL for user web browsers authenticating to web servers using certificates
issued by webclient-ca
Enabled: TRUE
```

3. Add the **webclient-ca** sub-CA to the CA ACL:

```
$ ipa caacl-add-ca TLS_web_client_authentication --ca=webclient-ca
ACL name: TLS_web_client_authentication
Description: CAACL for user web browsers authenticating to web servers using certificates
issued by webclient-ca
Enabled: TRUE
CAs: webclient-ca
-----
Number of members added 1
-----
```

4. Use the **ipa caacl-add-profile** command to specify the certificate profile for the requested certificate:

```
$ ipa caacl-add-profile TLS_web_client_authentication --certprofiles=IECUserRoles
ACL name: TLS_web_client_authentication
Description: CAACL for user web browsers authenticating to web servers using certificates
issued by webclient-ca
Enabled: TRUE
CAs: webclient-ca
Profiles: IECUserRoles
-----
Number of members added 1
-----
```

5. Modify the CA ACL using the **ipa caacl-mod** command to specify that the CA ACL applies to all IdM users:

```
$ ipa caacl-mod TLS_web_client_authentication --usercat=all
-----
Modified CA ACL "TLS_web_client_authentication"
-----
ACL name: TLS_web_client_authentication
Description: CAACL for user web browsers authenticating to web servers using certificates
issued by webclient-ca
Enabled: TRUE
User category: all
CAs: webclient-ca
Profiles: IECUserRoles
```

You can use the newly-created CA ACL straight away. It is enabled after its creation by default.



#### NOTE

The point of CA ACLs is to specify which CA and profile combinations are allowed for requests coming from particular principals or groups. CA ACLs do not affect certificate validation or trust. They do not affect how the issued certificates will be used.

## 73.4. OBTAINING AN IDM CERTIFICATE FOR A SERVICE USING CERTMONGER

To ensure that communication between browsers and the web service running on your IdM client is secure and encrypted, use a TLS certificate. If you want to restrict web browsers to trust certificates issued by the **webserver-ca** sub-CA but no other IdM sub-CA, obtain the TLS certificate for your web service from the **webserver-ca** sub-CA.

Follow this procedure to use **certmonger** to obtain an IdM certificate for a service (**HTTP/my\_company.idm.example.com@IDM.EXAMPLE.COM**) running on an IdM client.

Using **certmonger** to request the certificate automatically means that **certmonger** manages and renews the certificate when it is due for a renewal.

For a visual representation of what happens when **certmonger** requests a service certificate, see [Communication flow for certmonger requesting a service certificate](#) .

## Prerequisites

- The web server is enrolled as an IdM client.
- You have root access to the IdM client on which you are running the procedure.
- The service for which you are requesting a certificate does not have to pre-exist in IdM.

## Procedure

1. On the **my\_company.idm.example.com** IdM client on which the **HTTP** service is running, request a certificate for the service corresponding to the **HTTP/my\_company.idm.example.com@IDM.EXAMPLE.COM** principal, and specify that
  - The certificate is to be stored in the local **/etc/pki/tls/certs/httpd.pem** file
  - The private key is to be stored in the local **/etc/pki/tls/private/httpd.key** file
  - The **webserver-ca** sub-CA is to be the issuing certificate authority
  - That an extensionRequest for a **SubjectAltName** be added to the signing request with the DNS name of **my\_company.idm.example.com**:

```
# ipa-getcert request -K HTTP/my_company.idm.example.com -k
/etc/pki/tls/private/httpd.key -f /etc/pki/tls/certs/httpd.pem -g 2048 -D
my_company.idm.example.com -X webserver-ca -C "systemctl restart httpd"
New signing request "20190604065735" added.
```

In the command above:

- The **ipa-getcert request** command specifies that the certificate is to be obtained from the IdM CA. The **ipa-getcert request** command is a shortcut for **getcert request -c IPA**.
- The **-g** option specifies the size of key to be generated if one is not already in place.
- The **-D** option specifies the **SubjectAltName** DNS value to be added to the request.
- The **-X** option specifies that the issuer of the certificate must be **webserver-ca**, not **ipa**.
- The **-C** option instructs **certmonger** to restart the **httpd** service after obtaining the certificate.
- To specify that the certificate be issued with a particular profile, use the **-T** option.



### NOTE

RHEL 8 uses a different SSL module in Apache than the one used in RHEL 7. The SSL module relies on OpenSSL rather than NSS. For this reason, in RHEL 8 you cannot use an NSS database to store the **HTTPS** certificate and the private key.

2. Optionally, to check the status of your request:

```
# ipa-getcert list -f /etc/pki/tls/certs/httpd.pem
Number of certificates and requests being tracked: 3.
```

```
Request ID '20190604065735':
status: MONITORING
stuck: no
key pair storage: type=FILE,location='/etc/pki/tls/private/httpd.key'
certificate: type=FILE,location='/etc/pki/tls/certs/httpd.crt'
CA: IPA
issuer: CN=WEBSERVER,O=IDM.EXAMPLE.COM
```

[...]

The output shows that the request is in the **MONITORING** status, which means that a certificate has been obtained. The locations of the key pair and the certificate are those requested.

## 73.5. COMMUNICATION FLOW FOR CERTMONGER REQUESTING A SERVICE CERTIFICATE

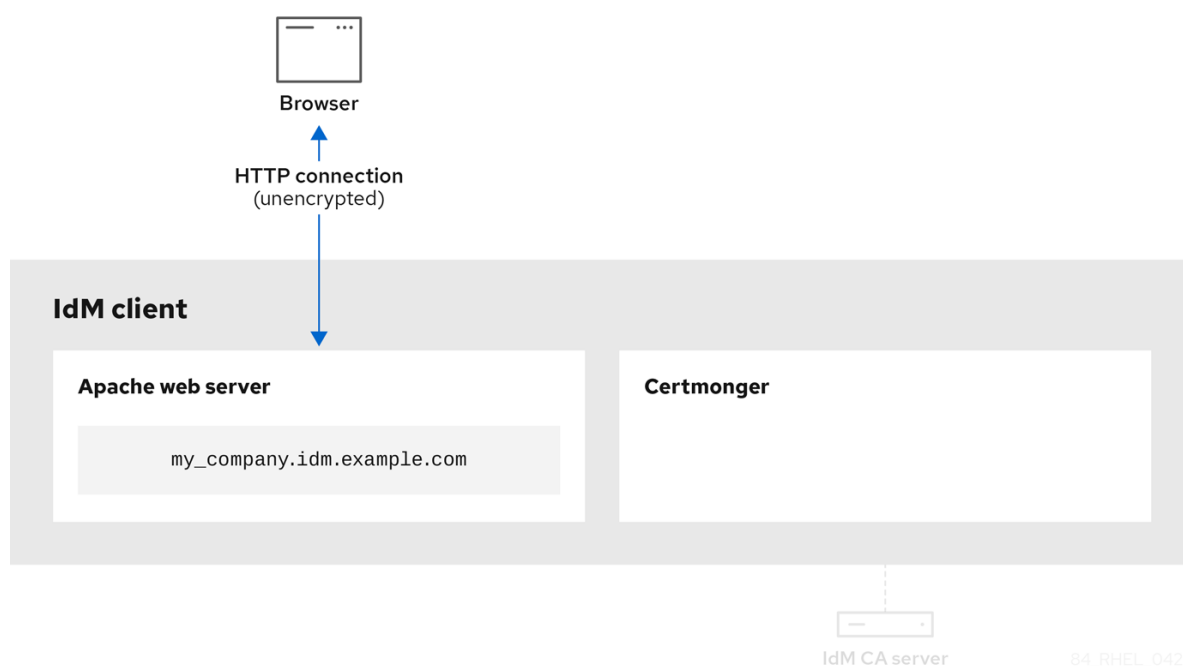
These diagrams show the stages of what happens when **certmonger** requests a service certificate from Identity Management (IdM) certificate authority (CA) server. The sequence consists of these diagrams:

- [Unencrypted communication](#)
- [Certmonger requesting a service certificate](#)
- [IdM CA issuing the service certificate](#)
- [Certmonger applying the service certificate](#)
- [Certmonger requesting a new certificate when the old one is nearing expiration](#)

In the diagrams, the **webserver-ca** sub-CA is represented by the generic **IdM CA server**.

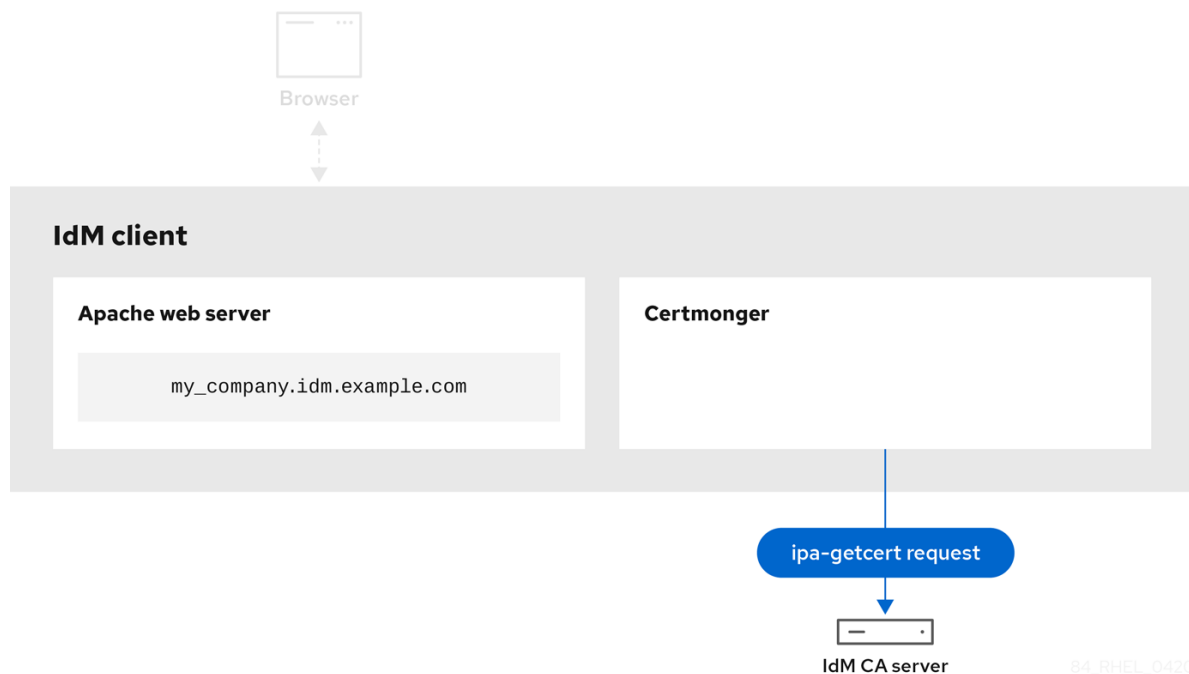
[Unencrypted communication](#) shows the initial situation: without an HTTPS certificate, the communication between the web server and the browser is unencrypted.

Figure 73.3. Unencrypted communication



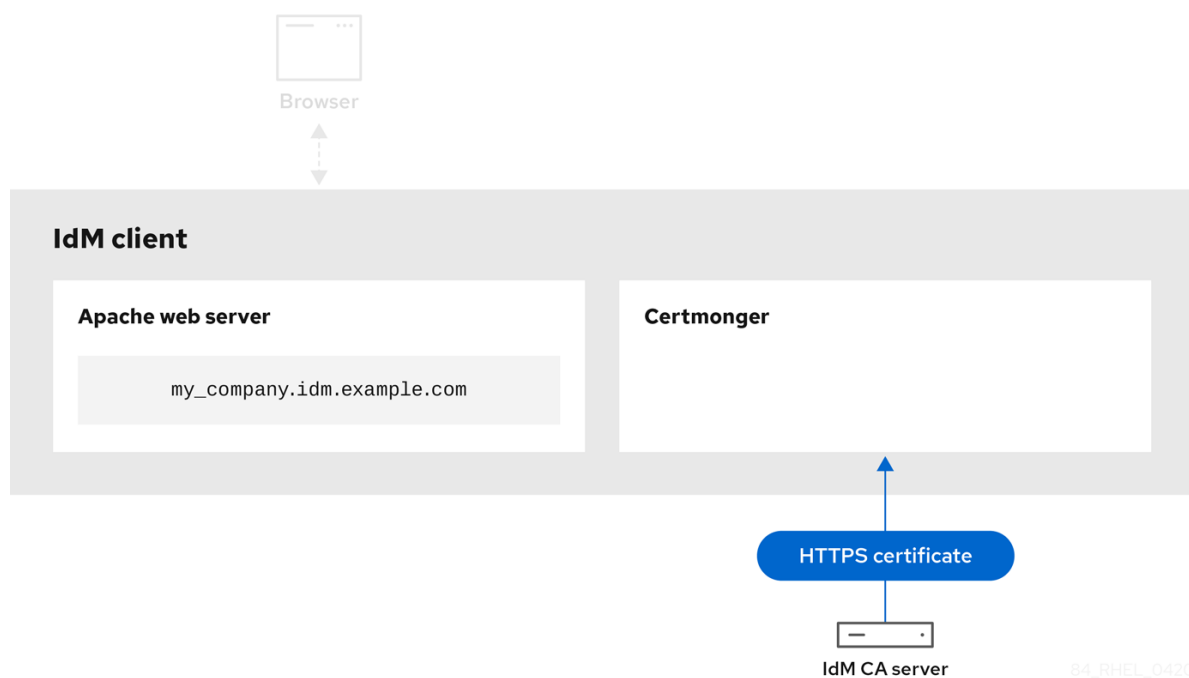
[Certmonger requesting a service certificate](#) shows the system administrator using **certmonger** to manually request an HTTPS certificate for the Apache web server. Note that when requesting a web server certificate, certmonger does not communicate directly with the CA. It proxies through IdM.

Figure 73.4. Certmonger requesting a service certificate



[IdM CA issuing the service certificate](#) shows an IdM CA issuing an HTTPS certificate for the web server.

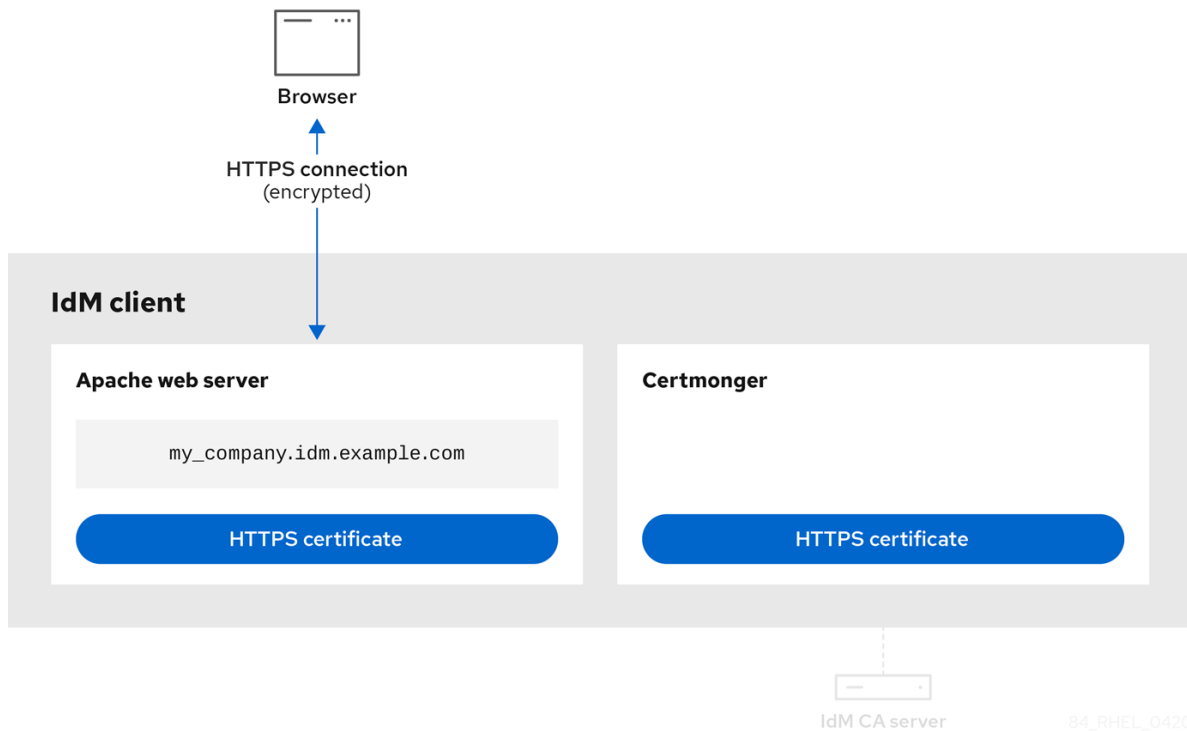
Figure 73.5. IdM CA issuing the service certificate





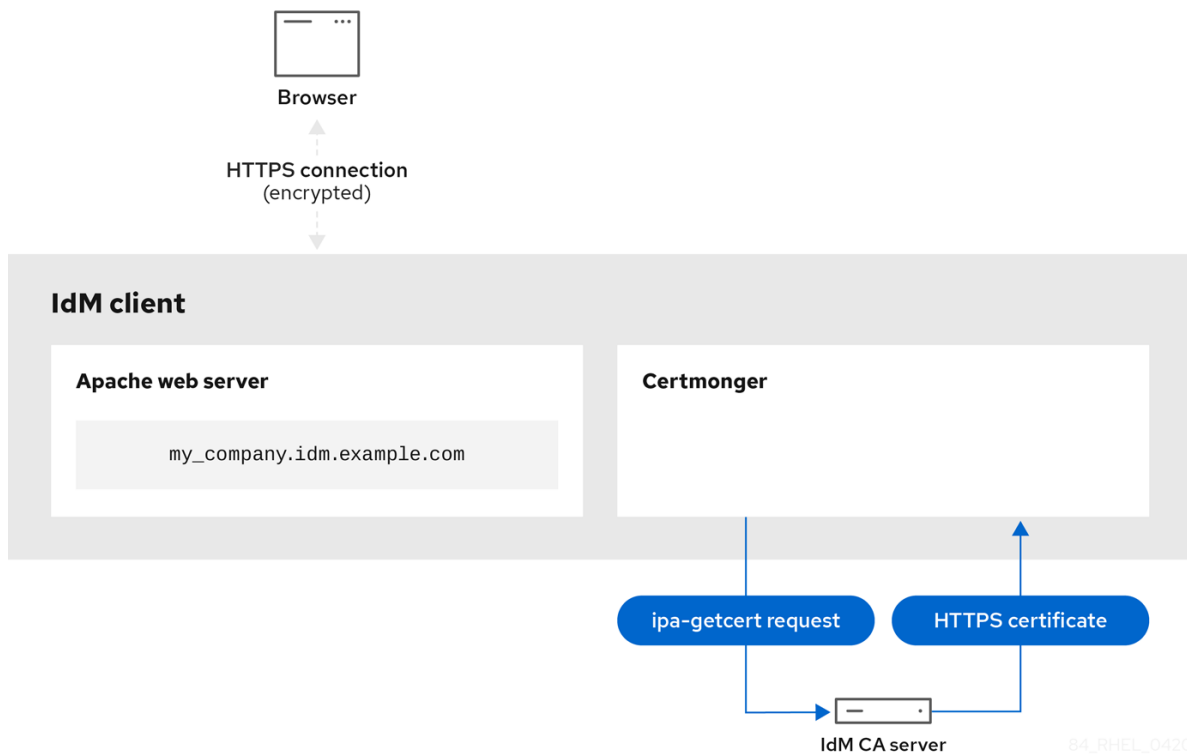
[Certmonger applying the service certificate](#) shows **certmonger** placing the HTTPS certificate in appropriate locations on the IdM client and, if instructed to do so, restarting the **httpd** service. The Apache server subsequently uses the HTTPS certificate to encrypt the traffic between itself and the browser.

Figure 73.6. Certmonger applying the service certificate



[Certmonger requesting a new certificate when the old one is nearing expiration](#) shows **certmonger** automatically requesting a renewal of the service certificate from the IdM CA before the expiration of the certificate. The IdM CA issues a new certificate.

Figure 73.7. Certmonger requesting a new certificate when the old one is nearing expiration



## 73.6. SETTING UP A SINGLE-INSTANCE APACHE HTTP SERVER

You can set up a single-instance Apache HTTP Server to serve static HTML content.

Follow the procedure if the web server should provide the same content for all domains associated with the server. If you want to provide different content for different domains, set up name-based virtual hosts. For details, see [Configuring Apache name-based virtual hosts](#).

### Procedure

1. Install the **httpd** package:

```
# yum install httpd
```

2. If you use **firewalld**, open the TCP port **80** in the local firewall:

```
# firewall-cmd --permanent --add-port=80/tcp
# firewall-cmd --reload
```

3. Enable and start the **httpd** service:

```
# systemctl enable --now httpd
```

4. Optional: Add HTML files to the **/var/www/html/** directory.



## NOTE

When adding content to `/var/www/html/`, files and directories must be readable by the user under which **httpd** runs by default. The content owner can be the either the **root** user and **root** user group, or another user or group of the administrator's choice. If the content owner is the **root** user and **root** user group, the files must be readable by other users. The SELinux context for all the files and directories must be **httpd\_sys\_content\_t**, which is applied by default to all content within the `/var/www` directory.

### Verification steps

- Connect with a web browser to **`http://my_company.idm.example.com/`** or **`http://server_IP/`**. If the `/var/www/html/` directory is empty or does not contain an **`index.html`** or **`index.htm`** file, Apache displays the **Red Hat Enterprise Linux Test Page**. If `/var/www/html/` contains HTML files with a different name, you can load them by entering the URL to that file, such as **`http://server_IP/example.html`** or **`http://my_company.idm.example.com/example.html`**.

### Additional resources

- Apache manual: [Installing the Apache HTTP Server manual](#).
- See the **`httpd.service(8)`** man page.

## 73.7. ADDING TLS ENCRYPTION TO AN APACHE HTTP SERVER

You can enable TLS encryption on the **`my_company.idm.example.com`** Apache HTTP Server for the **`idm.example.com`** domain.

### Prerequisites

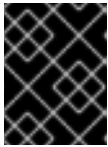
- The **`my_company.idm.example.com`** Apache HTTP Server is installed and running.
- You have obtained the TLS certificate from the **`webserver-ca`** sub-CA, and stored it in the `/etc/pki/tls/certs/httpd.pem` file as described in [Obtaining an IdM certificate for a service using certmonger](#). If you use a different path, adapt the corresponding steps of the procedure.
- The corresponding private key is stored in the `/etc/pki/tls/private/httpd.key` file. If you use a different path, adapt the corresponding steps of the procedure.
- The **`webserver-ca`** CA certificate is stored in the `/etc/pki/tls/private/sub-ca.crt` file. If you use a different path, adapt the corresponding steps of the procedure.
- Clients and the **`my_company.idm.example.com`** web server resolve the host name of the server to the IP address of the web server.

### Procedure

1. Install the **`mod_ssl`** package:  

```
# yum install mod_ssl
```
2. Edit the `/etc/httpd/conf.d/ssl.conf` file and add the following settings to the **`<VirtualHost _default_:443>`** directive:
  - a. Set the server name:

ServerName *my\_company.idm.example.com*



### IMPORTANT

The server name must match the entry set in the **Common Name** field of the certificate.

- a. Optional: If the certificate contains additional host names in the **Subject Alt Names** (SAN) field, you can configure **mod\_ssl** to provide TLS encryption also for these host names. To configure this, add the **ServerAliases** parameter with corresponding names:  
**ServerAlias *www.my\_company.idm.example.com server.my\_company.idm.example.com***
- b. Set the paths to the private key, the server certificate, and the CA certificate:  
**SSLCertificateKeyFile "/etc/pki/tls/private/httpd.key"SSLCertificateFile  
"/etc/pki/tls/certs/httpd.pem"SSLCACertificateFile "/etc/pki/tls/certs/ca.crt"**
3. For security reasons, configure that only the **root** user can access the private key file:  
**# chown root:root /etc/pki/tls/private/httpd.key # chmod 600  
/etc/pki/tls/private/httpd.key**



### WARNING

If the private key was accessed by unauthorized users, revoke the certificate, create a new private key, and request a new certificate. Otherwise, the TLS connection is no longer secure.

4. If you use **firewalld**, open port **443** in the local firewall:  
**# firewall-cmd --permanent --add-port=443/tcp # firewall-cmd --reload**
5. Restart the **httpd** service:  
**# systemctl restart httpd**



### NOTE

If you protected the private key file with a password, you must enter this password each time when the **httpd** service starts.

- Use a browser and connect to **https://my\_company.idm.example.com**.

#### Additional resources

- [SSL/TLS Encryption](#).
- [Security considerations for TLS in RHEL 8](#)

## 73.8. SETTING THE SUPPORTED TLS PROTOCOL VERSIONS ON AN APACHE HTTP SERVER

By default, the Apache HTTP Server on RHEL uses the system-wide crypto policy that defines safe default values, which are also compatible with recent browsers. For example, the **DEFAULT** policy defines that only the **TLSv1.2** and **TLSv1.3** protocol versions are enabled in apache.

You can manually configure which TLS protocol versions your **my\_company.idm.example.com** Apache HTTP Server supports. Follow the procedure if your environment requires to enable only specific TLS protocol versions, for example:

- If your environment requires that clients can also use the weak **TLS1** (TLSv1.0) or **TLS1.1** protocol.
- If you want to configure that Apache only supports the **TLSv1.2** or **TLSv1.3** protocol.

### Prerequisites

- TLS encryption is enabled on the **my\_company.idm.example.com** server as described in [Adding TLS encryption to an Apache HTTP server](#).

### Procedure

1. Edit the **/etc/httpd/conf/httpd.conf** file, and add the following setting to the **<VirtualHost>** directive for which you want to set the TLS protocol version. For example, to enable only the **TLSv1.3** protocol:

```
SSLProtocol -All TLSv1.3
```

2. Restart the **httpd** service:

```
# systemctl restart httpd
```

### Verification steps

1. Use the following command to verify that the server supports **TLSv1.3**:

```
# openssl s_client -connect example.com:443 -tls1_3
```

2. Use the following command to verify that the server does not support **TLSv1.2**:

```
# openssl s_client -connect example.com:443 -tls1_2
```

If the server does not support the protocol, the command returns an error:

```
140111600609088:error:1409442E:SSL routines:ssl3_read_bytes:tlsv1 alert protocol  
version:ssl/record/rec_layer_s3.c:1543:SSL alert number 70
```

3. Optional: Repeat the command for other TLS protocol versions.

### Additional resources

- **update-crypto-policies(8)** man page
- [Using system-wide cryptographic policies](#).

- For further details about the **SSLProtocol** parameter, refer to the **mod\_ssl** documentation in the Apache manual: [Installing the Apache HTTP Server manual](#).

## 73.9. SETTING THE SUPPORTED CIPHERS ON AN APACHE HTTP SERVER

By default, the Apache HTTP Server uses the system-wide crypto policy that defines safe default values, which are also compatible with recent browsers. For the list of ciphers the system-wide crypto allows, see the **/etc/crypto-policies/back-ends/openssl.config** file.

You can manually configure which ciphers the **my\_company.idm.example.com** Apache HTTP server supports. Follow the procedure if your environment requires specific ciphers.

### Prerequisites

- TLS encryption is enabled on the **my\_company.idm.example.com** server as described in [Adding TLS encryption to an Apache HTTP server](#).

### Procedure

1. Edit the **/etc/httpd/conf/httpd.conf** file, and add the **SSLCipherSuite** parameter to the **<VirtualHost>** directive for which you want to set the TLS ciphers:

```
SSLCipherSuite
"EECDH+AESGCM:EDH+AESGCM:AES256+EECDH:AES256+EDH:!SHA1:!SHA256"
```

This example enables only the **EECDH+AESGCM**, **EDH+AESGCM**, **AES256+EECDH**, and **AES256+EDH** ciphers and disables all ciphers which use the **SHA1** and **SHA256** message authentication code (MAC).

2. Restart the **httpd** service:

```
# systemctl restart httpd
```

### Verification steps

1. To display the list of ciphers the Apache HTTP Server supports:

- a. Install the **nmap** package:

```
# yum install nmap
```

- b. Use the **nmap** utility to display the supported ciphers:

```
# nmap --script ssl-enum-ciphers -p 443 example.com
...
PORT    STATE SERVICE
443/tcp open  https
| ssl-enum-ciphers:
|   TLSv1.2:
|     ciphers:
|       TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384 (ecdh_x25519) - A
```

```
| TLS_DHE_RSA_WITH_AES_256_GCM_SHA384 (dh 2048) - A
| TLS_ECDHE_RSA_WITH_CHACHA20_POLY1305_SHA256 (ecdh_x25519) - A
| ...
```

### Additional resources

- **update-crypto-policies(8)** man page
- [Using system-wide cryptographic policies](#).
- [Installing the Apache HTTP Server manual - SSLCipherSuite](#)

## 73.10. CONFIGURING TLS CLIENT CERTIFICATE AUTHENTICATION

Client certificate authentication enables administrators to allow only users who authenticate using a certificate to access resources on the **my\_company.idm.example.com** web server. You can configure client certificate authentication for the **/var/www/html/Example/** directory.



### IMPORTANT

If the **my\_company.idm.example.com** Apache server uses the TLS 1.3 protocol, certain clients require additional configuration. For example, in Firefox, set the **security.tls.enable\_post\_handshake\_auth** parameter in the **about:config** menu to **true**. For further details, see [Transport Layer Security version 1.3 in Red Hat Enterprise Linux 8](#).

### Prerequisites

- TLS encryption is enabled on the **my\_company.idm.example.com** server as described in [Adding TLS encryption to an Apache HTTP server](#).

### Procedure

1. Edit the **/etc/httpd/conf/httpd.conf** file and add the following settings to the **<VirtualHost>** directive for which you want to configure client authentication:

```
<Directory "/var/www/html/Example/">
    SSLVerifyClient require
</Directory>
```

The **SSLVerifyClient require** setting defines that the server must successfully validate the client certificate before the client can access the content in the **/var/www/html/Example/** directory.

2. Restart the **httpd** service:

```
# systemctl restart httpd
```

### Verification steps

1. Use the **curl** utility to access the **https://my\_company.idm.example.com/Example/** URL without client authentication:

```
$ curl https://my_company.idm.example.com/Example/
curl: (56) OpenSSL SSL_read: error:1409445C:SSL routines:ssl3_read_bytes:tlsv13 alert
certificate required, errno 0
```

The error indicates that the **my\_company.idm.example.com** web server requires a client certificate authentication.

2. Pass the client private key and certificate, as well as the CA certificate to **curl** to access the same URL with client authentication:

```
$ curl --cacert ca.crt --key client.key --cert client.crt
https://my_company.idm.example.com/Example/
```

If the request succeeds, **curl** displays the **index.html** file stored in the **/var/www/html/Example/** directory.

### Additional resources

- [Installing the Apache HTTP Server manual - mod\\_ssl configuration](#)

## 73.11. REQUESTING A NEW USER CERTIFICATE AND EXPORTING IT TO THE CLIENT

As an Identity Management (IdM) administrator, you can configure a web server running on an IdM client to request users that use web browsers to access the server to authenticate with certificates issued by a specific IdM sub-CA. Follow this procedure to request a user certificate from a specific IdM sub-CA and to export the certificate and the corresponding private key on to the host from which the user wants to access the web server using a web browser. Afterwards, [import the certificate and the private key into the browser](#).

### Procedure

1. Optionally, create a new directory, for example **~/certdb/**, and make it a temporary certificate database. When asked, create an NSS Certificate DB password to encrypt the keys to the certificate to be generated in a subsequent step:

```
# mkdir ~/certdb/
# certutil -N -d ~/certdb/
Enter a password which will be used to encrypt your keys.
The password should be at least 8 characters long,
and should contain at least one non-alphabetic character.
```

```
Enter new password:
Re-enter password:
```

2. Create the certificate signing request (CSR) and redirect the output to a file. For example, to create a CSR with the name **certificate\_request.csr** for a **4096** bit certificate for the **idm\_user** user in the **IDM.EXAMPLE.COM** realm, setting the nickname of the certificate private keys to **idm\_user** for easy findability, and setting the subject to **CN=idm\_user,O=IDM.EXAMPLE.COM**:

```
# certutil -R -d ~/certdb/ -a -g 4096 -n idm_user -s "CN=idm_user,O=IDM.EXAMPLE.COM"
> certificate_request.csr
```



- When prompted, enter the same password that you entered when using **certutil** to create the temporary database. Then continue typing randomly until told to stop:

Enter Password or Pin for "NSS Certificate DB":

A random seed must be generated that will be used in the creation of your key. One of the easiest ways to create a random seed is to use the timing of keystrokes on a keyboard.

To begin, type keys on the keyboard until this progress meter is full. DO NOT USE THE AUTOREPEAT FUNCTION ON YOUR KEYBOARD!

Continue typing until the progress meter is full:

- Submit the certificate request file to the server. Specify the Kerberos principal to associate with the newly-issued certificate, the output file to store the certificate, and optionally the certificate profile. Specify the IdM sub-CA that you want to issue the certificate. For example, to obtain a certificate of the **IECUserRoles** profile, a profile with added user roles extension, for the **idm\_user@IDM.EXAMPLE.COM** principal from **webclient-ca**, and save the certificate in the **~/idm\_user.pem** file:

```
# ipa cert-request certificate_request.csr --principal=idm_user@IDM.EXAMPLE.COM --
profile-id=IECUserRoles --ca=webclient-ca --certificate-out=~/idm_user.pem
```

- Add the certificate to the NSS database. Use the **-n** option to set the same nickname that you used when creating the CSR previously so that the certificate matches the private key in the NSS database. The **-t** option sets the trust level. For details, see the **certutil(1)** man page. The **-i** option specifies the input certificate file. For example, to add to the NSS database a certificate with the **idm\_user** nickname that is stored in the **~/idm\_user.pem** file in the **~/certdb/** database:

```
# certutil -A -d ~/certdb/ -n idm_user -t "P,," -i ~/idm_user.pem
```

- Verify that the key in the NSS database does not show (**orphan**) as its nickname. For example, to verify that the certificate stored in the **~/certdb/** database is not orphaned:

```
# certutil -K -d ~/certdb/
< 0> rsa      5ad14d41463b87a095b1896cf0068ccc467df395  NSS Certificate
DB:idm_user
```

- Use the **pk12util** command to export the certificate from the NSS database to the PKCS12 format. For example, to export the certificate with the **idm\_user** nickname from the **/root/certdb** NSS database into the **~/idm\_user.p12** file:

```
# pk12util -d ~/certdb -o ~/idm_user.p12 -n idm_user
Enter Password or Pin for "NSS Certificate DB":
Enter password for PKCS12 file:
Re-enter password:
pk12util: PKCS12 EXPORT SUCCESSFUL
```

- Transfer the certificate to the host on which you want the certificate authentication for **idm\_user** to be enabled:

```
# scp ~/idm_user.p12 idm_user@client.idm.example.com:/home/idm_user/
```

9. On the host to which the certificate has been transferred, make the directory in which the .pkcs12 file is stored inaccessible to the 'other' group for security reasons:

```
# chmod o-rwx /home/idm_user/
```

10. For security reasons, remove the temporary NSS database and the .pkcs12 file from the server:

```
# rm ~/certdb/
# rm ~/idm_user.p12
```

## 73.12. CONFIGURING A BROWSER TO ENABLE CERTIFICATE AUTHENTICATION

To be able to authenticate with a certificate when using the WebUI to log into Identity Management (IdM), you need to import the user and the relevant certificate authority (CA) certificates into the Mozilla Firefox or Google Chrome browser. The host itself on which the browser is running does not have to be part of the IdM domain.

IdM supports the following browsers for connecting to the WebUI:

- Mozilla Firefox 38 and later
- Google Chrome 46 and later

The following procedure shows how to configure the Mozilla Firefox 57.0.1 browser.

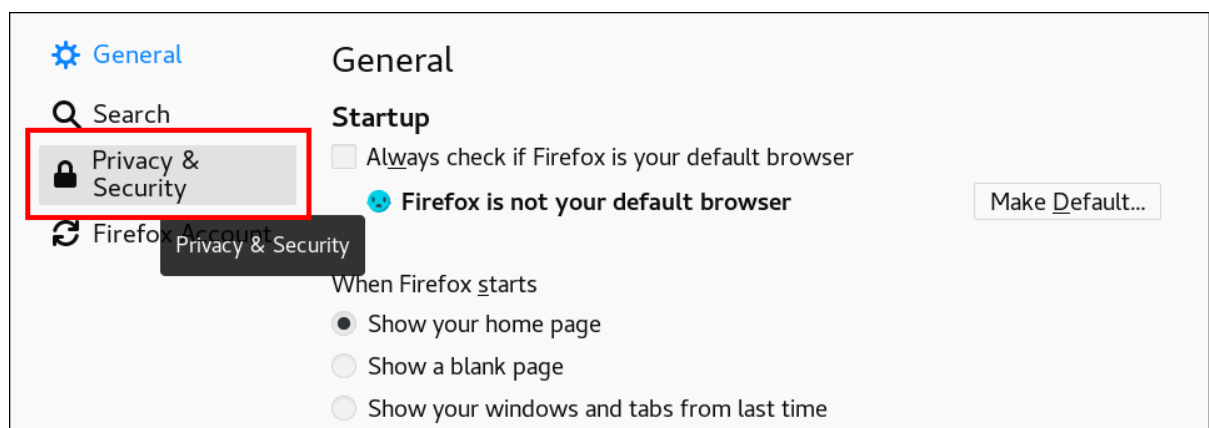
### Prerequisites

- You have the [user certificate](#) that you want to import to the browser at your disposal in the PKCS#12 format.
- You have [downloaded the sub-CA certificate](#) and have it at your disposal in the PEM format.

### Procedure

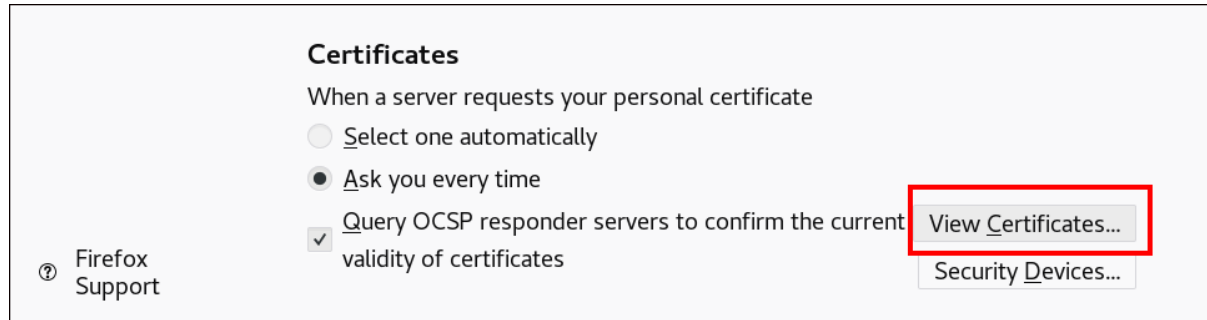
1. Open Firefox, then navigate to **Preferences → Privacy & Security**.

Figure 73.8. Privacy and Security section in Preferences



2. Click **View Certificates**.

Figure 73.9. View Certificates in Privacy and Security



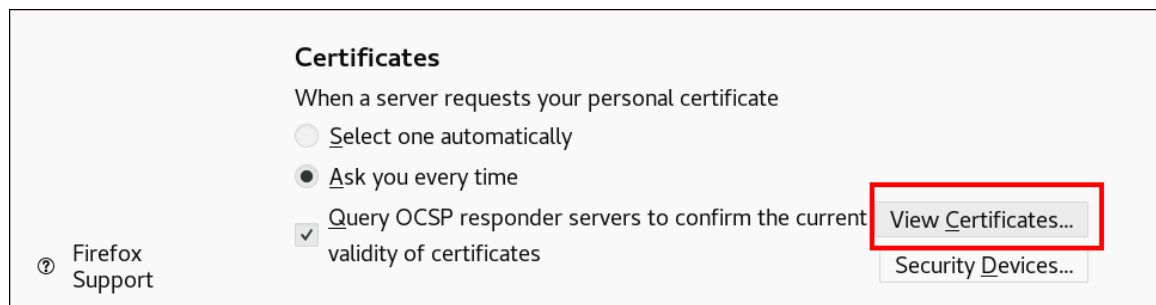
3. In the **Your Certificates** tab, click **Import**. Locate and open the certificate of the user in the PKCS12 format, then click **OK** and **OK**.
4. To make sure that your IdM sub-CA is recognized by Firefox as a trusted authority, import the IdM sub-CA certificate that you saved in [Downloading the sub-CA certificate from IdM WebUI](#) as a trusted certificate authority certificate:
  - a. Open Firefox, navigate to Preferences and click **Privacy & Security**.

Figure 73.10. Privacy and Security section in Preferences



- b. Click **View Certificates**.

Figure 73.11. View Certificates in Privacy and Security



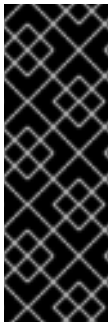
- c. In the **Authorities** tab, click **Import**. Locate and open the sub-CA certificate. Trust the certificate to identify websites, then click **OK** and **OK**.

## CHAPTER 74. INVALIDATING A SPECIFIC GROUP OF RELATED CERTIFICATES QUICKLY

As a system administrator, if you want to be able to invalidate a specific group of related certificates quickly:

- Design your applications so that they only trust certificates that were issued by a specific lightweight Identity Management (IdM) sub-CA. Afterwards, you will be able to invalidate all these certificates by only revoking the certificate of the Identity Management (IdM) sub-CA that issued these certificates. For details on how to create and use a lightweight sub-CA in IdM, see [Invalidating a specific group of related certificates quickly](#).
- To ensure that all the certificates that have been issued by the to-be-revoked IdM sub-CA are immediately invalid, configure applications that rely on such certificates to use the IdM OCSP responders. For example, to configure the Firefox browser to use OCSP responders, make sure that the **Query OCSP responder servers to confirm the current validity of certificates** checkbox is checked in Firefox Preferences.

In IdM, the certificate revocation list (CRL) is updated every four hours. To invalidate all the certificates issued by an IdM sub-CA, [revoke the IdM sub-CA certificate](#). In addition, [disable the relevant CA ACLs](#), and consider [disabling the IdM sub-CA](#). Disabling the sub-CA prevents the sub-CA from issuing new certificates, but allows Online Certificate Status Protocol (OCSP) responses to be produced for previously issued certificates because the sub-CA's signing keys are retained.



### IMPORTANT

Do not delete the sub-CA if you use OCSP in your environment. Deleting the sub-CA deletes the signing keys of the sub-CA, preventing production of OCSP responses for certificates issued by that sub-CA.

The only scenario when deleting a sub-CA is preferable to disabling it is when you want to create a new sub-CA with the same Subject distinguished name (DN) but a new signing key.

### 74.1. DISABLING CA ACLS IN IDM CLI

When you want to retire an IdM service or a group of IdM services, consider disabling any existing corresponding CA ACLs.

Follow this procedure to disable the [TLS\\_web\\_server\\_authentication](#) CA ACL that restricts the web server running on your IdM client to request a certificate to be issued by the **webserver-ca** IdM sub-CA, and to disable the [TLS\\_web\\_client\\_authentication](#) CA ACL that restricts IdM users to request a user certificate to be issued by the **webclient-ca** IdM sub-CA.

#### Procedure

1. Optionally, to view all the CA ACLs in your IdM environment, enter the **ipa caacl-find** command:

```
$ ipa caacl-find
-----
3 CA ACLs matched
-----
ACL name: hosts_services_calPAserviceCert
Enabled: TRUE
```

```
ACL name: TLS_web_server_authentication
Enabled: TRUE
```

```
ACL name: TLS_web_client_authentication
Enabled: TRUE
```

2. Optionally, to view the details of a CA ACL, enter the **ipa caacl-show** command, and specify the CA ACL name:

```
$ ipa caacl-show TLS_web_server_authentication
ACL name: TLS_web_server_authentication
Description: CAACL for web servers authenticating to web clients using certificates issued
by webserver-ca
Enabled: TRUE
CAs: webserver-ca
Profiles: calPAserviceCert
Services: HTTP/rhel8server.idm.example.com@IDM.EXAMPLE.COM
```

3. To disable a CA ACL, enter the **ipa caacl-disable** command, and specify the CA ACL name.

- To disable the **TLS\_web\_server\_authentication** CA ACL, enter:

```
$ ipa caacl-disable TLS_web_server_authentication
-----
Disabled CA ACL "TLS_web_server_authentication"
-----
```

- To disable the **TLS\_web\_client\_authentication** CA ACL, enter:

```
$ ipa caacl-disable TLS_web_client_authentication
-----
Disabled CA ACL "TLS_web_client_authentication"
-----
```

The only enabled CA ACL now is the **hosts\_services\_calPAserviceCert** CA ACL.



### IMPORTANT

Be extremely careful about disabling the **hosts\_services\_calPAserviceCert** CA ACL. Disabling **hosts\_services\_calPAserviceCert**, without another CA ACL granting IdM servers use of the **ipa** CA with the **calPAserviceCert** profile means that certificate renewal of the IdM **HTTP** and **LDAP** certificates will fail. The expired IdM **HTTP** and **LDAP** certificates will eventually cause IdM system failure.

## 74.2. DISABLING AN IDM SUB-CA

After revoking the CA certificate of an IdM sub-CA to invalidate all the certificates issued by that sub-CA, consider disabling the IdM sub-CA if you no longer need it. You can re-enable the sub-CA at a later time.

Disabling the sub-CA prevents the sub-CA from issuing new certificates, but allows Online Certificate Status Protocol (OCSP) responses to be produced for previously issued certificates because the sub-CA's signing keys are retained.

### Prerequisites

- You are logged in as IdM administrator.

### Procedure

- Enter the **ipa ca-disable** command and specify the name of the sub-CA:

```
$ ipa ca-disable webserver-CA
```

```
-----  
Disabled CA "webserver-CA"  
-----
```

## CHAPTER 75. VAULTS IN IDM

This chapter describes vaults in Identity Management (IdM). It introduces the following topics:

- [The concept of the vault.](#)
- [The different roles associated with a vault .](#)
- [The different types of vaults available in IdM based on the level of security and access control .](#)
- [The different types of vaults available in IdM based on ownership .](#)
- [The concept of vault containers.](#)
- [The basic commands for managing vaults in IdM .](#)
- [Installing the key recovery authority \(KRA\), which is a prerequisite for using vaults in IdM .](#)

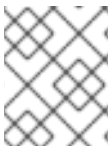
### 75.1. VAULTS AND THEIR BENEFITS

A vault is a useful feature for those Identity Management (IdM) users who want to keep all their sensitive data stored securely but conveniently in one place. There are various types of vaults and you should choose which vault to use based on your requirements.

A vault is a secure location in (IdM) for storing, retrieving, sharing, and recovering a secret. A secret is security-sensitive data, usually authentication credentials, that only a limited group of people or entities can access. For example, secrets include:

- passwords
- PINs
- private SSH keys

A vault is comparable to a password manager. Just like a password manager, a vault typically requires a user to generate and remember one primary password to unlock and access any information stored in the vault. However, a user can also decide to have a standard vault. A standard vault does not require the user to enter any password to access the secrets stored in the vault.



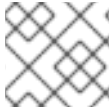
#### NOTE

The purpose of vaults in IdM is to store authentication credentials that allow you to authenticate to external, non-IdM-related services.

Other important characteristics of the IdM vaults are:

- Vaults are only accessible to the vault owner and those IdM users that the vault owner selects to be the vault members. In addition, the IdM administrator has access to the vault.
- If a user does not have sufficient privileges to create a vault, an IdM administrator can create the vault and set the user as its owner.
- Users and services can access the secrets stored in a vault from any machine enrolled in the IdM domain.

- One vault can only contain one secret, for example, one file. However, the file itself can contain multiple secrets such as passwords, keytabs or certificates.

**NOTE**

Vault is only available from the IdM command line (CLI), not from the IdM Web UI.

## 75.2. VAULT OWNERS, MEMBERS, AND ADMINISTRATORS

Identity Management (IdM) distinguishes the following vault user types:

### Vault owner

A vault owner is a user or service with basic management privileges on the vault. For example, a vault owner can modify the properties of the vault or add new vault members.

Each vault must have at least one owner. A vault can also have multiple owners.

### Vault member

A vault member is a user or service that can access a vault created by another user or service.

### Vault administrator

Vault administrators have unrestricted access to all vaults and are allowed to perform all vault operations.

**NOTE**

Symmetric and asymmetric vaults are protected with a password or key and apply special access control rules (see [Vault types](#)). The administrator must meet these rules to:

- Access secrets in symmetric and asymmetric vaults.
- Change or reset the vault password or key.

A vault administrator is any user with the **Vault Administrators** privilege. In the context of the role-based access control (RBAC) in IdM, a privilege is a group of permissions that you can apply to a role.

### Vault User

The vault user represents the user in whose container the vault is located. The **Vault user** information is displayed in the output of specific commands, such as **ipa vault-show**:

```
$ ipa vault-show my_vault
Vault name: my_vault
Type: standard
Owner users: user
Vault user: user
```

For details on vault containers and user vaults, see [Vault containers](#).

### Additional resources

- See [Standard, symmetric and asymmetric vaults](#) for details on vault types.



## 75.3. STANDARD, SYMMETRIC, AND ASYMMETRIC VAULTS

Based on the level of security and access control, IdM classifies vaults into the following types:

### Standard vaults

Vault owners and vault members can archive and retrieve the secrets without having to use a password or key.

### Symmetric vaults

Secrets in the vault are protected with a symmetric key. Vault owners and members can archive and retrieve the secrets, but they must provide the vault password.

### Asymmetric vaults

Secrets in the vault are protected with an asymmetric key. Users archive the secret using a public key and retrieve it using a private key. Vault members can only archive secrets, while vault owners can do both, archive and retrieve secrets.

## 75.4. USER, SERVICE, AND SHARED VAULTS

Based on ownership, IdM classifies vaults into several types. The [table below](#) contains information about each type, its owner and use.

**Table 75.1. IdM vaults based on ownership**

| Type                 | Description                                   | Owner   | Note   |
|----------------------|---|---|--|
| <b>User vault</b>    | A private vault for a user                    | A single user                                 | Any user can own one or more user vaults if allowed by IdM administrator   |
| <b>Service vault</b> | A private vault for a service                 | A single service                              | Any service can own one or more user vaults if allowed by IdM administrator  |
| <b>Shared vault</b>  | A vault shared by multiple users and services | The vault administrator who created the vault | Users and services can own one or more user vaults if allowed by IdM administrator. The vault administrators other than the one that created the vault also have full access to the vault. |

## 75.5. VAULT CONTAINERS

A vault container is a collection of vaults. The [table below](#) lists the default vault containers that Identity Management (IdM) provides.

**Table 75.2. Default vault containers in IdM**

| Type              | Description                       | Purpose  |
|-------------------|-----------------------------------|--|
| User container    | A private container for a user    | Stores user vaults for a particular user       |
| Service container | A private container for a service | Stores service vaults for a particular service |

| Type             | Description                                 | Purpose  |
|------------------|---|--|
| Shared container | A container for multiple users and services | Stores vaults that can be shared by multiple users or services |

IdM creates user and service containers for each user or service automatically when the first private vault for the user or service is created. After the user or service is deleted, IdM removes the container and its contents.

## 75.6. BASIC IDM VAULT COMMANDS

You can use the basic commands outlined below to manage Identity Management (IdM) vaults. The [table below](#) contains a list of **ipa vault-\*** commands with the explanation of their purpose.



**NOTE**

Before running any **ipa vault-\*** command, install the Key Recovery Authority (KRA) certificate system component on one or more of the servers in your IdM domain. For details, see [Installing the Key Recovery Authority in IdM](#) .

Table 75.3. Basic IdM vault commands with explanations

| Command   | Purpose   |
|---|---|
| <b>ipa help vault</b>   | Displays conceptual information about IdM vaults and sample vault commands.   |
| <b>ipa vault-add --help</b> ,<br><b>ipa vault-find --help</b> | Adding the <b>--help</b> option to a specific <b>ipa vault-*</b> command displays the options and detailed help available for that command.   |
| <b>ipa vault-show user_vault --user idm_user</b>              | When accessing a vault as a vault member, you must specify the vault owner. If you do not specify the vault owner, IdM informs you that it did not find the vault:<br><br>[admin@server ~]\$ ipa vault-show user_vault<br>ipa: ERROR: user_vault: vault not found |
| <b>ipa vault-show shared_vault --shared</b>                   | When accessing a shared vault, you must specify that the vault you want to access is a shared vault. Otherwise, IdM informs you it did not find the vault:<br><br>[admin@server ~]\$ ipa vault-show shared_vault<br>ipa: ERROR: shared_vault: vault not found     |

## 75.7. INSTALLING THE KEY RECOVERY AUTHORITY IN IDM

Follow this procedure to enable vaults in Identity Management (IdM) by installing the Key Recovery Authority (KRA) Certificate System (CS) component on a specific IdM server.

**Prerequisites**

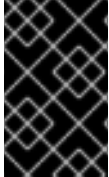
- You are logged in as **root** on the IdM server.

- An IdM certificate authority is installed on the IdM server.
- You have the **Directory Manager** credentials.

### Procedure

- Install the KRA:

```
# ipa-kra-install
```



#### IMPORTANT

You can install the first KRA of an IdM cluster on a hidden replica. However, installing additional KRAs requires temporarily activating the hidden replica before you install the KRA clone on a non-hidden replica. Then you can hide the originally hidden replica again.



#### NOTE

To make the vault service highly available and resilient, install the KRA on two IdM servers or more. Maintaining multiple KRA servers prevents data loss.

### Additional resources

- See [Demoting or promoting hidden replicas](#).
- See [The hidden replica mode](#).

## CHAPTER 76. USING IDM USER VAULTS: STORING AND RETRIEVING SECRETS

This chapter describes how to use user vaults in Identity Management. Specifically, it describes how a user can store a secret in an IdM vault, and how the user can retrieve it. The user can do the storing and the retrieving from two different IdM clients.

### Prerequisites

- The Key Recovery Authority (KRA) Certificate System component has been installed on one or more of the servers in your IdM domain. For details, see [Installing the Key Recovery Authority in IdM](#).

### 76.1. STORING A SECRET IN A USER VAULT

Follow this procedure to create a vault container with one or more private vaults to securely store files with sensitive information. In the example used in the procedure below, the **idm\_user** user creates a vault of the standard type. The standard vault type ensures that **idm\_user** will not be required to authenticate when accessing the file. **idm\_user** will be able to retrieve the file from any IdM client to which the user is logged in.

In the procedure:

- **idm\_user** is the user who wants to create the vault.
- **my\_vault** is the vault used to store the user's certificate.
- The vault type is **standard**, so that accessing the archived certificate does not require the user to provide a vault password.
- **secret.txt** is the file containing the certificate that the user wants to store in the vault.

### Prerequisites

- You know the password of **idm\_user**.
- You are logged in to a host that is an IdM client.

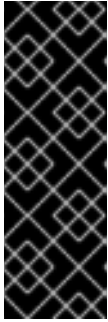
### Procedure

1. Obtain the Kerberos ticket granting ticket (TGT) for **idm\_user**:

```
$ kinit idm_user
```

2. Use the **ipa vault-add** command with the **--type standard** option to create a standard vault:

```
$ ipa vault-add my_vault --type standard
-----
Added vault "my_vault"
-----
Vault name: my_vault
Type: standard
Owner users: idm_user
Vault user: idm_user
```



## IMPORTANT

Make sure the first user vault for a user is created by the same user. Creating the first vault for a user also creates the user's vault container. The agent of the creation becomes the owner of the vault container.

For example, if another user, such as **admin**, creates the first user vault for **user1**, the owner of the user's vault container will also be **admin**, and **user1** will be unable to access the user vault or create new user vaults.

3. Use the **ipa vault-archive** command with the **--in** option to archive the **secret.txt** file into the vault:

```
$ ipa vault-archive my_vault --in secret.txt
```

```
-----  
Archived data into vault "my_vault"  
-----
```

## 76.2. RETRIEVING A SECRET FROM A USER VAULT

As an Identity Management (IdM), you can retrieve a secret from your user private vault onto any IdM client to which you are logged in.

Follow this procedure to retrieve, as an IdM user named **idm\_user**, a secret from the user private vault named **my\_vault** onto **idm\_client.idm.example.com**.

### Prerequisites

- **idm\_user** is the owner of **my\_vault**.
- **idm\_user** has [archived a secret in the vault](#) .
- **my\_vault** is a standard vault, which means that **idm\_user** does not have to enter any password to access the contents of the vault.

### Procedure

1. SSH to **idm\_client** as **idm\_user**:

```
$ ssh idm_user@idm_client.idm.example.com
```

2. Log in as **idm\_user**:

```
$ kinit user
```

3. Use the **ipa vault-retrieve --out** command with the **--out** option to retrieve the contents of the vault and save them into the **secret\_exported.txt** file.

```
$ ipa vault-retrieve my_vault --out secret_exported.txt
```

```
-----  
Retrieved data from vault "my_vault"  
-----
```

## 76.3. ADDITIONAL RESOURCES

- See [Using Ansible to manage IdM user vaults: storing and retrieving secrets](#) .

## CHAPTER 77. USING ANSIBLE TO MANAGE IDM USER VAULTS: STORING AND RETRIEVING SECRETS

This chapter describes how to manage user vaults in Identity Management using the Ansible **vault** module. Specifically, it describes how a user can use Ansible playbooks to perform the following three consecutive actions:

- [Create a user vault in IdM](#) .
- [Store a secret in the vault](#) .
- [Retrieve a secret from the vault](#) .

The user can do the storing and the retrieving from two different IdM clients.

### Prerequisites

- The Key Recovery Authority (KRA) Certificate System component has been installed on one or more of the servers in your IdM domain. For details, see [Installing the Key Recovery Authority in IdM](#).

## 77.1. ENSURING THE PRESENCE OF A STANDARD USER VAULT IN IDM USING ANSIBLE

Follow this procedure to use an Ansible playbook to create a vault container with one or more private vaults to securely store sensitive information. In the example used in the procedure below, the **idm\_user** user creates a vault of the standard type named **my\_vault**. The standard vault type ensures that **idm\_user** will not be required to authenticate when accessing the file. **idm\_user** will be able to retrieve the file from any IdM client to which the user is logged in.

### Prerequisites

- You have installed the [ansible-freeipa](#) package on the Ansible controller, that is the host on which you execute the steps in the procedure.
- You know the password of **idm\_user**.

### Procedure

1. Navigate to the **/usr/share/doc/ansible-freeipa/playbooks/vault** directory:

```
$ cd /usr/share/doc/ansible-freeipa/playbooks/vault
```

2. Create an inventory file, for example **inventory.file**:

```
$ touch inventory.file
```

3. Open **inventory.file** and define the IdM server that you want to configure in the **[ipaserver]** section. For example, to instruct Ansible to configure **server.idm.example.com**, enter:

```
[ipaserver]
server.idm.example.com
```

4. Make a copy of the **ensure-standard-vault-is-present.yml** Ansible playbook file. For example:

```
$ cp ensure-standard-vault-is-present.yml ensure-standard-vault-is-present-copy.yml
```

5. Open the **ensure-standard-vault-is-present-copy.yml** file for editing.
6. Adapt the file by setting the following variables in the **ipavault** task section:

- Set the **ipaadmin\_principal** variable to **idm\_user**.
- Set the **ipaadmin\_password** variable to the password of **idm\_user**.
- Set the **user** variable to **idm\_user**.
- Set the **name** variable to **my\_vault**.
- Set the **vault\_type** variable to **standard**.

This is the modified Ansible playbook file for the current example:

```
---
- name: Tests
  hosts: ipaserver
  gather_facts: false

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - ipavault:
      ipaadmin_principal: idm_user
      ipaadmin_password: idm_user_password
      user: idm_user
      name: my_vault
      vault_type: standard
```

7. Save the file.
8. Run the playbook:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory.file ensure-standard-vault-is-present-copy.yml
```

## 77.2. ARCHIVING A SECRET IN A STANDARD USER VAULT IN IDM USING ANSIBLE

Follow this procedure to use an Ansible playbook to store sensitive information in a personal vault. In the example used, the **idm\_user** user archives a file with sensitive information named **password.txt** in a vault named **my\_vault**.

### Prerequisites

- You have installed the [ansible-freeipa](#) package on the Ansible controller, that is the host on which you execute the steps in the procedure.
- You know the password of **idm\_user**.



- **idm\_user** is the owner, or at least a member user of **my\_vault**.
- You have access to **password.txt**, the secret that you want to archive in **my\_vault**.

## Procedure

1. Navigate to the **/usr/share/doc/ansible-freeipa/playbooks/vault** directory:

```
$ cd /usr/share/doc/ansible-freeipa/playbooks/vault
```

2. Open your inventory file and make sure that the IdM server that you want to configure is listed in the **[ipaserver]** section. For example, to instruct Ansible to configure **server.idm.example.com**, enter:

```
[ipaserver]
server.idm.example.com
```

3. Make a copy of the **data-archive-in-symmetric-vault.yml** Ansible playbook file but replace "symmetric" by "standard". For example:

```
$ cp data-archive-in-symmetric-vault.yml data-archive-in-standard-vault-copy.yml
```

4. Open the **data-archive-in-standard-vault-copy.yml** file for editing.
5. Adapt the file by setting the following variables in the **ipavault** task section:
  - Set the **ipaadmin\_principal** variable to **idm\_user**.
  - Set the **ipaadmin\_password** variable to the password of **idm\_user**.
  - Set the **user** variable to **idm\_user**.
  - Set the **name** variable to **my\_vault**.
  - Set the **in** variable to the full path to the file with sensitive information.
  - Set the **action** variable to **member**.

This is the modified Ansible playbook file for the current example:

```
---
- name: Tests
  hosts: ipaserver
  gather_facts: false

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - ipavault:
      ipaadmin_principal: idm_user
      ipaadmin_password: idm_user_password
      user: idm_user
      name: my_vault
      in: /usr/share/doc/ansible-freeipa/playbooks/vault/password.txt
      action: member
```

6. Save the file.
7. Run the playbook:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory.file data-  
archive-in-standard-vault-copy.yml
```

## 77.3. RETRIEVING A SECRET FROM A STANDARD USER VAULT IN IDM USING ANSIBLE

Follow this procedure to use an Ansible playbook to retrieve a secret from the user personal vault. In the example used in the procedure below, the **idm\_user** user retrieves a file with sensitive data from a vault of the standard type named **my\_vault** onto an IdM client named **host01**. **idm\_user** does not have to authenticate when accessing the file. **idm\_user** can use Ansible to retrieve the file from any IdM client on which Ansible is installed.

### Prerequisites

- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipadmin\_password**.
- You know the password of **idm\_user**.
- **idm\_user** is the owner of **my\_vault**.
- **idm\_user** has stored a secret in **my\_vault**.
- Ansible can write into the directory on the IdM host into which you want to retrieve the secret.
- **idm\_user** can read from the directory on the IdM host into which you want to retrieve the secret.

### Procedure

1. Navigate to the **/usr/share/doc/ansible-freeipa/playbooks/vault** directory:

```
$ cd /usr/share/doc/ansible-freeipa/playbooks/vault
```

2. Open your inventory file and mention, in a clearly defined section, the IdM client onto which you want to retrieve the secret. For example, to instruct Ansible to retrieve the secret onto **host01.idm.example.com**, enter:

```
[ipahost]  
host01.idm.example.com
```

3. Make a copy of the **retrive-data-symmetric-vault.yml** Ansible playbook file. Replace "symmetric" with "standard". For example:

```
$ cp retrieve-data-symmetric-vault.yml retrieve-data-standard-vault.yml-copy.yml
```

4. Open the `retrieve-data-standard-vault.yml-copy.yml` file for editing.
5. Adapt the file by setting the **hosts** variable to **ipahost**.
6. Adapt the file by setting the following variables in the **ipavault** task section:
  - Set the **ipaadmin\_principal** variable to **idm\_user**.
  - Set the **ipaadmin\_password** variable to the password of **idm\_user**.
  - Set the **user** variable to **idm\_user**.
  - Set the **name** variable to **my\_vault**.
  - Set the **out** variable to the full path of the file into which you want to export the secret.
  - Set the **state** variable to **retrieved**.

This is the modified Ansible playbook file for the current example:

```
---
- name: Tests
  hosts: ipahost
  gather_facts: false

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - ipavault:
      ipaadmin_principal: idm_user
      ipaadmin_password: idm_user_password
      user: idm_user
      name: my_vault
      out: /tmp/password_exported.txt
      state: retrieved
```

7. Save the file.
8. Run the playbook:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory.file retrieve-data-standard-vault.yml-copy.yml
```

### Verification steps

1. **SSH** to **host01** as **user01**:

```
$ ssh user01@host01.idm.example.com
```

2. View the file specified by the **out** variable in the Ansible playbook file:

```
$ vim /tmp/password_exported.txt
```

You can now see the exported secret.

- For more information about using Ansible to manage IdM vaults and user secrets and about playbook variables, see the README-vault.md Markdown file available in the **/usr/share/doc/ansible-freeipa/** directory and the sample playbooks available in the **/usr/share/doc/ansible-freeipa/playbooks/vault/** directory.

## CHAPTER 78. MANAGING IDM SERVICE SECRETS: STORING AND RETRIEVING SECRETS

This section shows how an administrator can use the **ansible-freeipa vault** module to securely store a service secret in a centralized location. The **vault** used in the example is asymmetric, which means that to use it, the administrator needs to perform the following steps:

1. Generate a private key using, for example, the **openssl** utility.
2. Generate a public key based on the private key.

The service secret is encrypted with the public key when an administrator archives it into the vault. Afterwards, a service instance hosted on a specific machine in the domain retrieves the secret using the private key. Only the service and the administrator are allowed to access the secret.

If the secret is compromised, the administrator can replace it in the service vault and then redistribute it to those individual service instances that have not been compromised.

### Prerequisites

- The Key Recovery Authority (KRA) Certificate System component has been installed on one or more of the servers in your IdM domain. For details, see [Installing the Key Recovery Authority in IdM](#).

This section includes these procedure

1. [Storing an IdM service secret in an asymmetric vault](#)
2. [Retrieving a service secret for an IdM service instance](#)
3. [Changing an IdM service vault secret when compromised](#)

### Terminology used

In the procedures:

- **admin** is the administrator who manages the service password.
- **private-key-to-an-externally-signed-certificate.pem** is the file containing the service secret, in this case a private key to an externally signed certificate. Do not confuse this private key with the private key used to retrieve the secret from the vault.
- **secret\_vault** is the vault created for the service.
- **HTTP/webserver.idm.example.com** is the service whose secret is being archived.
- **service-public.pem** is the service public key used to encrypt the password stored in **password\_vault**.
- **service-private.pem** is the service private key used to decrypt the password stored in **secret\_vault**.

## 78.1. STORING AN IDM SERVICE SECRET IN AN ASYMMETRIC VAULT

Follow this procedure to create an asymmetric vault and use it to archive a service secret.

## Prerequisites

- You know the IdM administrator password.

## Procedure

1. Log in as the administrator:

```
$ kinit admin
```

2. Obtain the public key of the service instance. For example, using the **openssl** utility:
  - a. Generate the **service-private.pem** private key.

```
$ openssl genrsa -out service-private.pem 2048
Generating RSA private key, 2048 bit long modulus
.+++
.....+++
e is 65537 (0x10001)
```

- b. Generate the **service-public.pem** public key based on the private key.

```
$ openssl rsa -in service-private.pem -out service-public.pem -pubout
writing RSA key
```

3. Create an asymmetric vault as the service instance vault, and provide the public key:

```
$ ipa vault-add secret_vault --service HTTP/webserver.idm.example.com --type
asymmetric --public-key-file service-public.pem
-----
Added vault "secret_vault"
-----
Vault name: secret_vault
Type: asymmetric
Public key: LS0tLS1C...S0tLS0tCg==
Owner users: admin
Vault service: HTTP/webserver.idm.example.com@IDM.EXAMPLE.COM
```

The password archived into the vault will be protected with the key.

4. Archive the service secret into the service vault:

```
$ ipa vault-archive secret_vault --service HTTP/webserver.idm.example.com --in
private-key-to-an-externally-signed-certificate.pem
-----
Archived data into vault "secret_vault"
-----
```

This encrypts the secret with the service instance public key.

Repeat these steps for every service instance that requires the secret. Create a new asymmetric vault for each service instance.

## 78.2. RETRIEVING A SERVICE SECRET FOR AN IDM SERVICE INSTANCE

Follow this procedure to use a service instance to retrieve the service vault secret using a locally-stored service private key.

### Prerequisites

- You have access to the keytab of the service principal owning the service vault, for example `HTTP/webserver.idm.example.com`.
- You have [created an asymmetric vault and archived a secret in the vault](#) .
- You have access to the private key used to retrieve the service vault secret.

### Procedure

1. Log in as the administrator:

```
$ kinit admin
```

2. Obtain a Kerberos ticket for the service:

```
# kinit HTTP/webserver.idm.example.com -k -t /etc/httpd/conf/ipa.keytab
```

3. Retrieve the service vault password:

```
$ ipa vault-retrieve secret_vault --service HTTP/webserver.idm.example.com --private-key-file service-private.pem --out secret.txt
```

```
-----
Retrieved data from vault "secret_vault"
-----
```

## 78.3. CHANGING AN IDM SERVICE VAULT SECRET WHEN COMPROMISED

Follow this procedure to isolate a compromised service instance by changing the service vault secret.

### Prerequisites

- You know the **IdM administrator** password.
- You have [created an asymmetric vault](#) to store the service secret.
- You have generated the new secret and have access to it, for example in the **new-private-key-to-an-externally-signed-certificate.pem** file.

### Procedure

1. Archive the new secret into the service instance vault:

```
$ ipa vault-archive secret_vault --service HTTP/webserver.idm.example.com --in new-private-key-to-an-externally-signed-certificate.pem
```

```
-----  
Archived data into vault "secret_vault"  
-----
```

This overwrites the current secret stored in the vault.

2. Retrieve the new secret on non-compromised service instances only. For details, see [Retrieving a service secret for an IdM service instance](#).

## 78.4. ADDITIONAL RESOURCES

- See [Using Ansible to manage IdM service vaults: storing and retrieving secrets](#) .



## CHAPTER 79. USING ANSIBLE TO MANAGE IDM SERVICE VAULTS: STORING AND RETRIEVING SECRETS

This section shows how an administrator can use the **ansible-freeipa vault** module to securely store a service secret in a centralized location. The **vault** used in the example is asymmetric, which means that to use it, the administrator needs to perform the following steps:

1. Generate a private key using, for example, the **openssl** utility.
2. Generate a public key based on the private key.

The service secret is encrypted with the public key when an administrator archives it into the vault. Afterwards, a service instance hosted on a specific machine in the domain retrieves the secret using the private key. Only the service and the administrator are allowed to access the secret.

If the secret is compromised, the administrator can replace it in the service vault and then redistribute it to those individual service instances that have not been compromised.

### Prerequisites

- The Key Recovery Authority (KRA) Certificate System component has been installed on one or more of the servers in your IdM domain. For details, see [Installing the Key Recovery Authority in IdM](#).

This section includes these procedures:

- [Ensuring the presence of an asymmetric service vault in IdM using Ansible](#)
- [Storing an IdM service secret in an asymmetric vault using Ansible](#)
- [Retrieving a service secret for an IdM service using Ansible](#)
- [Changing an IdM service vault secret when compromised using Ansible](#)

In the procedures:

- **admin** is the administrator who manages the service password.
- **private-key-to-an-externally-signed-certificate.pem** is the file containing the service secret, in this case a private key to an externally signed certificate. Do not confuse this private key with the private key used to retrieve the secret from the vault.
- **secret\_vault** is the vault created to store the service secret.
- **HTTP/webserver1.idm.example.com** is the service that is the owner of the vault.
- **HTTP/webserver2.idm.example.com** and **HTTP/webserver3.idm.example.com** are the vault member services.
- **service-public.pem** is the service public key used to encrypt the password stored in **password\_vault**.
- **service-private.pem** is the service private key used to decrypt the password stored in **secret\_vault**.

## 79.1. ENSURING THE PRESENCE OF AN ASYMMETRIC SERVICE VAULT IN IDM USING ANSIBLE

Follow this procedure to use an Ansible playbook to create a service vault container with one or more private vaults to securely store sensitive information. In the example used in the procedure below, the administrator creates an asymmetric vault named **secret\_vault**. This ensures that the vault members have to authenticate using a private key to retrieve the secret in the vault. The vault members will be able to retrieve the file from any IdM client.

### Prerequisites

- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipadmin\_password**.
- You know the **IdM administrator** password.

### Procedure

1. Navigate to the `/usr/share/doc/ansible-freeipa/playbooks/vault` directory:

```
$ cd /usr/share/doc/ansible-freeipa/playbooks/vault
```

2. Obtain the public key of the service instance. For example, using the **openssl** utility:
  - a. Generate the **service-private.pem** private key.

```
$ openssl genrsa -out service-private.pem 2048
Generating RSA private key, 2048 bit long modulus
.+++
.....+++
e is 65537 (0x10001)
```

- b. Generate the **service-public.pem** public key based on the private key.

```
$ openssl rsa -in service-private.pem -out service-public.pem -pubout
writing RSA key
```

3. Optional: Create an inventory file if it does not exist, for example **inventory.file**:

```
$ touch inventory.file
```

4. Open your inventory file and define the IdM server that you want to configure in the **[ipaserver]** section. For example, to instruct Ansible to configure **server.idm.example.com**, enter:

```
[ipaserver]
server.idm.example.com
```

5. Make a copy of the **ensure-asymmetric-vault-is-present.yml** Ansible playbook file. For example:

```
$ cp ensure-asymmetric-vault-is-present.yml ensure-asymmetric-service-vault-is-present-copy.yml
```

6. Open the **ensure-asymmetric-vault-is-present-copy.yml** file for editing.
7. Add a task that copies the **service-public.pem** public key from the Ansible controller to the **server.idm.example.com** server.
8. Modify the rest of the file by setting the following variables in the **ipavault** task section:
  - Set the **ipaadmin\_password** variable to the IdM administrator password.
  - Define the name of the vault using the **name** variable, for example **secret\_vault**.
  - Set the **vault\_type** variable to **asymmetric**.
  - Set the **service** variable to the principal of the service that owns the vault, for example **HTTP/webserver1.idm.example.com**.
  - Set the **public\_key\_file** to the location of your public key.
 This is the modified Ansible playbook file for the current example:

```
---
- name: Tests
  hosts: ipaserver
  gather_facts: false
  vars_files:
    - /home/user_name/MyPlaybooks/secret.yml
  tasks:
    - name: Copy public key to ipaserver.
      copy:
        src: /path/to/service-public.pem
        dest: /usr/share/doc/ansible-freeipa/playbooks/vault/service-public.pem
        mode: 0600
    - name: Add data to vault, from a LOCAL file.
      ipavault:
        ipaadmin_password: "{{ ipaadmin_password }}"
        name: secret_vault
        vault_type: asymmetric
        service: HTTP/webserver1.idm.example.com
        public_key_file: /usr/share/doc/ansible-freeipa/playbooks/vault/service-public.pem
```

9. Save the file.
10. Run the playbook:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory.file ensure-asymmetric-service-vault-is-present-copy.yml
```

## 79.2. ADDING MEMBER SERVICES TO AN ASYMMETRIC VAULT USING ANSIBLE

Follow this procedure to use an Ansible playbook to add member services to a service vault so that they can all retrieve the secret stored in the vault. In the example used in the procedure below, the IdM administrator adds the **HTTP/webserver2.idm.example.com** and **HTTP/webserver3.idm.example.com** service principals to the **secret\_vault** vault that is owned by **HTTP/webserver1.idm.example.com**.

### Prerequisites

- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the **~/MyPlaybooks/** directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipaadmin\_password**.
- You know the **IdM administrator** password.
- You have [created an asymmetric vault](#) to store the service secret.

### Procedure

1. Navigate to the **/usr/share/doc/ansible-freeipa/playbooks/vault** directory:

```
$ cd /usr/share/doc/ansible-freeipa/playbooks/vault
```

2. Optional: Create an inventory file if it does not exist, for example **inventory.file**:

```
$ touch inventory.file
```

3. Open your inventory file and define the IdM server that you want to configure in the **[ipaserver]** section. For example, to instruct Ansible to configure **server.idm.example.com**, enter:

```
[ipaserver]
server.idm.example.com
```

4. Make a copy of the **data-archive-in-asymmetric-vault.yml** Ansible playbook file. For example:

```
$ cp data-archive-in-asymmetric-vault.yml add-services-to-an-asymmetric-vault.yml
```

5. Open the **data-archive-in-asymmetric-vault-copy.yml** file for editing.
6. Modify the file by setting the following variables in the **ipavault** task section:
  - Set the **ipaadmin\_password** variable to the IdM administrator password.
  - Set the **name** variable to the name of the vault, for example **secret\_vault**.
  - Set the **service** variable to the service owner of the vault, for example **HTTP/webserver1.idm.example.com**.

- Define the services that you want to have access to the vault secret using the **services** variable.
- Set the **action** variable to **member**.  
This is the modified Ansible playbook file for the current example:

```
---
- name: Tests
  hosts: ipaserver
  gather_facts: false

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - ipavault:
      ipadmin_password: "{{ ipadmin_password }}"
      name: secret_vault
      service: HTTP/webserver1.idm.example.com
      services:
      - HTTP/webserver2.idm.example.com
      - HTTP/webserver3.idm.example.com
      action: member
```

7. Save the file.
8. Run the playbook:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory.file add-
services-to-an-asymmetric-vault.yml
```

### 79.3. STORING AN IDM SERVICE SECRET IN AN ASYMMETRIC VAULT USING ANSIBLE

Follow this procedure to use an Ansible playbook to store a secret in a service vault so that it can be later retrieved by the service. In the example used in the procedure below, the administrator stores a **PEM** file with the secret in an asymmetric vault named **secret\_vault**. This ensures that the service will have to authenticate using a private key to retrieve the secret from the vault. The vault members will be able to retrieve the file from any IdM client.

#### Prerequisites

- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipadmin\_password**.
- You know the **IdM administrator** password.
- You have [created an asymmetric vault](#) to store the service secret.

- The secret is stored locally on the Ansible controller, for example in the `/usr/share/doc/ansible-freeipa/playbooks/vault/private-key-to-an-externally-signed-certificate.pem` file.

## Procedure

1. Navigate to the `/usr/share/doc/ansible-freeipa/playbooks/vault` directory:

```
$ cd /usr/share/doc/ansible-freeipa/playbooks/vault
```

2. Optional: Create an inventory file if it does not exist, for example `inventory.file`:

```
$ touch inventory.file
```

3. Open your inventory file and define the IdM server that you want to configure in the `[ipaserver]` section. For example, to instruct Ansible to configure `server.idm.example.com`, enter:

```
[ipaserver]
server.idm.example.com
```

4. Make a copy of the `data-archive-in-asymmetric-vault.yml` Ansible playbook file. For example:

```
$ cp data-archive-in-asymmetric-vault.yml data-archive-in-asymmetric-vault-copy.yml
```

5. Open the `data-archive-in-asymmetric-vault-copy.yml` file for editing.

6. Modify the file by setting the following variables in the `ipavault` task section:

- Set the `ipaadmin_password` variable to the IdM administrator password.
- Set the `name` variable to the name of the vault, for example `secret_vault`.
- Set the `service` variable to the service owner of the vault, for example `HTTP/webserver1.idm.example.com`.
- Set the `in` variable to `"{{ lookup('file', 'private-key-to-an-externally-signed-certificate.pem') | b64encode }}"`. This ensures that Ansible retrieves the file with the private key from the working directory on the Ansible controller rather than from the IdM server.
- Set the `action` variable to `member`.  
This is the modified Ansible playbook file for the current example:

```
---
- name: Tests
  hosts: ipaserver
  gather_facts: false

  vars_files:
    - /home/user_name/MyPlaybooks/secret.yml
  tasks:
    - ipavault:
        ipaadmin_password: "{{ ipaadmin_password }}"
        name: secret_vault
```

```
service: HTTP/webserver1.idm.example.com
in: "{{ lookup('file', 'private-key-to-an-externally-signed-certificate.pem') | b64encode }}"
action: member
```

7. Save the file.
8. Run the playbook:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory.file data-
archive-in-asymmetric-vault-copy.yml
```

## 79.4. RETRIEVING A SERVICE SECRET FOR AN IDM SERVICE USING ANSIBLE

Follow this procedure to use an Ansible playbook to retrieve a secret from a service vault on behalf of the service. In the example used in the procedure below, running the playbook retrieves a **PEM** file with the secret from an asymmetric vault named **secret\_vault**, and stores it in the specified location on all the hosts listed in the Ansible inventory file as **ipaservers**.

The services authenticate to IdM using keytabs, and they authenticate to the vault using a private key. You can retrieve the file on behalf of the service from any IdM client on which **ansible-freeipa** is installed.

### Prerequisites

- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipaadmin\_password**.
- You know the IdM administrator password.
- You have [created an asymmetric vault](#) to store the service secret.
- You have [archived the secret in the vault](#).
- You have stored the private key used to retrieve the service vault secret in the location specified by the **private\_key\_file** variable on the Ansible controller.

### Procedure

1. Navigate to the **/usr/share/doc/ansible-freeipa/playbooks/vault** directory:

```
$ cd /usr/share/doc/ansible-freeipa/playbooks/vault
```

2. Optional: Create an inventory file if it does not exist, for example **inventory.file**:

```
$ touch inventory.file
```

3. Open your inventory file and define the following hosts:

- Define your IdM server in the **[ipaserver]** section.
- Define the hosts onto which you want to retrieve the secret in the **[webservers]** section. For example, to instruct Ansible to retrieve the secret to **webserver1.idm.example.com**, **webserver2.idm.example.com**, and **webserver3.idm.example.com**, enter:

```
[ipaserver]
server.idm.example.com

[webservers]
webserver1.idm.example.com
webserver2.idm.example.com
webserver3.idm.example.com
```

4. Make a copy of the **retrieve-data-asymmetric-vault.yml** Ansible playbook file. For example:

```
$ cp retrieve-data-asymmetric-vault.yml retrieve-data-asymmetric-vault-copy.yml
```

5. Open the **retrieve-data-asymmetric-vault-copy.yml** file for editing.

6. Modify the file by setting the following variables in the **ipavault** task section:

- Set the **ipaadmin\_password** variable to your IdM administrator password.
  - Set the **name** variable to the name of the vault, for example **secret\_vault**.
  - Set the **service** variable to the service owner of the vault, for example **HTTP/webserver1.idm.example.com**.
  - Set the **private\_key\_file** variable to the location of the private key used to retrieve the service vault secret.
  - Set the **out** variable to the location on the IdM server where you want to retrieve the **private-key-to-an-externally-signed-certificate.pem** secret, for example the current working directory.
  - Set the **action** variable to **member**.
- This the modified Ansible playbook file for the current example:

```
---
- name: Retrieve data from vault
  hosts: ipaserver
  become: no
  gather_facts: false

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - name: Retrieve data from the service vault
    ipavault:
      ipaadmin_password: "{{ ipaadmin_password }}"
      name: secret_vault
      service: HTTP/webserver1.idm.example.com
      vault_type: asymmetric
```



```
private_key: "{{ lookup('file', 'service-private.pem') | b64encode }}"
out: private-key-to-an-externally-signed-certificate.pem
state: retrieved
```

7. Add a section to the playbook that retrieves the data file from the IdM server to the Ansible controller:

```
---
- name: Retrieve data from vault
  hosts: ipaserver
  become: no
  gather_facts: false
  tasks:
[...]
```

```
- name: Retrieve data file
  fetch:
    src: private-key-to-an-externally-signed-certificate.pem
    dest: ./
    flat: yes
    mode: 0600
```

8. Add a section to the playbook that transfers the retrieved **private-key-to-an-externally-signed-certificate.pem** file from the Ansible controller on to the webserver listed in the **webserver** section of the inventory file:

```
---
- name: Send data file to webserver
  become: no
  gather_facts: no
  hosts: webserver
  tasks:
- name: Send data to webserver
  copy:
    src: private-key-to-an-externally-signed-certificate.pem
    dest: /etc/pki/tls/private/httpd.key
    mode: 0444
```

9. Save the file.
10. Run the playbook:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory file retrieve-
data-asymmetric-vault-copy.yml
```

## 79.5. CHANGING AN IDM SERVICE VAULT SECRET WHEN COMPROMISED USING ANSIBLE

Follow this procedure to reuse an Ansible playbook to change the secret stored in a service vault when a service instance has been compromised. The scenario in the following example assumes that on **webserver3.idm.example.com**, the retrieved secret has been compromised, but not the key to the asymmetric vault storing the secret. In the example, the administrator reuses the Ansible playbooks used when [storing a secret in an asymmetric vault](#) and [retrieving a secret from the asymmetric vault onto IdM](#)

[hosts](#). At the start of the procedure, the IdM administrator stores a new **PEM** file with a new secret in the asymmetric vault, adapts the inventory file so as not to retrieve the new secret on to the compromised web server, **webserver3.idm.example.com**, and then re-runs the two procedures.

## Prerequisites

- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipadmin\_password**.
- You know the **IdM administrator** password.
- You have [created an asymmetric vault](#) to store the service secret.
- You have generated a new **httpd** key for the web services running on IdM hosts to replace the compromised old key.
- The new **httpd** key is stored locally on the Ansible controller, for example in the `/usr/share/doc/ansible-freeipa/playbooks/vault/private-key-to-an-externally-signed-certificate.pem` file.

## Procedure

1. Navigate to the `/usr/share/doc/ansible-freeipa/playbooks/vault` directory:

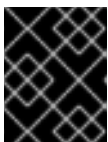
```
$ cd /usr/share/doc/ansible-freeipa/playbooks/vault
```

2. Open your inventory file and make sure that the following hosts are defined correctly:

- The IdM server in the **[ipaserver]** section.
- The hosts onto which you want to retrieve the secret in the **[webservers]** section. For example, to instruct Ansible to retrieve the secret to **webserver1.idm.example.com** and **webserver2.idm.example.com**, enter:

```
[ipaserver]
server.idm.example.com

[webservers]
webserver1.idm.example.com
webserver2.idm.example.com
```



### IMPORTANT

Make sure that the list does not contain the compromised webserver, in the current example **webserver3.idm.example.com**.

3. Open the **data-archive-in-asymmetric-vault-copy.yml** file for editing.

4. Modify the file by setting the following variables in the **ipavault** task section:

- Set the **ipaadmin\_password** variable to the IdM administrator password.
  - Set the **name** variable to the name of the vault, for example **secret\_vault**.
  - Set the **service** variable to the service owner of the vault, for example **HTTP/webserver.idm.example.com**.
  - Set the **in** variable to `"{{ lookup('file', 'new-private-key-to-an-externally-signed-certificate.pem') | b64encode }}"`. This ensures that Ansible retrieves the file with the private key from the working directory on the Ansible controller rather than from the IdM server.
  - Set the **action** variable to **member**.
- This is the modified Ansible playbook file for the current example:

```
---
- name: Tests
  hosts: ipaserver
  gather_facts: false

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - ipavault:
      ipaadmin_password: "{{ ipaadmin_password }}"
      name: secret_vault
      service: HTTP/webserver.idm.example.com
      in: "{{ lookup('file', 'new-private-key-to-an-externally-signed-certificate.pem') | b64encode
      }}"
      action: member
```

5. Save the file.

6. Run the playbook:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory.file data-
archive-in-asymmetric-vault-copy.yml
```

7. Open the **retrieve-data-asymmetric-vault-copy.yml** file for editing.

8. Modify the file by setting the following variables in the **ipavault** task section:

- Set the **ipaadmin\_password** variable to your IdM administrator password.
- Set the **name** variable to the name of the vault, for example **secret\_vault**.
- Set the **service** variable to the service owner of the vault, for example **HTTP/webserver1.idm.example.com**.
- Set the **private\_key\_file** variable to the location of the private key used to retrieve the service vault secret.

- Set the **out** variable to the location on the IdM server where you want to retrieve the **new-private-key-to-an-externally-signed-certificate.pem** secret, for example the current working directory.
- Set the **action** variable to **member**.  
This is the modified Ansible playbook file for the current example:

```
---
- name: Retrieve data from vault
  hosts: ipaserver
  become: no
  gather_facts: false

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - name: Retrieve data from the service vault
    ipavault:
      ipaadmin_password: "{{ ipaadmin_password }}"
      name: secret_vault
      service: HTTP/webserver1.idm.example.com
      vault_type: asymmetric
      private_key: "{{ lookup('file', 'service-private.pem') | b64encode }}"
      out: new-private-key-to-an-externally-signed-certificate.pem
      state: retrieved
```

9. Add a section to the playbook that retrieves the data file from the IdM server to the Ansible controller:

```
---
- name: Retrieve data from vault
  hosts: ipaserver
  become: true
  gather_facts: false
  tasks:
  [...]
  - name: Retrieve data file
    fetch:
      src: new-private-key-to-an-externally-signed-certificate.pem
      dest: ./
      flat: yes
      mode: 0600
```

10. Add a section to the playbook that transfers the retrieved **new-private-key-to-an-externally-signed-certificate.pem** file from the Ansible controller on to the webserver listed in the **webserver** section of the inventory file:

```
---
- name: Send data file to webserver
  become: true
  gather_facts: no
  hosts: webserver
  tasks:
  - name: Send data to webserver
    copy:
```

```
src: new-private-key-to-an-externally-signed-certificate.pem
dest: /etc/pki/tls/private/httpd.key
mode: 0444
```

11. Save the file.
12. Run the playbook:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory.file retrieve-
data-asymmetric-vault-copy.yml
```

## 79.6. ADDITIONAL RESOURCES

- See the README-vault.md Markdown file in the **/usr/share/doc/ansible-freeipa/** directory.
- See the sample playbooks in the **/usr/share/doc/ansible-freeipa/playbooks/vault/** directory.

## CHAPTER 80. ENSURING THE PRESENCE AND ABSENCE OF SERVICES IN IDM USING ANSIBLE

With the Ansible **service** module, Identity Management (IdM) administrator can ensure that specific services that are not native to IdM are present or absent in IdM. For example, you can use the **service** module to:

- Check that a manually installed service is present on an IdM client and automatically install that service if it is absent. For details, see:
  - [Ensuring the presence of an HTTP service in IdM on an IdM client.](#)
  - [Ensuring the presence of an HTTP service in IdM on a non-IdM client.](#)
  - [Ensuring the presence of an HTTP service on an IdM client without DNS.](#)
- Check that a service enrolled in IdM has a certificate attached and automatically install that certificate if it is absent. For details, see:
  - [Ensuring the presence of an externally-signed certificate in an IdM service entry.](#)
- Allow IdM users and hosts to retrieve and create the service keytab. For details, see:
  - [Allowing IdM users, groups, hosts, or host groups to create a keytab of a service.](#)
  - [Allowing IdM users, groups, hosts, or host groups to retrieve a keytab of a service.](#)
- Allow IdM users and hosts to add a Kerberos alias to a service. For details, see:
  - [Ensuring the presence of a Kerberos principal alias for a service.](#)
- Check that a service is not present on an IdM client and automatically remove that service if it is present. For details, see:
  - [Ensuring the absence of an HTTP service in IdM on an IdM client.](#)

### 80.1. ENSURING THE PRESENCE OF AN HTTP SERVICE IN IDM USING AN ANSIBLE PLAYBOOK

Follow this procedure to ensure the presence of an HTTP server in IdM using an Ansible playbook.

#### Prerequisites

- The system to host the HTTP service is an IdM client.
- You have the IdM administrator password.

#### Procedure

1. Create an inventory file, for example **inventory.file**:

```
$ touch inventory.file
```

2. Open the **inventory.file** and define the IdM server that you want to configure in the **[ipaserver]** section. For example, to instruct Ansible to configure **server.idm.example.com**, enter:

```
[ipaserver]
server.idm.example.com
```

3. Make a copy of the `/usr/share/doc/ansible-freeipa/playbooks/service/service-is-present.yml` Ansible playbook file. For example:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/service/service-is-present.yml
   /usr/share/doc/ansible-freeipa/playbooks/service/service-is-present-copy.yml
```

4. Open the `/usr/share/doc/ansible-freeipa/playbooks/service/service-is-present-copy.yml` Ansible playbook file for editing:

```
---
- name: Playbook to manage IPA service.
  hosts: ipaserver
  gather_facts: false

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  # Ensure service is present
  - ipaservice:
      ipaadmin_password: "{{ ipaadmin_password }}"
      name: HTTP/client.idm.example.com
```

5. Adapt the file:
  - Change the IdM administrator password defined by the **ipaadmin\_password** variable.
  - Change the name of your IdM client on which the HTTP service is running, as defined by the **name** variable of the **ipaservice** task.
6. Save and exit the file.
7. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the **secret.yml** file, and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i
   path_to_inventory_directory/inventory.file /usr/share/doc/ansible-
   freeipa/playbooks/service/service-is-present-copy.yml
```

### Verification steps

1. Log into the IdM Web UI as IdM administrator.
2. Navigate to **Identity** → **Services**.

If **HTTP/client.idm.example.com@IDM.EXAMPLE.COM** is listed in the **Services** list, the Ansible playbook has been successfully added to IdM.

### Additional resources

- To secure the communication between the HTTP server and browser clients, see [adding TLS encryption to an Apache HTTP Server](#).

- To request a certificate for the HTTP service, see the procedure described in [Obtaining an IdM certificate for a service using certmonger](#).

## 80.2. ENSURING THE PRESENCE OF AN HTTP SERVICE IN IDM ON A NON-IDM CLIENT USING AN ANSIBLE PLAYBOOK

Follow this procedure to ensure the presence of an HTTP server in IdM on a host that is not an IdM client using an Ansible playbook. By adding the HTTP server to IdM you are also adding the host to IdM.

### Prerequisites

- You have [installed an HTTP service](#) on your host.
- The host on which you have set up HTTP is not an IdM client. Otherwise, follow the steps in [Ensuring the presence of an HTTP service in IdM using an Ansible playbook](#).
- You have the IdM administrator password.
- The DNS A record - or the AAAA record if IPv6 is used - for the host is available.

### Procedure

1. Create an inventory file, for example **inventory.file**:

```
$ touch inventory.file
```

2. Open the **inventory.file** and define the IdM server that you want to configure in the **[ipaserver]** section. For example, to instruct Ansible to configure **server.idm.example.com**, enter:

```
[ipaserver]
server.idm.example.com
```

3. Make a copy of the **/usr/share/doc/ansible-freeipa/playbooks/service/service-is-present-without-host-check.yml** Ansible playbook file. For example:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/service/service-is-present-without-host-check.yml /usr/share/doc/ansible-freeipa/playbooks/service/service-is-present-without-host-check-copy.yml
```

4. Open the copied file, **/usr/share/doc/ansible-freeipa/playbooks/service/service-is-present-without-host-check-copy.yml**, for editing. Locate the **ipaadmin\_password** and **name** variables in the **ipaservice** task:

```
---
- name: Playbook to manage IPA service.
  hosts: ipaserver
  gather_facts: false

  vars_files:
    - /home/user_name/MyPlaybooks/secret.yml
  tasks:
    # Ensure service is present
    - ipaservice:
```



```
ipaadmin_password: "{{ ipaadmin_password }}"
name: HTTP/www2.example.com
skip_host_check: yes
```

5. Adapt the file:

- Set the **ipaadmin\_password** variable to your IdM administrator password.
- Set the **name** variable to the name of the host on which the HTTP service is running.

6. Save and exit the file.

7. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the **secret.yml** file, and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i
path_to_inventory_directory/inventory.file /usr/share/doc/ansible-
freeipa/playbooks/service/service-is-present-without-host-check-copy.yml
```

### Verification steps

1. Log into the IdM Web UI as IdM administrator.
2. Navigate to **Identity** → **Services**.

You can now see **HTTP/client.idm.example.com@IDM.EXAMPLE.COM** listed in the **Services** list.

### Additional resources

- To secure the communication, see [adding TLS encryption to an Apache HTTP Server](#) .

## 80.3. ENSURING THE PRESENCE OF AN HTTP SERVICE ON AN IDM CLIENT WITHOUT DNS USING AN ANSIBLE PLAYBOOK

Follow this procedure to ensure the presence of an HTTP server running on an IdM client that has no DNS entry using an Ansible playbook. The scenario implied is that the IdM host has no DNS A entry available – or no DNS AAAA entry if IPv6 is used instead of IPv4.

### Prerequisites

- The system to host the HTTP service is enrolled in IdM.
- The DNS A or DNS AAAA record for the host may not exist. Otherwise, if the DNS record for the host does exist, follow the procedure in [Ensuring the presence of an HTTP service in IdM using an Ansible playbook](#).
- You have the IdM administrator password.

### Procedure

1. Create an inventory file, for example **inventory.file**:

```
$ touch inventory.file
```

2. Open the **inventory.file** and define the IdM server that you want to configure in the **[ipaserver]** section. For example, to instruct Ansible to configure **server.idm.example.com**, enter:

```
[ipaserver]
server.idm.example.com
```

3. Make a copy of the **/usr/share/doc/ansible-freeipa/playbooks/service/service-is-present-with-host-force.yml** Ansible playbook file. For example:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/service/service-is-present-with-host-force.yml /usr/share/doc/ansible-freeipa/playbooks/service/service-is-present-with-host-force-copy.yml
```

4. Open the copied file, **/usr/share/doc/ansible-freeipa/playbooks/service/service-is-present-with-host-force-copy.yml**, for editing. Locate the **ipaadmin\_password** and **name** variables in the **ipaservice** task:

```
---
- name: Playbook to manage IPA service.
  hosts: ipaserver
  gather_facts: false

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  # Ensure service is present
  - ipaservice:
    ipaadmin_password: "{{ ipaadmin_password }}"
    name: HTTP/ihavenodns.info
    force: yes
```

5. Adapt the file:
  - Set the **ipaadmin\_password** variable to your IdM administrator password.
  - Set the **name** variable to the name of the host on which the HTTP service is running.
6. Save and exit the file.
7. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the **secret.yml** file, and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i
path_to_inventory_directory/inventory.file /usr/share/doc/ansible-freeipa/playbooks/service/service-is-present-with-host-force-copy.yml
```

### Verification steps

1. Log into the IdM Web UI as IdM administrator.
2. Navigate to **Identity → Services**.

You can now see **HTTP/client.idm.example.com@IDM.EXAMPLE.COM** listed in the **Services** list.

### Additional resources

- To secure the communication, see [adding TLS encryption to the Apache HTTP Server](#).

## 80.4. ENSURING THE PRESENCE OF AN EXTERNALLY SIGNED CERTIFICATE IN AN IDM SERVICE ENTRY USING AN ANSIBLE PLAYBOOK

Follow this procedure to use the **ansible-freeipa service** module to ensure that a certificate issued by an external certificate authority (CA) is attached to the IdM entry of the HTTP service. Having the certificate of an HTTP service signed by an external CA rather than the IdM CA is particularly useful if your IdM CA uses a self-signed certificate.

### Prerequisites

- You have [installed an HTTP service](#) on your host.
- You have [enrolled the HTTP service to IdM](#).
- You have the IdM administrator password.
- You have an externally signed certificate whose Subject corresponds to the principal of the HTTP service.

### Procedure

1. Create an inventory file, for example **inventory.file**:

```
$ touch inventory.file
```

2. Open the **inventory.file** and define the IdM server that you want to configure in the **[ipaserver]** section. For example, to instruct Ansible to configure **server.idm.example.com**, enter:

```
[ipaserver]
server.idm.example.com
```

3. Make a copy of the **/usr/share/doc/ansible-freeipa/playbooks/service/service-member-certificate-present.yml** file, for example:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/service/service-member-certificate-present.yml /usr/share/doc/ansible-freeipa/playbooks/service/service-member-certificate-present-copy.yml
```

4. Optional: If the certificate is in the Privacy Enhanced Mail (PEM) format, convert the certificate to the Distinguished Encoding Rules (DER) format for easier handling through the command-line interface (CLI):

```
$ openssl x509 -outform der -in cert1.pem -out cert1.der
```

5. Decode the **DER** file to standard output using the **base64** command. Use the **-w0** option to disable wrapping:

```
$ base64 cert1.der -w0
MIIC/zCCAeegAwIBAgIUUV74O+4kXeg21o4vxfRRtyJm...
```

6. Copy the certificate from the standard output to the clipboard.
7. Open the `/usr/share/doc/ansible-freeipa/playbooks/service/service-member-certificate-present-copy.yml` file for editing and view its contents:

```
---
- name: Service certificate present.
  hosts: ipaserver
  gather_facts: false

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  # Ensure service certificate is present
  - ipaservice:
    ipaadmin_password: "{{ ipaadmin_password }}"
    name: HTTP/client.idm.example.com
    certificate: |
      - MIICBjCCAW8CFHnm32VcXaUDGfEGdDL/...
      [...]
    action: member
    state: present
```

8. Adapt the file:
  - Replace the certificate, defined using the **certificate** variable, with the certificate you copied from the CLI. Note that if you use the **certificate:** variable with the "|" pipe character as indicated, you can enter the certificate THIS WAY rather than having it to enter it in a single line. This makes reading the certificate easier.
  - Change the IdM administrator password, defined by the **ipaadmin\_password** variable.
  - Change the name of your IdM client on which the HTTP service is running, defined by the **name** variable.
  - Change any other relevant variables.
9. Save and exit the file.
10. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the **secret.yml** file, and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i
path_to_inventory_directory/inventory.file /usr/share/doc/ansible-
freeipa/playbooks/service/service-member-certificate-present-copy.yml
```

### Verification steps

1. Log into the IdM Web UI as IdM administrator.
2. Navigate to **Identity → Services**.
3. Click the name of the service with the newly added certificate, for example **HTTP/client.idm.example.com**.

In the **Service Certificate** section on the right, you can now see the newly added certificate.

## 80.5. USING AN ANSIBLE PLAYBOOK TO ALLOW IDM USERS, GROUPS, HOSTS, OR HOST GROUPS TO CREATE A KEYTAB OF A SERVICE

A keytab is a file containing pairs of Kerberos principals and encrypted keys. Keytab files are commonly used to allow scripts to automatically authenticate using Kerberos, without requiring human interaction or access to password stored in a plain-text file. The script is then able to use the acquired credentials to access files stored on a remote system.

As an Identity Management (IdM) administrator, you can allow other users to retrieve or even create a keytab for a service running in IdM. By allowing specific users and user groups to create keytabs, you can delegate the administration of the service to them without sharing the IdM administrator password. This delegation provides a more fine-grained system administration.

Follow this procedure to allow specific IdM users, user groups, hosts, and host groups to create a keytab for the HTTP service running on an IdM client. Specifically, it describes how you can allow the **user01** IdM user to create a keytab for the HTTP service running on an IdM client named **client.idm.example.com**.

### Prerequisites

- You know the IdM administrator password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipaadmin\_password**.
- You have [enrolled the HTTP service to IdM](#).
- The system to host the HTTP service is an IdM client.
- The IdM users and user groups that you want to allow to create the keytab exist in IdM.
- The IdM hosts and host groups that you want to allow to create the keytab exist in IdM.

### Procedure

1. Create an inventory file, for example **inventory.file**:

```
$ touch inventory.file
```

2. Open the **inventory.file** and define the IdM server that you want to configure in the **[ipaserver]** section. For example, to instruct Ansible to configure **server.idm.example.com**, enter:

```
[ipaserver]
server.idm.example.com
```

3. Make a copy of the **/usr/share/doc/ansible-freeipa/playbooks/service/service-member-allow\_create\_keytab-present.yml** Ansible playbook file. For example:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/service/service-member-allow_create_keytab-present.yml /usr/share/doc/ansible-freeipa/playbooks/service/service-member-allow_create_keytab-present-copy.yml
```

4. Open the `/usr/share/doc/ansible-freeipa/playbooks/service/service-member-allow_create_keytab-present-copy.yml` Ansible playbook file for editing.
5. Adapt the file by changing the following:
  - The IdM administrator password specified by the **ipaadmin\_password** variable.
  - The name of your IdM client on which the HTTP service is running. In the current example, it is **HTTP/client.idm.example.com**
  - The names of IdM users that are listed in the **allow\_create\_keytab\_user:** section. In the current example, it is **user01**.
  - The names of IdM user groups that are listed in the **allow\_create\_keytab\_group:** section.
  - The names of IdM hosts that are listed in the **allow\_create\_keytab\_host:** section.
  - The names of IdM host groups that are listed in the **allow\_create\_keytab\_hostgroup:** section.
  - The name of the task specified by the **name** variable in the **tasks** section. After being adapted for the current example, the copied file looks like this:

```
---
- name: Service member allow_create_keytab present
  hosts: ipaserver

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - name: Service HTTP/client.idm.example.com members allow_create_keytab present for user01
    ipaservice:
      ipaadmin_password: "{{ ipaadmin_password }}"
      name: HTTP/client.idm.example.com
      allow_create_keytab_user:
      - user01
    action: member
```

6. Save the file.
7. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the **secret.yml** file, and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i path_to_inventory_directory/inventory.file /usr/share/doc/ansible-freeipa/playbooks/service/service-member-allow_create_keytab-present-copy.yml
```

## Verification steps

1. SSH to an IdM server as an IdM user that has the privilege to create a keytab for the particular HTTP service:

```
$ ssh user01@server.idm.example.com
Password:
```

2. Use the **ipa-getkeytab** command to generate the new keytab for the HTTP service:

```
$ ipa-getkeytab -s server.idm.example.com -p HTTP/client.idm.example.com -k
/etc/httpd/conf/krb5.keytab
```

The **-s** option specifies a Key Distribution Center (KDC) server to generate the keytab.

The **-p** option specifies the principal whose keytab you want to create.

The **-k** option specifies the keytab file to append the new key to. The file will be created if it does not exist.

If the command does not result in an error, you have successfully created a keytab of **HTTP/client.idm.example.com** as **user01**.

## 80.6. USING AN ANSIBLE PLAYBOOK TO ALLOW IDM USERS, GROUPS, HOSTS, OR HOST GROUPS TO RETRIEVE A KEYTAB OF A SERVICE

A keytab is a file containing pairs of Kerberos principals and encrypted keys. Keytab files are commonly used to allow scripts to automatically authenticate using Kerberos, without requiring human interaction or access to a password stored in a plain-text file. The script is then able to use the acquired credentials to access files stored on a remote system.

As IdM administrator, you can allow other users to retrieve or even create a keytab for a service running in IdM.

Follow this procedure to allow specific IdM users, user groups, hosts, and host groups to retrieve a keytab for the HTTP service running on an IdM client. Specifically, it describes how to allow the **user01** IdM user to retrieve the keytab of the HTTP service running on **client.idm.example.com**.

### Prerequisites

- You know the IdM administrator password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the **ansible-freeipa** package on the Ansible controller.
  - The example assumes that in the **~/MyPlaybooks/** directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipadmin\_password**.
- You have [enrolled the HTTP service to IdM](#).
- The IdM users and user groups that you want to allow to retrieve the keytab exist in IdM.

- The IdM hosts and host groups that you want to allow to retrieve the keytab exist in IdM.

## Procedure

1. Create an inventory file, for example **inventory.file**:

```
$ touch inventory.file
```

2. Open the **inventory.file** and define the IdM server that you want to configure in the **[ipaserver]** section. For example, to instruct Ansible to configure **server.idm.example.com**, enter:

```
[ipaserver]
server.idm.example.com
```

3. Make a copy of the **/usr/share/doc/ansible-freeipa/playbooks/service/service-member-allow\_retrieve\_keytab-present.yml** Ansible playbook file. For example:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/service/service-member-allow_retrieve_keytab-present.yml /usr/share/doc/ansible-freeipa/playbooks/service/service-member-allow_retrieve_keytab-present-copy.yml
```

4. Open the copied file, **/usr/share/doc/ansible-freeipa/playbooks/service/service-member-allow\_retrieve\_keytab-present-copy.yml**, for editing:

5. Adapt the file:

- Set the **ipaadmin\_password** variable to your IdM administrator password.
- Set the **name** variable of the **ipaservice** task to the principal of the HTTP service. In the current example, it is **HTTP/client.idm.example.com**
- Specify the names of IdM users in the **allow\_retrieve\_keytab\_group**: section. In the current example, it is **user01**.
- Specify the names of IdM user groups in the **allow\_retrieve\_keytab\_group**: section.
- Specify the names of IdM hosts in the **allow\_retrieve\_keytab\_group**: section.
- Specify the names of IdM host groups in the **allow\_retrieve\_keytab\_group**: section.
- Specify the name of the task using the **name** variable in the **tasks** section. After being adapted for the current example, the copied file looks like this:

```
---
- name: Service member allow_retrieve_keytab present
  hosts: ipaserver

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - name: Service HTTP/client.idm.example.com members allow_retrieve_keytab present for user01
    ipaservice:
      ipaadmin_password: "{{ ipaadmin_password }}"
      name: HTTP/client.idm.example.com
```



```
allow_retrieve_keytab_user:
- user01
action: member
```

6. Save the file.
7. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the **secret.yml** file, and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i
path_to_inventory_directory/inventory.file /usr/share/doc/ansible-
freeipa/playbooks/service/service-member-allow_retrieve_keytab-present-copy.yml
```

### Verification steps

1. SSH to an IdM server as an IdM user with the privilege to retrieve a keytab for the HTTP service:

```
$ ssh user01@server.idm.example.com
Password:
```

2. Use the **ipa-getkeytab** command with the **-r** option to retrieve the keytab:

```
$ ipa-getkeytab -r -s server.idm.example.com -p HTTP/client.idm.example.com -k
/etc/httpd/conf/krb5.keytab
```

The **-s** option specifies a Key Distribution Center (KDC) server from which you want to retrieve the keytab.

The **-p** option specifies the principal whose keytab you want to retrieve.

The **-k** option specifies the keytab file to which you want to append the retrieved key. The file will be created if it does not exist.

If the command does not result in an error, you have successfully retrieved a keytab of **HTTP/client.idm.example.com** as **user01**.

## 80.7. ENSURING THE PRESENCE OF A KERBEROS PRINCIPAL ALIAS OF A SERVICE USING AN ANSIBLE PLAYBOOK

In some scenarios, it is beneficial for IdM administrator to enable IdM users, hosts, or services to authenticate against Kerberos applications using a Kerberos principal alias. These scenarios include:

- The user name changed, but the user should be able to log into the system using both the previous and new user names.
- The user needs to log in using the email address even if the IdM Kerberos realm differs from the email domain.

Follow this procedure to create the principal alias of **HTTP/mycompany.idm.example.com** for the HTTP service running on **client.idm.example.com**.

### Prerequisites

- You know the IdM administrator password.

- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the `secret.yml` Ansible vault stores your `ipaadmin_password`.
- You have [set up an HTTP service](#)
- You have [enrolled the HTTP service to IdM](#).
- The host on which you have set up HTTP is an IdM client.

## Procedure

1. Create an inventory file, for example **inventory.file**:

```
$ touch inventory.file
```

2. Open the **inventory.file** and define the IdM server that you want to configure in the **[ipaserver]** section. For example, to instruct Ansible to configure **server.idm.example.com**, enter:

```
[ipaserver]
server.idm.example.com
```

3. Make a copy of the **/usr/share/doc/ansible-freeipa/playbooks/service/service-member-principal-present.yml** Ansible playbook file. For example:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/service/service-member-principal-present.yml /usr/share/doc/ansible-freeipa/playbooks/service/service-member-principal-present-copy.yml
```

4. Open the **/usr/share/doc/ansible-freeipa/playbooks/service/service-member-principal-present-copy.yml** Ansible playbook file for editing.

5. Adapt the file by changing the following:

- The IdM administrator password specified by the **ipaadmin\_password** variable.
- The name of the service specified by the **name** variable. This is the canonical principal name of the service. In the current example, it is **HTTP/client.idm.example.com**.
- The Kerberos principal alias specified by the **principal** variable. This is the alias you want to add to the service defined by the **name** variable. In the current example, it is **host/mycompany.idm.example.com**.
- The name of the task specified by the **name** variable in the **tasks** section. After being adapted for the current example, the copied file looks like this:

```
---
- name: Service member principal present
```

```

hosts: ipaserver

vars_files:
- /home/user_name/MyPlaybooks/secret.yml
tasks:
- name: Service HTTP/client.idm.example.com member principals
  host/mycompany.idm.exmaple.com present
  ipaservice:
    ipadmin_password: "{{ ipadmin_password }}"
    name: HTTP/client.idm.example.com
  principal:
    - host/mycompany.idm.example.com
  action: member

```

6. Save the file.
7. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the **secret.yml** file, and the inventory file:

```

$ ansible-playbook --vault-password-file=password_file -v -i
path_to_inventory_directory/inventory.file /usr/share/doc/ansible-
freeipa/playbooks/service/service-member-principal-present-copy.yml

```

If running the playbook results in 0 unreachable and 0 failed tasks, you have successfully created the **host/mycompany.idm.example.com** Kerberos principal for the **HTTP/client.idm.example.com** service.

#### Additional resources

- See [Managing Kerberos principal aliases for users, hosts, and services](#) .

## 80.8. ENSURING THE ABSENCE OF AN HTTP SERVICE IN IDM USING AN ANSIBLE PLAYBOOK

Follow this procedure to unenroll a service from IdM. More specifically, it describes how to use an Ansible playbook to ensure the absence of an HTTP server named **HTTP/client.idm.example.com** in IdM.

#### Prerequisites

- You have the IdM administrator password.

#### Procedure

1. Create an inventory file, for example **inventory.file**:

```
$ touch inventory.file
```

2. Open the **inventory.file** and define the IdM server that you want to configure in the **[ipaserver]** section. For example, to instruct Ansible to configure **server.idm.example.com**, enter:

```

[ipaserver]
server.idm.example.com

```

3. Make a copy of the `/usr/share/doc/ansible-freeipa/playbooks/service/service-is-absent.yml` Ansible playbook file. For example:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/service/service-is-absent.yml
   /usr/share/doc/ansible-freeipa/playbooks/service/service-is-absent-copy.yml
```

4. Open the `/usr/share/doc/ansible-freeipa/playbooks/service/service-is-absent-copy.yml` Ansible playbook file for editing.

5. Adapt the file by changing the following:

- The IdM administrator password defined by the `ipaadmin_password` variable.
- The Kerberos principal of the HTTP service, as defined by the `name` variable of the `ipaservice` task.

After being adapted for the current example, the copied file looks like this:

```
---
- name: Playbook to manage IPA service.
  hosts: ipaserver
  gather_facts: false

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  # Ensure service is absent
  - ipaservice:
    ipaadmin_password: "{{ ipaadmin_password }}"
    name: HTTP/client.idm.example.com
    state: absent
```

6. Save and exit the file.
7. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the `secret.yml` file, and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i
  path_to_inventory_directory/inventory.file /usr/share/doc/ansible-
  freeipa/playbooks/service/service-is-absent-copy.yml
```

### Verification steps

1. Log into the IdM Web UI as IdM administrator.
2. Navigate to **Identity → Services**.

If you cannot see the `HTTP/client.idm.example.com@IDM.EXAMPLE.COM` service in the **Services** list, you have successfully ensured its absence in IdM.

## 80.9. ADDITIONAL RESOURCES

- See the `README-service.md` Markdown file in the `/usr/share/doc/ansible-freeipa/` directory.
- See sample playbooks in the `/usr/share/doc/ansible-freeipa/playbooks/config` directory.

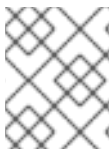
## CHAPTER 81. ENABLING AD USERS TO ADMINISTER IDM

### 81.1. ID OVERRIDES FOR AD USERS

In Red Hat Enterprise Linux (RHEL) 7, external group membership allows Active Directory (AD) users and groups to access Identity Management (IdM) resources in a POSIX environment with the help of the System Security Services Daemon (SSSD).

The IdM LDAP server has its own mechanisms to grant access control. RHEL 8 introduces an update that allows adding an ID user override for an AD user as a member of an IdM group. An ID override is a record describing what a specific Active Directory user or group properties should look like within a specific ID view, in this case the **Default Trust View**. As a consequence of the update, the IdM LDAP server is able to apply access control rules for the IdM group to the AD user.

AD users are now able to use the self service features of IdM UI, for example to upload their SSH keys, or change their personal data. An AD administrator is able to fully administer IdM without having two different accounts and passwords.



#### NOTE

Currently, selected features in IdM may still be unavailable to AD users. For example, setting passwords for IdM users as an AD user from the IdM **admins** group might fail.



#### IMPORTANT

Do **not** use ID overrides of AD users for **sudo** rules in IdM. ID overrides of AD users represent only POSIX attributes of AD users, not AD users themselves.

#### Additional resources

- [Using ID views for Active Directory users](#)

### 81.2. USING ID OVERRIDES TO ENABLE AD USERS TO ADMINISTER IDM

Follow this procedure to create and use an ID override for an AD user to give that user rights identical to those of an IdM user. During this procedure, work on an IdM server that is configured as a trust controller or a trust agent.

#### Prerequisites

- The **idm:DL1** stream is enabled on your Identity Management (IdM) server and you have switched to the RPMs delivered through this stream:

```
# yum module enable idm:DL1
# yum distro-sync
```

- The **idm:DL1/adtrust** profile is installed on your IdM server.

```
# yum module install idm:DL1/adtrust
```

The profile contains all the packages necessary for installing an IdM server that will have a trust agreement with Active Directory (AD).

- A working IdM environment is set up. For details, see [Installing Identity Management](#).
- A working trust between your IdM environment and AD is set up.

## Procedure

1. As an IdM administrator, create an ID override for an AD user in the **Default Trust View**. For example, to create an ID override for the user **ad\_user@ad.example.com**:

```
# kinit admin
# ipa idoverrideuser-add 'default trust view' ad_user@ad.example.com
```

2. Add the ID override from the **Default Trust View** as a member of an IdM group. This must be a non-POSIX group, as it interacts with Active Directory.  
If the group in question is a member of an IdM role, the AD user represented by the ID override gains all permissions granted by the role when using the IdM API, including both the command line interface and the IdM web UI.

For example, to add the ID override for the **ad\_user@ad.example.com** user to the IdM **admins** group:

```
# ipa group-add-member admins --idoverrideusers=ad_user@ad.example.com
```

3. Alternatively, you can add the ID override to a role, such as the **User Administrator** role:

```
# ipa role-add-member 'User Administrator' --
idoverrideusers=ad_user@ad.example.com
```

## Additional resources

- [Using ID views for Active Directory users](#)

## 81.3. USING ANSIBLE TO ENABLE AD USERS TO ADMINISTER IDM

Follow this procedure to use an Ansible playbook to ensure that a user ID override is present in an Identity Management (IdM) group. The user ID override is the override of an Active Directory (AD) user that you created in the Default Trust View after you established a trust with AD. As a result of running the playbook, an AD user, for example an AD administrator, is able to fully administer IdM without having two different accounts and passwords.

## Prerequisites

- You know the IdM **admin** password.
- You have [installed a trust with AD](#).
- The user ID override of the AD user already exists in IdM. If it does not, create it with the **ipa idoverrideuser-add 'default trust view' ad\_user@ad.example.com** command.
- The [group to which you are adding the user ID override already exists in IdM](#).

- You are using the 4.8.7 version of IdM or later. To view the version of IdM you have installed on your server, enter **ipa --version**.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the **ansible-freeipa** package on the Ansible controller.
  - The example assumes that in the **~/MyPlaybooks/** directory, you have created an **Ansible inventory file** with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipaadmin\_password**.

## Procedure

1. Navigate to your **~/MyPlaybooks/** directory:

```
$ cd ~/MyPlaybooks/
```

2. Create an **add-useridoverride-to-group.yml** playbook with the following content:

```
---
- name: Playbook to ensure presence of users in a group
  hosts: ipaserver

  - name: Ensure the ad_user@ad.example.com user ID override is a member of the admins
    group:
      ipagroup:
        ipaadmin_password: "{{ ipaadmin_password }}"
        name: admins
        idoverrideuser:
          - ad_user@ad.example.com
```

In the example:

- Secret123 is the IdM **admin** password.
  - **admins** is the name of the IdM POSIX group to which you are adding the **ad\_user@ad.example.com** ID override. Members of this group have full administrator privileges.
  - **ad\_user@ad.example.com** is the user ID override of an AD administrator. The user is stored in the AD domain with which a trust has been established.
3. Save the file.
  4. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the **secret.yml** file, and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory add-
useridoverride-to-group.yml
```

## Additional resources

- [ID overrides for AD users](#)
- `/usr/share/doc/ansible-freeipa/README-group.md`
- `/usr/share/doc/ansible-freeipa/playbooks/user`
- [Using ID views in Active Directory environments](#)

## 81.4. VERIFYING THAT AN AD USER CAN PERFORM CORRECT COMMANDS IN THE IDM CLI

This procedure checks that an Active Directory (AD) user can log into Identity Management (IdM) command-line interface (CLI) and run commands appropriate for his role.

1. Destroy the current Kerberos ticket of the IdM administrator:

```
# kdestroy -A
```



### NOTE

The destruction of the Kerberos ticket is required because the GSSAPI implementation in MIT Kerberos chooses credentials from the realm of the target service by preference, which in this case is the IdM realm. This means that if a credentials cache collection, namely the **KCM:**, **KEYRING:**, or **DIR:** type of credentials cache is in use, a previously obtained **admin** or any other IdM principal's credentials will be used to access the IdM API instead of the AD user's credentials.

2. Obtain the Kerberos credentials of the AD user for whom an ID override has been created:

```
# kinit ad_user@AD.EXAMPLE.COM
Password for ad_user@AD.EXAMPLE.COM:
```

3. Test that the ID override of the AD user enjoys the same privileges stemming from membership in the IdM group as any IdM user in that group. If the ID override of the AD user has been added to the **admins** group, the AD user can, for example, create groups in IdM:

```
# ipa group-add some-new-group
-----
Added group "some-new-group"
-----
Group name: some-new-group
GID: 1997000011
```



## CHAPTER 82. CONFIGURING THE DOMAIN RESOLUTION ORDER TO RESOLVE SHORT AD USER NAMES

By default, you must specify fully qualified names in the format **user\_name@domain.com** or **domain.com\user\_name** to resolve and authenticate users and groups from an Active Directory (AD) environment. The following sections describe how to configure IdM servers and clients to resolve short AD usernames and group names.

- [How domain resolution order works](#)
- [Setting the global domain resolution order on an IdM server](#)
- [Setting the domain resolution order for an ID view on an IdM server](#)
- [Setting the domain resolution order in SSSD on an IdM client](#)

### 82.1. HOW DOMAIN RESOLUTION ORDER WORKS

In Identity Management (IdM) environments with an Active Directory (AD) trust, Red Hat recommends that you resolve and authenticate users and groups by specifying their fully qualified names. For example:

- **<idm\_username>@idm.example.com** for IdM users from the **idm.example.com** domain
- **<ad\_username>@ad.example.com** for AD users from the **ad.example.com** domain

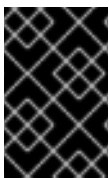
By default, if you perform user or group lookups using the *short name* format, such as **ad\_username**, IdM only searches the IdM domain and fails to find the AD users or groups. To resolve AD users or groups using short names, change the order in which IdM searches multiple domains by setting the **domain resolution order** option.

You can set the domain resolution order centrally in the IdM database or in the SSSD configuration of individual clients. IdM evaluates domain resolution order in the following order of priority:

- The local **/etc/sss/sssd.conf** configuration.
- The ID view configuration.
- The global IdM configuration.

#### Notes

- You must use fully qualified usernames if the SSSD configuration on the host includes the **default\_domain\_suffix** option and you want to make a request to a domain not specified with this option.
- If you use the **domain resolution order** option and query the **compat** tree, you might receive multiple user IDs (UIDs). If this might affect you, see Pagure bug report [Inconsistent compat user objects for AD users when domain resolution order is set](#).



#### IMPORTANT

Do not use the **full\_name\_format** SSSD option on IdM clients or IdM servers. Using a non-default value for this option changes how usernames are displayed and might disrupt lookups in an IdM environment.

### Additional resources

- [Active Directory Trust for Legacy Linux Clients](#) .

## 82.2. SETTING THE GLOBAL DOMAIN RESOLUTION ORDER ON AN IDM SERVER

This procedure sets the domain resolution order for all the clients in the IdM domain. This example sets the domain resolution order to search for users and groups in the following order:

1. Active Directory (AD) root domain **ad.example.com**
2. AD child domain **subdomain1.ad.example.com**
3. IdM domain **idm.example.com**

### Prerequisites

- You have configured a trust with an AD environment.

### Procedure

- Use the **ipa config-mod --domain-resolution-order** command to list the domains to be searched in your preferred order. Separate the domains with a colon (:).

```
[user@server ~]$ ipa config-mod --domain-resolution-  
order='ad.example.com:subdomain1.ad.example.com:idm.example.com'  
Maximum username length: 32  
Home directory base: /home  
...  
Domain Resolution Order:  
ad.example.com:subdomain1.ad.example.com:idm.example.com  
...
```

### Verification steps

- Verify you can retrieve user information for a user from the **ad.example.com** domain using only a short name.

```
[root@client ~]# id <ad_username>  
uid=1916901102(ad_username) gid=1916900513(domain users)  
groups=1916900513(domain users)
```

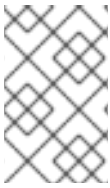
## 82.3. SETTING THE DOMAIN RESOLUTION ORDER FOR AN ID VIEW ON AN IDM SERVER

This procedure sets the domain resolution order for an ID view that you can apply to a specific set of IdM servers and clients. This example creates an ID view named **ADsubdomain1\_first** for IdM host **client1.idm.example.com**, and sets the domain resolution order to search for users and groups in the following order:

1. Active Directory (AD) child domain **subdomain1.ad.example.com**

2. AD root domain **ad.example.com**

3. IdM domain **idm.example.com**



## NOTE

The domain resolution order set in an ID view overrides the global domain resolution order, but it does not override any domain resolution order set locally in the SSSD configuration.

## Prerequisites

- You have configured a trust with an AD environment.

## Procedure

1. Create an ID view with the **--domain-resolution-order** option set.

```
[user@server ~]$ ipa idview-add ADsubdomain1_first --desc "ID view for resolving AD
subdomain1 first on client1.idm.example.com" --domain-resolution-order
subdomain1.ad.example.com:ad.example.com:idm.example.com
-----
Added ID View "ADsubdomain1_first"
-----
ID View Name: ADsubdomain1_first
Description: ID view for resolving AD subdomain1 first on client1.idm.example.com
Domain Resolution Order:
subdomain1.ad.example.com:ad.example.com:idm.example.com
```

2. Apply the ID view to IdM hosts.

```
[user@server ~]$ ipa idview-apply ADsubdomain1_first --hosts
client1.idm.example.com
-----
Applied ID View "ADsubdomain1_first"
-----
  hosts: client1.idm.example.com
-----
Number of hosts the ID View was applied to: 1
-----
```

## Verification steps

- Display the details of the ID view.

```
[user@server ~]$ ipa idview-show ADsubdomain1_first --show-hosts
ID View Name: ADsubdomain1_first
Description: ID view for resolving AD subdomain1 first on client1.idm.example.com
Hosts the view applies to: client1.idm.example.com
Domain resolution order:
subdomain1.ad.example.com:ad.example.com:idm.example.com
```

- Verify you can retrieve user information for a user from the **subdomain1.ad.example.com** domain using only a short name.

```
[root@client1 ~]# id <user_from_subdomain1>
uid=1916901106(user_from_subdomain1) gid=1916900513(domain users)
groups=1916900513(domain users)
```

## 82.4. SETTING THE DOMAIN RESOLUTION ORDER IN SSSD ON AN IDM CLIENT

This procedure sets the domain resolution order in the SSSD configuration on an IdM client. This example configures IdM host **client2.idm.example.com** to search for users and groups in the following order:

1. Active Directory (AD) child domain **subdomain1.ad.example.com**
2. AD root domain **ad.example.com**
3. IdM domain **idm.example.com**



### NOTE

The domain resolution order in the local SSSD configuration overrides any global and ID view domain resolution order.

### Prerequisites

- You have configured a trust with an AD environment.

### Procedure

1. Open the **/etc/sss/sssd.conf** file in a text editor.
2. Set the **domain\_resolution\_order** option in the **[sss]** section of the file.

```
domain_resolution_order = subdomain1.ad.example.com, ad.example.com,
idm.example.com
```

3. Save and close the file.
4. Restart the SSSD service to load the new configuration settings.

```
[root@client2 ~]# systemctl restart sssd
```

### Verification Steps

- Verify you can retrieve user information for a user from the **subdomain1.ad.example.com** domain using only a short name.

```
[root@client2 ~]# id <user_from_subdomain1>
uid=1916901106(user_from_subdomain1) gid=1916900513(domain users)
groups=1916900513(domain users)
```

## 82.5. ADDITIONAL RESOURCES

- [Using an ID view to override a user attribute value on an IdM client](#)

## CHAPTER 83. ENABLING AUTHENTICATION USING AD USER PRINCIPAL NAMES IN IDM

### 83.1. USER PRINCIPAL NAMES IN AN AD FOREST TRUSTED BY IDM

As an Identity Management (IdM) administrator, you can allow AD users to use alternative **User Principal Names** (UPNs) to access resources in the IdM domain. A UPN is an alternative user login that AD users authenticate with in the format of **user\_name@KERBEROS-REALM**. As an AD administrator, you can set alternative values for both **user\_name** and **KERBEROS-REALM**, since you can configure both additional Kerberos aliases and UPN suffixes in an AD forest.

For example, if a company uses the Kerberos realm **AD.EXAMPLE.COM**, the default UPN for a user is **user@ad.example.com**. To allow your users to log in using their email addresses, for example **user@example.com**, you can configure **EXAMPLE.COM** as an alternative UPN in AD. Alternative UPNs (also known as *enterprise UPNs*) are especially convenient if your company has recently experienced a merge and you want to provide your users with a unified logon namespace.

UPN suffixes are only visible for IdM when defined in the AD forest root. As an AD administrator, you can define UPNs with the **Active Directory Domain and Trust** utility or the **PowerShell** command line tool.



#### NOTE

To configure UPN suffixes for users, Red Hat recommends to use tools that perform error validation, such as the **Active Directory Domain and Trust** utility.

Red Hat recommends against configuring UPNs through low-level modifications, such as using **ldapmodify** commands to set the **userPrincipalName** attribute for users, because Active Directory does not validate those operations.

After you define a new UPN on the AD side, run the **ipa trust-fetch-domains** command on an IdM server to retrieve the updated UPNs. See [Ensuring that AD UPNs are up-to-date in IdM](#).

IdM stores the UPN suffixes for a domain in the multi-value attribute **ipaNTAdditionalSuffixes** of the subtree **cn=trusted\_domain\_name,cn=ad,cn=trusts,dc=idm,dc=example,dc=com**.

#### Additional resources

- [How to script UPN suffix setup in AD forest root](#)
- [How to manually modify AD user entries and bypass any UPN suffix validation](#)
- [Trust controllers and trust agents](#)

### 83.2. ENSURING THAT AD UPNS ARE UP-TO-DATE IN IDM

After you add or remove a User Principal Name (UPN) suffix in a trusted Active Directory (AD) forest, refresh the information for the trusted forest on an IdM server.

#### Prerequisites

- IdM administrator credentials.

#### Procedure

- Enter the **ipa trust-fetch-domains** command. Note that a seemingly empty output is expected:

```
[root@ipaserver ~]# ipa trust-fetch-domains
Realm-Name: ad.example.com
-----
No new trust domains were found
-----
-----
Number of entries returned 0
-----
```

### Verification steps

- Enter the **ipa trust-show** command to verify that the server has fetched the new UPN. Specify the name of the AD realm when prompted:

```
[root@ipaserver ~]# ipa trust-show
Realm-Name: ad.example.com
Realm-Name: ad.example.com
Domain NetBIOS name: AD
Domain Security Identifier: S-1-5-21-796215754-1239681026-23416912
Trust direction: One-way trust
Trust type: Active Directory domain
UPN suffixes: example.com
```

The output shows that the **example.com** UPN suffix is now part of the **ad.example.com** realm entry.

## 83.3. GATHERING TROUBLESHOOTING DATA FOR AD UPN AUTHENTICATION ISSUES

Follow this procedure to gather troubleshooting data about the User Principal Name (UPN) configuration from your Active Directory (AD) environment and your IdM environment. If your AD users are unable to log in using alternate UPNs, you can use this information to narrow your troubleshooting efforts.

### Prerequisites

- You must be logged in to an IdM Trust Controller or Trust Agent to retrieve information from an AD domain controller.
- You need **root** permissions to modify the following configuration files, and to restart IdM services.

### Procedure

1. Open the **/usr/share/ipa/smb.conf.empty** configuration file in a text editor.
2. Add the following contents to the file.

```
[global]
log level = 10
```

3. Save and close the **/usr/share/ipa/smb.conf.empty** file.

4. Open the **/etc/ipa/server.conf** configuration file in a text editor. If you do not have that file, create one.
5. Add the following contents to the file.

```
[global]
debug = True
```

6. Save and close the **/etc/ipa/server.conf** file.
7. Restart the Apache webserver service to apply the configuration changes:

```
[root@server ~]# systemctl restart httpd
```

8. Retrieve trust information from your AD domain:

```
[root@server ~]# ipa trust-fetch-domains <ad.example.com>
```

9. Review the debugging output and troubleshooting information in the following log files:
  - **/var/log/httpd/error\_log**
  - **/var/log/samba/log.\***

#### Additional resources

- See [Using rpcclient to gather troubleshooting data for AD UPN authentication issues](#) .



## CHAPTER 84. USING CANONICALIZED DNS HOST NAMES IN IDM

DNS canonicalization is disabled by default on Identity Management (IdM) clients to avoid potential security risks. For example, if an attacker controls the DNS server and a host in the domain, the attacker can cause the short host name, such as **demo**, to resolve to a compromised host, such as **malicious.example.com**. In this case, the user connects to a different server than expected.

This procedure describes how to use canonicalized host names on IdM clients.

### 84.1. ADDING AN ALIAS TO A HOST PRINCIPAL

By default, Identity Management (IdM) clients enrolled by using the **ipa-client-install** command do not allow to use short host names in service principals. For example, users can use only **host/demo.example.com@EXAMPLE.COM** instead of **host/demo@EXAMPLE.COM** when accessing a service.

Follow this procedure to add an alias to a Kerberos principal. Note that you can alternatively enable canonicalization of host names in the **/etc/krb5.conf** file. For details, see [Enabling canonicalization of host names in service principals on clients](#).

#### Prerequisites

- The IdM client is installed.
- The host name is unique in the network.

#### Procedure

1. Authenticate to IdM as the **admin** user:

```
$ kinit admin
```

2. Add the alias to the host principal. For example, to add the **demo** alias to the **demo.example.com** host principal:

```
$ ipa host-add-principal demo.example.com --principal=demo
```

### 84.2. ENABLING CANONICALIZATION OF HOST NAMES IN SERVICE PRINCIPALS ON CLIENTS

Follow this procedure to enable canonicalization of host names in services principals on clients.

Note that if you use host principal aliases, as described in [Adding an alias to a host principal](#), you do not need to enable canonicalization.

#### Prerequisites

- The Identity Management (IdM) client is installed.
- You are logged in to the IdM client as the **root** user.
- The host name is unique in the network.

## Procedure

1. Set the **dns\_canonicalize\_hostname** parameter in the **[libdefaults]** section in the **/etc/krb5.conf** file to **false**:

```
[libdefaults]
...
dns_canonicalize_hostname = true
```

## 84.3. OPTIONS FOR USING HOST NAMES WITH DNS HOST NAME CANONICALIZATION ENABLED

If you set **dns\_canonicalize\_hostname = true** in the **/etc/krb5.conf** file as explained in [Enabling canonicalization of host names in service principals on clients](#), you have the following options when you use a host name in a service principal:

- In Identity Management (IdM) environments, you can use the full host name in a service principal, such as **host/demo.example.com@EXAMPLE.COM**.
- In environments without IdM, but if the RHEL host as a member of an Active Directory (AD) domain, no further considerations are required, because AD domain controllers (DC) automatically create service principals for NetBIOS names of the machines enrolled into AD.

## CHAPTER 85. MANAGING GLOBAL DNS CONFIGURATION IN IDM USING ANSIBLE PLAYBOOKS

Using the Red Hat Ansible Engine **dnsconfig** module, you can configure global configuration for Identity Management (IdM) DNS. Settings defined in global DNS configuration are applied to all IdM DNS servers. However, the global configuration has lower priority than the configuration for a specific IdM DNS zone.

The **dnsconfig** module supports the following variables:

- The global forwarders, specifically their IP addresses and the port used for communication.
- The global forwarding policy: only, first, or none. For more details on these types of DNS forward policies, see [DNS forward policies in IdM](#).
- The synchronization of forward lookup and reverse lookup zones.

### Prerequisites

- DNS service is installed on the IdM server. For more information about how to install an IdM server with integrated DNS, see one of the following links:
  - [Installing an IdM server: With integrated DNS, with an integrated CA as the root CA](#)
  - [Installing an IdM server: With integrated DNS, with an external CA as the root CA](#)
  - [Installing an IdM server: With integrated DNS, without a CA](#)

This chapter includes the following sections:

- [How IdM ensures that global forwarders from /etc/resolv.conf are not removed by NetworkManager](#)
- [Ensuring the presence of a DNS global forwarder in IdM using Ansible](#)
- [Ensuring the absence of a DNS global forwarder in IdM using Ansible](#)
- [The \*\*action: member\*\* option in ipadnsconfig ansible-freeipa modules](#)
- [An introduction to \[DNS forward policies in IdM\]\(#\)](#)
- [Using an Ansible playbook to ensure that the forward first policy is set in IdM DNS global configuration](#)
- [Using an Ansible playbook to ensure that global forwarders are disabled in IdM DNS](#)
- [Using an Ansible playbook to ensure that synchronization of forward and reverse lookup zones is disabled in IdM DNS](#)

### 85.1. HOW IDM ENSURES THAT GLOBAL FORWARDERS FROM /ETC/RESOLV.CONF ARE NOT REMOVED BY NETWORKMANAGER

Installing Identity Management (IdM) with integrated DNS configures the **/etc/resolv.conf** file to point to the **127.0.0.1** localhost address:

```
# Generated by NetworkManager
search idm.example.com
nameserver 127.0.0.1
```

In certain environments, such as networks that use **Dynamic Host Configuration Protocol** (DHCP), the **NetworkManager** service may revert changes to the **/etc/resolv.conf** file. To make the DNS configuration persistent, the IdM DNS installation process also configures the **NetworkManager** service in the following way:

1. The DNS installation script creates an **/etc/NetworkManager/conf.d/zzz-ipa.conf** **NetworkManager** configuration file to control the search order and DNS server list:

```
# auto-generated by IPA installer
[main]
dns=default

[global-dns]
searches=$DOMAIN

[global-dns-domain-*]
servers=127.0.0.1
```

2. The **NetworkManager** service is reloaded, which always creates the **/etc/resolv.conf** file with the settings from the last file in the **/etc/NetworkManager/conf.d/** directory. This is in this case the **zzz-ipa.conf** file.



### IMPORTANT

Do not modify the **/etc/resolv.conf** file manually.

## 85.2. ENSURING THE PRESENCE OF A DNS GLOBAL FORWARDER IN IDM USING ANSIBLE

Follow this procedure to use an Ansible playbook to ensure the presence of a DNS global forwarder in IdM. In the example procedure below, the IdM administrator ensures the presence of a DNS global forwarder to a DNS server with an Internet Protocol (IP) v4 address of **7.7.9.9** and IP v6 address of **2001:db8::1:0** on port **53**.

### Prerequisites

- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the **ansible-freeipa** package on the Ansible controller.
  - The example assumes that in the **~/MyPlaybooks/** directory, you have created an **Ansible inventory file** with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipadmin\_password**.

- You know the IdM administrator password.

## Procedure

1. Navigate to the **/usr/share/doc/ansible-freeipa/playbooks/dnsconfig** directory:

```
$ cd /usr/share/doc/ansible-freeipa/playbooks/dnsconfig
```

2. Open your inventory file and make sure that the IdM server that you want to configure is listed in the **[ipaserver]** section. For example, to instruct Ansible to configure **server.idm.example.com**, enter:

```
[ipaserver]
server.idm.example.com
```

3. Make a copy of the **forwarders-absent.yml** Ansible playbook file. For example:

```
$ cp forwarders-absent.yml ensure-presence-of-a-global-forwarder.yml
```

4. Open the **ensure-presence-of-a-global-forwarder.yml** file for editing.

5. Adapt the file by setting the following variables:

- a. Change the **name** variable for the playbook to **Playbook to ensure the presence of a global forwarder in IdM DNS**.
- b. In the **tasks** section, change the **name** of the task to **Ensure the presence of a DNS global forwarder to 7.7.9.9 and 2001:db8::1:0 on port 53**.
- c. In the **forwarders** section of the **ipadnsconfig** portion:
  - i. Change the first **ip\_address** value to the IPv4 address of the global forwarder: **7.7.9.9**.
  - ii. Change the second **ip\_address** value to the IPv6 address of the global forwarder: **2001:db8::1:0**.
  - iii. Verify the **port** value is set to **53**.
- d. Change the **state** to **present**.  
This is the modified Ansible playbook file for the current example:

```
---
- name: Playbook to ensure the presence of a global forwarder in IdM DNS
  hosts: ipaserver

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - name: Ensure the presence of a DNS global forwarder to 7.7.9.9 and 2001:db8::1:0 on port
    53
    ipadnsconfig:
      forwarders:
      - ip_address: 7.7.9.9
```

```
- ip_address: 2001:db8::1:0
  port: 53
  state: present
```

6. Save the file.
7. Run the playbook:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory.file ensure-presence-
of-a-global-forwarder.yml
```

### Additional resources

- See the **README-dnsconfig.md** file in the `/usr/share/doc/ansible-freeipa/` directory.

## 85.3. ENSURING THE ABSENCE OF A DNS GLOBAL FORWARDER IN IDM USING ANSIBLE

Follow this procedure to use an Ansible playbook to ensure the absence of a DNS global forwarder in IdM. In the example procedure below, the IdM administrator ensures the absence of a DNS global forwarder with an Internet Protocol (IP) v4 address of **8.8.6.6** and IP v6 address of **2001:4860:4860::8800** on port **53**.

### Prerequisites

- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the `secret.yml` Ansible vault stores your `ipaadmin_password`.
- You know the IdM administrator password.

### Procedure

1. Navigate to the `/usr/share/doc/ansible-freeipa/playbooks/dnsconfig` directory:

```
$ cd /usr/share/doc/ansible-freeipa/playbooks/dnsconfig
```

2. Open your inventory file and make sure that the IdM server that you want to configure is listed in the `[ipaserver]` section. For example, to instruct Ansible to configure **server.idm.example.com**, enter:

```
[ipaserver]
server.idm.example.com
```

3. Make a copy of the **forwarders-absent.yml** Ansible playbook file. For example:

```
$ cp forwarders-absent.yml ensure-absence-of-a-global-forwarder.yml
```

4. Open the **ensure-absence-of-a-global-forwarder.yml** file for editing.
5. Adapt the file by setting the following variables:
  - a. Change the **name** variable for the playbook to **Playbook to ensure the absence of a global forwarder in IdM DNS**.
  - b. In the **tasks** section, change the **name** of the task to **Ensure the absence of a DNS global forwarder to 8.8.6.6 and 2001:4860:4860::8800 on port 53**.
  - c. In the **forwarders** section of the **ipadnsconfig** portion:
    - i. Change the first **ip\_address** value to the IPv4 address of the global forwarder: **8.8.6.6**.
    - ii. Change the second **ip\_address** value to the IPv6 address of the global forwarder: **2001:4860:4860::8800**.
    - iii. Verify the **port** value is set to **53**.
  - d. Set the **action** variable to **member**.
  - e. Verify the **state** is set to **absent**.

This is the modified Ansible playbook file for the current example:

```
---
- name: Playbook to ensure the absence of a global forwarder in IdM DNS
  hosts: ipaserver

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - name: Ensure the absence of a DNS global forwarder to 8.8.6.6 and
    2001:4860:4860::8800 on port 53
    ipadnsconfig:
      forwarders:
      - ip_address: 8.8.6.6
      - ip_address: 2001:4860:4860::8800
      port: 53
      action: member
      state: absent
```



### IMPORTANT

If you only use the **state: absent** option in your playbook without also using **action: member**, the playbook fails.

6. Save the file.
7. Run the playbook:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory.file ensure-absence-of-a-global-forwarder.yml
```

Additional resources

- The **README-dnsconfig.md** file in the `/usr/share/doc/ansible-freeipa/` directory
- The **action: member** option in `ipadnsconfig` `ansible-freeipa` modules

85.4. THE ACTION: MEMBER OPTION IN IPADNSCONFIG ANSIBLE-FREEIPA MODULES

Excluding global forwarders in Identity Management (IdM) by using the **ansible-freeipa** `ipadnsconfig` module requires using the **action: member** option in addition to the **state: absent** option. If you only use **state: absent** in your playbook without also using **action: member**, the playbook fails. Consequently, to remove all global forwarders, you must specify all of them individually in the playbook. In contrast, the **state: present** option does not require **action: member**.

The following table provides configuration examples for both adding and removing DNS global forwarders that demonstrate the correct use of the `action: member` option. The table shows, in each line:

- The global forwarders configured before executing a playbook
- An excerpt from the playbook
- The global forwarders configured after executing the playbook

Table 85.1. `ipadnsconfig` management of global forwarders

| Forwarders before | Playbook excerpt  | Forwarders after       |
|-------------------|---|------------------------|
| 8.8.6.6           | <pre>[...] tasks: - name: Ensure the presence of DNS global forwarder 8.8.6.7   ipadnsconfig:     forwarders:       - ip_address: 8.8.6.7     state: present</pre>                    | 8.8.6.7                |
| 8.8.6.6           | <pre>[...] tasks: - name: Ensure the presence of DNS global forwarder 8.8.6.7   ipadnsconfig:     forwarders:       - ip_address: 8.8.6.7     action: member     state: present</pre> | 8.8.6.6,       8.8.6.7 |



| Forwarders before   | Playbook excerpt  | Forwarders after   |
|---------------------|---|--|
| 8.8.6.6,<br>8.8.6.7 | <pre>[...] tasks: - name: Ensure the absence of DNS global forwarder 8.8.6.7   ipadnsconfig:     forwarders:       - ip_address: 8.8.6.7       state: absent</pre>                  | Trying to execute the playbook results in an error. The original configuration - 8.8.6.6, 8.8.6.7 - is left unchanged. |
| 8.8.6.6,<br>8.8.6.7 | <pre>[...] tasks: - name: Ensure the absence of DNS global forwarder 8.8.6.7   ipadnsconfig:     forwarders:       - ip_address: 8.8.6.7     action: member     state: absent</pre> | 8.8.6.6  |

## 85.5. DNS FORWARD POLICIES IN IDM

IdM supports the **first** and **only** standard BIND forward policies, as well as the **none** IdM-specific forward policy.

### Forward first (default)

The IdM BIND service forwards DNS queries to the configured forwarder. If a query fails because of a server error or timeout, BIND falls back to the recursive resolution using servers on the Internet. The **forward first** policy is the default policy, and it is suitable for optimizing DNS traffic.

### Forward only

The IdM BIND service forwards DNS queries to the configured forwarder. If a query fails because of a server error or timeout, BIND returns an error to the client. The **forward only** policy is recommended for environments with split DNS configuration.

### None (forwarding disabled)

DNS queries are not forwarded with the **none** forwarding policy. Disabling forwarding is only useful as a zone-specific override for global forwarding configuration. This option is the IdM equivalent of specifying an empty list of forwarders in BIND configuration.



## NOTE

You cannot use forwarding to combine data in IdM with data from other DNS servers. You can only forward queries for specific subzones of the primary zone in IdM DNS.

By default, the BIND service does not forward queries to another server if the queried DNS name belongs to a zone for which the IdM server is authoritative. In such a situation, if the queried DNS name cannot be found in the IdM database, the **NXDOMAIN** answer is returned. Forwarding is not used.

### Example 85.1. Example Scenario

The IdM server is authoritative for the **test.example.** DNS zone. BIND is configured to forward queries to the DNS server with the **192.0.2.254** IP address.

When a client sends a query for the **nonexistent.test.example.** DNS name, BIND detects that the IdM server is authoritative for the **test.example.** zone and does not forward the query to the **192.0.2.254.** server. As a result, the DNS client receives the **NXDomain** error message, informing the user that the queried domain does not exist.

## 85.6. USING AN ANSIBLE PLAYBOOK TO ENSURE THAT THE FORWARD FIRST POLICY IS SET IN IDM DNS GLOBAL CONFIGURATION

Follow this procedure to use an Ansible playbook to ensure that global forwarding policy in IdM DNS is set to **forward first**.

If you use the **forward first** DNS forwarding policy, DNS queries are forwarded to the configured forwarder. If a query fails because of a server error or timeout, BIND falls back to the recursive resolution using servers on the Internet. The forward first policy is the default policy. It is suitable for traffic optimization.

### Prerequisites

- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipaadmin\_password**.
- You know the IdM administrator password.
- Your IdM environment contains an integrated DNS server.

### Procedure

1. Navigate to the `/usr/share/doc/ansible-freeipa/playbooks/dnsconfig` directory:

```
$ cd /usr/share/doc/ansible-freeipa/playbooks/dnsconfig
```

2. Open your inventory file and ensure that the IdM server that you want to configure is listed in the **[ipaserver]** section. For example, to instruct Ansible to configure **server.idm.example.com**, enter:

```
[ipaserver]
server.idm.example.com
```

3. Make a copy of the **set-configuration.yml** Ansible playbook file. For example:

```
$ cp set-configuration.yml set-forward-policy-to-first.yml
```

4. Open the **set-forward-policy-to-first.yml** file for editing.
5. Adapt the file by setting the following variables in the **ipadnsconfig** task section:
  - Set the **ipaadmin\_password** variable to your IdM administrator password.
  - Set the **forward\_policy** variable to **first**.  
Delete all the other lines of the original playbook that are irrelevant. This is the modified Ansible playbook file for the current example:

```
---
- name: Playbook to set global forwarding policy to first
  hosts: ipaserver
  become: true

  tasks:
  - name: Set global forwarding policy to first.
    ipadnsconfig:
      ipaadmin_password: "{{ ipaadmin_password }}"
      forward_policy: first
```

6. Save the file.
7. Run the playbook:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory.file set-forward-policy-to-first.yml
```

#### Additional resources

- See [DNS forward policies in IdM](#) .
- See the **README-dnsconfig.md** file in the **/usr/share/doc/ansible-freeipa/** directory.
- For more sample playbooks, see the **/usr/share/doc/ansible-freeipa/playbooks/dnsconfig** directory.

## 85.7. USING AN ANSIBLE PLAYBOOK TO ENSURE THAT GLOBAL FORWARDERS ARE DISABLED IN IDM DNS

Follow this procedure to use an Ansible playbook to ensure that global forwarders are disabled in IdM DNS. The disabling is done by setting the **forward\_policy** variable to **none**.

Disabling global forwarders causes DNS queries not to be forwarded. Disabling forwarding is only useful as a zone-specific override for global forwarding configuration. This option is the IdM equivalent of specifying an empty list of forwarders in BIND configuration.

## Prerequisites

- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the `secret.yml` Ansible vault stores your `ipaadmin_password`.
- You know the IdM administrator password.
- Your IdM environment contains an integrated DNS server.

## Procedure

1. Navigate to the `/usr/share/doc/ansible-freeipa/playbooks/dnsconfig` directory:

```
$ cd /usr/share/doc/ansible-freeipa/playbooks/dnsconfig
```

2. Open your inventory file and ensure that the IdM server that you want to configure is listed in the **[ipaserver]** section. For example, to instruct Ansible to configure `server.idm.example.com`, enter:

```
[ipaserver]
server.idm.example.com
```

3. Make a copy of the `disable-global-forwarders.yml` Ansible playbook file. For example:

```
$ cp disable-global-forwarders.yml disable-global-forwarders-copy.yml
```

4. Open the `disable-global-forwarders-copy.yml` file for editing.
5. Adapt the file by setting the following variables in the **ipadnsconfig** task section:
  - Set the **ipaadmin\_password** variable to your IdM administrator password.
  - Set the **forward\_policy** variable to **none**.  
This is the modified Ansible playbook file for the current example:

```
---
- name: Playbook to disable global DNS forwarders
  hosts: ipaserver
  become: true
```

```
tasks:
- name: Disable global forwarders.
  ipadsnconfig:
    ipadmin_password: "{{ ipadmin_password }}"
    forward_policy: none
```

6. Save the file.

7. Run the playbook:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory.file disable-
global-forwarders-copy.yml
```

### Additional resources

- See [DNS forward policies in IdM](#) .
- See the **README-dnsconfig.md** file in the `/usr/share/doc/ansible-freeipa/` directory.
- See more sample playbooks in the `/usr/share/doc/ansible-freeipa/playbooks/dnsconfig` directory.

## 85.8. USING AN ANSIBLE PLAYBOOK TO ENSURE THAT SYNCHRONIZATION OF FORWARD AND REVERSE LOOKUP ZONES IS DISABLED IN IDM DNS

Follow this procedure to use an Ansible playbook to ensure that forward and reverse lookup zones are not synchronized in IdM DNS.

### Prerequisites

- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipadmin\_password**.
- You know the IdM administrator password.
- Your IdM environment contains an integrated DNS server.

### Procedure

1. Navigate to the `/usr/share/doc/ansible-freeipa/playbooks/dnsconfig` directory:

```
$ cd /usr/share/doc/ansible-freeipa/playbooks/dnsconfig
```

2. Open your inventory file and ensure that the IdM server that you want to configure is listed in the **[ipaserver]** section. For example, to instruct Ansible to configure **server.idm.example.com**, enter:

```
[ipaserver]
server.idm.example.com
```

3. Make a copy of the **disallow-reverse-sync.yml** Ansible playbook file. For example:

```
$ cp disallow-reverse-sync.yml disallow-reverse-sync-copy.yml
```

4. Open the **disallow-reverse-sync-copy.yml** file for editing.
5. Adapt the file by setting the following variables in the **ipadnsconfig** task section:
  - Set the **ipaadmin\_password** variable to your IdM administrator password.
  - Set the **allow\_sync\_ptr** variable to **no**.
 This is the modified Ansible playbook file for the current example:

```
---
- name: Playbook to disallow reverse record synchronization
  hosts: ipaserver
  become: true

  tasks:
  - name: Disallow reverse record synchronization.
    ipadnsconfig:
      ipaadmin_password: "{{ ipaadmin_password }}"
      allow_sync_ptr: no
```

6. Save the file.
7. Run the playbook:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory.file disallow-
reverse-sync-copy.yml
```

## Additional resources

- See the **README-dnsconfig.md** file in the **/usr/share/doc/ansible-freeipa/** directory.
- For more sample playbooks, see the **/usr/share/doc/ansible-freeipa/playbooks/dnsconfig** directory.

## CHAPTER 86. MANAGING DNS ZONES IN IDM

As Identity Management (IdM) administrator, you can manage how IdM DNS zones work. The chapter describes the following topics and procedures:

- [What DNS zone types are supported in IdM](#)
  - [How to add primary IdM DNS zones using the IdM Web UI](#)
  - [How to add primary IdM DNS zones using the IdM CLI](#)
  - [How to remove primary IdM DNS zones using the IdM Web UI](#)
  - [How to remove primary IdM DNS zones using the IdM CLI](#)
- [What DNS attributes you can configure in IdM](#)
  - [How you can configure these attributes in the IdM Web UI](#)
  - [How you can configure these attributes in the IdM CLI](#)
- [How zone transfers work in IdM](#)
  - [How you can allow zone transfers in the IdM Web UI](#)
  - [How you can allow zone transfers in the IdM CLI](#)

### Prerequisites

- DNS service is installed on the IdM server. For more information about how to install an IdM server with integrated DNS, see one of the following links:
  - [Installing an IdM server: With integrated DNS, with an integrated CA as the root CA](#)
  - [Installing an IdM server: With integrated DNS, with an external CA as the root CA](#)
  - [Installing an IdM server: With integrated DNS, without a CA](#)

## 86.1. SUPPORTED DNS ZONE TYPES

Identity Management (IdM) supports two types of DNS zones: *primary* and *forward* zones. These two types of zones are described here, including an example scenario for DNS forwarding.



### NOTE

This guide uses the BIND terminology for zone types which is different from the terminology used for Microsoft Windows DNS. Primary zones in BIND serve the same purpose as *forward lookup zones* and *reverse lookup zones* in Microsoft Windows DNS. Forward zones in BIND serve the same purpose as *conditional forwarders* in Microsoft Windows DNS.

### Primary DNS zones

Primary DNS zones contain authoritative DNS data and can accept dynamic DNS updates. This behavior is equivalent to the **type master** setting in standard BIND configuration. You can manage primary zones using the **ipa dnszone-\*** commands.

In compliance with standard DNS rules, every primary zone must contain **start of authority** (SOA) and **nameserver** (NS) records. IdM generates these records automatically when the DNS zone is created, but you must copy the NS records manually to the parent zone to create proper delegation.

In accordance with standard BIND behavior, queries for names for which the server is not authoritative are forwarded to other DNS servers. These DNS servers, so called forwarders, may or may not be authoritative for the query.

### Example 86.1. Example scenario for DNS forwarding

The IdM server contains the **test.example.** primary zone. This zone contains an NS delegation record for the **sub.test.example.** name. In addition, the **test.example.** zone is configured with the **192.0.2.254** forwarder IP address for the **sub.test.example** subzone.

A client querying the name **nonexistent.test.example.** receives the **NXDomain** answer, and no forwarding occurs because the IdM server is authoritative for this name.

On the other hand, querying for the **host1.sub.test.example.** name is forwarded to the configured forwarder **192.0.2.254** because the IdM server is not authoritative for this name.

## Forward DNS zones

From the perspective of IdM, forward DNS zones do not contain any authoritative data. In fact, a forward "zone" usually only contains two pieces of information:

- A domain name
- The IP address of a DNS server associated with the domain

All queries for names belonging to the domain defined are forwarded to the specified IP address. This behavior is equivalent to the **type forward** setting in standard BIND configuration. You can manage forward zones using the **ipa dnsforwardzone-\*** commands.

Forward DNS zones are especially useful in the context of IdM-Active Directory (AD) trusts. If the IdM DNS server is authoritative for the **idm.example.com** zone and the AD DNS server is authoritative for the **ad.example.com** zone, then **ad.example.com** is a DNS forward zone for the **idm.example.com** primary zone. That means that when a query comes from an IdM client for the IP address of **somehost.ad.example.com**, the query is forwarded to an AD domain controller specified in the **ad.example.com** IdM DNS forward zone.

## 86.2. ADDING A PRIMARY DNS ZONE IN IDM WEB UI

Follow this procedure to add a primary DNS zone using the Identity Management (IdM) Web UI.

### Prerequisites

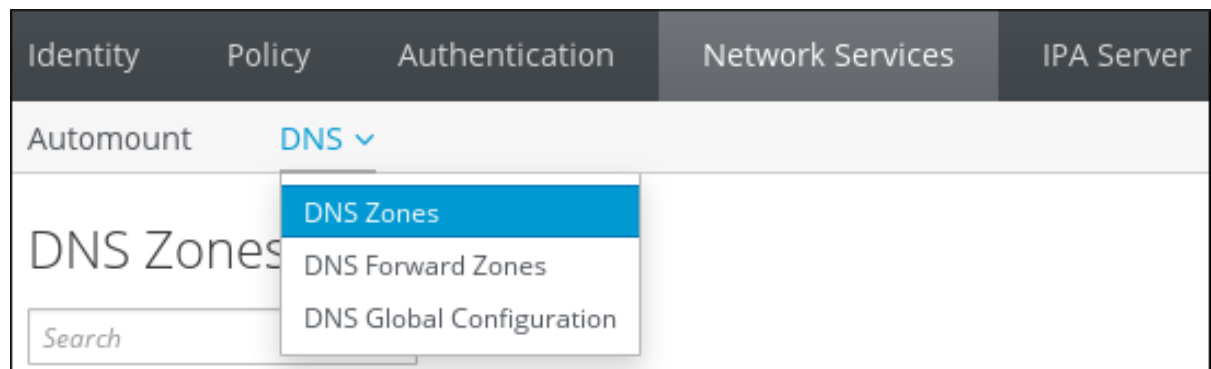
- You are logged in as IdM administrator.

### Procedure

1. In the IdM Web UI, click **Network Services → DNS → DNS Zones**.



Figure 86.1. Managing IdM DNS primary zones



2. Click **Add** at the top of the list of all zones.
3. Provide the zone name.

Figure 86.2. Entering an new IdM primary zone

 The screenshot shows the 'Add DNS Zone' dialog box. It has a title bar with a close button. Inside, there are two radio buttons: 'Zone name' (selected) and 'Reverse zone'. The 'Zone name' field contains 'zone.example.com.'. Below it, the 'Reverse zone' field is empty. A note indicates '\* Required field'. At the bottom, there are four buttons: 'Add', 'Add and Add Another', 'Add and Edit', and 'Cancel'.

4. Click **Add**.

### 86.3. ADDING A PRIMARY DNS ZONE IN IDM CLI

Follow this procedure to add a primary DNS zone using the Identity Management (IdM) command-line interface (CLI).

#### Prerequisites

- You are logged in as IdM administrator.

#### Procedure

- The **ipa dnszone-add** command adds a new zone to the DNS domain. Adding a new zone requires you to specify the name of the new subdomain. You can pass the subdomain name directly with the command:

```
$ ipa dnszone-add newzone.idm.example.com
```

If you do not pass the name to **ipa dnszone-add**, the script prompts for it automatically.

## Additional resources

- See **ipa dnszone-add --help**.

## 86.4. REMOVING A PRIMARY DNS ZONE IN IDM WEB UI

Follow this procedure to remove a primary DNS zone from Identity Management (IdM) using the IdM Web UI.

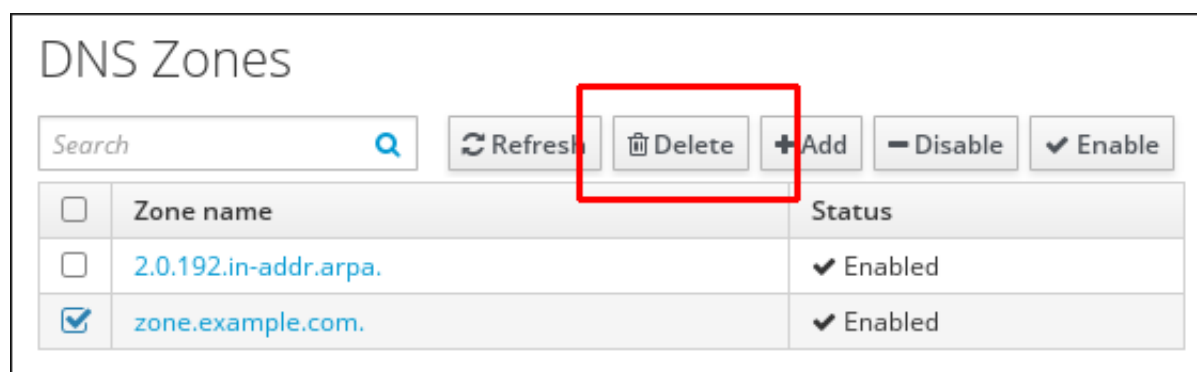
### Prerequisites

- You are logged in as IdM administrator.

### Procedure

1. In the IdM Web UI, click **Network Services** → **DNS** → **DNS Zones**.
2. Select the check box by the zone name and click **Delete**.

Figure 86.3. Removing a primary DNS Zone



3. In the **Remove DNS zones** dialog window, confirm that you want to delete the selected zone.

## 86.5. REMOVING A PRIMARY DNS ZONE IN IDM CLI

Follow this procedure to remove a primary DNS zone from Identity Management (IdM) using the IdM command-line interface (CLI).

### Prerequisites

- You are logged in as IdM administrator.

### Procedure

- To remove a primary DNS zone, enter the **ipa dnszone-del** command, followed by the name of the zone you want to remove. For example:

```
$ ipa dnszone-del idm.example.com
```

## 86.6. DNS CONFIGURATION PRIORITIES

You can configure many DNS configuration options on the following levels. Each level has a different priority.

## Zone-specific configuration

The level of configuration specific for a particular zone defined in IdM has the highest priority. You can manage zone-specific configuration by using the **ipa dnszone-\*** and **ipa dnsforwardzone-\*** commands.

## Per-server configuration

You are asked to define per-server forwarders during the installation of an IdM server. You can manage per-server forwarders by using the **ipa dnsserver-\*** commands. If you do not want to set a per-server forwarder when installing a replica, you can use the **--no-forwarder** option.

## Global DNS configuration

If no zone-specific configuration is defined, IdM uses global DNS configuration stored in LDAP. You can manage global DNS configuration using the **ipa dnsconfig-\*** commands. Settings defined in global DNS configuration are applied to all IdM DNS servers.

## Configuration in `/etc/named.conf`

Configuration defined in the `/etc/named.conf` file on each IdM DNS server has the lowest priority. It is specific for each server and must be edited manually.

The `/etc/named.conf` file is usually only used to specify DNS forwarding to a local DNS cache. Other options are managed using the commands for zone-specific and global DNS configuration mentioned above.

You can configure DNS options on multiple levels at the same time. In such cases, configuration with the highest priority takes precedence over configuration defined at lower levels.

## Additional resources

- The **Priority order of configuration** section in [Per Server Config in LDAP](#)

## 86.7. CONFIGURATION ATTRIBUTES OF PRIMARY IDM DNS ZONES

Identity Management (IdM) creates a new zone with certain default configuration, such as the refresh periods, transfer settings, or cache settings. In [IdM DNS zone attributes](#), you can find the attributes of the default zone configuration that you can modify using one of the following options:

- The **dnszone-mod** command in the command-line interface (CLI). For more information, see [Editing the configuration of a primary DNS zone in IdM CLI](#).
- The IdM Web UI. For more information, see [Editing the configuration of a primary DNS zone in IdM Web UI](#).
- An Ansible playbook that uses the **ipadnszone** module. For more information, see [Managing DNS zones in IdM](#).

Along with setting the actual information for the zone, the settings define how the DNS server handles the *start of authority* (SOA) record entries and how it updates its records from the DNS name server.

**Table 86.1. IdM DNS zone attributes**

| Attribute | Command-Line Option | Description |
|-----------|---------------------|-------------|
|-----------|---------------------|-------------|

| Attribute                    | Command-Line Option                | Description  |
|------------------------------|------------------------------------|--|
| Authoritative name server    | <b>--name-server</b>               | <p>Sets the domain name of the primary DNS name server, also known as SOA MNAME.</p> <p>By default, each IdM server advertises itself in the SOA MNAME field. Consequently, the value stored in LDAP using <b>--name-server</b> is ignored.</p>                  |
| Administrator e-mail address | <b>--admin-email</b>               | Sets the email address to use for the zone administrator. This defaults to the root account on the host.   |
| SOA serial                   | <b>--serial</b>                    | Sets a serial number in the SOA record. Note that IdM sets the version number automatically and users are not expected to modify it.   |
| SOA refresh                  | <b>--refresh</b>                   | Sets the interval, in seconds, for a secondary DNS server to wait before requesting updates from the primary DNS server.   |
| SOA retry                    | <b>--retry</b>                     | Sets the time, in seconds, to wait before retrying a failed refresh operation.   |
| SOA expire                   | <b>--expire</b>                    | Sets the time, in seconds, that a secondary DNS server will try to perform a refresh update before ending the operation attempt.   |
| SOA minimum                  | <b>--minimum</b>                   | Sets the time to live (TTL) value in seconds for negative caching according to <a href="#">RFC 2308</a> .  |
| SOA time to live             | <b>--ttl</b>                       | Sets TTL in seconds for records at zone apex. In zone <b>example.com</b> , for instance, all records (A, NS, or SOA) under name <b>example.com</b> are configured, but no other domain names, like <b>test.example.com</b> , are affected.                       |
| Default time to live         | <b>--default-ttl</b>               | Sets the default time to live (TTL) value in seconds for negative caching for all values in a zone that never had an individual TTL value set before. Requires a restart of the <b>named-pkcs11</b> service on all IdM DNS servers after changes to take effect. |
| BIND update policy           | <b>--update-policy</b>             | Sets the permissions allowed to clients in the DNS zone.   |
| Dynamic update               | <b>--dynamic-update=TRUE FALSE</b> | <p>Enables dynamic updates to DNS records for clients.</p> <p>Note that if this is set to false, IdM client machines will not be able to add or update their IP address.</p>   |

| Attribute       | Command-Line Option                      | Description  |
|-----------------|--|--|
| Allow transfer  | <b>--allow-transfer</b> = <i>string</i>  | Gives a list of IP addresses or network names which are allowed to transfer the given zone, separated by semicolons (;).<br><br>Zone transfers are disabled by default. The default <b>--allow-transfer</b> value is <b>none</b> . |
| Allow query     | <b>--allow-query</b>                     | Gives a list of IP addresses or network names which are allowed to issue DNS queries, separated by semicolons (;).   |
| Allow PTR sync  | <b>--allow-sync-ptr</b> =1 0             | Sets whether A or AAAA records (forward records) for the zone will be automatically synchronized with the PTR (reverse) records.   |
| Zone forwarders | <b>--forwarder</b> = <i>IP_address</i>   | Specifies a forwarder specifically configured for the DNS zone. This is separate from any global forwarders used in the IdM domain.<br><br>To specify multiple forwarders, use the option multiple times.                          |
| Forward policy  | <b>--forward-policy</b> =none only first | Specifies the forward policy. For information about the supported policies, see <a href="#">DNS forward policies in IdM</a> .  |

## 86.8. EDITING THE CONFIGURATION OF A PRIMARY DNS ZONE IN IDM WEB UI

Follow this procedure to edit the configuration attributes of a primary Identity Management (IdM) DNS using the IdM Web UI.

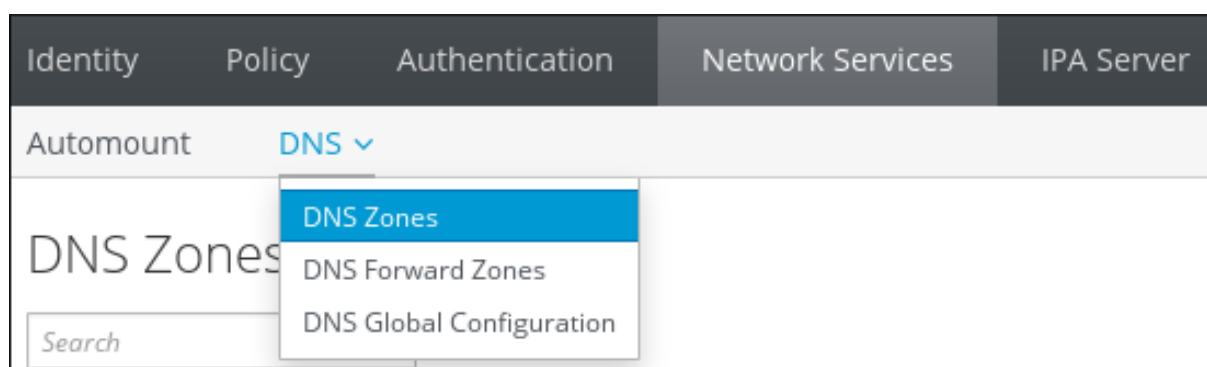
### Prerequisites

- You are logged in as IdM administrator.

### Procedure

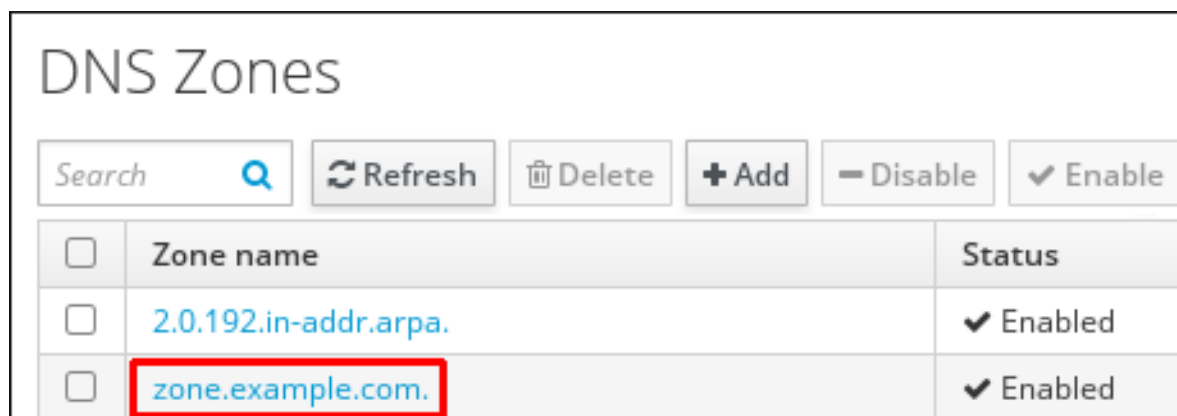
- In the IdM Web UI, click **Network Services** → **DNS** → **DNS Zones**.

Figure 86.4. DNS primary zones management



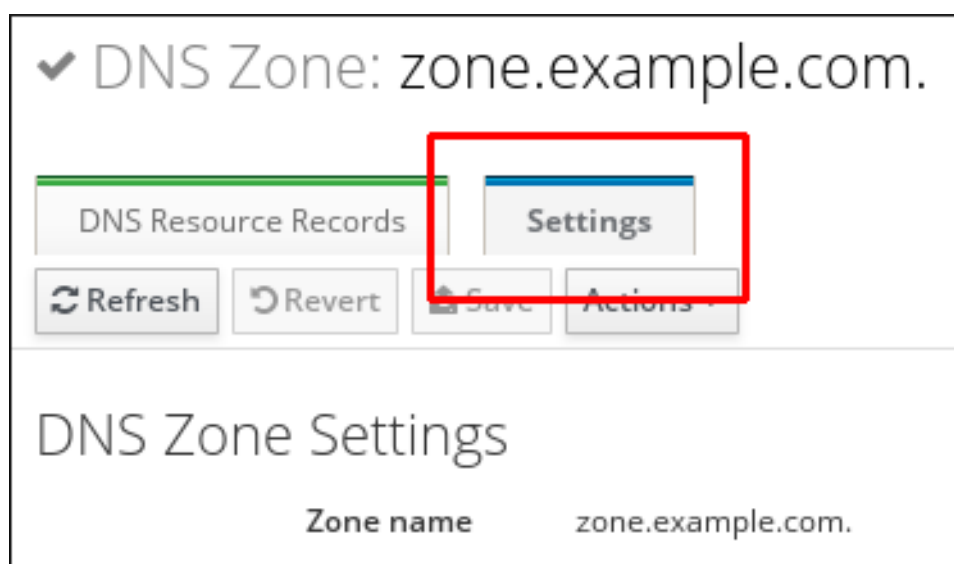
2. In the **DNS Zones** section, click on the zone name in the list of all zones to open the DNS zone page.

Figure 86.5. Editing a primary zone



3. Click **Settings**.

Figure 86.6. The Settings tab in the primary zone edit page



4. Change the zone configuration as required.  
For information about the available settings, see [IdM DNS zone attributes](#).
5. Click **Save** to confirm the new configuration.

**NOTE**

If you are changing the default time to live (TTL) of a zone, restart the **named-pkcs11** service on all IdM DNS servers to make the changes take effect. All other settings are automatically activated immediately.

## 86.9. EDITING THE CONFIGURATION OF A PRIMARY DNS ZONE IN IDM CLI

Follow this procedure to edit the configuration of a primary DNS zone using the Identity Management (IdM) command-line interface (CLI).

### Prerequisites

- You are logged in as IdM administrator.

### Procedure

- To modify an existing primary DNS zone, use the **ipa dnszone-mod** command. For example, to set the time to wait before retrying a failed refresh operation to 1800 seconds:

```
$ ipa dnszone-mod --retry 1800
```

For more information about the available settings and their corresponding CLI options, see [IdM DNS zone attributes](#).

If a specific setting does not have a value in the DNS zone entry you are modifying, the **ipa dnszone-mod** command adds the value. If the setting does not have a value, the command overwrites the current value with the specified value.



### NOTE

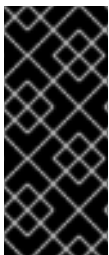
If you are changing the default time to live (TTL) of a zone, restart the **named-pkcs11** service on all IdM DNS servers to make the changes take effect. All other settings are automatically activated immediately.

### Additional resources

- See **ipa dnszone-mod --help**.

## 86.10. ZONE TRANSFERS IN IDM

In an Identity Management (IdM) deployment that has integrated DNS, you can use *zone transfers* to copy all resource records from one name server to another. Name servers maintain authoritative data for their zones. If you make changes to the zone on a DNS server that is authoritative for *zone A* DNS zone, you must distribute the changes among the other name servers in the IdM DNS domain that are outside *zone A*.



### IMPORTANT

The IdM-integrated DNS can be written to by different servers simultaneously. The Start of Authority (SOA) serial numbers in IdM zones are not synchronized among the individual IdM DNS servers. For this reason, configure your DNS servers outside the to-be-transferred zone to only use one specific DNS server inside the to-be-transferred zone. This prevents zone transfer failures caused by non-synchronized SOA serial numbers.

IdM supports zone transfers according to the [RFC 5936](#) (AXFR) and [RFC 1995](#) (IXFR) standards.

### Additional resources

- See [Enabling zone transfers in IdM Web UI](#).
- See [Enabling zone transfers in IdM CLI](#).

## 86.11. ENABLING ZONE TRANSFERS IN IDM WEB UI

Follow this procedure to enable zone transfers in Identity Management (IdM) using the IdM Web UI.

### Prerequisites

- You are logged in as IdM administrator.

### Procedure

1. In the IdM Web UI, click **Network Services** → **DNS** → **DNS Zones**.
2. Click **Settings**.
3. Under **Allow transfer**, specify the name servers to which you want to transfer the zone records.

Figure 86.7. Enabling zone transfers



The screenshot shows a web form titled 'Allow transfer'. It contains three rows, each with a text input field and an 'Undo' button. The input fields contain the IP addresses '192.0.2.1', '198.51.100.1', and '203.0.113.1'. Below these rows are two buttons: 'Add' and 'Undo All'.

4. Click **Save** at the top of the DNS zone page to confirm the new configuration.

## 86.12. ENABLING ZONE TRANSFERS IN IDM CLI

Follow this procedure to enable zone transfers in Identity Management (IdM) using the IdM command-line interface (CLI).

### Prerequisites

- You are logged in as IdM administrator.
- You have root access to the secondary DNS servers.

### Procedure

- To enable zone transfers in the **BIND** service, enter the **ipa dnszone-mod** command, and specify the list of name servers that are outside the to-be-transferred zone to which the zone records will be transferred using the **--allow-transfer** option. For example:

```
$ ipa dnszone-mod --allow-transfer=192.0.2.1;198.51.100.1;203.0.113.1
idm.example.com
```

### Verification steps

1. SSH to one of the DNS servers to which zone transfer has been enabled:



```
$ ssh 192.0.2.1
```

2. Transfer the IdM DNS zone using a tool such as the **dig** utility:

```
# dig @ipa-server zone_name AXFR
```

If the command returns no error, you have successfully enabled zone transfer for *zone\_name*.

## 86.13. ADDITIONAL RESOURCES

- See [Using Ansible playbooks to manage IdM DNS zones](#) .

## CHAPTER 87. USING ANSIBLE PLAYBOOKS TO MANAGE IDM DNS ZONES

As Identity Management (IdM) administrator, you can manage how IdM DNS zones work using the **dnszone** module available in the **ansible-freeipa** package.

- [What DNS zone types are supported in IdM](#)
- [What DNS attributes you can configure in IdM](#)
- [How to use an Ansible playbook to create a primary zone in IdM DNS](#)
- [How to use an Ansible playbook to ensure the presence of a primary IdM DNS zone with multiple variables](#)
- [How to use an Ansible playbook to ensure the presence of a zone for reverse DNS lookup when an IP address is given](#)

### Prerequisites

- DNS service is installed on the IdM server. For more information about how to use Red Hat Ansible Engine to install an IdM server with integrated DNS, see [Installing an Identity Management server using an Ansible playbook](#).

### 87.1. SUPPORTED DNS ZONE TYPES

Identity Management (IdM) supports two types of DNS zones: *primary* and *forward* zones. These two types of zones are described here, including an example scenario for DNS forwarding.



#### NOTE

This guide uses the BIND terminology for zone types which is different from the terminology used for Microsoft Windows DNS. Primary zones in BIND serve the same purpose as *forward lookup zones* and *reverse lookup zones* in Microsoft Windows DNS. Forward zones in BIND serve the same purpose as *conditional forwarders* in Microsoft Windows DNS.

#### Primary DNS zones

Primary DNS zones contain authoritative DNS data and can accept dynamic DNS updates. This behavior is equivalent to the **type master** setting in standard BIND configuration. You can manage primary zones using the **ipa dnszone-\*** commands.

In compliance with standard DNS rules, every primary zone must contain **start of authority** (SOA) and **nameserver** (NS) records. IdM generates these records automatically when the DNS zone is created, but you must copy the NS records manually to the parent zone to create proper delegation.

In accordance with standard BIND behavior, queries for names for which the server is not authoritative are forwarded to other DNS servers. These DNS servers, so called forwarders, may or may not be authoritative for the query.

#### Example 87.1. Example scenario for DNS forwarding

The IdM server contains the **test.example.** primary zone. This zone contains an NS delegation record for the **sub.test.example.** name. In addition, the **test.example.** zone is configured with the **192.0.2.254** forwarder IP address for the **sub.test.example** subzone.

A client querying the name **nonexistent.test.example.** receives the **NXDomain** answer, and no forwarding occurs because the IdM server is authoritative for this name.

On the other hand, querying for the **host1.sub.test.example.** name is forwarded to the configured forwarder **192.0.2.254** because the IdM server is not authoritative for this name.

## Forward DNS zones

From the perspective of IdM, forward DNS zones do not contain any authoritative data. In fact, a forward "zone" usually only contains two pieces of information:

- A domain name
- The IP address of a DNS server associated with the domain

All queries for names belonging to the domain defined are forwarded to the specified IP address. This behavior is equivalent to the **type forward** setting in standard BIND configuration. You can manage forward zones using the **ipa dnsforwardzone-\*** commands.

Forward DNS zones are especially useful in the context of IdM-Active Directory (AD) trusts. If the IdM DNS server is authoritative for the **idm.example.com** zone and the AD DNS server is authoritative for the **ad.example.com** zone, then **ad.example.com** is a DNS forward zone for the **idm.example.com** primary zone. That means that when a query comes from an IdM client for the IP address of **somehost.ad.example.com**, the query is forwarded to an AD domain controller specified in the **ad.example.com** IdM DNS forward zone.

## 87.2. CONFIGURATION ATTRIBUTES OF PRIMARY IDM DNS ZONES

Identity Management (IdM) creates a new zone with certain default configuration, such as the refresh periods, transfer settings, or cache settings. In [IdM DNS zone attributes](#), you can find the attributes of the default zone configuration that you can modify using one of the following options:

- The **dnszone-mod** command in the command-line interface (CLI). For more information, see [Editing the configuration of a primary DNS zone in IdM CLI](#).
- The IdM Web UI. For more information, see [Editing the configuration of a primary DNS zone in IdM Web UI](#).
- An Ansible playbook that uses the **ipadnszone** module. For more information, see [Managing DNS zones in IdM](#).

Along with setting the actual information for the zone, the settings define how the DNS server handles the *start of authority* (SOA) record entries and how it updates its records from the DNS name server.

**Table 87.1. IdM DNS zone attributes**

| Attribute | ansible-freeipa variable | Description |
|-----------|--------------------------|-------------|
|-----------|--------------------------|-------------|

| Attribute                    | ansible-freeipa variable         | Description  |
|------------------------------|----------------------------------|--|
| Authoritative name server    | <b>name_server</b>               | <p>Sets the domain name of the primary DNS name server, also known as SOA MNAME.</p> <p>By default, each IdM server advertises itself in the SOA MNAME field. Consequently, the value stored in LDAP using <b>--name-server</b> is ignored.</p>                  |
| Administrator e-mail address | <b>admin_email</b>               | Sets the email address to use for the zone administrator. This defaults to the root account on the host.   |
| SOA serial                   | <b>serial</b>                    | Sets a serial number in the SOA record. Note that IdM sets the version number automatically and users are not expected to modify it.   |
| SOA refresh                  | <b>refresh</b>                   | Sets the interval, in seconds, for a secondary DNS server to wait before requesting updates from the primary DNS server.   |
| SOA retry                    | <b>retry</b>                     | Sets the time, in seconds, to wait before retrying a failed refresh operation.   |
| SOA expire                   | <b>expire</b>                    | Sets the time, in seconds, that a secondary DNS server will try to perform a refresh update before ending the operation attempt.   |
| SOA minimum                  | <b>minimum</b>                   | Sets the time to live (TTL) value in seconds for negative caching according to <a href="#">RFC 2308</a> .  |
| SOA time to live             | <b>ttl</b>                       | Sets TTL in seconds for records at zone apex. In zone <b>example.com</b> , for instance, all records (A, NS, or SOA) under name <b>example.com</b> are configured, but no other domain names, like <b>test.example.com</b> , are affected.                       |
| Default time to live         | <b>default_ttl</b>               | Sets the default time to live (TTL) value in seconds for negative caching for all values in a zone that never had an individual TTL value set before. Requires a restart of the <b>named-pkcs11</b> service on all IdM DNS servers after changes to take effect. |
| BIND update policy           | <b>update_policy</b>             | Sets the permissions allowed to clients in the DNS zone.   |
| Dynamic update               | <b>dynamic_update=TRUE FALSE</b> | <p>Enables dynamic updates to DNS records for clients.</p> <p>Note that if this is set to false, IdM client machines will not be able to add or update their IP address.</p>   |

| Attribute       | ansible-freeipa variable               | Description  |
|-----------------|--|--|
| Allow transfer  | <b>allow_transfer</b> =string          | Gives a list of IP addresses or network names which are allowed to transfer the given zone, separated by semicolons (;).<br><br>Zone transfers are disabled by default. The default <b>allow_transfer</b> value is <b>none</b> . |
| Allow query     | <b>allow_query</b>                     | Gives a list of IP addresses or network names which are allowed to issue DNS queries, separated by semicolons (;).   |
| Allow PTR sync  | <b>allow_sync_ptr</b> =1 0             | Sets whether A or AAAA records (forward records) for the zone will be automatically synchronized with the PTR (reverse) records.   |
| Zone forwarders | <b>forwarder</b> =IP_address           | Specifies a forwarder specifically configured for the DNS zone. This is separate from any global forwarders used in the IdM domain.<br><br>To specify multiple forwarders, use the option multiple times.                        |
| Forward policy  | <b>forward_policy</b> =none only first | Specifies the forward policy. For information about the supported policies, see <a href="#">DNS forward policies in IdM</a> .  |

### Additional resources

- See the **README-dnszone.md** file in the `/usr/share/doc/ansible-freeipa/` directory.

## 87.3. USING ANSIBLE TO CREATE A PRIMARY ZONE IN IDM DNS

Follow this procedure to use an Ansible playbook to ensure that a primary DNS zone exists. In the example used in the procedure below, you ensure the presence of the **zone.idm.example.com** DNS zone.

### Prerequisites

- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipadmin\_password**.
- You know the IdM administrator password.

### Procedure

1. Navigate to the **/usr/share/doc/ansible-freeipa/playbooks/dnszone** directory:

```
$ cd /usr/share/doc/ansible-freeipa/playbooks/dnszone
```

2. Open your inventory file and ensure that the IdM server that you want to configure is listed in the **[ipaserver]** section. For example, to instruct Ansible to configure **server.idm.example.com**, enter:

```
[ipaserver]
server.idm.example.com
```

3. Make a copy of the **dnszone-present.yml** Ansible playbook file. For example:

```
$ cp dnszone-present.yml dnszone-present-copy.yml
```

4. Open the **dnszone-present-copy.yml** file for editing.
5. Adapt the file by setting the following variables in the **ipadnszone** task section:
  - Set the **ipaadmin\_password** variable to your IdM administrator password.
  - Set the **zone\_name** variable to **zone.idm.example.com**.  
This is the modified Ansible playbook file for the current example:

```
---
- name: Ensure dnszone present
  hosts: ipaserver
  become: true

  tasks:
    - name: Ensure zone is present.
      ipadnszone:
        ipaadmin_password: "{{ ipaadmin_password }}"
        zone_name: zone.idm.example.com
        state: present
```

6. Save the file.
7. Run the playbook:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory.file dnszone-present-copy.yml
```

### Additional resources

- See [Supported DNS zone types](#).
- See the **README-dnszone.md** file in the **/usr/share/doc/ansible-freeipa/** directory.
- See sample Ansible playbooks in the **/usr/share/doc/ansible-freeipa/playbooks/dnszone** directory.

## 87.4. USING AN ANSIBLE PLAYBOOK TO ENSURE THE PRESENCE OF A PRIMARY DNS ZONE IN IDM WITH MULTIPLE VARIABLES

Follow this procedure to use an Ansible playbook to ensure that a primary DNS zone exists. In the example used in the procedure below, an IdM administrator ensures the presence of the **zone.idm.example.com** DNS zone. The Ansible playbook configures multiple parameters of the zone.

### Prerequisites

- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipaadmin\_password**.
- You know the IdM administrator password.

### Procedure

1. Navigate to the `/usr/share/doc/ansible-freeipa/playbooks/dnszone` directory:

```
$ cd /usr/share/doc/ansible-freeipa/playbooks/dnszone
```

2. Open your inventory file and ensure that the IdM server that you want to configure is listed in the **[ipaserver]** section. For example, to instruct Ansible to configure **server.idm.example.com**, enter:

```
[ipaserver]
server.idm.example.com
```

3. Make a copy of the **dnszone-all-params.yml** Ansible playbook file. For example:

```
$ cp dnszone-all-params.yml dnszone-all-params-copy.yml
```

4. Open the **dnszone-all-params-copy.yml** file for editing.
5. Adapt the file by setting the following variables in the **ipadnszone** task section:
  - Set the **ipaadmin\_password** variable to your IdM administrator password.
  - Set the **zone\_name** variable to **zone.idm.example.com**.
  - Set the **allow\_sync\_ptr** variable to true if you want to allow the synchronization of forward and reverse records, that is the synchronization of A and AAAA records with PTR records.
  - Set the **dynamic\_update** variable to true to enable IdM client machines to add or update their IP addresses.
  - Set the **dnssec** variable to true to allow inline DNSSEC signing of records in the zone.

- Set the **allow\_transfer** variable to the IP addresses of secondary name servers in the zone.
- Set the **allow\_query** variable to the IP addresses or networks that are allowed to issue queries.
- Set the **forwarders** variable to the IP addresses of global forwarders.
- Set the **serial** variable to the SOA record serial number.
- Define the **refresh**, **retry**, **expire**, **minimum**, **ttl**, and **default\_ttl** values for DNS records in the zone.
- Define the NSEC3PARAM record for the zone using the **nsec3param\_rec** variable.
- Set the **skip\_overlap\_check** variable to true to force DNS creation even if it overlaps with an existing zone.
- Set the **skip\_nameserver\_check** to true to force DNS zone creation even if the nameserver is not resolvable.

This is the modified Ansible playbook file for the current example:

```
---
- name: Ensure dnszone present
  hosts: ipaserver
  become: true

  tasks:
    - name: Ensure zone is present.
      ipadszone:
        ipadmin_password: "{{ ipadmin_password }}"
        zone_name: zone.idm.example.com
        allow_sync_ptr: true
        dynamic_update: true
        dnssec: true
        allow_transfer:
          - 1.1.1.1
          - 2.2.2.2
        allow_query:
          - 1.1.1.1
          - 2.2.2.2
        forwarders:
          - ip_address: 8.8.8.8
          - ip_address: 8.8.4.4
            port: 52
        serial: 1234
        refresh: 3600
        retry: 900
        expire: 1209600
        minimum: 3600
        ttl: 60
        default_ttl: 90
        name_server: server.idm.example.com.
        admin_email: admin.admin@idm.example.com
        nsec3param_rec: "1 7 100 0123456789abcdef"
```



```
skip_overlap_check: true
skip_nameserver_check: true
state: present
```

6. Save the file.
7. Run the playbook:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory.file dnszone-all-params-copy.yml
```

### Additional resources

- See [Supported DNS zone types](#).
- See [Configuration attributes of primary IdM DNS zones](#).
- See the **README-dnszone.md** file in the `/usr/share/doc/ansible-freeipa/` directory.
- See sample Ansible playbooks in the `/usr/share/doc/ansible-freeipa/playbooks/dnszone` directory.

## 87.5. USING AN ANSIBLE PLAYBOOK TO ENSURE THE PRESENCE OF A ZONE FOR REVERSE DNS LOOKUP WHEN AN IP ADDRESS IS GIVEN

Follow this procedure to use an Ansible playbook to ensure that a reverse DNS zone exists. In the example used in the procedure below, an IdM administrator ensures the presence of a reverse DNS lookup zone using the IP address and prefix length of an IdM host.

Providing the prefix length of the IP address of your DNS server using the **name\_from\_ip** variable allows you to control the zone name. If you do not state the prefix length, the system queries DNS servers for zones and, based on the **name\_from\_ip** value of `192.168.1.2`, the query can return any of the following DNS zones:

- `1.168.192.in-addr.arpa.`
- `168.192.in-addr.arpa.`
- `192.in-addr.arpa.`

Because the zone returned by the query might not be what you expect, **name\_from\_ip** can only be used with the **state** option set to **present** to prevent accidental removals of zones.

### Prerequisites

- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipadmin\_password**.

- You know the IdM administrator password.

## Procedure

1. Navigate to the `/usr/share/doc/ansible-freeipa/playbooks/dnszone` directory:

```
$ cd /usr/share/doc/ansible-freeipa/playbooks/dnszone
```

2. Open your inventory file and ensure that the IdM server that you want to configure is listed in the **[ipaserver]** section. For example, to instruct Ansible to configure `server.idm.example.com`, enter:

```
[ipaserver]
server.idm.example.com
```

3. Make a copy of the `dnszone-reverse-from-ip.yml` Ansible playbook file. For example:

```
$ cp dnszone-reverse-from-ip.yml dnszone-reverse-from-ip-copy.yml
```

4. Open the `dnszone-reverse-from-ip-copy.yml` file for editing.
5. Adapt the file by setting the following variables in the **ipadnszone** task section:

- Set the **ipaadmin\_password** variable to your IdM administrator password.
- Set the **name\_from\_ip** variable to the IP of your IdM nameserver, and provide its prefix length.

This is the modified Ansible playbook file for the current example:

```
---
- name: Ensure dnszone present
  hosts: ipaserver
  become: true

  tasks:
    - name: Ensure zone for reverse DNS lookup is present.
      ipadnszone:
        ipaadmin_password: "{{ ipaadmin_password }}"
        name_from_ip: 192.168.1.2/24
        state: present
        register: result
    - name: Display inferred zone name.
      debug:
        msg: "Zone name: {{ result.dnszone.name }}"
```

The playbook creates a zone for reverse DNS lookup from the **192.168.1.2** IP address and its prefix length of 24. Next, the playbook displays the resulting zone name.

6. Save the file.
7. Run the playbook:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory.file dnszone-reverse-from-ip-copy.yml
```

### Additional resources

- See [Supported DNS zone types](#).
- See the **README-dnszone.md** file in the `/usr/share/doc/ansible-freeipa/` directory.
- See sample Ansible playbooks in the `/usr/share/doc/ansible-freeipa/playbooks/dnszone` directory.

## CHAPTER 88. MANAGING DNS LOCATIONS IN IDM

To learn more about managing Identity Management (IdM) DNS locations by using the IdM Web UI and IdM command-line interface (CLI), see the following topics and procedures:

- [DNS-based service discovery](#)
- [Deployment considerations for DNS locations](#)
- [DNS time to live \(TTL\)](#)
- [Creating DNS locations using the IdM Web UI](#)
- [Creating DNS locations using the IdM CLI](#)
- [Assigning an IdM server to a DNS location using the IdM Web UI](#)
- [Assigning an IdM server to a DNS location using the IdM Web UI](#)
- [Configuring an IdM client to use IdM servers in the same location](#)

### 88.1. DNS-BASED SERVICE DISCOVERY

DNS-based service discovery is a process in which a client uses the DNS protocol to locate servers in a network that offer a specific service, such as **LDAP** or **Kerberos**. One typical type of operation is to allow clients to locate authentication servers within the closest network infrastructure, because they provide a higher throughput and lower network latency, lowering overall costs.

The major advantages of service discovery are:

- No need for clients to be explicitly configured with names of nearby servers.
- DNS servers are used as central providers of policy. Clients using the same DNS server have access to the same policy about service providers and their preferred order.

In an Identity Management (IdM) domain, DNS service records (SRV records) exist for **LDAP**, **Kerberos**, and other services. For example, the following command queries the DNS server for hosts providing a TCP-based **Kerberos** service in an IdM DNS domain:

#### Example 88.1. DNS location independent results

```
$ dig -t SRV +short _kerberos._tcp.idm.example.com
0 100 88 idmserver-01.idm.example.com.
0 100 88 idmserver-02.idm.example.com.
```

The output contains the following information:

- **0** (priority): Priority of the target host. A lower value is preferred.
- **100** (weight). Specifies a relative weight for entries with the same priority. For further information, see [RFC 2782, section 3](#).
- **88** (port number): Port number of the service.
- Canonical name of the host providing the service.

In the example, the two host names returned have the same priority and weight. In this case, the client uses a random entry from the result list.

When the client is, instead, configured to query a DNS server that is configured in a DNS location, the output differs. For IdM servers that are assigned to a location, tailored values are returned. In the example below, the client is configured to query a DNS server in the location **germany**:

### Example 88.2. DNS location-based results

```
$ dig -t SRV +short _kerberos._tcp.idm.example.com
_kerberos._tcp.germany._locations.idm.example.com.
0 100 88 idmserver-01.idm.example.com.
50 100 88 idmserver-02.idm.example.com.
```

The IdM DNS server automatically returns a DNS alias (CNAME) pointing to a DNS location specific SRV record which prefers local servers. This CNAME record is shown in the first line of the output. In the example, the host **idmserver-01.idm.example.com** has the lowest priority value and is therefore preferred. The **idmserver-02.idm.example.com** has a higher priority and thus is used only as backup for cases when the preferred host is unavailable.

## 88.2. DEPLOYMENT CONSIDERATIONS FOR DNS LOCATIONS

Identity Management (IdM) can generate location-specific service (SRV) records when using the integrated DNS. Because each IdM DNS server generates location-specific SRV records, you have to install at least one IdM DNS server in each DNS location.

The client's affinity to a DNS location is only defined by the DNS records received by the client. For this reason, you can combine IdM DNS servers with non-IdM DNS consumer servers and recursors if the clients doing DNS service discovery resolve location-specific records from IdM DNS servers.

In the majority of deployments with mixed IdM and non-IdM DNS services, DNS recursors select the closest IdM DNS server automatically by using round-trip time metrics. Typically, this ensures that clients using non-IdM DNS servers are getting records for the nearest DNS location and thus use the optimal set of IdM servers.

## 88.3. DNS TIME TO LIVE (TTL)

Clients can cache DNS resource records for an amount of time that is set in the zone's configuration. Because of this caching, a client might not be able to receive the changes until the time to live (TTL) value expires. The default TTL value in Identity Management (IdM) is **1 day**.

If your client computers roam between sites, you should adapt the TTL value for your IdM DNS zone. Set the value to a lower value than the time clients need to roam between sites. This ensures that cached DNS entries on the client expire before they reconnect to another site and thus query the DNS server to refresh location-specific SRV records.

### Additional resources

- See [Configuration attributes of primary IdM DNS zones](#) .

## 88.4. CREATING DNS LOCATIONS USING THE IDM WEB UI

You can use DNS locations to increase the speed of communication between Identity Management (IdM) clients and servers. Follow this procedure to create a DNS location using the IdM Web UI.

### Prerequisites

- Your IdM deployment has integrated DNS.
- You have a permission to create DNS locations in IdM. For example, you are logged in as IdM admin.

### Procedure

1. Open the **IPA Server** tab.
2. Select **Topology** subtab.
3. Click **IPA Locations** in the navigation bar.
4. Click **Add** at the top of the locations list.
5. Fill in the location name.
6. Click the **Add** button to save the location.
7. Optional: Repeat the steps to add further locations.

### Additional resources

- See [Assigning an IdM server to a DNS location using the IdM Web UI](#) .
- See [Using Ansible to ensure an IdM location is present](#) .

## 88.5. CREATING DNS LOCATIONS USING THE IDM CLI

You can use DNS locations to increase the speed of communication between Identity Management (IdM) clients and servers. Follow this procedure to create DNS locations using the **ipa location-add** command in the IdM command-line interface (CLI).

### Prerequisites

- Your IdM deployment has integrated DNS.
- You have a permission to create DNS locations in IdM. For example, you are logged in as IdM admin.

### Procedure

1. For example, to create a new location **germany**, enter:

```
$ ipa location-add germany
-----
Added IPA location "germany"
-----
Location name: germany
```

2. Optional: Repeat the step to add further locations.

### Additional resources

- See [Assigning an IdM Server to a DNS Location using the IdM CLI](#) .
- See [Using Ansible to ensure an IdM location is present](#) .

## 88.6. ASSIGNING AN IDM SERVER TO A DNS LOCATION USING THE IDM WEB UI

You can use Identity Management (IdM) DNS locations to increase the speed of communication between IdM clients and servers. Follow this procedure to assign IdM servers to DNS locations using the IdM Web UI.

### Prerequisites

- Your IdM deployment has integrated DNS.
- You are logged in as a user with a permission to assign a server to a DNS location, for example the IdM admin user.
- You have **root** access to the host that you want to assign a DNS location to.
- You have [created the IdM DNS locations](#) to which you want to assign servers.

### Procedure

1. Open the **IPA Server** tab.
2. Select the **Topology** subtab.
3. Click **IPA Servers** in the navigation.
4. Click on the IdM server name.
5. Select a DNS location, and optionally set a service weight:

Figure 88.1. Assigning a server to a DNS location

IPA Server: idmserver-01.idm.example.com

Refresh Revert Save

|                  |                               |
|------------------|-------------------------------|
| Server name      | idmserver-01.idm.example.com. |
| Min domain level | 0                             |
| Max domain level | 1                             |
| Managed suffixes | domain<br>ca                  |
| Location         | germany                       |
| Service weight   | 100                           |

- Click **Save**.
- In the command-line interface (CLI) of the host you assigned in the previous steps the DNS location to, restart the **named-pkcs11** service:

```
[root@idmserver-01 ~]# systemctl restart named-pkcs11
```

- Optional: Repeat the steps to assign DNS locations to further IdM servers.

#### Additional resources

- See [Configuring an IdM client to use IdM servers in the same location](#) .

## 88.7. ASSIGNING AN IDM SERVER TO A DNS LOCATION USING THE IDM CLI

You can use Identity Management (IdM) DNS locations to increase the speed of communication between IdM clients and servers. Follow this procedure to assign IdM servers to DNS locations using the IdM command-line interface (CLI).

#### Prerequisites

- Your IdM deployment has integrated DNS.
- You are logged in as a user with a permission to assign a server to a DNS location, for example the IdM admin user.
- You have **root** access to the host that you want to assign a DNS location to.
- You have [created the IdM DNS locations](#) to which you want to assign servers.

#### Procedure



- Optional: List all configured DNS locations:

```
[root@server ~]# ipa location-find
-----
2 IPA locations matched
-----
Location name: australia
Location name: germany
-----
Number of entries returned: 2
-----
```

- Assign the server to the DNS location. For example, to assign the location **germany** to the server **idmserver-01.idm.example.com**, run:

```
# ipa server-mod idmserver-01.idm.example.com --location=germany
ipa: WARNING: Service named-pkcs11.service requires restart on IPA server
idmserver-01.idm.example.com to apply configuration changes.
-----
Modified IPA server "idmserver-01.idm.example.com"
-----
Servername: idmserver-01.idm.example.com
Min domain level: 0
Max domain level: 1
Location: germany
Enabled server roles: DNS server, NTP server
```

- Restart the **named-pkcs11** service on the host you assigned in the previous steps the DNS location to:

```
# systemctl restart named-pkcs11
```

- Optional: Repeat the steps to assign DNS locations to further IdM servers.

### Additional resources

- See [Configuring an IdM client to use IdM servers in the same location](#) .

## 88.8. CONFIGURING AN IDM CLIENT TO USE IDM SERVERS IN THE SAME LOCATION

Identity Management (IdM) servers are assigned to DNS locations as described in [Assigning an IdM server to a DNS location using the IdM Web UI](#). Now you can configure the clients to use a DNS server that is in the same location as the IdM servers:

- If a **DHCP** server assigns the DNS server IP addresses to the clients, configure the **DHCP** service. For further details about assigning a DNS server in your **DHCP** service, see the **DHCP** service documentation.
- If your clients do not receive the DNS server IP addresses from a **DHCP** server, manually set the IPs in the client's network configuration. For further details about configuring the network on Red Hat Enterprise Linux, see the [Configuring Network Connection Settings](#) section in the *Red Hat Enterprise Linux Networking Guide*.

**NOTE**

If you configure the client to use a DNS server that is assigned to a different location, the client contacts IdM servers in both locations.

**Example 88.3. Different name server entries depending on the location of the client**

The following example shows different name server entries in the `/etc/resolv.conf` file for clients in different locations:

Clients in Prague:

```
nameserver 10.10.0.1
nameserver 10.10.0.2
```

Clients in Paris:

```
nameserver 10.50.0.1
nameserver 10.50.0.3
```

Clients in Oslo:

```
nameserver 10.30.0.1
```

Clients in Berlin:

```
nameserver 10.30.0.1
```

If each of the DNS servers is assigned to a location in IdM, the clients use the IdM servers in their location.

## 88.9. ADDITIONAL RESOURCES

- See [Using Ansible to manage DNS locations in IdM](#) .

## CHAPTER 89. USING ANSIBLE TO MANAGE DNS LOCATIONS IN IDM

As Identity Management (IdM) administrator, you can manage IdM DNS locations using the **location** module available in the **ansible-freeipa** package.

- [DNS-based service discovery](#)
- [Deployment considerations for DNS locations](#)
- [DNS time to live \(TTL\)](#)
- [Using Ansible to ensure an IdM location is present](#)
- [Using Ansible to ensure an IdM location is absent](#)

### 89.1. DNS-BASED SERVICE DISCOVERY

DNS-based service discovery is a process in which a client uses the DNS protocol to locate servers in a network that offer a specific service, such as **LDAP** or **Kerberos**. One typical type of operation is to allow clients to locate authentication servers within the closest network infrastructure, because they provide a higher throughput and lower network latency, lowering overall costs.

The major advantages of service discovery are:

- No need for clients to be explicitly configured with names of nearby servers.
- DNS servers are used as central providers of policy. Clients using the same DNS server have access to the same policy about service providers and their preferred order.

In an Identity Management (IdM) domain, DNS service records (SRV records) exist for **LDAP**, **Kerberos**, and other services. For example, the following command queries the DNS server for hosts providing a TCP-based **Kerberos** service in an IdM DNS domain:

#### Example 89.1. DNS location independent results

```
$ dig -t SRV +short _kerberos._tcp.idm.example.com
0 100 88 idmsvr-01.idm.example.com.
0 100 88 idmsvr-02.idm.example.com.
```

The output contains the following information:

- **0** (priority): Priority of the target host. A lower value is preferred.
- **100** (weight). Specifies a relative weight for entries with the same priority. For further information, see [RFC 2782, section 3](#).
- **88** (port number): Port number of the service.
- Canonical name of the host providing the service.

In the example, the two host names returned have the same priority and weight. In this case, the client uses a random entry from the result list.

When the client is, instead, configured to query a DNS server that is configured in a DNS location, the output differs. For IdM servers that are assigned to a location, tailored values are returned. In the example below, the client is configured to query a DNS server in the location **germany**:

#### Example 89.2. DNS location-based results

```
$ dig -t SRV +short _kerberos._tcp.idm.example.com
_kerberos._tcp.germany._locations.idm.example.com.
0 100 88 idmsvr-01.idm.example.com.
50 100 88 idmsvr-02.idm.example.com.
```

The IdM DNS server automatically returns a DNS alias (CNAME) pointing to a DNS location specific SRV record which prefers local servers. This CNAME record is shown in the first line of the output. In the example, the host **idmsvr-01.idm.example.com** has the lowest priority value and is therefore preferred. The **idmsvr-02.idm.example.com** has a higher priority and thus is used only as backup for cases when the preferred host is unavailable.

## 89.2. DEPLOYMENT CONSIDERATIONS FOR DNS LOCATIONS

Identity Management (IdM) can generate location-specific service (SRV) records when using the integrated DNS. Because each IdM DNS server generates location-specific SRV records, you have to install at least one IdM DNS server in each DNS location.

The client's affinity to a DNS location is only defined by the DNS records received by the client. For this reason, you can combine IdM DNS servers with non-IdM DNS consumer servers and recursors if the clients doing DNS service discovery resolve location-specific records from IdM DNS servers.

In the majority of deployments with mixed IdM and non-IdM DNS services, DNS recursors select the closest IdM DNS server automatically by using round-trip time metrics. Typically, this ensures that clients using non-IdM DNS servers are getting records for the nearest DNS location and thus use the optimal set of IdM servers.

## 89.3. DNS TIME TO LIVE (TTL)

Clients can cache DNS resource records for an amount of time that is set in the zone's configuration. Because of this caching, a client might not be able to receive the changes until the time to live (TTL) value expires. The default TTL value in Identity Management (IdM) is **1 day**.

If your client computers roam between sites, you should adapt the TTL value for your IdM DNS zone. Set the value to a lower value than the time clients need to roam between sites. This ensures that cached DNS entries on the client expire before they reconnect to another site and thus query the DNS server to refresh location-specific SRV records.

#### Additional resources

- See [Configuration attributes of primary IdM DNS zones](#).

## 89.4. USING ANSIBLE TO ENSURE AN IDM LOCATION IS PRESENT

As a system administrator of Identity Management (IdM), you can configure IdM DNS locations to allow clients to locate authentication servers within the closest network infrastructure.

The following procedure describes how to use an Ansible playbook to ensure a DNS location is present in IdM. The example describes how to ensure that the **germany** DNS location is present in IdM. As a result, you can assign particular IdM servers to this location so that local IdM clients can use them to reduce server response time.

## Prerequisites

- You know the IdM administrator password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the `secret.yml` Ansible vault stores your `ipaadmin_password`.
- You understand the [deployment considerations for DNS locations](#).

## Procedure

1. Navigate to the `~/MyPlaybooks/` directory:

```
$ cd ~/MyPlaybooks/
```

2. Make a copy of the `location-present.yml` file located in the `/usr/share/doc/ansible-freeipa/playbooks/location/` directory:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/location/location-present.yml location-present-copy.yml
```

3. Open the `location-present-copy.yml` Ansible playbook file for editing.
4. Adapt the file by setting the following variables in the `ipalocation` task section:
  - Adapt the **name** of the task to correspond to your use case.
  - Set the `ipaadmin_password` variable to the password of the IdM administrator.
  - Set the **name** variable to the name of the location.

This is the modified Ansible playbook file for the current example:

```
---
- name: location present example
  hosts: ipaserver

  vars_files:
    - /home/user_name/MyPlaybooks/secret.yml
  tasks:
    - name: Ensure that the "germany" location is present
```

```

ipalocation:
  ipadmin_password: "{{ ipadmin_password }}"
  name: germany

```

5. Save the file.
6. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the **secret.yml** file, and the inventory file:

```

$ ansible-playbook --vault-password-file=password_file -v -i inventory location-
present-copy.yml

```

### Additional resources

- See [Assigning an IdM server to a DNS location using the IdM Web UI](#) or [Assigning an IdM server to a DNS location using the IdM CLI](#).

## 89.5. USING ANSIBLE TO ENSURE AN IDM LOCATION IS ABSENT

As a system administrator of Identity Management (IdM), you can configure IdM DNS locations to allow clients to locate authentication servers within the closest network infrastructure.

The following procedure describes how to use an Ansible playbook to ensure that a DNS location is absent in IdM. The example describes how to ensure that the **germany** DNS location is absent in IdM. As a result, you cannot assign particular IdM servers to this location and local IdM clients cannot use them.

### Prerequisites

- You know the IdM administrator password.
- No IdM server is assigned to the **germany** DNS location.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipadmin\_password**.
- The example assumes that you have [created and configured](#) the `~/MyPlaybooks/` directory as a central location to store copies of sample playbooks.

### Procedure

1. Navigate to the `~/MyPlaybooks/` directory:

```

$ cd ~/MyPlaybooks/

```

2. Make a copy of the **location-absent.yml** file located in the `/usr/share/doc/ansible-freeipa/playbooks/location/` directory:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/location/location-absent.yml location-absent-copy.yml
```

3. Open the **location-absent-copy.yml** Ansible playbook file for editing.
4. Adapt the file by setting the following variables in the **ipalocation** task section:
  - Adapt the **name** of the task to correspond to your use case.
  - Set the **ipaadmin\_password** variable to the password of the IdM administrator.
  - Set the **name** variable to the name of the DNS location.
  - Make sure that the **state** variable is set to **absent**.

This is the modified Ansible playbook file for the current example:

```
---
- name: location absent example
  hosts: ipaserver

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - name: Ensure that the "germany" location is absent
    ipalocation:
      ipaadmin_password: "{{ ipaadmin_password }}"
      name: germany
      state: absent
```

5. Save the file.
6. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the **secret.yml** file, and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory location-absent-copy.yml
```

## 89.6. ADDITIONAL RESOURCES

- See the **README-location.md** file in the **/usr/share/doc/ansible-freeipa/** directory.
- See sample Ansible playbooks in the **/usr/share/doc/ansible-freeipa/playbooks/location** directory.

## CHAPTER 90. MANAGING DNS FORWARDING IN IDM

Follow these procedures to configure DNS global forwarders and DNS forward zones in the Identity Management (IdM) Web UI, the IdM CLI, and using Ansible:

- [The two roles of an IdM DNS server](#)
- [DNS forward policies in IdM](#)
- [Adding a global forwarder in the IdM Web UI](#)
- [Adding a global forwarder in the CLI](#)
- [Adding a DNS Forward Zone in the IdM Web UI](#)
- [Adding a DNS Forward Zone in the CLI](#)
- [Establishing a DNS Global Forwarder in IdM using Ansible](#)
- [Ensuring the presence of a DNS global forwarder in IdM using Ansible](#)
- [Ensuring the absence of a DNS global forwarder in IdM using Ansible](#)
- [Ensuring DNS Global Forwarders are disabled in IdM using Ansible](#)
- [Ensuring the presence of a DNS Forward Zone in IdM using Ansible](#)
- [Ensuring a DNS Forward Zone has multiple forwarders in IdM using Ansible](#)
- [Ensuring a DNS Forward Zone is disabled in IdM using Ansible](#)
- [Ensuring the absence of a DNS Forward Zone in IdM using Ansible](#)

### 90.1. THE TWO ROLES OF AN IDM DNS SERVER

DNS forwarding affects how a DNS service answers DNS queries. By default, the Berkeley Internet Name Domain (BIND) service integrated with IdM acts as both an *authoritative* and a *recursive* DNS server:

#### Authoritative DNS server

When a DNS client queries a name belonging to a DNS zone for which the IdM server is authoritative, BIND replies with data contained in the configured zone. Authoritative data always takes precedence over any other data.

#### Recursive DNS server

When a DNS client queries a name for which the IdM server is not authoritative, BIND attempts to resolve the query using other DNS servers. If forwarders are not defined, BIND asks the root servers on the Internet and uses a recursive resolution algorithm to answer the DNS query.

In some cases, it is not desirable to let BIND contact other DNS servers directly and perform the recursion based on data available on the Internet. You can configure BIND to use another DNS server, a *forwarder*, to resolve the query.

When you configure BIND to use a forwarder, queries and answers are forwarded back and forth between the IdM server and the forwarder, and the IdM server acts as the DNS cache for non-authoritative data.



## 90.2. DNS FORWARD POLICIES IN IDM

IdM supports the **first** and **only** standard BIND forward policies, as well as the **none** IdM-specific forward policy.

### Forward first (*default*)

The IdM BIND service forwards DNS queries to the configured forwarder. If a query fails because of a server error or timeout, BIND falls back to the recursive resolution using servers on the Internet. The **forward first** policy is the default policy, and it is suitable for optimizing DNS traffic.

### Forward only

The IdM BIND service forwards DNS queries to the configured forwarder. If a query fails because of a server error or timeout, BIND returns an error to the client. The **forward only** policy is recommended for environments with split DNS configuration.

### None (*forwarding disabled*)

DNS queries are not forwarded with the **none** forwarding policy. Disabling forwarding is only useful as a zone-specific override for global forwarding configuration. This option is the IdM equivalent of specifying an empty list of forwarders in BIND configuration.



### NOTE

You cannot use forwarding to combine data in IdM with data from other DNS servers. You can only forward queries for specific subzones of the primary zone in IdM DNS.

By default, the BIND service does not forward queries to another server if the queried DNS name belongs to a zone for which the IdM server is authoritative. In such a situation, if the queried DNS name cannot be found in the IdM database, the **NXDOMAIN** answer is returned. Forwarding is not used.

### Example 90.1. Example Scenario

The IdM server is authoritative for the **test.example.** DNS zone. BIND is configured to forward queries to the DNS server with the **192.0.2.254** IP address.

When a client sends a query for the **nonexistent.test.example.** DNS name, BIND detects that the IdM server is authoritative for the **test.example.** zone and does not forward the query to the **192.0.2.254.** server. As a result, the DNS client receives the **NXDomain** error message, informing the user that the queried domain does not exist.

## 90.3. ADDING A GLOBAL FORWARDER IN THE IDM WEB UI

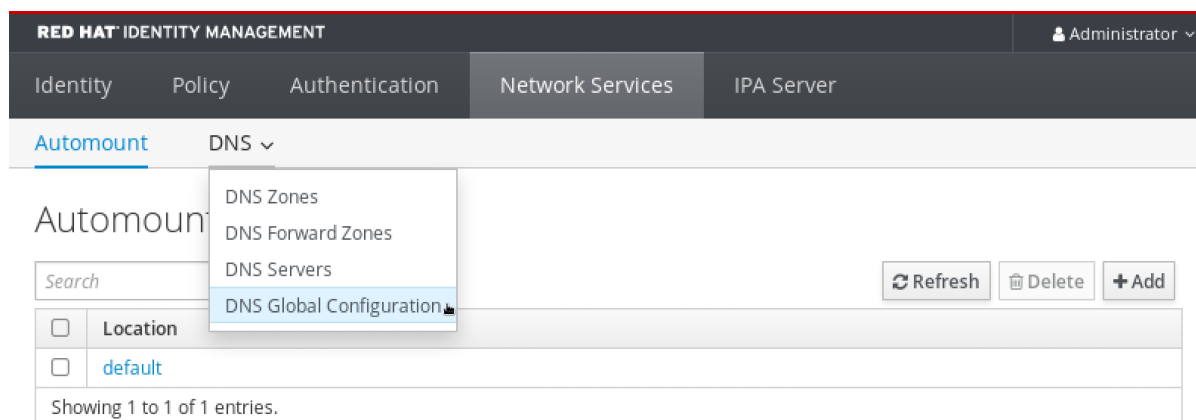
Follow this procedure to add a global DNS forwarder in the Identity Management (IdM) Web UI.

### Prerequisites

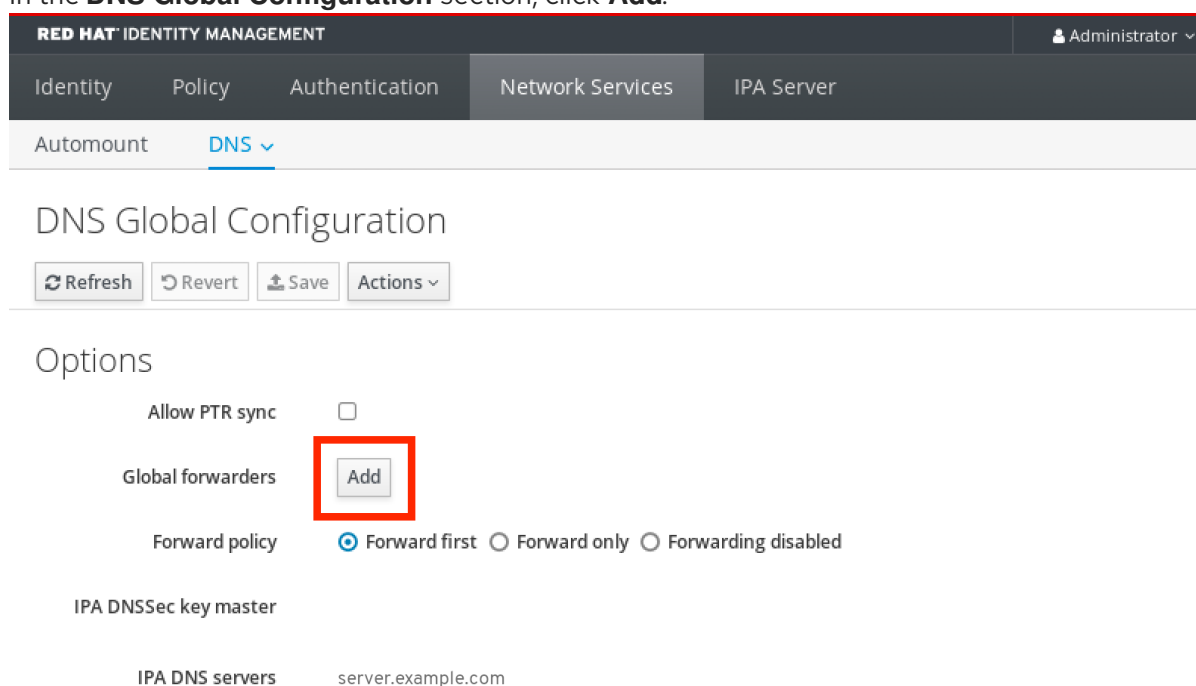
- You are logged in to the IdM WebUI as IdM administrator.
- You know the Internet Protocol (IP) address of the DNS server to forward queries to.

### Procedure

1. In the IdM Web UI, select **Network Services** → **DNS Global Configuration** → **DNS**.



2. In the **DNS Global Configuration** section, click **Add**.



3. Specify the IP address of the DNS server that will receive forwarded DNS queries.

**RED HAT IDENTITY MANAGEMENT** Administrator ▾

Identity Policy Authentication **Network Services** IPA Server

Automount **DNS ▾**

## DNS Global Configuration

### Options

Allow PTR sync ☐

Global forwarders

Forward policy ☒ Forward first ☐ Forward only ☐ Forwarding disabled

IPA DNSSec key master

IPA DNS servers server.example.com

4. Select the **Forward policy**.

**RED HAT IDENTITY MANAGEMENT** Administrator ▾

Identity Policy Authentication **Network Services** IPA Server

Automount **DNS ▾**

## DNS Global Configuration

### Options

Allow PTR sync ☐

Global forwarders

Forward policy ☒ Forward first ☐ Forward only ☐ Forwarding disabled

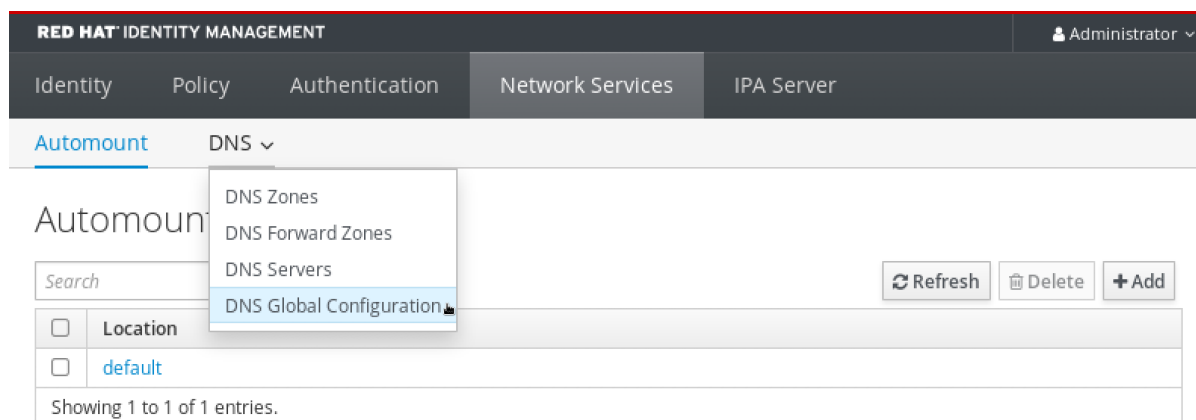
IPA DNSSec key master

IPA DNS servers server.example.com

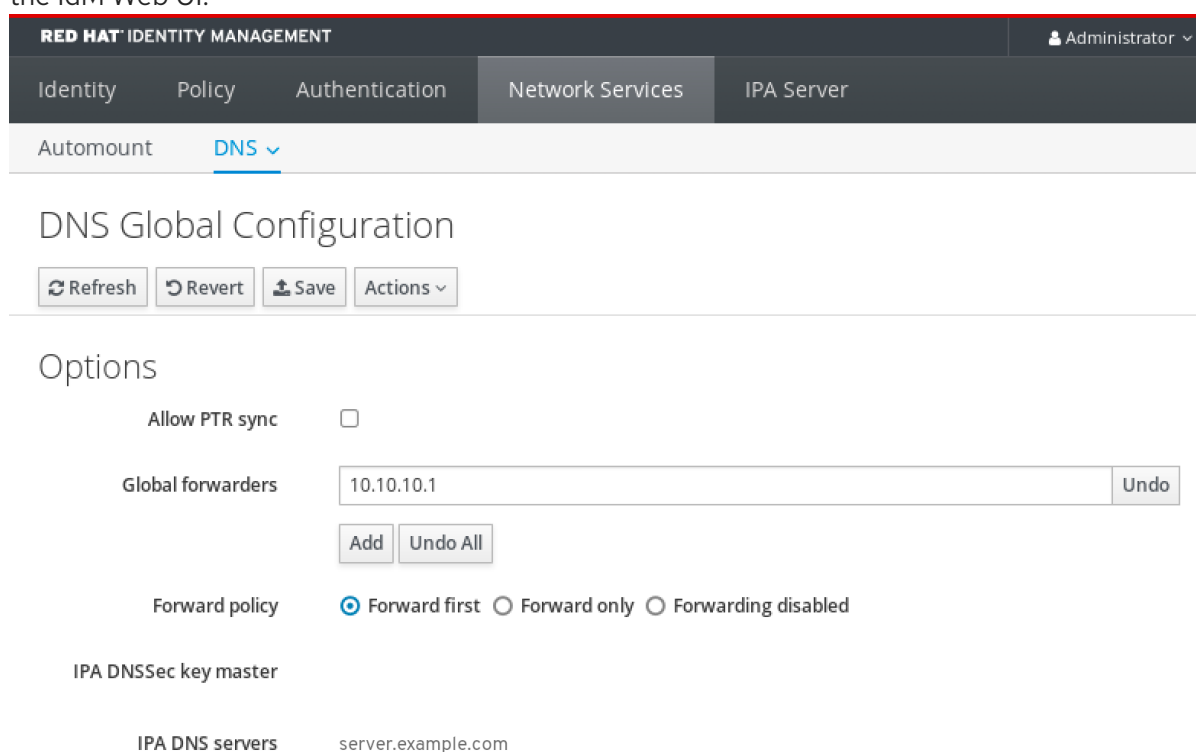
5. Click **Save** at the top of the window.

### Verification steps

1. Select **Network Services** → **DNS Global Configuration** → **DNS**.



2. Verify that the global forwarder, with the forward policy you specified, is present and enabled in the IdM Web UI.



## 90.4. ADDING A GLOBAL FORWARDER IN THE CLI

Follow this procedure to add a global DNS forwarder by using the command line interface (CLI).

### Prerequisites

- You are logged in as IdM administrator.
- You know the Internet Protocol (IP) address of the DNS server to forward queries to.

### Procedure

- Use the **ipa dnsconfig-mod** command to add a new global forwarder. Specify the IP address of the DNS forwarder with the **--forwarder** option.

```
[user@server ~]$ ipa dnsconfig-mod --forwarder=10.10.0.1
Server will check DNS forwarder(s).
```

This may take some time, please wait ...  
 Global forwarders: 10.10.0.1  
 IPA DNS servers: server.example.com

### Verification steps

- Use the **dnsconfig-show** command to display global forwarders.

```
[user@server ~]$ ipa dnsconfig-show
Global forwarders: 10.10.0.1
IPA DNS servers: server.example.com
```

## 90.5. ADDING A DNS FORWARD ZONE IN THE IDM WEB UI

Follow this procedure to add a DNS forward zone in the Identity Management (IdM) Web UI.



### IMPORTANT

Do not use forward zones unless absolutely required. Forward zones are not a standard solution, and using them can lead to unexpected and problematic behavior. If you must use forward zones, limit their use to overriding a global forwarding configuration.

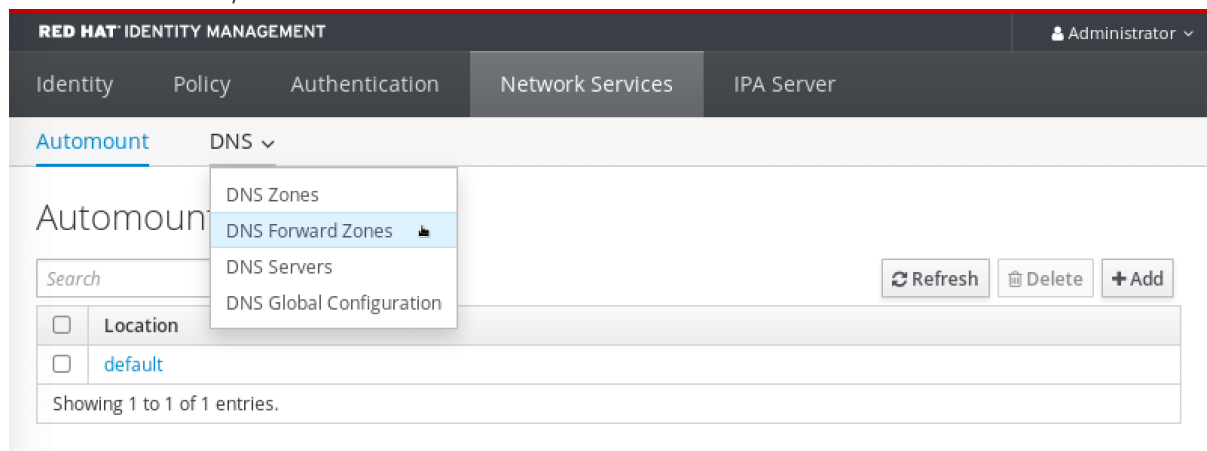
When creating a new DNS zone, Red Hat recommends to always use standard DNS delegation using nameserver (NS) records and to avoid forward zones. In most cases, using a global forwarder is sufficient, and forward zones are not necessary.

### Prerequisites

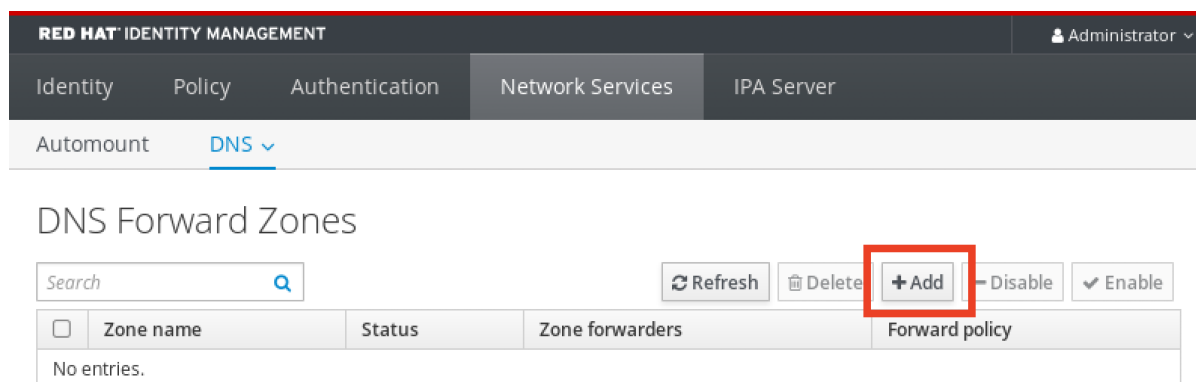
- You are logged in to the IdM WebUI as IdM administrator.
- You know the Internet Protocol (IP) address of the DNS server to forward queries to.

### Procedure

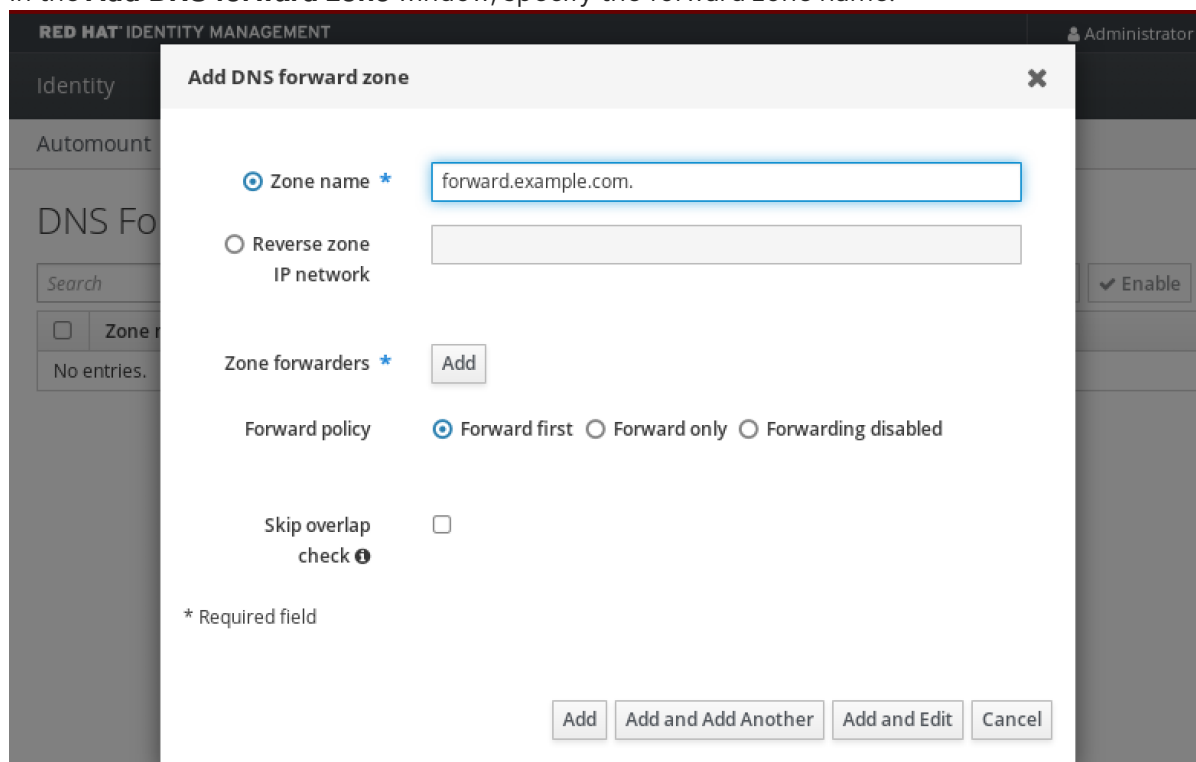
1. In the IdM Web UI, select **Network Services → DNS Forward Zones → DNS**.



2. In the **DNS Forward Zones** section, click **Add**.



3. In the **Add DNS forward zone** window, specify the forward zone name.



4. Click the **Add** button and specify the IP address of a DNS server to receive the forwarding request. You can specify multiple forwarders per forward zone.

**Add DNS forward zone**

☒ Zone name \*

☐ Reverse zone

IP network

Zone forwarders \*

Forward policy ☒ Forward first ☐ Forward only ☐ Forwarding disabled

Skip overlap check ☐

\* Required field

5. Select the **Forward policy**.

**Add DNS forward zone**

☒ Zone name \*

☐ Reverse zone

IP network

Zone forwarders \*

**Forward policy** ☒ Forward first ☐ Forward only ☐ Forwarding disabled

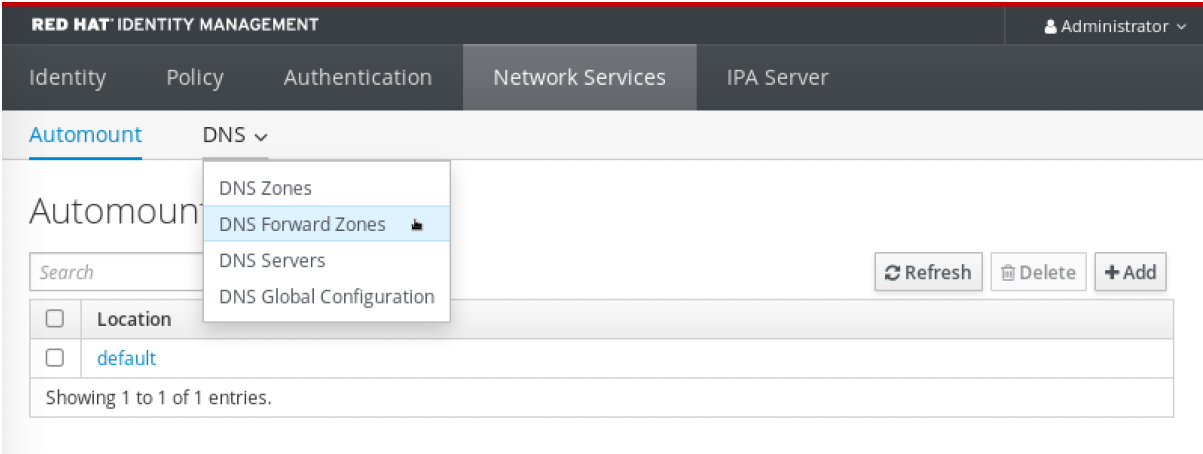
Skip overlap check ☐

\* Required field

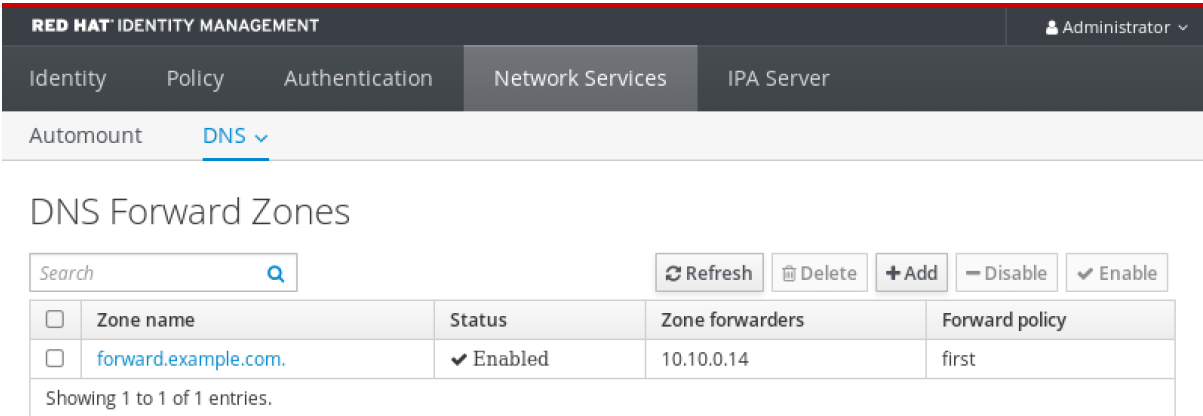
6. Click **Add** at the bottom of the window to add the new forward zone.

## Verification steps

1. In the IdM Web UI, select **Network Services** → **DNS Forward Zones** → **DNS**.



- 2. Verify that the forward zone you created, with the forwarders and forward policy you specified, is present and enabled in the IdM Web UI.



90.6. ADDING A DNS FORWARD ZONE IN THE CLI

Follow this procedure to add a DNS forward zone by using the command line interface (CLI).



IMPORTANT

Do not use forward zones unless absolutely required. Forward zones are not a standard solution, and using them can lead to unexpected and problematic behavior. If you must use forward zones, limit their use to overriding a global forwarding configuration.

When creating a new DNS zone, Red Hat recommends to always use standard DNS delegation using nameserver (NS) records and to avoid forward zones. In most cases, using a global forwarder is sufficient, and forward zones are not necessary.

Prerequisites

- You are logged in as IdM administrator.
- You know the Internet Protocol (IP) address of the DNS server to forward queries to.

Procedure

- Use the **dnsforwardzone-add** command to add a new forward zone. Specify at least one forwarder with the **--forwarder** option if the forward policy is not **none**, and specify the forward policy with the **--forward-policy** option.
-



```
[user@server ~]$ ipa dnsforwardzone-add forward.example.com. --
forwarder=10.10.0.14 --forwarder=10.10.1.15 --forward-policy=first
```

```
Zone name: forward.example.com.
Zone forwarders: 10.10.0.14, 10.10.1.15
Forward policy: first
```

### Verification steps

- Use the **dnsforwardzone-show** command to display the DNS forward zone you just created.

```
[user@server ~]$ ipa dnsforwardzone-show forward.example.com.
```

```
Zone name: forward.example.com.
Zone forwarders: 10.10.0.14, 10.10.1.15
Forward policy: first
```

## 90.7. ESTABLISHING A DNS GLOBAL FORWARDER IN IDM USING ANSIBLE

Follow this procedure to use an Ansible playbook to establish a DNS Global Forwarder in IdM.

In the example procedure below, the IdM administrator creates a DNS global forwarder to a DNS server with an Internet Protocol (IP) v4 address of **8.8.6.6** and IPv6 address of **2001:4860:4860::8800** on port **53**.

### Prerequisites

- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the **ansible-freeipa** package on the Ansible controller.
  - The example assumes that in the **~/MyPlaybooks/** directory, you have created an **Ansible inventory file** with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipadmin\_password**.
- You know the IdM administrator password.

### Procedure

1. Navigate to the **/usr/share/doc/ansible-freeipa/playbooks/dnsconfig** directory:

```
$ cd /usr/share/doc/ansible-freeipa/playbooks/dnsconfig
```

2. Open your inventory file and make sure that the IdM server that you want to configure is listed in the **[ipaserver]** section. For example, to instruct Ansible to configure **server.idm.example.com**, enter:

```
[ipaserver]
server.idm.example.com
```

3. Make a copy of the **set-configuration.yml** Ansible playbook file. For example:

```
$ cp set-configuration.yml establish-global-forwarder.yml
```

4. Open the **establish-global-forwarder.yml** file for editing.
5. Adapt the file by setting the following variables:
  - a. Change the **name** variable for the playbook to **Playbook to establish a global forwarder in IdM DNS**.
  - b. In the **tasks** section, change the **name** of the task to **Create a DNS global forwarder to 8.8.6.6 and 2001:4860:4860::8800**.
  - c. In the **forwarders** section of the **ipadnsconfig** portion:
    - i. Change the first **ip\_address** value to the IPv4 address of the global forwarder: **8.8.6.6**.
    - ii. Change the second **ip\_address** value to the IPv6 address of the global forwarder: **2001:4860:4860::8800**.
    - iii. Verify the **port** value is set to **53**.
  - d. Change the **forward\_policy** to **first**.  
This is the modified Ansible playbook file for the current example:

```
---
- name: Playbook to establish a global forwarder in IdM DNS
  hosts: ipaserver

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - name: Create a DNS global forwarder to 8.8.6.6 and 2001:4860:4860::8800
    ipadnsconfig:
      forwarders:
        - ip_address: 8.8.6.6
        - ip_address: 2001:4860:4860::8800
      port: 53
      forward_policy: first
      allow_sync_ptr: yes
```

6. Save the file.
7. Run the playbook:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory.file establish-global-forwarder.yml
```

## Additional resources

- See the **README-dnsconfig.md** file in the **/usr/share/doc/ansible-freeipa/** directory.

## 90.8. ENSURING THE PRESENCE OF A DNS GLOBAL FORWARDER IN IDM USING ANSIBLE

Follow this procedure to use an Ansible playbook to ensure the presence of a DNS global forwarder in IdM. In the example procedure below, the IdM administrator ensures the presence of a DNS global forwarder to a DNS server with an Internet Protocol (IP) v4 address of **7.7.9.9** and IP v6 address of **2001:db8::1:0** on port **53**.

### Prerequisites

- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the `secret.yml` Ansible vault stores your `ipaadmin_password`.
- You know the IdM administrator password.

### Procedure

1. Navigate to the `/usr/share/doc/ansible-freeipa/playbooks/dnsconfig` directory:

```
$ cd /usr/share/doc/ansible-freeipa/playbooks/dnsconfig
```

2. Open your inventory file and make sure that the IdM server that you want to configure is listed in the `[ipaserver]` section. For example, to instruct Ansible to configure `server.idm.example.com`, enter:

```
[ipaserver]
server.idm.example.com
```

3. Make a copy of the `forwarders-absent.yml` Ansible playbook file. For example:

```
$ cp forwarders-absent.yml ensure-presence-of-a-global-forwarder.yml
```

4. Open the `ensure-presence-of-a-global-forwarder.yml` file for editing.
5. Adapt the file by setting the following variables:
  - a. Change the `name` variable for the playbook to **Playbook to ensure the presence of a global forwarder in IdM DNS**.
  - b. In the `tasks` section, change the `name` of the task to **Ensure the presence of a DNS global forwarder to 7.7.9.9 and 2001:db8::1:0 on port 53**.
  - c. In the `forwarders` section of the `ipadnsconfig` portion:
    - i. Change the first `ip_address` value to the IPv4 address of the global forwarder: **7.7.9.9**.

- ii. Change the second **ip\_address** value to the IPv6 address of the global forwarder: **2001:db8::1:0**.
- iii. Verify the **port** value is set to **53**.
- d. Change the **state** to **present**.  
This is the modified Ansible playbook file for the current example:

```
---
- name: Playbook to ensure the presence of a global forwarder in IdM DNS
  hosts: ipaserver

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - name: Ensure the presence of a DNS global forwarder to 7.7.9.9 and 2001:db8::1:0 on port
    53
    ipadnsconfig:
      forwarders:
      - ip_address: 7.7.9.9
      - ip_address: 2001:db8::1:0
      port: 53
      state: present
```

6. Save the file.

7. Run the playbook:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory.file ensure-presence-
of-a-global-forwarder.yml
```

### Additional resources

- See the **README-dnsconfig.md** file in the **/usr/share/doc/ansible-freeipa/** directory.

## 90.9. ENSURING THE ABSENCE OF A DNS GLOBAL FORWARDER IN IDM USING ANSIBLE

Follow this procedure to use an Ansible playbook to ensure the absence of a DNS global forwarder in IdM. In the example procedure below, the IdM administrator ensures the absence of a DNS global forwarder with an Internet Protocol (IP) v4 address of **8.8.6.6** and IP v6 address of **2001:4860:4860::8800** on port **53**.

### Prerequisites

- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the **ansible-freeipa** package on the Ansible controller.
  - The example assumes that in the **~/MyPlaybooks/** directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.

- The example assumes that the **secret.yml** Ansible vault stores your **ipaadmin\_password**.
- You know the IdM administrator password.

## Procedure

1. Navigate to the **/usr/share/doc/ansible-freeipa/playbooks/dnsconfig** directory:

```
$ cd /usr/share/doc/ansible-freeipa/playbooks/dnsconfig
```

2. Open your inventory file and make sure that the IdM server that you want to configure is listed in the **[ipaserver]** section. For example, to instruct Ansible to configure **server.idm.example.com**, enter:

```
[ipaserver]
server.idm.example.com
```

3. Make a copy of the **forwarders-absent.yml** Ansible playbook file. For example:

```
$ cp forwarders-absent.yml ensure-absence-of-a-global-forwarder.yml
```

4. Open the **ensure-absence-of-a-global-forwarder.yml** file for editing.
5. Adapt the file by setting the following variables:
  - a. Change the **name** variable for the playbook to **Playbook to ensure the absence of a global forwarder in IdM DNS**.
  - b. In the **tasks** section, change the **name** of the task to **Ensure the absence of a DNS global forwarder to 8.8.6.6 and 2001:4860:4860::8800 on port 53**.
  - c. In the **forwarders** section of the **ipadnsconfig** portion:
    - i. Change the first **ip\_address** value to the IPv4 address of the global forwarder: **8.8.6.6**.
    - ii. Change the second **ip\_address** value to the IPv6 address of the global forwarder: **2001:4860:4860::8800**.
    - iii. Verify the **port** value is set to **53**.
  - d. Set the **action** variable to **member**.
  - e. Verify the **state** is set to **absent**.

This the modified Ansible playbook file for the current example:

```
---
- name: Playbook to ensure the absence of a global forwarder in IdM DNS
  hosts: ipaserver

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - name: Ensure the absence of a DNS global forwarder to 8.8.6.6 and
    2001:4860:4860::8800 on port 53
```

```

ipadnsconfig:
  forwarders:
    - ip_address: 8.8.6.6
    - ip_address: 2001:4860:4860::8800
  port: 53
  action: member
  state: absent

```



### IMPORTANT

If you only use the **state: absent** option in your playbook without also using **action: member**, the playbook fails.

6. Save the file.

7. Run the playbook:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory.file ensure-absence-of-a-global-forwarder.yml
```

### Additional resources

- The **README-dnsconfig.md** file in the `/usr/share/doc/ansible-freeipa/` directory
- The **action: member** option in `ipadnsconfig` `ansible-freeipa` modules

## 90.10. ENSURING DNS GLOBAL FORWARDERS ARE DISABLED IN IDM USING ANSIBLE

Follow this procedure to use an Ansible playbook to ensure DNS Global Forwarders are disabled in IdM. In the example procedure below, the IdM administrator ensures that the forwarding policy for the global forwarder is set to **none**, which effectively disables the global forwarder.

### Prerequisites

- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the **ansible-freeipa** package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipadmin\_password**.
- You know the IdM administrator password.

### Procedure

1. Navigate to the `/usr/share/doc/ansible-freeipa/playbooks/dnsconfig` directory:

```
$ cd /usr/share/doc/ansible-freeipa/playbooks/dnsconfig
```

2. Open your inventory file and make sure that the IdM server that you want to configure is listed in the **[ipaserver]** section. For example, to instruct Ansible to configure **server.idm.example.com**, enter:

```
[ipaserver]
server.idm.example.com
```

3. Verify the contents of the **disable-global-forwarders.yml** Ansible playbook file which is already configured to disable all DNS global forwarders. For example:

```
$ cat disable-global-forwarders.yml
---
- name: Playbook to disable global DNS forwarders
  hosts: ipaserver

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - name: Disable global forwarders.
    ipadsnconfig:
      forward_policy: none
```

4. Run the playbook:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory.file disable-global-forwarders.yml
```

#### Additional resources

- See the **README-dnsconfig.md** file in the **/usr/share/doc/ansible-freeipa/** directory.

## 90.11. ENSURING THE PRESENCE OF A DNS FORWARD ZONE IN IDM USING ANSIBLE

Follow this procedure to use an Ansible playbook to ensure the presence of a DNS Forward Zone in IdM. In the example procedure below, the IdM administrator ensures the presence of a DNS forward zone for **example.com** to a DNS server with an Internet Protocol (IP) address of **8.8.8.8**.

#### Prerequisites

- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the **ansible-freeipa** package on the Ansible controller.
  - The example assumes that in the **~/MyPlaybooks/** directory, you have created an **Ansible inventory file** with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipadmin\_password**.
- You know the IdM administrator password.

## Procedure

1. Navigate to the **/usr/share/doc/ansible-freeipa/playbooks/dnsconfig** directory:

```
$ cd /usr/share/doc/ansible-freeipa/playbooks/dnsconfig
```

2. Open your inventory file and make sure that the IdM server that you want to configure is listed in the **[ipaserver]** section. For example, to instruct Ansible to configure **server.idm.example.com**, enter:

```
[ipaserver]
server.idm.example.com
```

3. Make a copy of the **forwarders-absent.yml** Ansible playbook file. For example:

```
$ cp forwarders-absent.yml ensure-presence-forwardzone.yml
```

4. Open the **ensure-presence-forwardzone.yml** file for editing.

5. Adapt the file by setting the following variables:

- a. Change the **name** variable for the playbook to **Playbook to ensure the presence of a dnsforwardzone in IdM DNS**.
- b. In the **tasks** section, change the **name** of the task to **Ensure presence of a dnsforwardzone for example.com to 8.8.8.8**.
- c. In the **tasks** section, change the **ipadnsconfig** heading to **ipadnsforwardzone**.
- d. In the **ipadnsforwardzone** section:
  - i. Add the **ipaadmin\_password** variable and set it to your IdM administrator password.
  - ii. Add the **name** variable and set it to **example.com**.
  - iii. In the **forwarders** section:
    - A. Remove the **ip\_address** and **port** lines.
    - B. Add the IP address of the DNS server to receive forwarded requests by specifying it after a dash:

```
- 8.8.8.8
```

- iv. Add the **forwardpolicy** variable and set it to **first**.
- v. Add the **skip\_overlap\_check** variable and set it to **true**.
- vi. Change the **state** variable to **present**.

This the modified Ansible playbook file for the current example:

```
---
- name: Playbook to ensure the presence of a dnsforwardzone in IdM DNS
  hosts: ipaserver
```



```
vars_files:
- /home/user_name/MyPlaybooks/secret.yml
tasks:
- name: Ensure the presence of a dnsforwardzone for example.com to 8.8.8.8
  ipadsforwardzone:
    ipadmin_password: "{{ ipadmin_password }}"
    name: example.com
    forwarders:
      - 8.8.8.8
    forwardpolicy: first
    skip_overlap_check: true
    state: present
```

6. Save the file.

7. Run the playbook:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory.file ensure-presence-forwardzone.yml
```

### Additional resources

- See the **README-dnsforwardzone.md** file in the `/usr/share/doc/ansible-freeipa/` directory.

## 90.12. ENSURING A DNS FORWARD ZONE HAS MULTIPLE FORWARDERS IN IDM USING ANSIBLE

Follow this procedure to use an Ansible playbook to ensure a DNS Forward Zone in IdM has multiple forwarders. In the example procedure below, the IdM administrator ensures the DNS forward zone for **example.com** is forwarding to **8.8.8.8** and **4.4.4.4**.

### Prerequisites

- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipadmin\_password**.
- You know the IdM administrator password.

### Procedure

1. Navigate to the `/usr/share/doc/ansible-freeipa/playbooks/dnsconfig` directory:

```
$ cd /usr/share/doc/ansible-freeipa/playbooks/dnsconfig
```

2. Open your inventory file and make sure that the IdM server that you want to configure is listed in the **[ipaserver]** section. For example, to instruct Ansible to configure **server.idm.example.com**, enter:

```
[ipaserver]
server.idm.example.com
```

3. Make a copy of the **forwarders-absent.yml** Ansible playbook file. For example:

```
$ cp forwarders-absent.yml ensure-presence-multiple-forwarders.yml
```

4. Open the **ensure-presence-multiple-forwarders.yml** file for editing.
5. Adapt the file by setting the following variables:
  - a. Change the **name** variable for the playbook to **Playbook to ensure the presence of multiple forwarders in a dnsforwardzone in IdM DNS**.
  - b. In the **tasks** section, change the **name** of the task to **Ensure presence of 8.8.8.8 and 4.4.4.4 forwarders in dnsforwardzone for example.com**.
  - c. In the **tasks** section, change the **ipadnsconfig** heading to **ipadnsforwardzone**.
  - d. In the **ipadnsforwardzone** section:
    - i. Add the **ipaadmin\_password** variable and set it to your IdM administrator password.
    - ii. Add the **name** variable and set it to **example.com**.
    - iii. In the **forwarders** section:
      - A. Remove the **ip\_address** and **port** lines.
      - B. Add the IP address of the DNS servers you want to ensure are present, preceded by a dash:
 

```
- 8.8.8.8
- 4.4.4.4
```
    - iv. Change the state variable to present.

This the modified Ansible playbook file for the current example:

```
---
- name: name: Playbook to ensure the presence of multiple forwarders in a dnsforwardzone
  in IdM DNS
  hosts: ipaserver

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - name: Ensure presence of 8.8.8.8 and 4.4.4.4 forwarders in dnsforwardzone for
    example.com
    ipadnsforwardzone:
      ipaadmin_password: "{{ ipaadmin_password }}"
      name: example.com
```

```

forwarders:
  - 8.8.8.8
  - 4.4.4.4
state: present

```

6. Save the file.
7. Run the playbook:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory.file ensure-presence-multiple-forwarders.yml
```

### Additional resources

- See the **README-dnsforwardzone.md** file in the `/usr/share/doc/ansible-freeipa/` directory.

## 90.13. ENSURING A DNS FORWARD ZONE IS DISABLED IN IDM USING ANSIBLE

Follow this procedure to use an Ansible playbook to ensure a DNS Forward Zone is disabled in IdM. In the example procedure below, the IdM administrator ensures the DNS forward zone for **example.com** is disabled.

### Prerequisites

- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipaadmin\_password**.
- You know the IdM administrator password.

### Procedure

1. Navigate to the `/usr/share/doc/ansible-freeipa/playbooks/dnsconfig` directory:

```
$ cd /usr/share/doc/ansible-freeipa/playbooks/dnsconfig
```

2. Open your inventory file and make sure that the IdM server that you want to configure is listed in the **[ipaserver]** section. For example, to instruct Ansible to configure **server.idm.example.com**, enter:

```
[ipaserver]
server.idm.example.com
```

3. Make a copy of the **forwarders-absent.yml** Ansible playbook file. For example:

```
$ cp forwarders-absent.yml ensure-disabled-forwardzone.yml
```

4. Open the **ensure-disabled-forwardzone.yml** file for editing.
5. Adapt the file by setting the following variables:
  - a. Change the **name** variable for the playbook to **Playbook to ensure a dnsforwardzone is disabled in IdM DNS**.
  - b. In the **tasks** section, change the **name** of the task to **Ensure a dnsforwardzone for example.com is disabled**.
  - c. In the **tasks** section, change the **ipadnsconfig** heading to **ipadnsforwardzone**.
  - d. In the **ipadnsforwardzone** section:
    - i. Add the **ipaadmin\_password** variable and set it to your IdM administrator password.
    - ii. Add the **name** variable and set it to **example.com**.
    - iii. Remove the entire **forwarders** section.
    - iv. Change the **state** variable to **disabled**.

This is the modified Ansible playbook file for the current example:

```
---
- name: Playbook to ensure a dnsforwardzone is disabled in IdM DNS
  hosts: ipaserver

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - name: Ensure a dnsforwardzone for example.com is disabled
    ipadnsforwardzone:
      ipaadmin_password: "{{ ipaadmin_password }}"
      name: example.com
      state: disabled
```

6. Save the file.
7. Run the playbook:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory.file ensure-disabled-forwardzone.yml
```

#### Additional resources

- See the **README-dnsforwardzone.md** file in the **/usr/share/doc/ansible-freeipa/** directory.

## 90.14. ENSURING THE ABSENCE OF A DNS FORWARD ZONE IN IDM USING ANSIBLE

Follow this procedure to use an Ansible playbook to ensure the absence of a DNS Forward Zone in IdM. In the example procedure below, the IdM administrator ensures the absence of a DNS forward zone for **example.com**.

### Prerequisites

- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the `secret.yml` Ansible vault stores your `ipaadmin_password`.
- You know the IdM administrator password.

### Procedure

1. Navigate to the `/usr/share/doc/ansible-freeipa/playbooks/dnsconfig` directory:

```
$ cd /usr/share/doc/ansible-freeipa/playbooks/dnsconfig
```

2. Open your inventory file and make sure that the IdM server that you want to configure is listed in the `[ipaserver]` section. For example, to instruct Ansible to configure **server.idm.example.com**, enter:

```
[ipaserver]
server.idm.example.com
```

3. Make a copy of the `forwarders-absent.yml` Ansible playbook file. For example:

```
$ cp forwarders-absent.yml ensure-absence-forwardzone.yml
```

4. Open the `ensure-absence-forwardzone.yml` file for editing.
5. Adapt the file by setting the following variables:
  - a. Change the `name` variable for the playbook to **Playbook to ensure the absence of a dnsforwardzone in IdM DNS**.
  - b. In the `tasks` section, change the `name` of the task to **Ensure the absence of a dnsforwardzone for example.com**.
  - c. In the `tasks` section, change the `ipadnsconfig` heading to `ipadnsforwardzone`.
  - d. In the `ipadnsforwardzone` section:
    - i. Add the `ipaadmin_password` variable and set it to your IdM administrator password.
    - ii. Add the `name` variable and set it to **example.com**.
    - iii. Remove the entire `forwarders` section.

- iv. Leave the **state** variable as **absent**.

This the modified Ansible playbook file for the current example:

```
---
- name: Playbook to ensure the absence of a dnsforwardzone in IdM DNS
  hosts: ipaserver

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - name: Ensure the absence of a dnsforwardzone for example.com
    ipadsforwardzone:
      ipaadmin_password: "{{ ipaadmin_password }}"
      name: example.com
      state: absent
```

6. Save the file.

7. Run the playbook:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory.file ensure-absence-forwardzone.yml
```

#### Additional resources

- See the **README-dnsforwardzone.md** file in the `/usr/share/doc/ansible-freeipa/` directory.

## CHAPTER 91. MANAGING DNS RECORDS IN IDM

This chapter describes how to manage DNS records in Identity Management (IdM). As an IdM administrator, you can add, modify and delete DNS records in IdM. The chapter contains the following sections:

- [DNS records in IdM](#)
- [Adding DNS resource records from the IdM Web UI](#)
- [Adding DNS resource records from the IdM CLI](#)
- [Common ipa dnsrecord-add options](#)
- [Deleting DNS records in the IdM Web UI](#)
- [Deleting an entire DNS record in the IdM Web UI](#)
- [Deleting DNS records in the IdM CLI](#)

### Prerequisites

- Your IdM deployment contains an integrated DNS server. For information how to install IdM with integrated DNS, see one of the following links:
  - [Installing an IdM server: With integrated DNS, with an integrated CA as the root CA](#) .
  - [Installing an IdM server: With integrated DNS, with an external CA as the root CA](#) .

## 91.1. DNS RECORDS IN IDM

Identity Management (IdM) supports many different DNS record types. The following four are used most frequently:

### A

This is a basic map for a host name and an IPv4 address. The record name of an A record is a host name, such as **www**. The **IP Address** value of an A record is an IPv4 address, such as **192.0.2.1**. For more information about A records, see [RFC 1035](#).

### AAAA

This is a basic map for a host name and an IPv6 address. The record name of an AAAA record is a host name, such as **www**. The **IP Address** value is an IPv6 address, such as **2001:DB8::1111**. For more information about AAAA records, see [RFC 3596](#).

### SRV

*Service (SRV) resource records* map service names to the DNS name of the server that is providing that particular service. For example, this record type can map a service like an LDAP directory to the server which manages it.

The record name of an SRV record has the format **\_service.\_protocol**, such as **\_ldap.\_tcp**. The configuration options for SRV records include priority, weight, port number, and host name for the target service.

For more information about SRV records, see [RFC 2782](#).

## PTR

A pointer record (PTR) adds a reverse DNS record, which maps an IP address to a domain name.



### NOTE

All reverse DNS lookups for IPv4 addresses use reverse entries that are defined in the **in-addr.arpa.** domain. The reverse address, in human-readable form, is the exact reverse of the regular IP address, with the **in-addr.arpa.** domain appended to it. For example, for the network address **192.0.2.0/24**, the reverse zone is **2.0.192.in-addr.arpa.**

The record name of a PTR must be in the standard format specified in [RFC 1035](#), extended in [RFC 2317](#), and [RFC 3596](#). The host name value must be a canonical host name of the host for which you want to create the record.



### NOTE

Reverse zones can also be configured for IPv6 addresses, with zones in the **.ip6.arpa.** domain. For more information about IPv6 reverse zones, see [RFC 3596](#).

When adding DNS resource records, note that many of the records require different data. For example, a CNAME record requires a host name, while an A record requires an IP address. In the IdM Web UI, the fields in the form for adding a new record are updated automatically to reflect what data is required for the currently selected type of record.

## 91.2. ADDING DNS RESOURCE RECORDS IN THE IDM WEB UI

Follow this procedure to add DNS resource records in the Identity Management (IdM) Web UI.

### Prerequisites

- The DNS zone to which you want to add a DNS record exists and is managed by IdM. For more information about creating a DNS zone in IdM DNS, see [Managing DNS zones in IdM](#).
- You are logged in as IdM administrator.

### Procedure

1. In the IdM Web UI, click **Network Services** → **DNS** → **DNS Zones**.
2. Click the DNS zone to which you want to add a DNS record.
3. In the **DNS Resource Records** section, click **Add** to add a new record.



Figure 91.1. Adding a New DNS Resource Record

DNS Resource Records: zone.example.com.

**DNS Resource Records** | Settings

Search

Refresh Delete **+ Add**

| <input type="checkbox"/> | Record name | Record Type | Data             |
|--------------------------|-------------|-------------|------------------|
| <input type="checkbox"/> | @           | NS          | example.com.     |
| <input type="checkbox"/> | dns         | CNAME       | dns.example.com. |

Showing 1 to 2 of 2 entries.

4. Select the type of record to create and fill out the other fields as required.

Figure 91.2. Defining a New DNS Resource Record

**Add DNS Resource Record**

Record name \*

Record Type

Hostname \*

\* Required field

5. Click **Add** to confirm the new record.

### 91.3. ADDING DNS RESOURCE RECORDS FROM THE IDM CLI

Follow this procedure to add a DNS resource record of any type from the command line interface (CLI).

#### Prerequisites

- The DNS zone to which you want to add a DNS records exists. For more information about creating a DNS zone in IdM DNS, see [Managing DNS zones in IdM](#).
- You are logged in as IdM administrator.

Procedure

1. To add a DNS resource record, use the **ipa dnsrecord-add** command. The command follows this syntax:

```
$ ipa dnsrecord-add zone_name record_name --record_type_option=data
```

In the command above:

- The *zone\_name* is the name of the DNS zone to which the record is being added.
- The *record\_name* is an identifier for the new DNS resource record.

For example, to add an A type DNS record of **host1** to the **idm.example.com** zone, enter:

```
$ ipa dnsrecord-add idm.example.com host1 --a-rec=192.168.122.123
```

91.4. COMMON IPA DNSRECORD-\* OPTIONS

You can use the following options when adding, modifying and deleting the most common DNS resource record types in Identity Management (IdM):

- A (IPv4)
- AAAA (IPv6)
- SRV
- PTR

In **Bash**, you can define multiple entries by listing the values in a comma-separated list inside curly braces, such as **--option={val1,val2,val3}**.

Table 91.1. General Record Options

| Option              | Description   |
|---------------------|---|
| <b>--ttl=number</b> | Sets the time to live for the record.                               |
| <b>--structured</b> | Parses the raw DNS records and returns them in a structured format. |

Table 91.2. "A" record options

| Option                 | Description                                      | Examples   |
|------------------------|--|--|
| <b>--a-rec=ARECORD</b> | Passes a single A record or a list of A records. | <b>ipa dnsrecord-add idm.example.com host1 --a-rec=192.168.122.123</b> |

| Option                       | Description  | Examples  |
|------------------------------|--|---|
|                              | Can create a wildcard A record with a given IP address.  | <b>ipa dnsrecord-add idm.example.com "*" --a-rec=192.168.122.123</b> <sup>[a]</sup>             |
| <b>--a-ip-address=string</b> | Gives the IP address for the record. When creating a record, the option to specify the <b>A</b> record value is <b>--a-rec</b> . However, when modifying an <b>A</b> record, the <b>--a-rec</b> option is used to specify the current value for the <b>A</b> record. The new value is set with the <b>--a-ip-address</b> option. | <b>ipa dnsrecord-mod idm.example.com --a-rec 192.168.122.123 --a-ip-address 192.168.122.124</b> |

[a] The example creates a wildcard **A** record with the IP address of 192.0.2.123.

Table 91.3. "AAAA" record options

| Option                          | Description  | Example   |
|---------------------------------|--|---|
| <b>--aaaa-rec=AAAARECORD</b>    | Passes a single AAAA (IPv6) record or a list of AAAA records.  | <b>ipa dnsrecord-add idm.example.com www --aaaa-rec 2001:db8::1231:5675</b>                                   |
| <b>--aaaa-ip-address=string</b> | Gives the IPv6 address for the record. When creating a record, the option to specify the <b>A</b> record value is <b>--aaaa-rec</b> . However, when modifying an <b>A</b> record, the <b>--aaaa-rec</b> option is used to specify the current value for the <b>A</b> record. The new value is set with the <b>--a-ip-address</b> option. | <b>ipa dnsrecord-mod idm.example.com --aaaa-rec 2001:db8::1231:5675 --aaaa-ip-address 2001:db8::1231:5676</b> |

Table 91.4. "PTR" record options

| Option                     | Description   | Example  |
|----------------------------|---|--|
| <b>--ptr-rec=PTRRECORD</b> | Passes a single PTR record or a list of PTR records. When adding the reverse DNS record, the zone name used with the <b>ipa dnsrecord-add</b> command is reversed, compared to the usage for adding other DNS records. Typically, the host IP address is the last octet of the IP address in a given network. The first example on the right adds a PTR record for <b>server4.idm.example.com</b> with IPv4 address <b>192.168.122.4</b> . The second example adds a reverse DNS entry to the <b>0.0.0.0.0.0.0.0.8.b.d.0.1.0.0.2.ip6.arpa</b> . IPv6 reverse zone for the host <b>server2.example.com</b> with the IP address <b>2001:DB8::1111</b> . | <b>ipa dnsrecord-add 122.168.192.in-addr.arpa 4 --ptr-rec server4.idm.example.com.</b><br><br><b>\$ ipa dnsrecord-add 0.0.0.0.0.0.0.0.8.b.d.0.1.0.0.2.ip6.arpa. 1.1.1.0.0.0.0.0.0.0.0.0.0.0.0 --ptr-rec server2.idm.example.com.</b> |

| Option                       | Description                         | Example |
|------------------------------|-------------------------------------|---------|
| <b>--ptr-hostname=string</b> | Gives the host name for the record. |         |

Table 91.5. "SRV" Record Options

| Option                       | Description  | Example  |
|------------------------------|--|--|
| <b>--srv-rec=SRVRECORD</b>   | Passes a single SRV record or a list of SRV records. In the examples on the right, <code>_ldap._tcp</code> defines the service type and the connection protocol for the SRV record. The <b>--srv-rec</b> option defines the priority, weight, port, and target values. The weight values of 51 and 49 in the examples add up to 100 and represent the probability, in percentages, that a particular record is used. | <pre># ipa dnsrecord-add idm.example.com _ldap._tcp --srv-rec="0 51 389 server1.idm.example.com."</pre> <pre># ipa dnsrecord-add server.idm.example.com _ldap._tcp --srv-rec="1 49 389 server2.idm.example.com."</pre> |
| <b>--srv-priority=number</b> | Sets the priority of the record. There can be multiple SRV records for a service type. The priority (0 - 65535) sets the rank of the record; the lower the number, the higher the priority. A service has to use the record with the highest priority first.   | <pre># ipa dnsrecord-mod server.idm.example.com _ldap._tcp --srv-rec="1 49 389 server2.idm.example.com." --srv-priority=0</pre>  |
| <b>--srv-weight=number</b>   | Sets the weight of the record. This helps determine the order of SRV records with the same priority. The set weights should add up to 100, representing the probability (in percentages) that a particular record is used.   | <pre># ipa dnsrecord-mod server.idm.example.com _ldap._tcp --srv-rec="0 49 389 server2.idm.example.com." --srv-weight=60</pre>   |
| <b>--srv-port=number</b>     | Gives the port for the service on the target host.   | <pre># ipa dnsrecord-mod server.idm.example.com _ldap._tcp --srv-rec="0 60 389 server2.idm.example.com." --srv-port=636</pre>  |
| <b>--srv-target=string</b>   | Gives the domain name of the target host. This can be a single period (.) if the service is not available in the domain.   |  |

#### Additional resources

- Run **ipa dnsrecord-add --help**.

## 91.5. DELETING DNS RECORDS IN THE IDM WEB UI

Follow this procedure to delete DNS records in Identity Management (IdM) using the IdM Web UI.

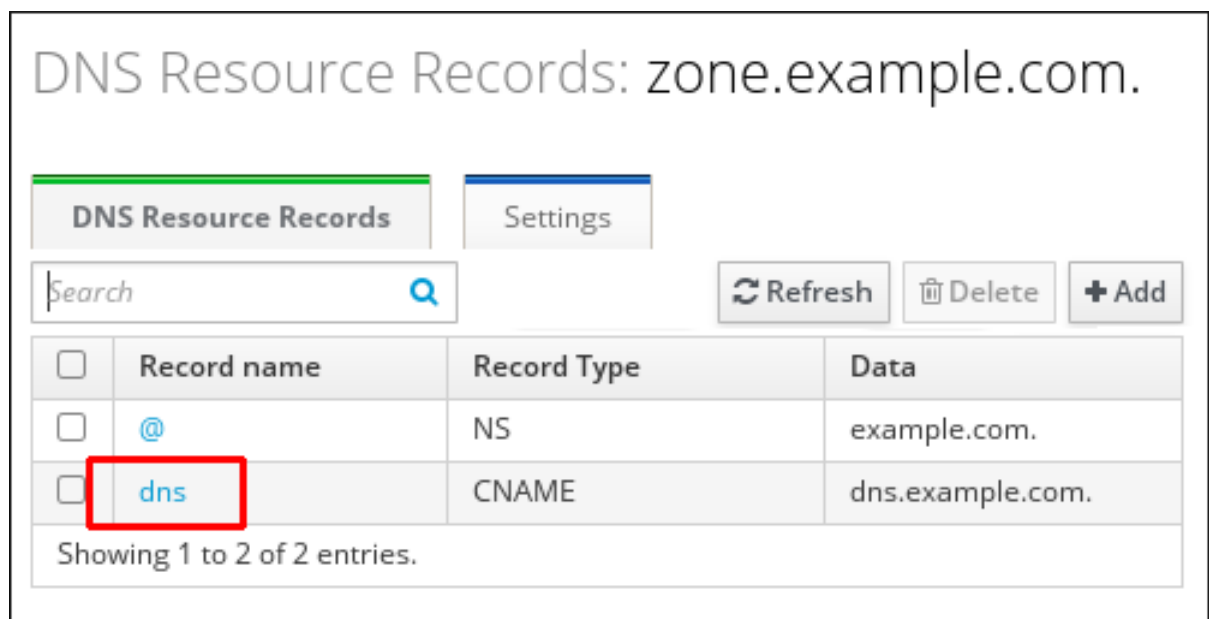
### Prerequisites

- You are logged in as IdM administrator.

### Procedure

- In the IdM Web UI, click **Network Services** → **DNS** → **DNS Zones**.
- Click the zone from which you want to delete a DNS record, for example **example.com..**
- In the **DNS Resource Records** section, click the name of the resource record.

Figure 91.3. Selecting a DNS Resource Record



- Select the check box by the name of the record type to delete.
- Click **Delete**.

Figure 91.4. Deleting a DNS Resource Record

The screenshot shows the 'Standard Record Types' section of the IdM Web UI. It contains three record types: A, AAAA, and CNAME. Each record type has a checkbox, a label, and buttons for 'Delete' and 'Add'. The CNAME record type is selected, and its 'Delete' button is highlighted with a red box.

| Record Type | Checkbox                            | Label            | Buttons      |
|-------------|-------------------------------------|------------------|--------------|
| A           | <input type="checkbox"/>            | IP Address       | Delete + Add |
| AAAA        | <input type="checkbox"/>            | IP Address       | Delete + Add |
| CNAME       | <input checked="" type="checkbox"/> | Hostname         | Delete + Add |
|             | <input checked="" type="checkbox"/> | dns.example.com. | Edit         |

The selected record type is now deleted. The other configuration of the resource record is left intact.

#### Additional resources

- See [Deleting an entire DNS record in the IdM Web UI](#) .

## 91.6. DELETING AN ENTIRE DNS RECORD IN THE IDM WEB UI

Follow this procedure to delete all the records for a particular resource in a zone using the Identity Management (IdM) Web UI.

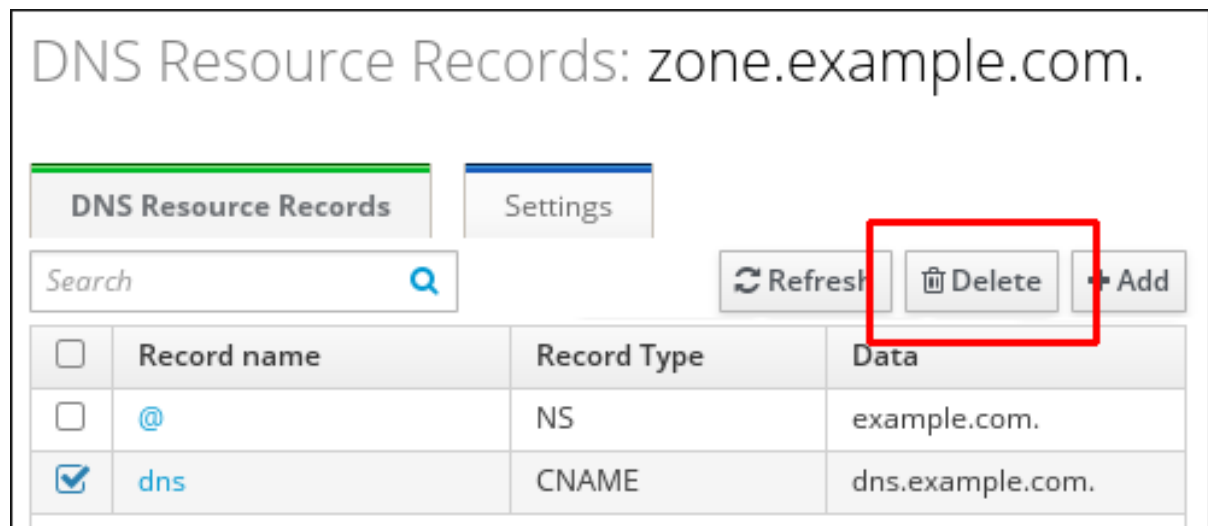
#### Prerequisites

- You are logged in as IdM administrator.

#### Procedure

1. In the IdM Web UI, click **Network Services** → **DNS** → **DNS Zones**.
2. Click the zone from which you want to delete a DNS record, for example **zone.example.com.**.
3. In the **DNS Resource Records** section, select the check box of the resource record to delete.
4. Click **Delete**.

Figure 91.5. Deleting an Entire Resource Record



The entire resource record is now deleted.

## 91.7. DELETING DNS RECORDS IN THE IDM CLI

Follow this procedure to remove DNS records from a zone managed by the Identity Management (IdM) DNS.

### Prerequisites

- You are logged in as IdM administrator.

### Procedure

- To remove records from a zone, use the **ipa dnsrecord-del** command and add the **-recordType-rec** option together with the record value. For example, to remove an A type record:

```
$ ipa dnsrecord-del example.com www --a-rec 192.0.2.1
```

If you run **ipa dnsrecord-del** without any options, the command prompts for information about the record to delete. Note that passing the **--del-all** option with the command removes all associated records for the zone.

### Additional resources

- Run the **ipa dnsrecord-del --help** command.

## 91.8. ADDITIONAL RESOURCES

- See [Using Ansible to manage DNS records in IdM](#) .

## CHAPTER 92. USING ANSIBLE TO MANAGE DNS RECORDS IN IDM

This chapter describes how to manage DNS records in Identity Management (IdM) using an Ansible playbook. As an IdM administrator, you can add, modify, and delete DNS records in IdM. The chapter contains the following sections:

- [Ensuring the presence of A and AAAA DNS records in IdM using Ansible](#)
- [Ensuring the presence of A and PTR DNS records in IdM using Ansible](#)
- [Ensuring the presence of multiple DNS records in IdM using Ansible](#)
- [Ensuring the presence of multiple CNAME records in IdM using Ansible](#)
- [Ensuring the presence of an SRV record in IdM using Ansible](#)

### 92.1. DNS RECORDS IN IDM

Identity Management (IdM) supports many different DNS record types. The following four are used most frequently:

#### A

This is a basic map for a host name and an IPv4 address. The record name of an A record is a host name, such as **www**. The **IP Address** value of an A record is an IPv4 address, such as **192.0.2.1**. For more information about A records, see [RFC 1035](#).

#### AAAA

This is a basic map for a host name and an IPv6 address. The record name of an AAAA record is a host name, such as **www**. The **IP Address** value is an IPv6 address, such as **2001:DB8::1111**. For more information about AAAA records, see [RFC 3596](#).

#### SRV

*Service (SRV) resource records* map service names to the DNS name of the server that is providing that particular service. For example, this record type can map a service like an LDAP directory to the server which manages it.

The record name of an SRV record has the format **\_service.\_protocol**, such as **\_ldap.\_tcp**. The configuration options for SRV records include priority, weight, port number, and host name for the target service.

For more information about SRV records, see [RFC 2782](#).

#### PTR

A pointer record (PTR) adds a reverse DNS record, which maps an IP address to a domain name.

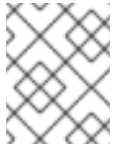


#### NOTE

All reverse DNS lookups for IPv4 addresses use reverse entries that are defined in the **in-addr.arpa** domain. The reverse address, in human-readable form, is the exact reverse of the regular IP address, with the **in-addr.arpa** domain appended to it. For example, for the network address **192.0.2.0/24**, the reverse zone is **2.0.192.in-addr.arpa**.



The record name of a PTR must be in the standard format specified in [RFC 1035](#), extended in [RFC 2317](#), and [RFC 3596](#). The host name value must be a canonical host name of the host for which you want to create the record.



## NOTE

Reverse zones can also be configured for IPv6 addresses, with zones in the **.ip6.arpa.** domain. For more information about IPv6 reverse zones, see [RFC 3596](#).

When adding DNS resource records, note that many of the records require different data. For example, a CNAME record requires a host name, while an A record requires an IP address. In the IdM Web UI, the fields in the form for adding a new record are updated automatically to reflect what data is required for the currently selected type of record.

## 92.2. COMMON IPA DNSRECORD-\* OPTIONS

You can use the following options when adding, modifying and deleting the most common DNS resource record types in Identity Management (IdM):

- A (IPv4)
- AAAA (IPv6)
- SRV
- PTR

In **Bash**, you can define multiple entries by listing the values in a comma-separated list inside curly braces, such as **--option={val1,val2,val3}**.

**Table 92.1. General Record Options**

| Option              | Description   |
|---------------------|---|
| <b>--ttl=number</b> | Sets the time to live for the record.                               |
| <b>--structured</b> | Parses the raw DNS records and returns them in a structured format. |

**Table 92.2. "A" record options**

| Option                 | Description   | Examples   |
|------------------------|---|--|
| <b>--a-rec=ARECORD</b> | Passes a single A record or a list of A records.        | <b>ipa dnsrecord-add idm.example.com host1 --a-rec=192.168.122.123</b>             |
|                        | Can create a wildcard A record with a given IP address. | <b>ipa dnsrecord-add idm.example.com "*" --a-rec=192.168.122.123<sup>[a]</sup></b> |
|                        |   |  |

| Option   | Description  | Examples  |
|--|--|---|
| <b>--a-ip-address=string</b>   | Gives the IP address for the record. When creating a record, the option to specify the <b>A</b> record value is <b>--a-rec</b> . However, when modifying an <b>A</b> record, the <b>--a-rec</b> option is used to specify the current value for the <b>A</b> record. The new value is set with the <b>--a-ip-address</b> option. | <b>ipa dnsrecord-mod idm.example.com --a-rec 192.168.122.123 --a-ip-address 192.168.122.124</b> |
| [a] The example creates a wildcard <b>A</b> record with the IP address of 192.0.2.123. |  |   |

Table 92.3. "AAAA" record options

| Option                          | Description  | Example   |
|---------------------------------|--|---|
| <b>--aaaa-rec=AAAARECORD</b>    | Passes a single AAAA (IPv6) record or a list of AAAA records.  | <b>ipa dnsrecord-add idm.example.com www --aaaa-rec 2001:db8::1231:5675</b>                                   |
| <b>--aaaa-ip-address=string</b> | Gives the IPv6 address for the record. When creating a record, the option to specify the <b>A</b> record value is <b>--aaaa-rec</b> . However, when modifying an <b>A</b> record, the <b>--aaaa-rec</b> option is used to specify the current value for the <b>A</b> record. The new value is set with the <b>--a-ip-address</b> option. | <b>ipa dnsrecord-mod idm.example.com --aaaa-rec 2001:db8::1231:5675 --aaaa-ip-address 2001:db8::1231:5676</b> |

Table 92.4. "PTR" record options

| Option                       | Description   | Example  |
|------------------------------|---|--|
| <b>--ptr-rec=PTRRECORD</b>   | Passes a single PTR record or a list of PTR records. When adding the reverse DNS record, the zone name used with the <b>ipa dnsrecord-add</b> command is reversed, compared to the usage for adding other DNS records. Typically, the host IP address is the last octet of the IP address in a given network. The first example on the right adds a PTR record for <b>server4.idm.example.com</b> with IPv4 address <b>192.168.122.4</b> . The second example adds a reverse DNS entry to the <b>0.0.0.0.0.0.0.8.b.d.0.1.0.0.2.ip6.arpa</b> . IPv6 reverse zone for the host <b>server2.example.com</b> with the IP address <b>2001:DB8::1111</b> . | <b>ipa dnsrecord-add 122.168.192.in-addr.arpa 4 --ptr-rec server4.idm.example.com.</b><br><br><b>\$ ipa dnsrecord-add 0.0.0.0.0.0.0.8.b.d.0.1.0.0.2.ip6.arpa. 1.1.1.0.0.0.0.0.0.0.0.0.0.0 --ptr-rec server2.idm.example.com.</b> |
| <b>--ptr-hostname=string</b> | Gives the host name for the record.   |  |

Table 92.5. "SRV" Record Options

| Option                       | Description  | Example  |
|------------------------------|--|--|
| <b>--srv-rec=SRVRECORD</b>   | Passes a single SRV record or a list of SRV records. In the examples on the right, <code>_ldap._tcp</code> defines the service type and the connection protocol for the SRV record. The <b>--srv-rec</b> option defines the priority, weight, port, and target values. The weight values of 51 and 49 in the examples add up to 100 and represent the probability, in percentages, that a particular record is used. | <pre># ipa dnsrecord-add idm.example.com _ldap._tcp --srv-rec="0 51 389 server1.idm.example.com."</pre> <pre># ipa dnsrecord-add server.idm.example.com _ldap._tcp --srv-rec="1 49 389 server2.idm.example.com."</pre> |
| <b>--srv-priority=number</b> | Sets the priority of the record. There can be multiple SRV records for a service type. The priority (0 - 65535) sets the rank of the record; the lower the number, the higher the priority. A service has to use the record with the highest priority first.   | <pre># ipa dnsrecord-mod server.idm.example.com _ldap._tcp --srv-rec="1 49 389 server2.idm.example.com." --srv-priority=0</pre>  |
| <b>--srv-weight=number</b>   | Sets the weight of the record. This helps determine the order of SRV records with the same priority. The set weights should add up to 100, representing the probability (in percentages) that a particular record is used.   | <pre># ipa dnsrecord-mod server.idm.example.com _ldap._tcp --srv-rec="0 49 389 server2.idm.example.com." --srv-weight=60</pre>   |
| <b>--srv-port=number</b>     | Gives the port for the service on the target host.   | <pre># ipa dnsrecord-mod server.idm.example.com _ldap._tcp --srv-rec="0 60 389 server2.idm.example.com." --srv-port=636</pre>  |
| <b>--srv-target=string</b>   | Gives the domain name of the target host. This can be a single period (.) if the service is not available in the domain.   |  |

#### Additional resources

- Run **ipa dnsrecord-add --help**.

## 92.3. ENSURING THE PRESENCE OF A AND AAAA DNS RECORDS IN IDM USING ANSIBLE

Follow this procedure to use an Ansible playbook to ensure that A and AAAA records for a particular IdM host are present. In the example used in the procedure below, an IdM administrator ensures the presence of A and AAAA records for **host1** in the **idm.example.com** DNS zone.

#### Prerequisites

- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the `secret.yml` Ansible vault stores your `ipadmin_password`.
- You know the IdM administrator password.
- The `idm.example.com` zone exists and is managed by IdM DNS. For more information about adding a primary DNS zone in IdM DNS, see [Using Ansible playbooks to manage IdM DNS zones](#) .

## Procedure

1. Navigate to the `/usr/share/doc/ansible-freeipa/playbooks/dnsrecord` directory:

```
$ cd /usr/share/doc/ansible-freeipa/playbooks/dnsrecord
```

2. Open your inventory file and ensure that the IdM server that you want to configure is listed in the `[ipaserver]` section. For example, to instruct Ansible to configure `server.idm.example.com`, enter:

```
[ipaserver]
server.idm.example.com
```

3. Make a copy of the `ensure-A-and-AAAA-records-are-present.yml` Ansible playbook file. For example:

```
$ cp ensure-A-and-AAAA-records-are-present.yml ensure-A-and-AAAA-records-are-present-copy.yml
```

4. Open the `ensure-A-and-AAAA-records-are-present-copy.yml` file for editing.
5. Adapt the file by setting the following variables in the `ipadnsrecord` task section:
  - Set the `ipadmin_password` variable to your IdM administrator password.
  - Set the `zone_name` variable to `idm.example.com`.
  - In the `records` variable, set the `name` variable to `host1`, and the `a_ip_address` variable to `192.168.122.123`.
  - In the `records` variable, set the `name` variable to `host1`, and the `aaaa_ip_address` variable to `::1`.
 This is the modified Ansible playbook file for the current example:

```
---
- name: Ensure A and AAAA records are present
  hosts: ipaserver
  become: true
  gather_facts: false
```

```

tasks:
# Ensure A and AAAA records are present
- name: Ensure that 'host1' has A and AAAA records.
  ipadnsrecord:
    ipadmin_password: "{{ ipadmin_password }}"
    zone_name: idm.example.com
  records:
    - name: host1
      a_ip_address: 192.168.122.123
    - name: host1
      aaaa_ip_address: ::1

```

6. Save the file.

7. Run the playbook:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory.file ensure-A-and-AAAA-records-are-present-copy.yml
```

#### Additional resources

- See [DNS records in IdM](#).
- See the **README-dnsrecord.md** file in the `/usr/share/doc/ansible-freeipa/` directory.
- See sample Ansible playbooks in the `/usr/share/doc/ansible-freeipa/playbooks/dnsrecord` directory.

## 92.4. ENSURING THE PRESENCE OF A AND PTR DNS RECORDS IN IDM USING ANSIBLE

Follow this procedure to use an Ansible playbook to ensure that an A record for a particular IdM host is present, with a corresponding PTR record. In the example used in the procedure below, an IdM administrator ensures the presence of A and PTR records for **host1** with an IP address of **192.168.122.45** in the **idm.example.com** zone.

#### Prerequisites

- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipadmin\_password**.
- You know the IdM administrator password.
- The **idm.example.com** DNS zone exists and is managed by IdM DNS. For more information about adding a primary DNS zone in IdM DNS, see [Using Ansible playbooks to manage IdM DNS zones](#).

## Procedure

1. Navigate to the **/usr/share/doc/ansible-freeipa/playbooks/dnsrecord** directory:

```
$ cd /usr/share/doc/ansible-freeipa/playbooks/dnsrecord
```

2. Open your inventory file and ensure that the IdM server that you want to configure is listed in the **[ipaserver]** section. For example, to instruct Ansible to configure **server.idm.example.com**, enter:

```
[ipaserver]
server.idm.example.com
```

3. Make a copy of the **ensure-dnsrecord-with-reverse-is-present.yml** Ansible playbook file. For example:

```
$ cp ensure-dnsrecord-with-reverse-is-present.yml ensure-dnsrecord-with-reverse-is-present-copy.yml
```

4. Open the **ensure-dnsrecord-with-reverse-is-present-copy.yml** file for editing.
5. Adapt the file by setting the following variables in the **ipadnsrecord** task section:

- Set the **ipaadmin\_password** variable to your IdM administrator password.
- Set the **name** variable to **host1**.
- Set the **zone\_name** variable to **idm.example.com**.
- Set the **ip\_address** variable to **192.168.122.45**.
- Set the **create\_reverse** variable to **yes**.

This is the modified Ansible playbook file for the current example:

```
---
- name: Ensure DNS Record is present.
  hosts: ipaserver
  become: true
  gather_facts: false

  tasks:
    # Ensure that dns record is present
    - ipadnsrecord:
        ipaadmin_password: "{{ ipaadmin_password }}"
        name: host1
        zone_name: idm.example.com
        ip_address: 192.168.122.45
        create_reverse: yes
        state: present
```

6. Save the file.
7. Run the playbook:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory.file ensure-
dnsrecord-with-reverse-is-present-copy.yml
```

### Additional resources

- See [DNS records in IdM](#).
- See the **README-dnsrecord.md** file in the `/usr/share/doc/ansible-freeipa/` directory.
- See sample Ansible playbooks in the `/usr/share/doc/ansible-freeipa/playbooks/dnsrecord` directory.

## 92.5. ENSURING THE PRESENCE OF MULTIPLE DNS RECORDS IN IDM USING ANSIBLE

Follow this procedure to use an Ansible playbook to ensure that multiple values are associated with a particular IdM DNS record. In the example used in the procedure below, an IdM administrator ensures the presence of multiple A records for **host1** in the **idm.example.com** DNS zone.

### Prerequisites

- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipadmin\_password**.
- You know the IdM administrator password.
- The **idm.example.com** zone exists and is managed by IdM DNS. For more information about adding a primary DNS zone in IdM DNS, see [Using Ansible playbooks to manage IdM DNS zones](#).

### Procedure

1. Navigate to the `/usr/share/doc/ansible-freeipa/playbooks/dnsrecord` directory:

```
$ cd /usr/share/doc/ansible-freeipa/playbooks/dnsrecord
```

2. Open your inventory file and ensure that the IdM server that you want to configure is listed in the **[ipaserver]** section. For example, to instruct Ansible to configure **server.idm.example.com**, enter:

```
[ipaserver]
server.idm.example.com
```

3. Make a copy of the **ensure-presence-multiple-records.yml** Ansible playbook file. For example:

```
$ cp ensure-presence-multiple-records.yml ensure-presence-multiple-records-
copy.yml
```

- 4. Open the **ensure-presence-multiple-records-copy.yml** file for editing.
- 5. Adapt the file by setting the following variables in the **ipadnsrecord** task section:
  - Set the **ipaadmin\_password** variable to your IdM administrator password.
  - In the **records** section, set the **name** variable to **host1**.
  - In the **records** section, set the **zone\_name** variable to **idm.example.com**.
  - In the **records** section, set the **a\_rec** variable to **192.168.122.112** and to **192.168.122.122**.
  - Define a second record in the **records** section:
    - Set the **name** variable to **host1**.
    - Set the **zone\_name** variable to **idm.example.com**.
    - Set the **aaaa\_rec** variable to **::1**.

This is the modified Ansible playbook file for the current example:

```
---
- name: Test multiple DNS Records are present.
  hosts: ipaserver
  become: true
  gather_facts: false

  tasks:
    # Ensure that multiple dns records are present
    - ipadnsrecord:
        ipaadmin_password: "{{ ipaadmin_password }}"
        records:
          - name: host1
            zone_name: idm.example.com
            a_rec: 192.168.122.112
            a_rec: 192.168.122.122
          - name: host1
            zone_name: idm.example.com
            aaaa_rec: ::1
```

- 6. Save the file.
- 7. Run the playbook:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory.file ensure-
presence-multiple-records-copy.yml
```

#### Additional resources

- See [DNS records in IdM](#).
- See the **README-dnsrecord.md** file in the **/usr/share/doc/ansible-freeipa/** directory.



- See sample Ansible playbooks in the `/usr/share/doc/ansible-freeipa/playbooks/dnsrecord` directory.

## 92.6. ENSURING THE PRESENCE OF MULTIPLE CNAME RECORDS IN IDM USING ANSIBLE

A Canonical Name record (CNAME record) is a type of resource record in the Domain Name System (DNS) that maps one domain name, an alias, to another name, the canonical name.

You may find CNAME records useful when running multiple services from a single IP address: for example, an FTP service and a web service, each running on a different port.

Follow this procedure to use an Ansible playbook to ensure that multiple CNAME records are present in IdM DNS. In the example used in the procedure below, **host03** is both an HTTP server and an FTP server. The IdM administrator ensures the presence of the **www** and **ftp** CNAME records for the **host03** A record in the **idm.example.com** zone.

### Prerequisites

- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the `secret.yml` Ansible vault stores your `ipaadmin_password`.
- You know the IdM administrator password.
- The **idm.example.com** zone exists and is managed by IdM DNS. For more information about adding a primary DNS zone in IdM DNS, see [Using Ansible playbooks to manage IdM DNS zones](#).
- The **host03** A record exists in the **idm.example.com** zone.

### Procedure

1. Navigate to the `/usr/share/doc/ansible-freeipa/playbooks/dnsrecord` directory:

```
$ cd /usr/share/doc/ansible-freeipa/playbooks/dnsrecord
```

2. Open your inventory file and ensure that the IdM server that you want to configure is listed in the **[ipaserver]** section. For example, to instruct Ansible to configure **server.idm.example.com**, enter:

```
[ipaserver]
server.idm.example.com
```

3. Make a copy of the `ensure-CNAME-record-is-present.yml` Ansible playbook file. For example:

```
$ cp ensure-CNAME-record-is-present.yml ensure-CNAME-record-is-present-copy.yml
```

4. Open the **ensure-CNAME-record-is-present-copy.yml** file for editing.
5. Adapt the file by setting the following variables in the **ipadnsrecord** task section:
  - (Optional) Adapt the description provided by the **name** of the play.
  - Set the **ipaadmin\_password** variable to your IdM administrator password.
  - Set the **zone\_name** variable to **idm.example.com**.
  - In the **records** variable section, set the following variables and values:
    - Set the **name** variable to **www**.
    - Set the **cname\_hostname** variable to **host03**.
    - Set the **name** variable to **ftp**.
    - Set the **cname\_hostname** variable to **host03**.

This is the modified Ansible playbook file for the current example:

```
---
- name: Ensure that 'www.idm.example.com' and 'ftp.idm.example.com' CNAME records
  point to 'host03.idm.example.com'.
  hosts: ipaserver
  become: true
  gather_facts: false

  tasks:
  - ipadnsrecord:
    ipaadmin_password: "{{ ipaadmin_password }}"
    zone_name: idm.example.com
    records:
    - name: www
      cname_hostname: host03
    - name: ftp
      cname_hostname: host03
```

6. Save the file.
7. Run the playbook:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory.file ensure-
CNAME-record-is-present.yml
```

#### Additional resources

- See the **README-dnsrecord.md** file in the **/usr/share/doc/ansible-freeipa/** directory.
- See sample Ansible playbooks in the **/usr/share/doc/ansible-freeipa/playbooks/dnsrecord** directory.

## 92.7. ENSURING THE PRESENCE OF AN SRV RECORD IN IDM USING ANSIBLE

A DNS service (SRV) record defines the hostname, port number, transport protocol, priority and weight of a service available in a domain. In Identity Management (IdM), you can use SRV records to locate IdM servers and replicas.

Follow this procedure to use an Ansible playbook to ensure that an SRV record is present in IdM DNS. In the example used in the procedure below, an IdM administrator ensures the presence of the `_kerberos._udp.idm.example.com` SRV record with the value of `10 50 88 idm.example.com`. This sets the following values:

- It sets the priority of the service to 10.
- It sets the weight of the service to 50.
- It sets the port to be used by the service to 88.

### Prerequisites

- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the `secret.yml` Ansible vault stores your `ipadmin_password`.
- You know the IdM administrator password.
- The `idm.example.com` zone exists and is managed by IdM DNS. For more information about adding a primary DNS zone in IdM DNS, see [Using Ansible playbooks to manage IdM DNS zones](#).

### Procedure

1. Navigate to the `/usr/share/doc/ansible-freeipa/playbooks/dnsrecord` directory:

```
$ cd /usr/share/doc/ansible-freeipa/playbooks/dnsrecord
```

2. Open your inventory file and ensure that the IdM server that you want to configure is listed in the `[ipaserver]` section. For example, to instruct Ansible to configure `server.idm.example.com`, enter:

```
[ipaserver]
server.idm.example.com
```

3. Make a copy of the `ensure-SRV-record-is-present.yml` Ansible playbook file. For example:

```
$ cp ensure-SRV-record-is-present.yml ensure-SRV-record-is-present-copy.yml
```

4. Open the `ensure-SRV-record-is-present-copy.yml` file for editing.
5. Adapt the file by setting the following variables in the `ipadnsrecord` task section:
  - Set the `ipadmin_password` variable to your IdM administrator password.

- Set the **name** variable to `_kerberos._udp.idm.example.com`.
- Set the **srv\_rec** variable to `'10 50 88 idm.example.com'`.
- Set the **zone\_name** variable to `idm.example.com`.  
This the modified Ansible playbook file for the current example:

```
---
- name: Test multiple DNS Records are present.
  hosts: ipaserver
  become: true
  gather_facts: false

  tasks:
    # Ensure a SRV record is present
    - ipadsrecord:
        ipaadmin_password: "{{ ipaadmin_password }}"
        name: _kerberos._udp.idm.example.com
        srv_rec: '10 50 88 idm.example.com'
        zone_name: idm.example.com
        state: present
```

6. Save the file.

7. Run the playbook:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory.file ensure-SRV-
record-is-present.yml
```

### Additional resources

- See [DNS records in IdM](#).
- See the **README-dnsrecord.md** file in the `/usr/share/doc/ansible-freeipa/` directory.
- See sample Ansible playbooks in the `/usr/share/doc/ansible-freeipa/playbooks/dnsrecord` directory.

## CHAPTER 93. MANAGING IDM SERVERS BY USING ANSIBLE

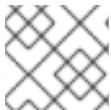
You can use **Red Hat Ansible Engine** to manage the servers in your Identity Management (IdM) topology. You can use the **server** module in the **ansible-freeipa** package to check the presence or absence of a server in the IdM topology. You can also hide any replica or make a replica visible.

The section contains the following topics:

- [Checking that an IdM server is present by using Ansible](#)
- [Ensuring that an IdM server is absent from an IdM topology by using Ansible](#)
- [Ensuring the absence of an IdM server despite hosting a last IdM server role](#)
- [Ensuring that an IdM server is absent but not necessarily disconnected from other IdM servers](#)
- [Ensuring that an existing IdM server is hidden using an Ansible playbook](#)
- [Ensuring that an existing IdM server is visible using an Ansible playbook](#)
- [Ensuring that an existing IdM server has an IdM DNS location assigned](#)
- [Ensuring that an existing IdM server has no IdM DNS location assigned](#)

### 93.1. CHECKING THAT AN IDM SERVER IS PRESENT BY USING ANSIBLE

You can use the **ipaserver ansible-freeipa** module in an Ansible playbook to verify that an Identity Management (IdM) server exists.



#### NOTE

The **ipaserver** Ansible module does not install the IdM server.

#### Prerequisites

- You know the IdM **admin** password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the **ansible-freeipa** package on the Ansible controller.
  - The example assumes that in the **~/MyPlaybooks/** directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipaadmin\_password**.
  - The **SSH** connection from the control node to the IdM server defined in the inventory file is working correctly.

#### Procedure

1. Navigate to your **~/MyPlaybooks/** directory:

```
$ cd ~/MyPlaybooks/
```

- Copy the **server-present.yml** Ansible playbook file located in the **/usr/share/doc/ansible-freeipa/playbooks/server/** directory:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/server/server-present.yml server-present-copy.yml
```

- Open the **server-present-copy.yml** file for editing.
- Adapt the file by setting the following variables in the **ipaserver** task section and save the file:
  - Set the **ipaadmin\_password** variable to the password of the IdM **admin**.
  - Set the **name** variable to the **FQDN** of the server. The **FQDN** of the example server is **server123.idm.example.com**.

```
---
- name: Server present example
  hosts: ipaserver
  vars_files:
    - /home/user_name/MyPlaybooks/secret.yml
  tasks:
    - name: Ensure server server123.idm.example.com is present
      ipaserver:
        ipaadmin_password: "{{ ipaadmin_password }}"
        name: server123.idm.example.com
```

- Run the Ansible playbook and specify the playbook file and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory server-present-copy.yml
```

#### Additional resources

- See [Installing an Identity Management server using an Ansible playbook](#) .
- See the **README-server.md** file in the **/usr/share/doc/ansible-freeipa/** directory.
- See the sample playbooks in the **/usr/share/doc/ansible-freeipa/playbooks/server** directory.

## 93.2. ENSURING THAT AN IDM SERVER IS ABSENT FROM AN IDM TOPOLOGY BY USING ANSIBLE

Use an Ansible playbook to ensure an Identity Management (IdM) server does not exist in an IdM topology, even as a host.

In contrast to the **ansible-freeipa ipaserver** role, the **ipaserver** module used in this playbook does not uninstall IdM services from the server.

#### Prerequisites

- You know the IdM **admin** password.

- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the `secret.yml` Ansible vault stores your `ipaadmin_password`.
  - The **SSH** connection from the control node to the IdM server defined in the inventory file is working correctly.

## Procedure

1. Navigate to your `~/MyPlaybooks/` directory:

```
$ cd ~/MyPlaybooks/
```

2. Copy the `server-absent.yml` Ansible playbook file located in the `/usr/share/doc/ansible-freeipa/playbooks/server/` directory:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/server/server-absent.yml server-absent-copy.yml
```

3. Open the `server-absent-copy.yml` file for editing.
4. Adapt the file by setting the following variables in the `ipaserver` task section and save the file:
  - Set the `ipaadmin_password` variable to the password of the IdM **admin**.
  - Set the `name` variable to the **FQDN** of the server. The **FQDN** of the example server is `server123.idm.example.com`.
  - Ensure that the `state` variable is set to **absent**.

```
---
- name: Server absent example
  hosts: ipaserver
  vars_files:
    - /home/user_name/MyPlaybooks/secret.yml
  tasks:
    - name: Ensure server server123.idm.example.com is absent
      ipaserver:
        ipaadmin_password: "{{ ipaadmin_password }}"
        name: server123.idm.example.com
        state: absent
```

5. Run the Ansible playbook and specify the playbook file and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory server-absent-copy.yml
```

6. Make sure all name server (NS) DNS records pointing to **server123.idm.example.com** are deleted from your DNS zones. This applies regardless of whether you use integrated DNS managed by IdM or external DNS.

### Additional resources

- See [Uninstalling an IdM server](#).
- See the **README-server.md** file in the `/usr/share/doc/ansible-freeipa/` directory.
- See the sample playbooks in the `/usr/share/doc/ansible-freeipa/playbooks/server` directory.

## 93.3. ENSURING THE ABSENCE OF AN IDM SERVER DESPITE HOSTING A LAST IDM SERVER ROLE

You can use Ansible to ensure that an Identity Management (IdM) server is absent even if the last IdM service instance is running on the server. A certificate authority (CA), key recovery authority (KRA), or DNS server are all examples of IdM services.



### WARNING

If you remove the last server that serves as a CA, KRA, or DNS server, you disrupt IdM functionality seriously. You can manually check which services are running on which IdM servers with the **ipa service-find** command. The principal name of a CA server is **dogtag/server\_name/REALM\_NAME**.

In contrast to the **ansible-freeipa ipaserver** role, the **ipaserver** module used in this playbook does not uninstall IdM services from the server.

### Prerequisites

- You know the IdM **admin** password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the **ansible-freeipa** package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipaadmin\_password**.
  - The **SSH** connection from the control node to the IdM server defined in the inventory file is working correctly.

### Procedure

1. Navigate to your `~/MyPlaybooks/` directory:



```
$ cd ~/MyPlaybooks/
```

- Copy the **server-absent-ignore-last-of-role.yml** Ansible playbook file located in the **/usr/share/doc/ansible-freeipa/playbooks/server/** directory:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/server/server-absent-ignore-last-of-role.yml server-absent-ignore-last-of-role-copy.yml
```

- Open the **server-absent-ignore-last-of-role-copy.yml** file for editing.
- Adapt the file by setting the following variables in the **ipaserver** task section and save the file:
  - Set the **ipaadmin\_password** variable to the password of the IdM **admin**.
  - Set the **name** variable to the **FQDN** of the server. The **FQDN** of the example server is **server123.idm.example.com**.
  - Ensure that the **ignore\_last\_of\_role** variable is set to **yes**.
  - Set the **state** variable to **absent**.

```
---
- name: Server absent with last of role skip example
  hosts: ipaserver
  vars_files:
    - /home/user_name/MyPlaybooks/secret.yml
  tasks:
    - name: Ensure server "server123.idm.example.com" is absent with last of role skip
      ipaserver:
        ipaadmin_password: "{{ ipaadmin_password }}"
        name: server123.idm.example.com
        ignore_last_of_role: yes
        state: absent
```

- Run the Ansible playbook and specify the playbook file and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory server-absent-ignore-last-of-role-copy.yml
```

- Make sure all name server (NS) DNS records that point to **server123.idm.example.com** are deleted from your DNS zones. This applies regardless of whether you use integrated DNS managed by IdM or external DNS.

#### Additional resources

- See [Uninstalling an IdM server](#).
- See the **README-server.md** file in the **/usr/share/doc/ansible-freeipa/** directory.
- See sample playbooks in the **/usr/share/doc/ansible-freeipa/playbooks/server** directory.

## 93.4. ENSURING THAT AN IDM SERVER IS ABSENT BUT NOT NECESSARILY DISCONNECTED FROM OTHER IDM SERVERS

If you are removing an Identity Management (IdM) server from the topology, you can keep its replication agreements intact with an Ansible playbook. The playbook also ensures that the IdM server does not exist in IdM, even as a host.



### IMPORTANT

Ignoring a server's replication agreements when removing it is only recommended when the other servers are dysfunctional servers that you are planning to remove anyway. Removing a server that serves as a central point in the topology can split your topology into two disconnected clusters.

You can remove a dysfunctional server from the topology with the **ipa server-del** command.



### NOTE

If you remove the last server that serves as a certificate authority (CA), key recovery authority (KRA), or DNS server, you seriously disrupt the Identity Management (IdM) functionality. To prevent this problem, the playbook makes sure these services are running on another server in the domain before it uninstalls a server that serves as a CA, KRA, or DNS server.

In contrast to the **ansible-freeipa ipaserver** role, the **ipaserver** module used in this playbook does not uninstall IdM services from the server.

### Prerequisites

- You know the IdM **admin** password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the **ansible-freeipa** package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipaadmin\_password**.
  - The **SSH** connection from the control node to the IdM server defined in the inventory file is working correctly.

### Procedure

1. Navigate to your `~/MyPlaybooks/` directory:

```
$ cd ~/MyPlaybooks/
```

2. Copy the **server-absent-ignore\_topology\_disconnect.yml** Ansible playbook file located in the `/usr/share/doc/ansible-freeipa/playbooks/server/` directory:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/server/server-absent-  
ignore_topology_disconnect.yml server-absent-ignore_topology_disconnect-copy.yml
```

3. Open the **server-absent-ignore\_topology\_disconnect-copy.yml** file for editing.
4. Adapt the file by setting the following variables in the **ipaserver** task section and save the file:
  - Set the **ipaadmin\_password** variable to the password of the IdM **admin**.
  - Set the **name** variable to the **FQDN** of the server. The **FQDN** of the example server is **server123.idm.example.com**.
  - Ensure that the **ignore\_topology\_disconnect** variable is set to **yes**.
  - Ensure that the **state** variable is set to **absent**.

```
---
- name: Server absent with ignoring topology disconnects example
  hosts: ipaserver
  vars_files:
    - /home/user_name/MyPlaybooks/secret.yml
  tasks:
    - name: Ensure server "server123.idm.example.com" with ignoring topology disconnects
      ipaserver:
        ipaadmin_password: "{{ ipaadmin_password }}"
        name: server123.idm.example.com
        ignore_topology_disconnect: yes
        state: absent
```

5. Run the Ansible playbook and specify the playbook file and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory server-absent-
ignore_topology_disconnect-copy.yml
```

6. [Optional] Make sure all name server (NS) DNS records pointing to **server123.idm.example.com** are deleted from your DNS zones. This applies regardless of whether you use integrated DNS managed by IdM or external DNS.

#### Additional resources

- See [Uninstalling an IdM server](#).
- See the **README-server.md** file in the **/usr/share/doc/ansible-freeipa/** directory.
- See sample playbooks in the **/usr/share/doc/ansible-freeipa/playbooks/server** directory.

## 93.5. ENSURING THAT AN EXISTING IDM SERVER IS HIDDEN USING AN ANSIBLE PLAYBOOK

Use the **ipaserver ansible-freeipa** module in an Ansible playbook to ensure that an existing Identity Management (IdM) server is hidden. Note that this playbook does not install the IdM server.

#### Prerequisites

- You know the IdM **admin** password.
- You have configured your Ansible control node to meet the following requirements:

- You are using Ansible version 2.14 or later.
- You have installed the [ansible-freeipa](#) package on the Ansible controller.
- The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
- The example assumes that the `secret.yml` Ansible vault stores your `ipaadmin_password`.
- The **SSH** connection from the control node to the IdM server defined in the inventory file is working correctly.

## Procedure

1. Navigate to your `~/MyPlaybooks/` directory:

```
$ cd ~/MyPlaybooks/
```

2. Copy the `server-hidden.yml` Ansible playbook file located in the `/usr/share/doc/ansible-freeipa/playbooks/server/` directory:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/server/server-hidden.yml server-hidden-copy.yml
```

3. Open the `server-hidden-copy.yml` file for editing.
4. Adapt the file by setting the following variables in the `ipaserver` task section and save the file:
  - Set the `ipaadmin_password` variable to the password of the IdM **admin**.
  - Set the `name` variable to the **FQDN** of the server. The **FQDN** of the example server is `server123.idm.example.com`.
  - Ensure that the `hidden` variable is set to **True**.

```
---
- name: Server hidden example
  hosts: ipaserver
  vars_files:
    - /home/user_name/MyPlaybooks/secret.yml
  tasks:
    - name: Ensure server server123.idm.example.com is hidden
      ipaserver:
        ipaadmin_password: "{{ ipaadmin_password }}"
        name: server123.idm.example.com
        hidden: True
```

5. Run the Ansible playbook and specify the playbook file and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory server-hidden-copy.yml
```

## Additional resources

- See [Installing an Identity Management server using an Ansible playbook](#) .
- See [The hidden replica mode](#).
- See the **README-server.md** file in the `/usr/share/doc/ansible-freeipa/` directory.
- See sample playbooks in the `/usr/share/doc/ansible-freeipa/playbooks/server` directory.

## 93.6. ENSURING THAT AN EXISTING IDM SERVER IS VISIBLE BY USING AN ANSIBLE PLAYBOOK

Use the **ipaserver ansible-freeipa** module in an Ansible playbook to ensure that an existing Identity Management (IdM) server is visible. Note that this playbook does not install the IdM server.

### Prerequisites

- You know the IdM **admin** password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipadmin\_password**.
  - The **SSH** connection from the control node to the IdM server defined in the inventory file is working correctly.

### Procedure

1. Navigate to your `~/MyPlaybooks/` directory:

```
$ cd ~/MyPlaybooks/
```

2. Copy the **server-not-hidden.yml** Ansible playbook file located in the `/usr/share/doc/ansible-freeipa/playbooks/server/` directory:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/server/server-not-hidden.yml server-not-hidden-copy.yml
```

3. Open the **server-not-hidden-copy.yml** file for editing.
4. Adapt the file by setting the following variables in the **ipaserver** task section and save the file:
  - Set the **ipadmin\_password** variable to the password of the IdM **admin**.
  - Set the **name** variable to the **FQDN** of the server. The **FQDN** of the example server is **server123.idm.example.com**.
  - Ensure that the **hidden** variable is set to **no**.

```

---
- name: Server not hidden example
  hosts: ipaserver
  vars_files:
    - /home/user_name/MyPlaybooks/secret.yml
  tasks:
    - name: Ensure server server123.idm.example.com is not hidden
      ipaserver:
        ipaadmin_password: "{{ ipaadmin_password }}"
        name: server123.idm.example.com
        hidden: no

```

5. Run the Ansible playbook and specify the playbook file and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory server-not-hidden-copy.yml
```

### Additional resources

- See [Installing an Identity Management server using an Ansible playbook](#) .
- See [The hidden replica mode](#).
- See the **README-server.md** file in the `/usr/share/doc/ansible-freeipa/` directory.
- See the sample playbooks in the `/usr/share/doc/ansible-freeipa/playbooks/server` directory.

## 93.7. ENSURING THAT AN EXISTING IDM SERVER HAS AN IDM DNS LOCATION ASSIGNED

Use the **ipaserver ansible-freeipa** module in an Ansible playbook to ensure that an existing Identity Management (IdM) server is assigned a specific IdM DNS location.

Note that the **ipaserver** Ansible module does not install the IdM server.

### Prerequisites

- You know the IdM **admin** password.
- The IdM DNS location exists. The example location is **germany**.
- You have **root** access to the server. The example server is **server123.idm.example.com**.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipaadmin\_password**.

- The **SSH** connection from the control node to the IdM server defined in the inventory file is working correctly.

## Procedure

1. Navigate to your `~/MyPlaybooks/` directory:

```
$ cd ~/MyPlaybooks/
```

2. Copy the **server-location.yml** Ansible playbook file located in the `/usr/share/doc/ansible-freeipa/playbooks/server/` directory:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/server/server-location.yml server-location-copy.yml
```

3. Open the **server-location-copy.yml** file for editing.
4. Adapt the file by setting the following variables in the **ipaserver** task section and save the file:
  - Set the **ipaadmin\_password** variable to the password of the IdM **admin**.
  - Set the **name** variable to **server123.idm.example.com**.
  - Set the **location** variable to **germany**.

This is the modified Ansible playbook file for the current example:

```
---
- name: Server enabled example
  hosts: ipaserver
  vars_files:
    - /home/user_name/MyPlaybooks/secret.yml
  tasks:
    - name: Ensure server server123.idm.example.com with location "germany" is present
      ipaserver:
        ipaadmin_password: "{{ ipaadmin_password }}"
        name: server123.idm.example.com
        location: germany
```

5. Run the Ansible playbook and specify the playbook file and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory server-location-copy.yml
```

6. Connect to **server123.idm.example.com** as **root** using **SSH**:

```
ssh root@server123.idm.example.com
```

7. Restart the **named-pkcs11** service on the server for the updates to take effect immediately:

```
[root@server123.idm.example.com ~]# systemctl restart named-pkcs11
```

## Additional resources

- See [Installing an Identity Management server using an Ansible playbook](#) .
- See [Using Ansible to ensure an IdM location is present](#) .
- See the **README-server.md** file in the `/usr/share/doc/ansible-freeipa/` directory.
- See sample playbooks in the `/usr/share/doc/ansible-freeipa/playbooks/server` directory.

## 93.8. ENSURING THAT AN EXISTING IDM SERVER HAS NO IDM DNS LOCATION ASSIGNED

Use the **ipaserver ansible-freeipa** module in an Ansible playbook to ensure that an existing Identity Management (IdM) server has no IdM DNS location assigned to it. Do not assign a DNS location to servers that change geographical location frequently. Note that the playbook does not install the IdM server.

### Prerequisites

- You know the IdM **admin** password.
- You have **root** access to the server. The example server is **server123.idm.example.com**.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipadmin\_password**.
  - The **SSH** connection from the control node to the IdM server defined in the inventory file is working correctly.

### Procedure

1. Navigate to your `~/MyPlaybooks/` directory:

```
$ cd ~/MyPlaybooks/
```

2. Copy the **server-no-location.yml** Ansible playbook file located in the `/usr/share/doc/ansible-freeipa/playbooks/server/` directory:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/server/server-no-location.yml server-no-location-copy.yml
```

3. Open the **server-no-location-copy.yml** file for editing.
4. Adapt the file by setting the following variables in the **ipaserver** task section and save the file:
  - Set the **ipadmin\_password** variable to the password of the IdM **admin**.
  - Set the **name** variable to **server123.idm.example.com**.



- Ensure that the **location** variable is set to `""`.

```
---
- name: Server no location example
  hosts: ipaserver

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - name: Ensure server server123.idm.example.com is present with no location
    ipaserver:
      ipaadmin_password: "{{ ipaadmin_password }}"
      name: server123.idm.example.com
      location: ""
```

5. Run the Ansible playbook and specify the playbook file and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory server-no-
location-copy.yml
```

6. Connect to **server123.idm.example.com** as **root** using **SSH**:

```
ssh root@server123.idm.example.com
```

7. Restart the **named-pkcs11** service on the server for the updates to take effect immediately:

```
[root@server123.idm.example.com ~]# systemctl restart named-pkcs11
```

### Additional resources

- See [Installing an Identity Management server using an Ansible playbook](#) .
- See [Using Ansible to manage DNS locations in IdM](#) .
- See the **README-server.md** file in the `/usr/share/doc/ansible-freeipa/` directory.
- See sample playbooks in the `/usr/share/doc/ansible-freeipa/playbooks/server` directory.

## CHAPTER 94. COLLECTING IDM HEALTHCHECK INFORMATION

Healthcheck has been designed as a manual command line tool which should help you to identify possible problems in Identity Management (IdM).

You can create a collection of logs based on the Healthcheck output with 30-day rotation.

### Prerequisites

- The Healthcheck tool is only available on RHEL 8.1 or newer

### 94.1. HEALTHCHECK IN IDM

The Healthcheck tool in Identity Management (IdM) helps find issues that may impact the health of your IdM environment.



#### NOTE

The Healthcheck tool is a command line tool that can be used without Kerberos authentication.

### Modules are Independent

Healthcheck consists of independent modules which test for:

- Replication issues
- Certificate validity
- Certificate Authority infrastructure issues
- IdM and Active Directory trust issues
- Correct file permissions and ownership settings

### Two output formats

Healthcheck generates the following outputs, which you can set using the **output-type** option:

- **json**: Machine-readable output in JSON format (default)
- **human**: Human-readable output

You can specify a different file destination with the **--output-file** option.

### Results

Each Healthcheck module returns one of the following results:

#### SUCCESS

configured as expected

#### WARNING

not an error, but worth keeping an eye on or evaluating

**ERROR**

not configured as expected

**CRITICAL**

not configured as expected, with a high possibility for impact

**94.2. LOG ROTATION**

Log rotation creates a new log file every day, and the files are organized by date. Since log files are saved in the same directory, you can select a particular log file according to the date.

Rotation means that there is configured a number for max number of log files and if the number is exceeded, the newest file rewrites and renames the oldest one. For example, if the rotation number is 30, the thirty-first log file replaces the first (oldest) one.

Log rotation reduces voluminous log files and organizes them, which can help with analysis of the logs.

**94.3. CONFIGURING LOG ROTATION USING THE IDM HEALTHCHECK**

Follow this procedure to configure a log rotation with:

- the **systemd** timer
- the **crond** service

The **systemd** timer runs the Healthcheck tool periodically and generates the logs. The default value is set to 4 a.m. every day.

The **crond** service is used for log rotation.

The default log name is **healthcheck.log** and the rotated logs use the **healthcheck.log-YYYYMMDD** format.

**Prerequisites**

- You must execute commands as root.

**Procedure**

1. Enable a **systemd** timer:

```
# systemctl enable ipa-healthcheck.timer
Created symlink /etc/systemd/system/multi-user.target.wants/ipa-healthcheck.timer ->
/usr/lib/systemd/system/ipa-healthcheck.timer.
```

2. Start the **systemd** timer:

```
# systemctl start ipa-healthcheck.timer
```

3. Open the **/etc/logrotate.d/ipahealthcheck** file to configure the number of logs which should be saved.  
By default, log rotation is set up for 30 days.
4. In the **/etc/logrotate.d/ipahealthcheck** file, configure the path to the logs.

By default, logs are saved in the `/var/log/ipa/healthcheck/` directory.

5. In the `/etc/logrotate.d/ipahealthcheck` file, configure the time for log generation.  
By default, a log is created daily at 4 a.m.
6. To use log rotation, ensure that the **crond** service is enabled and running:

```
# systemctl enable crond
# systemctl start crond
```

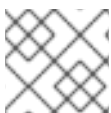
To start with generating logs, start the IPA healthcheck service:

```
# systemctl start ipa-healthcheck
```

To verify the result, go to `/var/log/ipa/healthcheck/` and check if logs are created correctly.

## 94.4. CHANGING IDM HEALTHCHECK CONFIGURATION

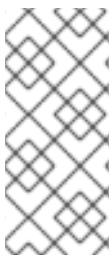
You can change Healthcheck settings by adding the desired command line options to the `/etc/ipahealthcheck/ipahealthcheck.conf` file. This can be useful when, for example, you configured a log rotation and want to ensure the logs are in a format suitable for automatic analysis, but do not want to set up a new timer.



### NOTE

This Healthcheck feature is only available on RHEL 8.7 and newer.

After the modification, all logs that Healthcheck creates follow the new settings. These settings also apply to any manual execution of Healthcheck.



### NOTE

When running Healthcheck manually, settings in the configuration file take precedence over options specified in the command line. For example, if **output\_type** is set to **human** in the configuration file, specifying **json** on the command line has no effect. Any command line options you use that are not specified in the configuration file are applied normally.

### Additional resources

- [Configuring log rotation using the IdM Healthcheck](#)

## 94.5. CONFIGURING HEALTHCHECK TO CHANGE THE OUTPUT LOGS FORMAT

Follow this procedure to configure Healthcheck with a timer already set up. In this example, you configure Healthcheck to produce logs in a human-readable format and to also include successful results instead of only errors.

### Prerequisites

- Your system is running RHEL 8.7 or later.

- You have **root** privileges.
- You have previously configured log rotation on a timer.

### Procedure

1. Open the **/etc/ipahealthcheck/ipahealthcheck.conf** file in a text editor.
2. Add options **output\_type=human** and **all=True** to the **[default]** section.
3. Save and close the file.

### Verification

1. Run Healthcheck manually:

```
# ipa-healthcheck
```

2. Go to **/var/log/ipa/healthcheck/** and check that the logs are in the correct format.

### Additional resources

- [Configuring log rotation using the IdM Healthcheck](#)

## CHAPTER 95. CHECKING SERVICES USING IDM HEALTHCHECK

You can monitor services used by the Identity Management (IdM) server using the Healthcheck tool.

For details, see [Healthcheck in IdM](#).

### Prerequisites

- The Healthcheck tool is only available on RHEL 8.1 and newer

### 95.1. SERVICES HEALTHCHECK TEST

The Healthcheck tool includes a test to check if any IdM services is not running. This test is important because services which are not running can cause failures in other tests. Therefore, check that all services are running first. You can then check all other test results.

To see all services tests, run **ipa-healthcheck** with the **--list-sources** option:

```
# ipa-healthcheck --list-sources
```

You can find all services tested with Healthcheck under the **ipahealthcheck.meta.services** source:

- certmonger
- dirsrv
- gssproxy
- httpd
- ipa\_custodia
- ipa\_dnssyncd
- ipa\_otpd
- kadmin
- krb5kdc
- named
- pki\_tomcatd
- sssd



#### NOTE

Run these tests on all IdM servers when trying to discover issues.

### 95.2. SCREENING SERVICES USING HEALTHCHECK

Follow this procedure to run a standalone manual test of services running on the Identity Management (IdM) server using the Healthcheck tool.

The Healthcheck tool includes many tests, whose results can be shortened with:

- excluding all successful test: **--failures-only**
- including only services tests: **--source=ipahealthcheck.meta.services**

### Procedure

- To run Healthcheck with warnings, errors and critical issues regarding services, enter:

```
# ipa-healthcheck --source=ipahealthcheck.meta.services --failures-only
```

A successful test displays empty brackets:

```
[]
```

If one of the services fails, the result can look similarly to this example:

```
{
  "source": "ipahealthcheck.meta.services",
  "check": "httpd",
  "result": "ERROR",
  "kw": {
    "status": false,
    "msg": "httpd: not running"
  }
}
```

### Additional resources

- See **man ipa-healthcheck**.

## CHAPTER 96. VERIFYING YOUR IDM AND AD TRUST CONFIGURATION USING IDM HEALTHCHECK

Learn more about identifying issues with IdM and an Active Directory trust in Identity Management (IdM) by using the Healthcheck tool.

### Prerequisites

- The Healthcheck tool is only available on RHEL 8.1 or newer

### 96.1. IDM AND AD TRUST HEALTHCHECK TESTS

The Healthcheck tool includes several tests for testing the status of your Identity Management (IdM) and Active Directory (AD) trust.

To see all trust tests, run **ipa-healthcheck** with the **--list-sources** option:

```
# ipa-healthcheck --list-sources
```

You can find all tests under the **ipahealthcheck.ipa.trust** source:

#### IPATrustAgentCheck

This test checks the SSSD configuration when the machine is configured as a trust agent. For each domain in **/etc/sss/sss.conf** where **id\_provider=ipa** ensure that **ipa\_server\_mode** is **True**.

#### IPATrustDomainsCheck

This test checks if the trust domains match SSSD domains by comparing the list of domains in **sssctl domain-list** with the list of domains from **ipa trust-find** excluding the IPA domain.

#### IPATrustCatalogCheck

This test resolves an AD user, **Administrator@REALM**. This populates the AD Global catalog and AD Domain Controller values in **sssctl domain-status** output.

For each trust domain look up the user with the id of the SID + 500 (the administrator) and then check the output of **sssctl domain-status <domain> --active-server** to ensure that the domain is active.

#### IPAsidgenpluginCheck

This test verifies that the **sidgen** plugin is enabled in the IPA 389-ds instance. The test also verifies that the **IPA SIDGEN** and **ipa-sidgen-task** plugins in **cn=plugins,cn=config** include the **nsslapd-pluginEnabled** option.

#### IPATrustAgentMemberCheck

This test verifies that the current host is a member of **cn=adtrust agents,cn=sysaccounts,cn=etc,SUFFIX**.

#### IPATrustControllerPrincipalCheck

This test verifies that the current host is a member of **cn=adtrust agents,cn=sysaccounts,cn=etc,SUFFIX**.

#### IPATrustControllerServiceCheck

This test verifies that the current host starts the ADTRUST service in ipactl.

#### IPATrustControllerConfCheck

This test verifies that **ldapi** is enabled for the passdb backend in the output of **net conf list**.

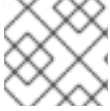


**IPATrustControllerGroupSIDCheck**

This test verifies that the admins group's SID ends with 512 (Domain Admins RID).

**IPATrustPackageCheck**

This test verifies that the **trust-ad** package is installed if the trust controller and AD trust are not enabled.

**NOTE**

Run these tests on all IdM servers when trying to find an issue.

**96.2. SCREENING THE TRUST WITH THE HEALTHCHECK TOOL**

Follow this procedure to run a standalone manual test of an Identity Management (IdM) and Active Directory (AD) trust health check using the Healthcheck tool.

The Healthcheck tool includes many tests, therefore, you can shorten the results by:

- excluding all successful test: **--failures-only**
- including only trust tests: **--source=ipahealthcheck.ipa.trust**

**Procedure**

- To run Healthcheck with warnings, errors and critical issues in the trust, enter:

```
# ipa-healthcheck --source=ipahealthcheck.ipa.trust --failures-only
```

Successful test displays empty brackets:

```
# ipa-healthcheck --source=ipahealthcheck.ipa.trust --failures-only
[]
```

**Additional resources**

- See **man ipa-healthcheck**.

## CHAPTER 97. VERIFYING CERTIFICATES USING IDM HEALTHCHECK

Learn more about understanding and using the Healthcheck tool in Identity management (IdM) to identify issues with IPA certificates maintained by **certmonger**.

For details, see [Healthcheck in IdM](#).

### Prerequisites

- The Healthcheck tool is only available in RHEL 8.1 and newer.

### 97.1. IDM CERTIFICATES HEALTHCHECK TESTS

The Healthcheck tool includes several tests for verifying the status of certificates maintained by certmonger in Identity Management (IdM). For details about certmonger, see [Obtaining an IdM certificate for a service using certmonger](#).

This suite of tests checks expiration, validation, trust and other issues. Multiple errors may be thrown for the same underlying issue.

To see all certificate tests, run the **ipa-healthcheck** with the **--list-sources** option:

```
# ipa-healthcheck --list-sources
```

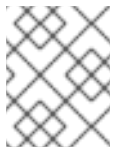
You can find all tests under the **ipahealthcheck.ipa.certs** source:

#### IPACertmongerExpirationCheck

This test checks expirations in **certmonger**.  
If an error is reported, the certificate has expired.

If a warning appears, the certificate will expire soon. By default, this test applies within 28 days or fewer days before certificate expiration.

You can configure the number of days in the **/etc/ipahealthcheck/ipahealthcheck.conf** file. After opening the file, change the **cert\_expiration\_days** option located in the default section.



#### NOTE

Certmonger loads and maintains its own view of the certificate expiration. This check does not validate the on-disk certificate.

#### IPACertfileExpirationCheck

This test checks if the certificate file or NSS database cannot be opened. This test also checks expiration. Therefore, carefully read the **msg** attribute in the error or warning output. The message specifies the problem.



#### NOTE

This test checks the on-disk certificate. If a certificate is missing, unreadable, etc a separate error can also be raised.

### IPACertNSSTrust

This test compares the trust for certificates stored in NSS databases. For the expected tracked certificates in NSS databases the trust is compared to an expected value and an error raised on a non-match.

### IPANSSChainValidation

This test validates the certificate chain of the NSS certificates. The test executes: **certutil -V -u V -e -d [dbdir] -n [nickname]**

### IPAOpenSSLChainValidation

This test validates the certificate chain of the OpenSSL certificates. To be comparable to the **NSSChain** validation here is the OpenSSL command we execute:

```
openssl verify -verbose -show_chain -CAfile /etc/ipa/ca.crt [cert file]
```

### IPARAAgent

This test compares the certificate on disk with the equivalent record in LDAP in **uid=ipara,ou=People,o=ipaca**.

### IPACertRevocation

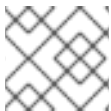
This test uses certmonger to verify that certificates have not been revoked. Therefore, the test can find issues connected with certificates maintained by certmonger only.

### IPACertmongerCA

This test verifies the certmonger Certificate Authority (CA) configuration. IdM cannot issue certificates without CA.

Certmonger maintains a set of CA helpers. In IdM, there is a CA named IPA which issues certificates through IdM, authenticating as a host or user principal, for host or service certs.

There are also **dogtag-ipa-ca-renew-agent** and **dogtag-ipa-ca-renew-agent-reuse** which renew the CA subsystem certificates.



#### NOTE

Run these tests on all IdM servers when trying to check for issues.

## 97.2. SCREENING CERTIFICATES USING THE HEALTHCHECK TOOL

Follow this procedure to run a standalone manual test of an Identity Management (IdM) certificate health check using the Healthcheck tool.

The Healthcheck tool includes many tests, therefore, you can shorten the results with:

- excluding all successful test: **--failures-only**
- including only certificate tests: **--source=ipahealthcheck.ipa.certs**

### Prerequisites

- You must perform Healthcheck tests as the **root** user.

### Procedure

- To run Healthcheck with warnings, errors and critical issues regarding certificates, enter:

```
# ipa-healthcheck --source=ipahealthcheck.ipa.certs --failures-only
```

Successful test displays empty brackets:

```
[]
```

Failed test shows you the following output:

```
{
  "source": "ipahealthcheck.ipa.certs",
  "check": "IPACertfileExpirationCheck",
  "result": "ERROR",
  "kw": {
    "key": 1234,
    "dbdir": "/path/to/nssdb",
    "error": [error],
    "msg": "Unable to open NSS database '/path/to/nssdb': [error]"
  }
}
```

This **IPACertfileExpirationCheck** test failed on opening the NSS database.

#### Additional resources

- See **man ipa-healthcheck**.

## CHAPTER 98. VERIFYING SYSTEM CERTIFICATES USING IDM HEALTHCHECK

Learn more about identifying issues with system certificates in Identity Management (IdM) by using the Healthcheck tool.

For details, see [Healthcheck in IdM](#).

### Prerequisites

- The Healthcheck tool is only available on RHEL 8.1 or newer.

## 98.1. SYSTEM CERTIFICATES HEALTHCHECK TESTS

The Healthcheck tool includes several tests for verifying system (DogTag) certificates.

To see all tests, run the **ipa-healthcheck** with the **--list-sources** option:

```
# ipa-healthcheck --list-sources
```

You can find all tests under the **ipahealthcheck.dogtag.ca** source:

### DogtagCertsConfigCheck

This test compares the CA (Certificate Authority) certificates in its NSS database to the same values stored in **CS.cfg**. If they don't match, CA fails to start.

Specifically, it checks:

- **auditSigningCert cert-pki-ca** against **ca.audit\_signing.cert**
- **ocspSigningCert cert-pki-ca** against **ca.ocsp\_signing.cert**
- **caSigningCert cert-pki-ca** against **ca.signing.cert**
- **subsystemCert cert-pki-ca** against **ca.subsystem.cert**
- **Server-Cert cert-pki-ca** against **ca.sslserver.cert**

If Key Recovery Authority (KRA) is installed:

- **transportCert cert-pki-kra** against **ca.connector.KRA.transportCert**

### DogtagCertsConnectivityCheck

This test verifies connectivity. This test is equivalent to the **ipa cert-show 1** command which checks:

- The PKI proxy configuration in Apache
- IdM being able to find a CA
- The RA agent client certificate
- Correctness of CA replies to requests

Note that the test checks a certificate with serial #1 because you want to verify that a **cert-show** can be executed and get back an expected result from CA (either the certificate or a not found).

**NOTE**

Run these tests on all IdM servers when trying to find an issue.

## 98.2. SCREENING SYSTEM CERTIFICATES USING HEALTHCHECK

Follow this procedure to run a standalone manual test of Identity Management (IdM) certificates using the Healthcheck tool.

Since, the Healthcheck tool includes many tests, you can narrow the results by including only DogTag tests: **--source=ipahealthcheck.dogtag.ca**

### Procedure

- To run Healthcheck restricted to DogTag certificates, enter:

```
# ipa-healthcheck --source=ipahealthcheck.dogtag.ca
```

An example of a successful test:

```
{
  "source: ipahealthcheck.dogtag.ca",
  "check: DogtagCertsConfigCheck",
  "result: SUCCESS",
  "uuid: 9b366200-9ec8-4bd9-bb5e-9a280c803a9c",
  "when: 20191008135826Z",
  "duration: 0.252280",
  "kw:" {
    "key": "Server-Cert cert-pki-ca",
    "configfile": "/var/lib/pki/pki-tomcat/conf/ca/CS.cfg"
  }
}
```

An example of a failed test:

```
{
  "source: ipahealthcheck.dogtag.ca",
  "check: DogtagCertsConfigCheck",
  "result: CRITICAL",
  "uuid: 59d66200-1447-4b3b-be01-89810c803a98",
  "when: 20191008135912Z",
  "duration: 0.002022",
  "kw:" {
    "exception": "NSDB /etc/pki/pki-tomcat/alias not initialized",
  }
}
```

### Additional resources

- See **man ipa-healthcheck**.

## CHAPTER 99. CHECKING DISK SPACE USING IDM HEALTHCHECK

You can monitor the Identity Management server's free disk space using the Healthcheck tool.

For details, see [Healthcheck in IdM](#).

### Prerequisites

- The Healthcheck tool is only available on RHEL 8.1 and newer.

### 99.1. DISK SPACE HEALTHCHECK TEST

The Healthcheck tool includes a test for checking available disk space. Insufficient free disk space can cause issues with:

- Logging
- Execution
- Backups

The test checks the following paths:

**Table 99.1. Tested paths**

| Paths checked by the test   | Minimal disk space in MB |
|-----------------------------|--------------------------|
| <b>/var/lib/dirsrv/</b>     | 1024                     |
| <b>/var/lib/ipa/backup/</b> | 512                      |
| <b>/var/log/</b>            | 1024                     |
| <b>var/log/audit/</b>       | 512                      |
| <b>/var/tmp/</b>            | 512                      |
| <b>/tmp/</b>                | 512                      |

To list all tests, run the **ipa-healthcheck** with the **--list-sources** option:

```
# ipa-healthcheck --list-sources
```

You can find the file system space check test under the **ipahealthcheck.system.filesystemspspace** source:

#### FileSystemSpaceCheck

This test checks available disk space in the following ways:

- The minimum raw free bytes needed.

- The percentage – the minimum free disk space is hardcoded to 20%.

## 99.2. SCREENING DISK SPACE USING THE HEALTHCHECK TOOL

Follow this procedure to run a standalone manual test of available disk space on an Identity Management (IdM) server using the Healthcheck tool.

Since Healthcheck includes many tests, you can narrow the results by:

- excluding all successful test: **--failures-only**
- including only space check tests: **--source=ipahealthcheck.system.filesystemspace**

### Procedure

- To run Healthcheck with warnings, errors and critical issues regarding available disk space, enter:

```
# ipa-healthcheck --source=ipahealthcheck.system.filesystemspace --failures-only
```

A successful test displays empty brackets:

```
[]
```

As an example, a failed test can display:

```
{
  "source": "ipahealthcheck.system.filesystemspace",
  "check": "FileSystemSpaceCheck",
  "result": "ERROR",
  "kw": {
    "msg": "/var/lib/dirsrv: free space under threshold: 0 MiB < 1024 MiB",
    "store": "/var/lib/dirsrv",
    "free_space": 0,
    "threshold": 1024
  }
}
```

The failed test informs you that the **/var/lib/dirsrv** directory has run out of space.

### Additional resources

- See **man ipa-healthcheck**.



# CHAPTER 100. VERIFYING PERMISSIONS OF IDM CONFIGURATION FILES USING HEALTHCHECK

Learn more about how to test Identity Management (IdM) configuration files using the Healthcheck tool.

For details, see [Healthcheck in IdM](#).

## Prerequisites

- The Healthcheck tool is only available on RHEL 8.1 or newer systems.

## 100.1. FILE PERMISSIONS HEALTHCHECK TESTS

The Healthcheck tool tests ownership and permissions of some important files installed or configured by Identity Management (IdM).

If you change the ownership or permissions of any tested file, the test returns a warning in the **result** section. While it does not necessarily mean that the configuration will not work, it means that the file differs from the default configuration.

To see all tests, run the **ipa-healthcheck** with the **--list-sources** option:

```
# ipa-healthcheck --list-sources
```

You can find the file permissions test under the **ipahealthcheck.ipa.files** source:

### IPAFileNSSDBCheck

This test checks the 389-ds NSS database and the Certificate Authority (CA) database. The 389-ds database is located in **/etc/dirsrv/slapd-*<dashed-REALM>*** and the CA database is located in **/etc/pki/pki-tomcat/alias/**.

### IPAFileCheck

This test checks the following files:

- **/var/lib/ipa/ra-agent.{key|pem}**
- **/var/lib/ipa/certs/httpd.pem**
- **/var/lib/ipa/private/httpd.key**
- **/etc/httpd/alias/ipasession.key**
- **/etc/dirsrv/ds.keytab**
- **/etc/ipa/ca.crt**
- **/etc/ipa/custodia/server.keys**  
If PKINIT is enabled:
- **/var/lib/ipa/certs/kdc.pem**
- **/var/lib/ipa/private/kdc.key**  
If DNS is configured:

- **/etc/named.keytab**
- **/etc/ipa/dnssec/ipa-dnskeysyncd.keytab**

### TomcatFileCheck

This test checks some tomcat-specific files if a CA is configured:

- **/etc/pki/pki-tomcat/password.conf**
- **/var/lib/pki/pki-tomcat/conf/ca/CS.cfg**
- **/etc/pki/pki-tomcat/server.xml**



### NOTE

Run these tests on all IdM servers when trying to find issues.

## 100.2. SCREENING CONFIGURATION FILES USING HEALTHCHECK

Follow this procedure to run a standalone manual test of an Identity Management (IdM) server's configuration files using the Healthcheck tool.

The Healthcheck tool includes many tests. Results can be narrowed down by:

- excluding all successful test: **--failures-only**
- including only ownership and permissions tests: **--source=ipahealthcheck.ipa.files**

### Procedure

1. To run Healthcheck tests on IdM configuration file ownership and permissions, while displaying only warnings, errors and critical issues, enter:

```
# ipa-healthcheck --source=ipahealthcheck.ipa.files --failures-only
```

A successful test displays empty brackets:

```
# ipa-healthcheck --source=ipahealthcheck.ipa.files --failures-only
[]
```

Failed tests display results similar to the following **WARNING**:

```
{
  "source": "ipahealthcheck.ipa.files",
  "check": "IPAFileNSSDBCheck",
  "result": "WARNING",
  "kw": {
    "key": "_etc_dirsrv_slapd-EXAMPLE-TEST_pkcs11.txt_mode",
    "path": "/etc/dirsrv/slapd-EXAMPLE-TEST/pkcs11.txt",
    "type": "mode",
    "expected": "0640",
    "got": "0666",
```

```
"msg": "Permissions of /etc/dirsrv/slapd-EXAMPLE-TEST/pkcs11.txt are 0666 and should be 0640"
```

```
}  
}
```

#### Additional resources

- See **man ipa-healthcheck**.

## CHAPTER 101. CHECKING IDM REPLICATION USING HEALTHCHECK

You can test Identity Management (IdM) replication using the Healthcheck tool.

For details, see [Healthcheck in IdM](#).

### Prerequisites

- The Healthcheck tool is only available on RHEL 8.1 or newer.

### 101.1. REPLICATION HEALTHCHECK TESTS

The Healthcheck tool tests the Identity Management (IdM) topology configuration and searches for replication conflict issues.

To list all tests, run the **ipa-healthcheck** with the **--list-sources** option:

```
# ipa-healthcheck --list-sources
```

The topology tests are placed under the **ipahealthcheck.ipa.topology** and **ipahealthcheck.ds.replication** sources:

#### IPATopologyDomainCheck

This test verifies:

- whether topology is not disconnected and there are replication paths between all servers.
- if servers don't have more than the recommended number of replication agreements.  
If the test fails, the test returns errors, such as connection errors or too many replication agreements.

If the test succeeds, the test returns the configured domains.



#### NOTE

The test runs the **ipa topologysuffix-verify** command for both the domain and ca suffixes (assuming the Certificate Authority is configured on this server).

#### ReplicationConflictCheck

The test searches for entries in LDAP matching **(&(!(objectclass=nsstombstone))(nsds5ReplConflict=\*))**.



#### NOTE

Run these tests on all IdM servers when trying to check for issues.

### 101.2. SCREENING REPLICATION USING HEALTHCHECK

Follow this procedure to run a standalone manual test of an Identity Management (IdM) replication topology and configuration using the Healthcheck tool.

The Healthcheck tool includes many tests, therefore, you can shorten the results with:

- Replication conflict test: **--source=ipahealthcheck.ds.replication**
- Correct topology test: **--source=ipahealthcheck.ipa.topology**

## Prerequisites

- You must perform Healthcheck tests as the **root** user.

## Procedure

- To run Healthcheck replication conflict and topology checks, enter:

```
# ipa-healthcheck --source=ipahealthcheck.ds.replication --
source=ipahealthcheck.ipa.topology
```

Four different results are possible:

- **SUCCESS** – the test passed successfully.

```
{
  "source": "ipahealthcheck.ipa.topology",
  "check": "IPATopologyDomainCheck",
  "result": "SUCCESS",
  "kw": {
    "suffix": "domain"
  }
}
```

- **WARNING** – the test passed but there might be a problem.
- **ERROR** – the test failed.

```
{
  "source": "ipahealthcheck.ipa.topology",
  "check": "IPATopologyDomainCheck",
  "result": "ERROR",
  "uuid": "d6ce3332-92da-423d-9818-e79f49ed321f",
  "when": "20191007115449Z",
  "duration": "0.005943",
  "kw": {
    "msg": "topologysuffix-verify domain failed, server2 is not connected
(server2_139664377356472 in MainThread)"
  }
}
```

- **CRITICAL** – the test failed and it affects the IdM server functionality.

## Additional resources

- See **man ipa-healthcheck**.

## CHAPTER 102. CHECKING DNS RECORDS USING IDM HEALTHCHECK

You can identify issues with DNS records in Identity Management (IdM) using the Healthcheck tool.

### Prerequisites

- The DNS records Healthcheck tool is only available on RHEL 8.2 or newer.

### 102.1. DNS RECORDS HEALTHCHECK TEST

The Healthcheck tool includes a test for checking that the expected DNS records required for autodiscovery are resolvable.

To list all tests, run the **ipa-healthcheck** with the **--list-sources** option:

```
# ipa-healthcheck --list-sources
```

You can find the DNS records check test under the **ipahealthcheck.ipa.idns** source.

#### IPADNSSystemRecordsCheck

This test checks the DNS records from the **ipa dns-update-system-records --dry-run** command using the first resolver specified in the **/etc/resolv.conf** file. The records are tested on the IPA server.

### 102.2. SCREENING DNS RECORDS USING THE HEALTHCHECK TOOL

Follow this procedure to run a standalone manual test of DNS records on an Identity Management (IdM) server using the Healthcheck tool.

The Healthcheck tool includes many tests. Results can be narrowed down by including only the DNS records tests by adding the **--source ipahealthcheck.ipa.idns** option.

### Prerequisites

- You must perform Healthcheck tests as the **root** user.

### Procedure

- To run the DNS records check, enter:

```
# ipa-healthcheck --source ipahealthcheck.ipa.idns
```

If the record is resolvable, the test returns **SUCCESS** as a result:

```
{
  "source": "ipahealthcheck.ipa.idns",
  "check": "IPADNSSystemRecordsCheck",
  "result": "SUCCESS",
  "uuid": "eb7a3b68-f6b2-4631-af01-798cac0eb018",
  "when": "20200415143339Z",
  "duration": "0.210471",
  "kw": {
```

```

    "key": "_ldap._tcp.idm.example.com.:server1.idm.example.com."
  }
}

```

The test returns a **WARNING** when, for example, the number of records does not match the expected number:

```

{
  "source": "ipahealthcheck.ipa.idns",
  "check": "IPADNSSystemRecordsCheck",
  "result": "WARNING",
  "uuid": "972b7782-1616-48e0-bd5c-49a80c257895",
  "when": "20200409100614Z",
  "duration": "0.203049",
  "kw": {
    "msg": "Got {count} ipa-ca A records, expected {expected}",
    "count": 2,
    "expected": 1
  }
}

```

#### Additional resources

- See **man ipa-healthcheck**.

## CHAPTER 103. DEMOTING OR PROMOTING HIDDEN REPLICAS

After a replica has been installed, you can configure whether the replica is hidden or visible.

For details about hidden replicas, see [The hidden replica mode](#).

If the replica is a CA renewal server, move the service to another replica before making this replica hidden.

For details, see [Changing and resetting IdM CA renewal server](#).

### Procedure

- To hide the replica, enter:

```
# ipa server-state replica.idm.example.com --state=hidden
```

Alternatively, you can make the replica visible with the following command:

```
# ipa server-state replica.idm.example.com --state=enabled
```



## CHAPTER 104. IDENTITY MANAGEMENT SECURITY SETTINGS

Learn more about security-related features of Identity Management.

### 104.1. HOW IDENTITY MANAGEMENT APPLIES DEFAULT SECURITY SETTINGS

By default, Identity Management (IdM) on RHEL 8 uses the system-wide crypto policy. The benefit of this policy is that you do not need to harden individual IdM components manually.



#### IMPORTANT

Red Hat recommends that you use the system-wide crypto policy. Changing individual security settings can break components of IdM. For example, Java in RHEL 8 does not fully support the TLS 1.3 protocol. Therefore, using this protocol can cause failures in IdM.

#### Additional resources

- See the **crypto-policies(7)** man page.

### 104.2. ANONYMOUS LDAP BINDS IN IDENTITY MANAGEMENT

By default, anonymous binds to the Identity Management (IdM) LDAP server are enabled. Anonymous binds can expose certain configuration settings or directory values. However, some utilities, such as **realmd**, or older RHEL clients require anonymous binds enabled to discover domain settings when enrolling a client.

#### Additional resources

- [Disabling anonymous binds](#)

### 104.3. DISABLING ANONYMOUS BINDS

You can disable anonymous binds on the Identity Management (IdM) 389 Directory Server instance by using LDAP tools to reset the **nsslapd-allow-anonymous-access** attribute.

These are the valid values for the **nsslapd-allow-anonymous-access** attribute:

- **on**: allows all anonymous binds (default)
- **rootdse**: allows anonymous binds only for root DSE information
- **off**: disallows any anonymous binds

Red Hat does not recommend completely disallowing anonymous binds by setting the attribute to **off**, because this also blocks external clients from checking the server configuration. LDAP and web clients are not necessarily domain clients, so they connect anonymously to read the root DSE file to get connection information.

By changing the value of the **nsslapd-allow-anonymous-access** attribute to **rootdse**, you allow access to the root DSE and server configuration without any access to the directory data.

**WARNING**

Certain clients rely on anonymous binds to discover IdM settings. Additionally, the compat tree can break for legacy clients that are not using authentication. Perform this procedure only if your clients do not require anonymous binds.

**Prerequisites**

- You can authenticate as the Directory Manager to write to the LDAP server.
- You can authenticate as the **root** user to restart IdM services.

**Procedure**

1. Change the **nsslapd-allow-anonymous-access** attribute to **rootdse**.

```
$ ldapmodify -x -D "cn=Directory Manager" -W -h server.example.com -p 389
Enter LDAP Password:
dn: cn=config
changetype: modify
replace: nsslapd-allow-anonymous-access
nsslapd-allow-anonymous-access: rootdse

modifying entry "cn=config"
```

2. Restart the 389 Directory Server instance to load the new setting.

```
# systemctl restart dirsrv.target
```

**Verification**

- Display the value of the **nsslapd-allow-anonymous-access** attribute.

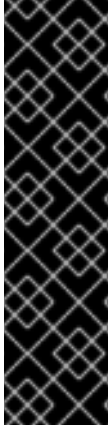
```
$ ldapsearch -x -D "cn=Directory Manager" -b cn=config -W -h server.example.com -p 389
nsslapd-allow-anonymous-access | grep nsslapd-allow-anonymous-access
Enter LDAP Password:
# requesting: nsslapd-allow-anonymous-access
nsslapd-allow-anonymous-access: rootdse
```

**Additional resources**

- [nsslapd-allow-anonymous-access](#) in Directory Server 11 documentation
- [Anonymous LDAP binds in Identity Management](#)

## CHAPTER 105. SETTING UP SAMBA ON AN IDM DOMAIN MEMBER

You can set up Samba on a host that is joined to a Red Hat Identity Management (IdM) domain. Users from IdM and also, if available, from trusted Active Directory (AD) domains, can access shares and printer services provided by Samba.



### IMPORTANT

Using Samba on an IdM domain member is an unsupported Technology Preview feature and contains certain limitations. For example, IdM trust controllers do not support the Active Directory Global Catalog service, and they do not support resolving IdM groups using the Distributed Computing Environment / Remote Procedure Calls (DCE/RPC) protocols. As a consequence, AD users can only access Samba shares and printers hosted on IdM clients when logged in to other IdM clients; AD users logged into a Windows machine can not access Samba shares hosted on an IdM domain member.

Customers deploying Samba on IdM domain members are encouraged to provide feedback to Red Hat.

### Prerequisites

- The host is joined as a client to the IdM domain.
- Both the IdM servers and the client must run on RHEL 8.1 or later.

## 105.1. PREPARING THE IDM DOMAIN FOR INSTALLING SAMBA ON DOMAIN MEMBERS

Before you can set up Samba on an IdM client, you must prepare the IdM domain using the **ipa-adtrust-install** utility on an IdM server.



### NOTE

Any system where you run the **ipa-adtrust-install** command automatically becomes an AD trust controller. However, you must run **ipa-adtrust-install** only once on an IdM server.

### Prerequisites

- IdM server is installed.
- You need root privileges to install packages and restart IdM services.

### Procedure

1. Install the required packages:

```
[root@ipaserver ~]# yum install ipa-server-trust-ad samba-client
```

2. Authenticate as the IdM administrative user:

```
[root@ipaserver ~]# kinit admin
```

3. Run the **ipa-adtrust-install** utility:

```
[root@ipaserver ~]# ipa-adtrust-install
```

The DNS service records are created automatically if IdM was installed with an integrated DNS server.

If you installed IdM without an integrated DNS server, **ipa-adtrust-install** prints a list of service records that you must manually add to DNS before you can continue.

4. The script prompts you that the **/etc/samba/smb.conf** already exists and will be rewritten:

```
WARNING: The smb.conf already exists. Running ipa-adtrust-install will break your existing Samba configuration.
```

```
Do you wish to continue? [no]: yes
```

5. The script prompts you to configure the **slapi-nis** plug-in, a compatibility plug-in that allows older Linux clients to work with trusted users:

```
Do you want to enable support for trusted domains in Schema Compatibility plugin?
This will allow clients older than SSSD 1.9 and non-Linux clients to work with trusted users.
```

```
Enable trusted domains support in slapi-nis? [no]: yes
```

6. When prompted, enter the NetBIOS name for the IdM domain or press **Enter** to accept the name suggested:

```
Trust is configured but no NetBIOS domain name found, setting it now.
Enter the NetBIOS name for the IPA domain.
Only up to 15 uppercase ASCII letters, digits and dashes are allowed.
Example: EXAMPLE.
```

```
NetBIOS domain name [IDM]:
```

7. You are prompted to run the SID generation task to create a SID for any existing users:

```
Do you want to run the ipa-sidgen task? [no]: yes
```

This is a resource-intensive task, so if you have a high number of users, you can run this at another time.

8. **(Optional)** By default, the Dynamic RPC port range is defined as **49152-65535** for Windows Server 2008 and later. If you need to define a different Dynamic RPC port range for your environment, configure Samba to use different ports and open those ports in your firewall settings. The following example sets the port range to **55000-65000**.

```
[root@ipaserver ~]# net conf setparm global 'rpc server dynamic port range' 55000-65000
```

```
[root@ipaserver ~]# firewall-cmd --add-port=55000-65000/tcp
```

```
[root@ipaserver ~]# firewall-cmd --runtime-to-permanent
```

9. Restart the **ipa** service:

```
[root@ipaserver ~]# ipactl restart
```

10. Use the **smbclient** utility to verify that Samba responds to Kerberos authentication from the IdM side:

```
[root@ipaserver ~]# smbclient -L server.idm.example.com -U user_name --use-kerberos=required
lp_load_ex: changing to config backend registry
Sharename      Type      Comment
-----
IPC$           IPC       IPC Service (Samba 4.15.2)
...
```

## 105.2. ENABLING THE AES ENCRYPTION TYPE IN ACTIVE DIRECTORY USING A GPO

This section describes how to enable the AES encryption type in Active Directory (AD) using a group policy object (GPO). Certain features on RHEL, such as running a Samba server on an IdM client, require this encryption type.

Note that RHEL no longer supports the weak DES and RC4 encryption types.

### Prerequisites

- You are logged into AD as a user who can edit group policies.
- The **Group Policy Management Console** is installed on the computer.

### Procedure

1. Open the **Group Policy Management Console**.
2. Right-click **Default Domain Policy**, and select **Edit**. The **Group Policy Management Editor** opens.
3. Navigate to **Computer Configuration → Policies → Windows Settings → Security Settings → Local Policies → Security Options**.
4. Double-click the **Network security: Configure encryption types allowed for Kerberos** policy.
5. Select **AES256\_HMAC\_SHA1** and, optionally, **Future encryption types**.
6. Click **OK**.
7. Close the **Group Policy Management Editor**.
8. Repeat the steps for the **Default Domain Controller Policy**.
9. Wait until the Windows domain controllers (DC) applied the group policy automatically. Alternatively, to apply the GPO manually on a DC, enter the following command using an account that has administrator permissions:

```
C:\> gpupdate /force /target:computer
```

## 105.3. INSTALLING AND CONFIGURING A SAMBA SERVER ON AN IDM CLIENT

You can install and configure Samba on a client enrolled in an IdM domain.

### Prerequisites

- Both the IdM servers and the client must run on RHEL 8.1 or later.
- The IdM domain is prepared as described in [Preparing the IdM domain for installing Samba on domain members](#).
- If IdM has a trust configured with AD, enable the AES encryption type for Kerberos. For example, use a group policy object (GPO) to enable the AES encryption type. For details, see [Enabling AES encryption in Active Directory using a GPO](#).

### Procedure

1. Install the **ipa-client-samba** package:

```
[root@idm_client]# yum install ipa-client-samba
```

2. Use the **ipa-client-samba** utility to prepare the client and create an initial Samba configuration:

```
[root@idm_client]# ipa-client-samba
Searching for IPA server...
IPA server: DNS discovery
Chosen IPA master: idm_server.idm.example.com
SMB principal to be created: cifs/idm_client.idm.example.com@IDM.EXAMPLE.COM
NetBIOS name to be used: IDM_CLIENT
Discovered domains to use:

Domain name: idm.example.com
NetBIOS name: IDM
SID: S-1-5-21-525930803-952335037-206501584
ID range: 212000000 - 212199999

Domain name: ad.example.com
NetBIOS name: AD
SID: None
ID range: 1918400000 - 1918599999

Continue to configure the system with these values? [no]: yes
Samba domain member is configured. Please check configuration at /etc/samba/smb.conf
and start smb and winbind services
```

3. By default, **ipa-client-samba** automatically adds the **[homes]** section to the **/etc/samba/smb.conf** file that dynamically shares a user's home directory when the user connects. If users do not have home directories on this server, or if you do not want to share them, remove the following lines from **/etc/samba/smb.conf**:

```
[homes]
read only = no
```

4. Share directories and printers. For details, see the following sections:

- [Setting up a Samba file share that uses POSIX ACLs](#)
- [Setting up a share that uses Windows ACLs](#)
- [Setting up Samba as a print server](#)

5. Open the ports required for a Samba client in the local firewall:

```
[root@idm_client]# firewall-cmd --permanent --add-service=samba-client
[root@idm_client]# firewall-cmd --reload
```

6. Enable and start the **smb** and **winbind** services:

```
[root@idm_client]# systemctl enable --now smb winbind
```

## Verification steps

Run the following verification step on a different IdM domain member that has the **samba-client** package installed:

- List the shares on the Samba server using Kerberos authentication:

```
$ smbclient -L idm_client.idm.example.com -U user_name --use-kerberos=required
lp_load_ex: changing to config backend registry

Sharename      Type      Comment
-----
example        Disk
IPC$           IPC       IPC Service (Samba 4.15.2)
...
```

## Additional resources

- **ipa-client-samba(1)** man page

## 105.4. MANUALLY ADDING AN ID MAPPING CONFIGURATION IF IDM TRUSTS A NEW DOMAIN

Samba requires an ID mapping configuration for each domain from which users access resources. On an existing Samba server running on an IdM client, you must manually add an ID mapping configuration after the administrator added a new trust to an Active Directory (AD) domain.

### Prerequisites

- You configured Samba on an IdM client. Afterward, a new trust was added to IdM.
- The DES and RC4 encryption types for Kerberos must be disabled in the trusted AD domain. For security reasons, RHEL 8 does not support these weak encryption types.

### Procedure

1. Authenticate using the host's keytab:

```
[root@idm_client]# kinit -k
```

2. Use the **ipa idrange-find** command to display both the base ID and the ID range size of the new domain. For example, the following command displays the values for the **ad.example.com** domain:

```
[root@idm_client]# ipa idrange-find --name="AD.EXAMPLE.COM_id_range" --raw
-----
1 range matched
-----
cn: AD.EXAMPLE.COM_id_range
ipabaseid: 1918400000
ipairangesize: 200000
ipabaserid: 0
ipanttrusteddomainsid: S-1-5-21-968346183-862388825-1738313271
iparangeltype: ipa-ad-trust
-----
Number of entries returned 1
-----
```

You need the values from the **ipabaseid** and **ipairangesize** attributes in the next steps.

3. To calculate the highest usable ID, use the following formula:

```
maximum_range = ipabaseid + ipairangesize - 1
```

With the values from the previous step, the highest usable ID for the **ad.example.com** domain is **1918599999** (1918400000 + 200000 - 1).

4. Edit the **/etc/samba/smb.conf** file, and add the ID mapping configuration for the domain to the **[global]** section:

```
idmap config AD : range = 1918400000 - 1918599999
idmap config AD : backend = sss
```

Specify the value from **ipabaseid** attribute as the lowest and the computed value from the previous step as the highest value of the range.

5. Restart the **smb** and **winbind** services:

```
[root@idm_client]# systemctl restart smb winbind
```

## Verification steps

- List the shares on the Samba server using Kerberos authentication:

```
$ smbclient -L idm_client.idm.example.com -U user_name --use-kerberos=required
lp_load_ex: changing to config backend registry

Sharename      Type      Comment
-----
example        Disk
IPC$           IPC      IPC Service (Samba 4.15.2)
...
```



## 105.5. ADDITIONAL RESOURCES

- [Installing an Identity Management client](#)

## CHAPTER 106. USING EXTERNAL IDENTITY PROVIDERS TO AUTHENTICATE TO IDM



### WARNING

Delegating user authentication to external identity providers is currently a Technology Preview, not a fully supported feature.

You can associate users with external identity providers (IdP) that support the OAuth 2 device authorization flow. When these users authenticate with the SSSD version available in RHEL 8.7 or later, they receive RHEL Identity Management (IdM) single sign-on capabilities with Kerberos tickets after performing authentication and authorization at the external IdP.

Notable features include:

- Adding, modifying, and deleting references to external IdPs with **ipa idp-\*** commands.
- Enabling IdP authentication for users with the **ipa user-mod --user-auth-type=idp** command.

This section discusses the following topics:

- [The benefits of connecting IdM to an external IdP](#)
- [Creating a reference to an external identity provider](#)
- [Managing references to external IdPs](#)
- [Enabling an IdM user to authenticate via an external IdP](#)
- [Retrieving an IdM ticket-granting ticket as an IdP user](#)
- [Logging in to an IdM client via SSH as an IdP user](#)
- [List of templates for external identity providers](#)

### 106.1. THE BENEFITS OF CONNECTING IDM TO AN EXTERNAL IDP

As an administrator, you might want to allow users stored in an external identity source, such as a cloud services provider, to access RHEL systems joined to your Identity Management (IdM) environment. To achieve this, you can delegate the authentication and authorization process of issuing Kerberos tickets for these users to that external entity.

You can use this feature to expand IdM's capabilities and allow users stored in external identity providers (IdPs) to access Linux systems managed by IdM.

#### 106.1.1. How IdM incorporates logins via external IdPs

SSSD 2.7.0 contains the **sssd-idp** package, which implements the **idp** Kerberos pre-authentication method. This authentication method follows the OAuth 2.0 Device Authorization Grant flow to delegate authorization decisions to external IdPs:

1. An IdM client user initiates OAuth 2.0 Device Authorization Grant flow, for example, by attempting to retrieve a Kerberos TGT with the **kinit** utility at the command line.
2. A special code and website link are sent from the Authorization Server to the IdM KDC backend.
3. The IdM client displays the link and the code to the user. In this example, the IdM client outputs the link and code on the command line.
4. The user opens the website link in a browser, which can be on another host, a mobile phone, and so on:
  - a. The user enters the special code.
  - b. If necessary, the user logs in to the OAuth 2.0-based IdP.
  - c. The user is prompted to authorize the client to access information.
5. The user confirms access at the original device prompt. In this example, the user hits the **Enter** key at the command line.
6. The IdM KDC backend polls the OAuth 2.0 Authorization Server for access to user information.

#### What is supported:

- Logging in remotely via SSH with the **keyboard-interactive** authentication method enabled, which allows calling Pluggable Authentication Module (PAM) libraries.
- Logging in locally with the console via the **logind** service.
- Retrieving a Kerberos ticket-granting ticket (TGT) with the **kinit** utility.

#### What is currently not supported:

- Logging in to the IdM WebUI directly. To log in to the IdM WebUI, you must first acquire a Kerberos ticket.
- Logging in to Cockpit WebUI directly. To log in to the Cockpit WebUI, you must first acquire a Kerberos ticket.

#### Additional resources

- [Authentication against external Identity Providers](#)
- [RFC 8628: OAuth 2.0 Device Authorization Grant](#)

## 106.2. CREATING A REFERENCE TO AN EXTERNAL IDENTITY PROVIDER

To connect external identity providers (IdPs) to your Identity Management (IdM) environment, create IdP references in IdM. These examples show how to configure references to external IdPs based on the different IdP templates. Use the following options to specify your settings:

#### **--provider**

the predefined template for one of the known identity providers

#### **--client-id**

the OAuth 2.0 client identifier issued by the IdP during application registration. As the application registration procedure is specific to each IdP, refer to their documentation for details. If the external IdP is Red Hat Single Sign-On (SSO), see [Creating an OpenID Connect Client](#).

**--base-url**

base URL for IdP templates, required by Keycloak and Okta

**--organization**

Domain or Organization ID from the IdP, required by Microsoft Azure

**--secret**

(*optional*) Use this option if you have configured your external IdP to require a secret from confidential OAuth 2.0 clients. If you use this option when creating an IdP reference, you are prompted for the secret interactively. Protect the client secret as a password.



**NOTE**

SSSD in RHEL 8.7 only supports non-confidential OAuth 2.0 clients that do not use a client secret. If you want to use external IdPs that require a client secret from confidential clients, you must use SSSD in RHEL 8.8 and later.

**Prerequisites**

- You have registered IdM as an OAuth application to your external IdP, and obtained a client ID.
- You can authenticate as the IdM admin account.
- Your IdM servers are using RHEL 8.7 or later.
- Your IdM servers are using SSSD 2.7.0 or later.


**Procedure**

1. Authenticate as the IdM admin on an IdM server.

```
[root@server ~]# kinit admin
```

2. Create a reference to the required IdP in IdM as outlined in the following table.

| Identity Provider                     | Important options                                    | Command example  |
|---------------------------------------|--|--|
| Microsoft Identity Platform, Azure AD | <b>--provider microsoft</b><br><b>--organization</b> | <pre># ipa idp-add my-azure-idp \<br/>--provider microsoft \<br/>--organization main \<br/>--client-id &lt;azure_client_id&gt;</pre> |
| Google                                | <b>--provider google</b>                             | <pre># ipa idp-add my-google-idp \<br/>--provider google \<br/>--client-id &lt;google_client_id&gt;</pre>                            |

| Identity Provider                          | Important options  | Command example  |
|--|--|--|
| GitHub                                     | <b>--provider github</b>   | <pre># ipa idp-add my-github-idp \   --provider github \   --client-id &lt;github_client_id&gt;</pre>  |
| Keycloak,<br>Red Hat<br>Single Sign-<br>On | <b>--provider keycloak</b><br><b>--organization</b><br><b>--base-url</b> | <pre># ipa idp-add my-keycloak-idp \   --provider keycloak \   --organization main \   --base-url   keycloak.idm.example.com:8443/auth \   --client-id &lt;keycloak_client_id&gt;</pre> <div>  <p><b>NOTE</b></p> <p>The Quarkus version of Keycloak 17 and later have removed the <b>/auth/</b> portion of the URI. If you use the non-Quarkus distribution of Keycloak in your deployment, include <b>/auth/</b> in the <b>--base-url</b> option.</p> </div> |
| Okta                                       | <b>--provider okta</b>   | <pre># ipa idp-add my-okta-idp \   --provider okta   --base-url dev-12345.okta.com \   --client-id &lt;okta_client_id&gt;</pre>  |

For example, the following command creates a reference called **my-keycloak-idp** to an IdP based on the Keycloak template, where the **--base-url** option specifies the URL to the Keycloak server in the format **server-name.\$DOMAIN:\$PORT/prefix**.

```
[root@server ~]# ipa idp-add my-keycloak-idp \
  --provider keycloak --organization main \
  --base-url keycloak.idm.example.com:8443/auth \
  --client-id id13778
```

-----

Added Identity Provider server "my-keycloak-idp"

-----

Identity Provider server name: my-keycloak-idp  
 Authorization URI:  
 https://keycloak.idm.example.com:8443/auth/realms/main/protocol/openid-connect/auth  
 Device authorization URI:  
 https://keycloak.idm.example.com:8443/auth/realms/main/protocol/openid-connect/auth/device  
 Token URI: https://keycloak.idm.example.com:8443/auth/realms/main/protocol/openid-connect/token  
 User info URI: https://keycloak.idm.example.com:8443/auth/realms/main/protocol/openid-

```
connect/userinfo
Client identifier: ipa_oidc_client
Scope: openid email
External IdP user identifier attribute: email
```

## Verification

- Verify that the output of the **ipa idp-show** command shows the IdP reference you have created.

```
[root@server ~]# ipa idp-show my-keycloak-idp
```

## Additional resources

- [List of templates for external identity providers](#)
- **ipa help idp-add** command output

## 106.3. MANAGING REFERENCES TO EXTERNAL IDPS

After you have created a reference to an external identity provider (IdP), you can find, show, modify, and delete that reference. This example shows you how to manage a reference to an external IdP named **keycloak-server1**.

### Prerequisites

- You can authenticate as the IdM admin account.
- Your IdM servers are using RHEL 8.7 or later.
- Your IdM servers are using SSSD 2.7.0 or later.
- You have created a reference to an IdP in IdM. See [Creating a reference to an external identity provider](#).

### Procedure

1. Authenticate as the IdM admin on an IdM server.

```
[root@server ~]# kinit admin
```

2. Manage the IdP reference.

- To find an IdP reference whose entry includes the string **keycloak**:

```
[root@server ~]# ipa idp-find keycloak
```

- To display an IdP reference named **my-keycloak-idp**:

```
[root@server ~]# ipa idp-show my-keycloak-idp
```

- To modify an IdP reference, use the **ipa idp-mod** command. For example, to change the secret for an IdP reference named **my-keycloak-idp**, specify the **--secret** option to be prompted for the secret:

```
[root@server ~]# ipa idp-mod my-keycloak-idp --secret
```

- To delete an IdP reference named **my-keycloak-idp**:

```
[root@server ~]# ipa idp-del my-keycloak-idp
```

## 106.4. ENABLING AN IDM USER TO AUTHENTICATE VIA AN EXTERNAL IDP

To enable an IdM user to authenticate via an external identity provider (IdP), associate the external IdP reference you have previously created with the user account. This example associates the external IdP reference **keycloak-server1** with the user **external-idp-user**.

### Prerequisites

- Your IdM client and IdM servers are using RHEL 8.7 or later.
- Your IdM client and IdM servers are using SSSD 2.7.0 or later.
- You have created a reference to an IdP in IdM. See [Creating a reference to an external identity provider](#).

### Procedure

- Modify the IdM user entry to associate an IdP reference with the user account:

```
[root@server ~]# ipa user-mod external-idp-user \
    --idp my-keycloak-idp \
    --idp-user-id external-idp-user@idm.example.com \
    --user-auth-type=idp
-----
Modified user "external-idp-user"
-----
User login: external-idp-user
First name: Test
Last name: User1
Home directory: /home/external-idp-user
Login shell: /bin/sh
Principal name: external-idp-user@idm.example.com
Principal alias: external-idp-user@idm.example.com
Email address: external-idp-user@idm.example.com
UID: 35000003
GID: 35000003
User authentication types: idp
External IdP configuration: keycloak
External IdP user identifier: external-idp-user@idm.example.com
Account disabled: False
Password: False
Member of groups: ipausers
Kerberos keys available: False
```

## Verification

- Verify that the output of the **ipa user-show** command for that user displays references to the IdP:

```
[root@server ~]# ipa user-show external-idp-user
User login: external-idp-user
First name: Test
Last name: User1
Home directory: /home/external-idp-user
Login shell: /bin/sh
Principal name: external-idp-user@idm.example.com
Principal alias: external-idp-user@idm.example.com
Email address: external-idp-user@idm.example.com
ID: 35000003
GID: 35000003
User authentication types: idp
External IdP configuration: keycloak
External IdP user identifier: external-idp-user@idm.example.com
Account disabled: False
Password: False
Member of groups: ipausers
Kerberos keys available: False
```

## 106.5. RETRIEVING AN IDM TICKET-GRANTING TICKET AS AN IDP USER

To retrieve a Kerberos ticket-granting ticket (TGT) as a user from an external identity provider (IdP), request an anonymous Kerberos ticket, and enable Flexible Authentication via Secure Tunneling (FAST) channel to provide a secure connection between the Kerberos client and Kerberos Distribution Center (KDC).

### Prerequisites

- Your IdM client and IdM servers are using RHEL 8.7 or later.
- Your IdM client and IdM servers are using SSSD 2.7.0 or later.
- You have created a reference to an IdP in IdM. See [Creating a reference to an external identity provider](#).
- You have associated an external IdP reference with the user account. See [Enabling an IdM user to authenticate via an external IdP](#).

### Procedure

1. Use Anonymous PKINIT to obtain a Kerberos ticket and store it in a file named **./fast.ccache**.

```
[root@client ~]# kinit -n -c ./fast.ccache
```

2. Begin authenticating as the user, using the **-T** option to enable the FAST communication channel.



```
[root@client ~]# kinit -T ./fast.ccache external-idp-user
Authenticate at https://oauth2.idp.com:8443/auth/realms/master/device?user_code=YHMQ-
XKTL and press ENTER.:
```

3. In a browser, authenticate as the user at the website provided in the command output.
4. At the command line, press the **Enter** key to finish the authentication process.

### Verification

- Display your Kerberos ticket information and confirm that the line **config: pa\_type** shows **152** for pre-authentication with an external IdP.

```
[root@client ~]# klist -C
Ticket cache: KCM:0:58420
Default principal: external-idp-user@IDM.EXAMPLE.COM

Valid starting    Expires          Service principal
05/09/22 07:48:23 05/10/22 07:03:07 krbtgt/IDM.EXAMPLE.COM@IDM.EXAMPLE.COM
config: fast_avail(krbtgt/IDM.EXAMPLE.COM@IDM.EXAMPLE.COM) = yes
08/17/2022 20:22:45 08/18/2022 20:22:43
krbtgt/IDM.EXAMPLE.COM@IDM.EXAMPLE.COM
config: pa_type(krbtgt/IDM.EXAMPLE.COM@IDM.EXAMPLE.COM) = 152
```

## 106.6. LOGGING IN TO AN IDM CLIENT VIA SSH AS AN IDP USER

To log in to an IdM client via SSH as an external identity provider (IdP) user, begin the login process on the command line. When prompted, perform the authentication process at the website associated with the IdP, and finish the process at the Identity Management (IdM) client.

### Prerequisites

- Your IdM client and IdM servers are using RHEL 8.7 or later.
- Your IdM client and IdM servers are using SSSD 2.7.0 or later.
- You have created a reference to an IdP in IdM. See [Creating a reference to an external identity provider](#).
- You have associated an external IdP reference with the user account. See [Enabling an IdM user to authenticate via an external IdP](#).

### Procedure

1. Attempt to log in to the IdM client via SSH.

```
[user@client ~]$ ssh external-idp-user@client.idm.example.com
(external-idp-user@client.idm.example.com) Authenticate at
https://oauth2.idp.com:8443/auth/realms/main/device?user_code=XYFL-ROYR and press
ENTER.
```

2. In a browser, authenticate as the user at the website provided in the command output.
3. At the command line, press the **Enter** key to finish the authentication process.

## Verification

- Display your Kerberos ticket information and confirm that the line **config: pa\_type** shows **152** for pre-authentication with an external IdP.

```
[external-idp-user@client ~]$ klist -C
Ticket cache: KCM:0:58420
Default principal: external-idp-user@IDM.EXAMPLE.COM

Valid starting    Expires          Service principal
05/09/22 07:48:23 05/10/22 07:03:07 krbtgt/IDM.EXAMPLE.COM@IDM.EXAMPLE.COM
config: fast_avail(krbtgt/IDM.EXAMPLE.COM@IDM.EXAMPLE.COM) = yes
08/17/2022 20:22:45 08/18/2022 20:22:43
krbtgt/IDM.EXAMPLE.COM@IDM.EXAMPLE.COM
config: pa_type(krbtgt/IDM.EXAMPLE.COM@IDM.EXAMPLE.COM) = 152
```

## 106.7. LIST OF TEMPLATES FOR EXTERNAL IDENTITY PROVIDERS

The following identity providers (IdPs) support OAuth 2.0 device authorization grant flow:

- Microsoft Identity Platform, including Azure AD
- Google
- GitHub
- Keycloak, including Red Hat Single Sign-On (SSO)
- Okta

When using the **ipa idp-add** command to create a reference to one of these external IdPs, you can specify the IdP type with the **--provider** option, which expands into additional options as described below:

### **--provider=microsoft**

Microsoft Azure IdPs allow parametrization based on the Azure tenant ID, which you can specify with the **--organization** option to the **ipa idp-add** command. If you need support for the live.com IdP, specify the option **--organization common**.

Choosing **--provider=microsoft** expands to use the following options. The value of the **--organization** option replaces the string **\${ipaidporg}** in the table.

| Option                    | Value   |
|---------------------------|---|
| <b>--auth-uri=URI</b>     | <b>https://login.microsoftonline.com/\${ipaidporg}/oauth2/v2.0/authorize</b>  |
| <b>--dev-auth-uri=URI</b> | <b>https://login.microsoftonline.com/\${ipaidporg}/oauth2/v2.0/devicecode</b> |
| <b>--token-uri=URI</b>    | <b>https://login.microsoftonline.com/\${ipaidporg}/oauth2/v2.0/token</b>      |
| <b>--userinfo-uri=URI</b> | <b>https://graph.microsoft.com/oidc/userinfo</b>                              |

| Option                   | Value   |
|--------------------------|---|
| <b>--keys-uri=URI</b>    | <b>https://login.microsoftonline.com/common/discovery/v2.0/keys</b> |
| <b>--scope=STR</b>       | <b>openid email</b>   |
| <b>--idp-user-id=STR</b> | <b>email</b>  |

**--provider=google**

Choosing **--provider=google** expands to use the following options:

| Option                    | Value   |
|---------------------------|---|
| <b>--auth-uri=URI</b>     | <b>https://accounts.google.com/o/oauth2/auth</b>        |
| <b>--dev-auth-uri=URI</b> | <b>https://oauth2.googleapis.com/device/code</b>        |
| <b>--token-uri=URI</b>    | <b>https://oauth2.googleapis.com/token</b>              |
| <b>--userinfo-uri=URI</b> | <b>https://openidconnect.googleapis.com/v1/userinfo</b> |
| <b>--keys-uri=URI</b>     | <b>https://www.googleapis.com/oauth2/v3/certs</b>       |
| <b>--scope=STR</b>        | <b>openid email</b>                                     |
| <b>--idp-user-id=STR</b>  | <b>email</b>  |

**--provider=github**

Choosing **--provider=github** expands to use the following options:

| Option                    | Value   |
|---------------------------|---|
| <b>--auth-uri=URI</b>     | <b>https://github.com/login/oauth/authorize</b>         |
| <b>--dev-auth-uri=URI</b> | <b>https://github.com/login/device/code</b>             |
| <b>--token-uri=URI</b>    | <b>https://github.com/login/oauth/access_token</b>      |
| <b>--userinfo-uri=URI</b> | <b>https://openidconnect.googleapis.com/v1/userinfo</b> |
| <b>--keys-uri=URI</b>     | <b>https://api.github.com/user</b>                      |
| <b>--scope=STR</b>        | <b>user</b>   |
| <b>--idp-user-id=STR</b>  | <b>login</b>  |

**--provider=keycloak**

With Keycloak, you can define multiple realms or organizations. Since it is often a part of a custom deployment, both base URL and realm ID are required, and you can specify them with the **--base-url** and **--organization** options to the **ipa idp-add** command:

```
[root@client ~]# ipa idp-add MySSO --provider keycloak \
--org main --base-url keycloak.domain.com:8443/auth \
--client-id <your-client-id>
```

Choosing **--provider=keycloak** expands to use the following options. The value you specify in the **--base-url** option replaces the string **\${ipaidpbaseurl}** in the table, and the value you specify for the **--organization** option replaces the string **\${ipaidporg}**.

| Option                    | Value   |
|---------------------------|---|
| <b>--auth-uri=URI</b>     | <b>https://\${ipaidpbaseurl}/realms/\${ipaidporg}/protocol/openid-connect/auth</b>        |
| <b>--dev-auth-uri=URI</b> | <b>https://\${ipaidpbaseurl}/realms/\${ipaidporg}/protocol/openid-connect/auth/device</b> |
| <b>--token-uri=URI</b>    | <b>https://\${ipaidpbaseurl}/realms/\${ipaidporg}/protocol/openid-connect/token</b>       |
| <b>--userinfo-uri=URI</b> | <b>https://\${ipaidpbaseurl}/realms/\${ipaidporg}/protocol/openid-connect/userinfo</b>    |
| <b>--scope=STR</b>        | <b>openid email</b>   |
| <b>--idp-user-id=STR</b>  | <b>email</b>  |

**--provider=okta**

After registering a new organization in Okta, a new base URL is associated with it. You can specify this base URL with the **--base-url** option to the **ipa idp-add** command:

```
[root@client ~]# ipa idp-add MyOkta --provider okta --base-url dev-12345.okta.com --client-id
<your-client-id>
```

Choosing **--provider=okta** expands to use the following options. The value you specify for the **--base-url** option replaces the string **\${ipaidpbaseurl}** in the table.

| Option                    | Value   |
|---------------------------|---|
| <b>--auth-uri=URI</b>     | <b>https://\${ipaidpbaseurl}/oauth2/v1/authorize</b>        |
| <b>--dev-auth-uri=URI</b> | <b>https://\${ipaidpbaseurl}/oauth2/v1/device/authorize</b> |
| <b>--token-uri=URI</b>    | <b>https://\${ipaidpbaseurl}/oauth2/v1/token</b>            |

| Option                    | Value   |
|---------------------------|---|
| <b>--userinfo-uri=URI</b> | <b>https://\${ipaidpbaseurl}/oauth2/v1/userinfo</b> |
| <b>--scope=STR</b>        | <b>openid email</b>                                 |
| <b>--idp-user-id=STR</b>  | <b>email</b>  |

#### Additional resources

- [Pre-populated IdP templates](#)

## CHAPTER 107. IDM INTEGRATION WITH OTHER RED HAT PRODUCTS

The following links are to documentation for other Red Hat products that integrate with IdM. You can configure these products to allow your IdM users to access their services.

### **Ansible Automation Platform**

[Setting up LDAP authentication](#)

### **OpenShift Container Platform**

[Configuring an LDAP identity provider](#)

### **OpenStack Platform**

[Integrating OpenStack Identity \(keystone\) with Red Hat Identity Manager \(IdM\)](#)

### **Satellite**

[Using Red Hat Identity Management](#)

### **Single Sign-On**

[SSSD and FreeIPA Identity Management integration](#)

### **Virtualization**

[Configuring an external LDAP provider](#)

# CHAPTER 108. USING ANSIBLE TO INTEGRATE IDM WITH NIS DOMAINS AND NETGROUPS

## 108.1. NIS AND ITS BENEFITS

In UNIX environments, the network information service (NIS) is a common way to centrally manage identities and authentication. NIS, which was originally named **Yellow Pages** (YP), centrally manages authentication and identity information such as:

- Users and passwords
- Host names and IP addresses
- POSIX groups

For modern network infrastructures, NIS is considered too insecure because, for example, it neither provides host authentication, nor is data sent encrypted over the network. To work around the problems, NIS is often integrated with other protocols to enhance security.

If you use Identity Management (IdM), you can use the NIS server plug-in to connect clients that cannot be fully migrated to IdM. IdM integrates netgroups and other NIS data into the IdM domain. Additionally, you can easily migrate user and host identities from a NIS domain to IdM.

Netgroups can be used everywhere that NIS groups are expected.

### Additional resources

- [NIS in IdM](#)
- [NIS netgroups in IdM](#)
- [Migrating from NIS to Identity Management](#)

## 108.2. NIS IN IDM

### NIS objects in IdM

NIS objects are integrated and stored in the Directory Server back end in compliance with [RFC 2307](#). IdM creates NIS objects in the LDAP directory and clients retrieve them through, for example, System Security Services Daemon (SSSD) or **nss\_Idap** using an encrypted LDAP connection.

IdM manages netgroups, accounts, groups, hosts, and other data. IdM uses a NIS listener to map passwords, groups, and netgroups to IdM entries.

### NIS Plug-ins in IdM

For NIS support, IdM uses the following plug-ins provided in the **slapi-nis** package:

#### NIS Server Plug-in

The NIS Server plug-in enables the IdM-integrated LDAP server to act as a NIS server for clients. In this role, Directory Server dynamically generates and updates NIS maps according to the configuration. Using the plug-in, IdM serves clients using the NIS protocol as an NIS server.

#### Schema Compatibility Plug-in

The Schema Compatibility plug-in enables the Directory Server back end to provide an alternate

view of entries stored in part of the directory information tree (DIT). This includes adding, dropping, or renaming attribute values, and optionally retrieving values for attributes from multiple entries in the tree.

For further details, see the `/usr/share/doc/slapi-nis-version/sch-getting-started.txt` file.

### 108.3. NIS NETGROUPS IN IDM

NIS entities can be stored in netgroups. Compared to UNIX groups, netgroups provide support for:

- Nested groups (groups as members of other groups).
- Grouping hosts.

A netgroup defines a set of the following information: host, user, and domain. This set is called a **triple**. These three fields can contain:

- A value.
- A dash (-), which specifies "no valid value"
- No value. An empty field specifies a wildcard.

```
(host.example.com,,nisdomain.example.com)
(-,user,nisdomain.example.com)
```

When a client requests a NIS netgroup, IdM translates the LDAP entry :

- to a traditional NIS map and sends it to the client over the NIS protocol by using the NIS plug-in.
- to an LDAP format that is compliant with [RFC 2307](#) or RFC 2307bis.

### 108.4. USING ANSIBLE TO ENSURE THAT A NETGROUP IS PRESENT

You can use an Ansible playbook to ensure that an IdM netgroup is present. The example describes how to ensure that the **TestNetgroup1** group is present.

#### Prerequisites

- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - You have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server in the `~/MyPlaybooks/` directory.
  - You have stored your **ipadmin\_password** in the **secret.yml** Ansible vault.

#### Procedure

1. Create your Ansible playbook file **netgroup-present.yml** with the following content:

```
---
```



```

- name: Playbook to manage IPA netgroup.
  hosts: ipaserver
  become: no

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - name: Ensure netgroup members are present
    ipanetgroup:
      ipadmin_password: "{{ ipadmin_password }}"
      name: TestNetgroup1

```

2. Run the playbook:

```

$ ansible-playbook --vault-password-file=password_file -v -i
  path_to_inventory_directory/inventory.file path_to_playbooks_directory/netgroup-
  present.yml

```

#### Additional resources

- [NIS in IdM](#)
- [/usr/share/doc/ansible-freeipa/README-netgroup.md](#)
- [/usr/share/doc/ansible-freeipa/playbooks/netgroup](#)

## 108.5. USING ANSIBLE TO ENSURE THAT MEMBERS ARE PRESENT IN A NETGROUP

You can use an Ansible playbook to ensure that IdM users, groups, and netgroups are members of a netgroup. The example describes how to ensure that the **TestNetgroup1** group has the following members:

- The **user1** and **user2** IdM users
- The **group1** IdM group
- The **admins** netgroup
- An **idmclient1** host that is an IdM client

#### Prerequisites

- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - You have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server in the `~/MyPlaybooks/` directory.
  - You have stored your **ipadmin\_password** in the **secret.yml** Ansible vault.
- The **TestNetgroup1** IdM netgroup exists.

- The **user1** and **user2** IdM users exist.
- The **group1** IdM group exists.
- The **admins** IdM netgroup exists.

## Procedure

1. Create your Ansible playbook file **IdM-members-present-in-a-netgroup.yml** with the following content:

```
---
- name: Playbook to manage IPA netgroup.
  hosts: ipaserver
  become: no

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - name: Ensure netgroup members are present
    ipanetgroup:
      ipaadmin_password: "{{ ipaadmin_password }}"
      name: TestNetgroup1
      user: user1,user2
      group: group1
      host: idmclient1
      netgroup: admins
      action: member
```

2. Run the playbook:

```
$ ansible-playbook --vault-password-file=password_file -v -i
path_to_inventory_directory/inventory.file path_to_playbooks_directory/IdM-
members-present-in-a-netgroup.yml
```

## Additional resources

- [NIS in IdM](#)
- [/usr/share/doc/ansible-freeipa/README-netgroup.md](#)
- [/usr/share/doc/ansible-freeipa/playbooks/netgroup](#)

## 108.6. USING ANSIBLE TO ENSURE THAT A MEMBER IS ABSENT FROM A NETGROUP

You can use an Ansible playbook to ensure that IdM users are members of a netgroup. The example describes how to ensure that the **TestNetgroup1** group does not have the **user1** IdM user among its members. netgroup

## Prerequisites

- You have configured your Ansible control node to meet the following requirements:

- You are using Ansible version 2.14 or later.
- You have installed the [ansible-freeipa](#) package on the Ansible controller.
- You have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server in the `~/MyPlaybooks/` directory.
- You have stored your `ipaadmin_password` in the `secret.yml` Ansible vault.
- The `TestNetgroup1` netgroup exists.

## Procedure

1. Create your Ansible playbook file `IdM-member-absent-from-a-netgroup.yml` with the following content:

```
---
- name: Playbook to manage IPA netgroup.
  hosts: ipaserver
  become: no

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - name: Ensure netgroup user, "user1", is absent
    ipanetgroup:
      ipaadmin_password: "{{ ipaadmin_password }}"
      name: TestNetgroup1
      user: "user1"
      action: member
      state: absent
```

2. Run the playbook:

```
$ ansible-playbook --vault-password-file=password_file -v -i
path_to_inventory_directory/inventory.file path_to_playbooks_directory/IdM-
member-absent-from-a-netgroup.yml
```

## Additional resources

- [NIS in IdM](#)
- `/usr/share/doc/ansible-freeipa/README-netgroup.md`
- `/usr/share/doc/ansible-freeipa/playbooks/netgroup`

## 108.7. USING ANSIBLE TO ENSURE THAT A NETGROUP IS ABSENT

You can use an Ansible playbook to ensure that a netgroup does not exist in Identity Management (IdM). The example describes how to ensure that the `TestNetgroup1` group does not exist in your IdM domain.

### Prerequisites

- You have configured your Ansible control node to meet the following requirements:

- You are using Ansible version 2.14 or later.
- You have installed the [ansible-freeipa](#) package on the Ansible controller.
- You have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server in the `~/MyPlaybooks/` directory.
- You have stored your `ipaadmin_password` in the `secret.yml` Ansible vault.

## Procedure

1. Create your Ansible playbook file `netgroup-absent.yml` with the following content:

```
---
- name: Playbook to manage IPA netgroup.
  hosts: ipaserver
  become: no

  vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
  tasks:
  - name: Ensure netgroup my_netgroup1 is absent
    ipanetgroup:
      ipaadmin_password: "{{ ipaadmin_password }}"
      name: my_netgroup1
      state: absent
```

2. Run the playbook:

```
$ ansible-playbook --vault-password-file=password_file -v -i
path_to_inventory_directory/inventory.file path_to_playbooks_directory/netgroup-
absent.yml
```

## Additional resources

- [NIS in IdM](#)
- `/usr/share/doc/ansible-freeipa/README-netgroup.md`
- `/usr/share/doc/ansible-freeipa/playbooks/netgroup`

## CHAPTER 109. MIGRATING FROM NIS TO IDENTITY MANAGEMENT

A Network Information Service (NIS) server can contain information about users, groups, hosts, netgroups and automount maps. As a system administrator you can migrate these entry types, authentication, and authorization from NIS server to an Identity Management (IdM) server so that all user management operations are performed on the IdM server. Migrating from NIS to IdM will also allow you access to more secure protocols such as Kerberos.

### 109.1. ENABLING NIS IN IDM

To allow communication between NIS and Identity Management (IdM) server, you must enable NIS compatibility options on IdM server.

#### Prerequisites

- You have root access on IdM server.

#### Procedure

1. Enable the NIS listener and compatibility plug-ins on IdM server:

```
[root@ipaserver ~]# ipa-nis-manage enable
[root@ipaserver ~]# ipa-compat-manage enable
```

2. *Optional:* For a more strict firewall configuration, set a fixed port.  
For example, to set the port to unused port **514**:

```
[root@ipaserver ~]# ldapmodify -x -D 'cn=directory manager' -W
dn: cn=NIS Server,cn=plugins,cn=config
changetype: modify
add: nsslapd-pluginarg0
nsslapd-pluginarg0: 514
```



#### WARNING

To avoid conflict with other services do not use any port number above 1024.

3. Enable and start the port mapper service:

```
[root@ipaserver ~]# systemctl enable rpcbind.service
[root@ipaserver ~]# systemctl start rpcbind.service
```

4. Restart Directory Server:

```
[root@ipaserver ~]# systemctl restart dirsrv.target
```

## 109.2. MIGRATING USER ENTRIES FROM NIS TO IDM

The NIS **passwd** map contains information about users, such as names, UIDs, primary group, GECOS, shell, and home directory. Use this data to migrate NIS user accounts to Identity Management (IdM):

### Prerequisites

- You have root access on NIS server.
- [NIS is enabled in IdM](#).
- The NIS server is enrolled into IdM.

### Procedure

1. Install the **yp-tools** package:

```
[root@nis-server ~]# yum install yp-tools -y
```

2. On the NIS server create the **/root/nis-users.sh** script with the following content:

```
#!/bin/sh
# $1 is the NIS domain, $2 is the primary NIS server
ypcat -d $1 -h $2 passwd > /dev/shm/nis-map.passwd 2>&1

IFS=$'\n'
for line in $(cat /dev/shm/nis-map.passwd) ; do
  IFS=' '
  username=$(echo $line | cut -f1 -d:)
  # Not collecting encrypted password because we need cleartext password
  # to create kerberos key
  uid=$(echo $line | cut -f3 -d:)
  gid=$(echo $line | cut -f4 -d:)
  gecos=$(echo $line | cut -f5 -d:)
  homedir=$(echo $line | cut -f6 -d:)
  shell=$(echo $line | cut -f7 -d:)

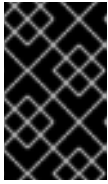
  # Now create this entry
  echo passw0rd1 | ipa user-add $username --first=NIS --last=USER \
    --password --gidnumber=$gid --uid=$uid --gecos="$gecos" --homedir=$homedir \
    --shell=$shell
  ipa user-show $username
done
```

3. Authenticate as the IdM **admin** user:

```
[root@nis-server ~]# kinit admin
```

4. Run the script. For example:

```
[root@nis-server ~]# sh /root/nis-users.sh nisdomain nis-server.example.com
```



## IMPORTANT

This script uses hard-coded values for first name, last name, and sets the password to **passw0rd1**. The user must change the temporary password at the next login.

## 109.3. MIGRATING USER GROUP FROM NIS TO IDM

The NIS **group** map contains information about groups, such as group names, GIDs, or group members. Use this data to migrate NIS groups to Identity Management (IdM):

### Prerequisites

- You have root access on NIS server.
- [NIS is enabled in IdM.](#)
- The NIS server is enrolled into IdM.

### Procedure

1. Install the **yp-tools** package:

```
[root@nis-server ~]# yum install yp-tools -y
```

2. Create the **/root/nis-groups.sh** script with the following content on the NIS server:

```
#!/bin/sh
# $1 is the NIS domain, $2 is the primary NIS server
ypcat -d $1 -h $2 group > /dev/shm/nis-map.group 2>&1

IFS=$'\n'
for line in $(cat /dev/shm/nis-map.group); do
  IFS=' '
  groupname=$(echo $line | cut -f1 -d:)
  # Not collecting encrypted password because we need cleartext password
  # to create kerberos key
  gid=$(echo $line | cut -f3 -d:)
  members=$(echo $line | cut -f4 -d:)

  # Now create this entry
  ipa group-add $groupname --desc=NIS_GROUP_$groupname --gid=$gid
  if [ -n "$members" ]; then
    ipa group-add-member $groupname --users={$members}
  fi
  ipa group-show $groupname
done
```

3. Authenticate as the IdM **admin** user:

```
[root@nis-server ~]# kinit admin
```

4. Run the script. For example:

```
[root@nis-server ~]# sh /root/nis-groups.sh nisdomain nis-server.example.com
```

## 109.4. MIGRATING HOST ENTRIES FROM NIS TO IDM

The NIS **hosts** map contains information about hosts, such as host names and IP addresses. Use this data to migrate NIS host entries to Identity Management (IdM):



### NOTE

When you create a host group in IdM, a corresponding shadow NIS group is automatically created. Do not use the **ipa netgroup-\*** commands on these shadow NIS groups. Use the **ipa netgroup-\*** commands only to manage native netgroups created via the **netgroup-add** command.

### Prerequisites

- You have root access on NIS server.
- [NIS is enabled in IdM.](#)
- The NIS server is enrolled into IdM.

### Procedure

1. Install the **yp-tools** package:

```
[root@nis-server ~]# yum install yp-tools -y
```

2. Create the **/root/nis-hosts.sh** script with the following content on the NIS server:

```
#!/bin/sh
# $1 is the NIS domain, $2 is the primary NIS server
ypcat -d $1 -h $2 hosts | egrep -v "localhost|127.0.0.1" > /dev/shm/nis-map.hosts 2>&1

IFS=$'\n'
for line in $(cat /dev/shm/nis-map.hosts); do
    IFS=' '
    ipaddress=$(echo $line | awk '{print $1}')
    hostname=$(echo $line | awk '{print $2}')
    primary=$(ipa env xmlrpc_uri | tr -d '[:space:]' | cut -f3 -d: | cut -f3 -d/)
    domain=$(ipa env domain | tr -d '[:space:]' | cut -f2 -d:)
    if [ $(echo $hostname | grep "\." | wc -l) -eq 0 ] ; then
        hostname=$(echo $hostname.$domain)
    fi
    zone=$(echo $hostname | cut -f2- -d.)
    if [ $(ipa dnszone-show $zone 2>/dev/null | wc -l) -eq 0 ] ; then
        ipa dnszone-add --name-server=$primary --admin-email=root.$primary
    fi
    ptrzone=$(echo $ipaddress | awk -F. '{print $3 "." $2 "." $1 ".in-addr.arpa."}')
    if [ $(ipa dnszone-show $ptrzone 2>/dev/null | wc -l) -eq 0 ] ; then
        ipa dnszone-add $ptrzone --name-server=$primary --admin-email=root.$primary
    fi
    # Now create this entry
```



```
ipa host-add $hostname --ip-address=$ipaddress
ipa host-show $hostname
done
```

3. Authenticate as the IdM **admin** user:

```
[root@nis-server ~]# kinit admin
```

4. Run the script. For example:

```
[root@nis-server ~]# sh /root/nis-hosts.sh nisdomain nis-server.example.com
```



#### NOTE

This script does not migrate special host configurations, such as aliases.

```
:_content-type: PROCEDURE
// Module included in the following assemblies:
//
// assembly_migrating-from-nis-to-identity-management.adoc
```

## 109.5. MIGRATING NETGROUP ENTRIES FROM NIS TO IDM

The NIS **netgroup** map contains information about netgroups. Use this data to migrate NIS netgroups to Identity Management (IdM):

### Prerequisites

- You have root access on NIS server.
- [NIS is enabled in IdM](#).
- The NIS server is enrolled into IdM.

### Procedure

1. Install the **yp-tools** package:

```
[root@nis-server ~]# yum install yp-tools -y
```

2. Create the **/root/nis-netgroups.sh** script with the following content on the NIS server:

```
#!/bin/sh
# $1 is the NIS domain, $2 is the primary NIS server
ypcat -k -d $1 -h $2 netgroup > /dev/shm/nis-map.netgroup 2>&1

IFS=$'\n'
for line in $(cat /dev/shm/nis-map.netgroup); do
  IFS=' '
  netgroupname=$(echo $line | awk '{print $1}')
  triples=$(echo $line | sed "s/^$netgroupname //")
  echo "ipa netgroup-add $netgroupname --desc=NIS_NG_$netgroupname"
```

```

if [ $(echo $line | grep "(" | wc -l) -gt 0 ]; then
    echo "ipa netgroup-mod $netgroupname --hostcat=all"
fi
if [ $(echo $line | grep ",," | wc -l) -gt 0 ]; then
    echo "ipa netgroup-mod $netgroupname --usercat=all"
fi

for triple in $triples; do
    triple=$(echo $triple | sed -e 's/-//g' -e 's/(//' -e 's/)//')
    if [ $(echo $triple | grep ",.*," | wc -l) -gt 0 ]; then
        hostname=$(echo $triple | cut -f1 -d,)
        username=$(echo $triple | cut -f2 -d,)
        domain=$(echo $triple | cut -f3 -d,)
        hosts=""; users=""; doms="";
        [ -n "$hostname" ] && hosts="--hosts=$hostname"
        [ -n "$username" ] && users="--users=$username"
        [ -n "$domain" ] && doms="--nisdomain=$domain"
        echo "ipa netgroup-add-member $netgroup $hosts $users $doms"
    else
        netgroup=$triple
        echo "ipa netgroup-add $netgroup --desc=<NIS_NG>_$netgroup"
    fi
done
done

```

3. Authenticate as the IdM **admin** user:

```
[root@nis-server ~]# kinit admin
```

4. Run the script. For example:

```
[root@nis-server ~]# sh /root/nis-netgroups.sh nisdomain nis-server.example.com
```

## 109.6. MIGRATING AUTOMOUNT MAPS FROM NIS TO IDM

Automount maps are a series of nested and interrelated entries that define the location (the parent entry), the associated keys, and maps. To migrate NIS automount maps to Identity Management (IdM):

### Prerequisites

- You have root access on NIS server.
- [NIS is enabled in IdM](#).
- The NIS server is enrolled into IdM.

### Procedure

1. Install the **yp-tools** package:

```
[root@nis-server ~]# yum install yp-tools -y
```

2. Create the **/root/nis-automounts.sh** script with the following content on the NIS server:

```
#!/bin/sh
# $1 is for the automount entry in ipa

ipa automountlocation-add $1

# $2 is the NIS domain, $3 is the primary NIS server, $4 is the map name

ypcat -k -d $2 -h $3 $4 > /dev/shm/nis-map.$4 2>&1

ipa automountmap-add $1 $4

basedn=$(ipa env basedn | tr -d '[:space:]' | cut -f2 -d:)
cat > /tmp/amap.ldif <<EOF
dn: nis-domain=$2+nis-map=$4,cn=NIS Server,cn=plugins,cn=config
objectClass: extensibleObject
nis-domain: $2
nis-map: $4
nis-base: automountmapname=$4,cn=$1,cn=automount,$basedn
nis-filter: (objectclass=*)
nis-key-format: %{automountKey}
nis-value-format: %{automountInformation}
EOF
ldapadd -x -h $3 -D "cn=Directory Manager" -W -f /tmp/amap.ldif

IFS=$'\n'
for line in $(cat /dev/shm/nis-map.$4); do
  IFS=" "
  key=$(echo "$line" | awk '{print $1}')
  info=$(echo "$line" | sed -e "s^$key[ \t]*")
  ipa automountkey-add nis $4 --key="$key" --info="$info"
done
```



## NOTE

The script exports the NIS automount information, generates an LDAP Data Interchange Format (LDIF) for the automount location and associated map, and imports the LDIF file into the IdM Directory Server.

3. Authenticate as the IdM **admin** user:

```
[root@nis-server ~]# kinit admin
```

4. Run the script. For example:

```
[root@nis-server ~]# sh /root/nis-automounts.sh location nisdomain
nis-server.example.com map_name
```

## CHAPTER 110. USING AUTOMOUNT IN IDM

Automount is a way to manage, organize, and access directories across multiple systems. Automount automatically mounts a directory whenever access to it is requested. This works well within an Identity Management (IdM) domain as it allows you to share directories on clients within the domain easily.

The example uses the following scenario:

- **nfs-server.idm.example.com** is the fully-qualified domain name (FQDN) of a Network File System (NFS) server.
- For the sake of simplicity, **nfs-server.idm.example.com** is an IdM client that provides the maps for the **raleigh** automount location.



### NOTE

An automount location is a unique set of NFS maps. Ideally, these maps are all located in the same geographical region so that, for example, the clients can benefit from fast connections, but this is not mandatory.

- The NFS server exports the **/exports/project** directory as read-write.
- Any IdM user belonging to the **developers** group can access the contents of the exported directory as **/devel/project/** on any IdM client that uses the **raleigh** automount location.
- **idm-client.idm.example.com** is an IdM client that uses the **raleigh** automount location.



### IMPORTANT

If you want to use a Samba server instead of an NFS server to provide the shares for IdM clients, see the [How do I configure kerberized CIFS mounts with Autofs in an IPA environment?](#) KCS solution.

### 110.1. AUTOFS AND AUTOMOUNT IN IDM

The **autofs** service automates the mounting of directories, as needed, by directing the **automount** daemon to mount directories when they are accessed. In addition, after a period of inactivity, **autofs** directs **automount** to unmount auto-mounted directories. Unlike static mounting, on-demand mounting saves system resources.

#### Automount maps

On a system that utilizes **autofs**, the **automount** configuration is stored in several different files. The primary **automount** configuration file is **/etc/auto.master**, which contains the master mapping of **automount** mount points, and their associated resources, on a system. This mapping is known as *automount maps*.

The **/etc/auto.master** configuration file contains the *master map*. It can contain references to other maps. These maps can either be direct or indirect. Direct maps use absolute path names for their mount points, while indirect maps use relative path names.

#### Automount configuration in IdM

While **automount** typically retrieves its map data from the local **/etc/auto.master** and associated files, it can also retrieve map data from other sources. One common source is an LDAP server. In the context of Identity Management (IdM), this is a 389 Directory Server.

If a system that uses **autofs** is a client in an IdM domain, the **automount** configuration is not stored in local configuration files. Instead, the **autofs** configuration, such as maps, locations, and keys, is stored as LDAP entries in the IdM directory. For example, for the **idm.example.com** IdM domain, the default *master map* is stored as follows:

```
dn:
automountmapname=auto.master,cn=default,cn=automount,dc=idm,dc=example,dc=com
objectClass: automountMap
objectClass: top
automountMapName: auto.master
```

### Additional resources

- [Mounting file systems on demand](#)

## 110.2. CONFIGURING AN IDM KEYTAB FOR AN NFS SERVER

Configure a Kerberos-aware NFS server so that users logged in to other Identity Management (IdM) clients can access directories and files on this NFS server.

The example describes how to configure NFS service running on **nfs-server.idm.example.com**.

### Prerequisites

- You are logged in as an IdM administrator.
- You have **root** access to the NFS server.
- You have [installed the required packages to export NFS shares](#) .
- [Optional] You have [configured the NFS server to run behind a firewall](#) .

### Procedure

1. On any IdM-enrolled host, add the NFS service to IdM:

```
$ ipa service-add nfs/nfs-server.idm.example.com
-----
Added service "nfs/nfs-server.idm.example.com@IDM.EXAMPLE.COM"
-----
Principal name: nfs/nfs-server.idm.example.com@IDM.EXAMPLE.COM
Principal alias: nfs/nfs-server.idm.example.com@IDM.EXAMPLE.COM
Managed by: nfs-server.idm.example.com
```

2. On the NFS server, obtain the keytab for the NFS service:

```
# ipa-getkeytab -p nfs/nfs-server.idm.example.com -k /etc/krb5.keytab
Keytab successfully retrieved and stored in: /etc/krb5.keytab
```

3. On the NFS server, restart the NFS service:

```
# systemctl restart nfs-server
```

4. On the NFS server, enable the NFS service:

```
# systemctl enable nfs-server
Created symlink /etc/systemd/system/multi-user.target.wants/nfs-server.service →
/usr/lib/systemd/system/nfs-server.service.
```

## 110.3. EXPORTING NFS SHARES IN IDM

As an Identity Management (IdM) system administrator, you can use an NFS server to share a directory with IdM users over the network.

### Prerequisites

- You are logged in as an IdM administrator.
- You have **root** access to the NFS server.
- You have [installed the required packages to export NFS shares](#) .
- [Optional] You have [configured the NFS server to run behind a firewall](#) .

### Procedure

1. Create the directory you want to export:

```
# mkdir -p /exports/project
```

2. Give the owner and group the rights to read, write and execute the directory:

```
# chmod 770 /exports/project
```

3. Add the **GSID** sticky bit so that any files created in the directory will have their group ownership set to that of the directory owner:

```
# chmod g+s /exports/project
```

4. Create an IdM group whose members will be able to access the directory. The example IdM group is **developers**:

```
# ipa group-add developers
```

5. Change the group ownership of the **/exports/project** directory to **developers** so that every IdM user in the group can access it:

```
# chgrp developers /exports/project
```

6. Add an IdM user to the group. The example user is **idm\_user**:

```
# ipa group-add-member developers --users=idm_user
```

7. Create a file in the directory with some content:

```
# echo "this is a read-write file" > /exports/project/rw_file
```

8. To a file in the **/etc/exports.d/** directory, add the following information:

- Which directory you want to export
- How you want users to authenticate to access the files in the directory
- What permissions you want users to have on the files in the directory

```
# echo "/exports/project *(sec=krb5,rw)" > /etc/exports.d/project.exports
```

**sec=krb5** uses the Kerberos V5 protocol instead of local UNIX UIDs and GIDs to authenticate users.

Alternatively, use **sec=krb5i** or **sec=krb5p**:

#### **sec=krb5i**

uses Kerberos V5 for user authentication and performs integrity checking of NFS operations using secure checksums to prevent data tampering.

#### **sec=krb5p**

uses Kerberos V5 for user authentication, integrity checking, and encrypts NFS traffic to prevent traffic sniffing. This is the most secure setting, but it also involves the most performance overhead.

9. Re-export all directories, synchronizing the main export table kept in **/var/lib/nfs/etab** with **/etc/exports** and files under **/etc/exports.d**:

```
# exportfs -r
```

10. Display the current export list suitable for **/etc/exports**:

```
# exportfs -s
/exports/project *
(sync,wdelay,hide,no_subtree_check,sec=krb5p,rw,secure,root_squash,no_all_squash)
```

#### Additional resources

- For information about **krb5** methods, see the **nfs** man page.

## 110.4. CONFIGURING AUTOMOUNT LOCATIONS AND MAPS IN IDM USING THE IDM CLI

A location is a set of maps, which are all stored in **auto.master**. A location can store multiple maps. The location entry only works as a container for map entries; it is not an automount configuration in and of itself.

As a system administrator in Identity Management (IdM), you can configure automount locations and maps in IdM so that IdM users in the specified locations can access shares exported by an NFS server by navigating to specific mount points on their hosts. Both the exported NFS server directory and the

mount points are specified in the maps. The example describes how to configure the **raleigh** location and a map that mounts the **nfs-server.idm.example.com:/exports/project** share on the **/devel/** mount point on the IdM client as a read-write directory.

## Prerequisites

- You are logged in as an IdM administrator on any IdM-enrolled host.

## Procedure

1. Create the **raleigh** automount location:

```
$ ipa automountlocation-add raleigh
-----
Added automount location "raleigh"
-----
Location: raleigh
```

2. Create an **auto.devel** automount map in the **raleigh** location:

```
$ ipa automountmap-add raleigh auto.devel
-----
Added automount map "auto.devel"
-----
Map: auto.devel
```

3. Add the keys and mount information for the **exports/** share:

- a. Add the key and mount information for the **auto.devel** map:

```
$ ipa automountkey-add raleigh auto.devel --key='*' --info='-sec=krb5p,vers=4 nfs-
server.idm.example.com:/exports/&'
-----
Added automount key "*"
-----
Key: *
Mount information: -sec=krb5p,vers=4 nfs-server.idm.example.com:/exports/&
```

- b. Add the key and mount information for the **auto.master** map:

```
$ ipa automountkey-add raleigh auto.master --key=/devel --info=auto.devel
-----
Added automount key "/devel"
-----
Key: /devel
Mount information: auto.devel
```

## 110.5. CONFIGURING AUTOMOUNT ON AN IDM CLIENT

As an Identity Management (IdM) system administrator, you can configure automount services on an IdM client so that NFS shares configured for a location to which the client has been added are accessible to an IdM user automatically when the user logs in to the client. The example describes how to configure an IdM client to use automount services that are available in the **raleigh** location.



## Prerequisites

- You have **root** access to the IdM client.
- You are logged in as IdM administrator.
- The automount location exists. The example location is **raleigh**.

## Procedure

1. On the IdM client, enter the **ipa-client-automount** command and specify the location. Use the **-U** option to run the script unattended:

```
# ipa-client-automount --location raleigh -U
```

2. Stop the autofs service, clear the SSSD cache, and start the autofs service to load the new configuration settings:

```
# systemctl stop autofs ; sss_cache -E ; systemctl start autofs
```

## 110.6. VERIFYING THAT AN IDM USER CAN ACCESS NFS SHARES ON AN IDM CLIENT

As an Identity Management (IdM) system administrator, you can test if an IdM user that is a member of a specific group can access NFS shares when logged in to a specific IdM client.

In the example, the following scenario is tested:

- An IdM user named **idm\_user** belonging to the **developers** group can read and write the contents of the files in the **/devel/project** directory automounted on **idm-client.idm.example.com**, an IdM client located in the **raleigh** automount location.

## Prerequisites

- You have [configured an IdM keytab for an NFS server](#) and [exported an NFS share](#).
- You have [configured automount locations, maps, and mount points in IdM](#) in which you configured how IdM users can access the NFS share.
- You have [configured automount on the IdM client](#).

## Procedure

1. Verify that the IdM user can access the **read-write** directory:
  - a. Connect to the IdM client as the IdM user:

```
$ ssh idm_user@idm-client.idm.example.com
Password:
```

- b. Obtain the ticket-granting ticket (TGT) for the IdM user:

```
$ kinit idm_user
```

- c. [Optional] View the group membership of the IdM user:

```
$ ipa user-show idm_user
User login: idm_user
[...]
Member of groups: developers, ipausers
```

- d. Navigate to the **/devel/project** directory:

```
$ cd /devel/project
```

- e. List the directory contents:

```
$ ls
rw_file
```

- f. Add a line to the file in the directory to test the **write** permission:

```
$ echo "idm_user can write into the file" > rw_file
```

- g. [Optional] View the updated contents of the file:

```
$ cat rw_file
this is a read-write file
idm_user can write into the file
```

The output confirms that **idm\_user** can write into the file.

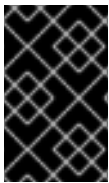
## CHAPTER 111. USING ANSIBLE TO AUTOMOUNT NFS SHARES FOR IDM USERS

Automount is a way to manage, organize, and access directories across multiple systems. Automount automatically mounts a directory whenever access to it is requested. This works well within an Identity Management (IdM) domain as it allows you to share directories on clients within the domain easily.

You can use Ansible to configure NFS shares to be mounted automatically for IdM users logged in to IdM clients in an IdM location.

The example in this chapter uses the following scenario:

- **nfs-server.idm.example.com** is the fully-qualified domain name (FQDN) of a Network File System (NFS) server.
- **nfs-server.idm.example.com** is an IdM client located in the **raleigh** automount location.
- The NFS server exports the **/exports/project** directory as read-write.
- Any IdM user belonging to the **developers** group can access the contents of the exported directory as **/devel/project/** on any IdM client that is located in the same **raleigh** automount location as the NFS server.
- **idm-client.idm.example.com** is an IdM client located in the **raleigh** automount location.



### IMPORTANT

If you want to use a Samba server instead of an NFS server to provide the shares for IdM clients, see the [How do I configure kerberized CIFS mounts with Autofs in an IPA environment?](#) KCS solution.

The chapter contains the following sections:

1. [Autofs and automount in IdM](#)
2. [Configuring an IdM keytab for an NFS server](#)
3. [Exporting NFS shares in IdM](#)
4. [Preparing your Ansible control node for managing IdM](#)
5. [Configuring automount locations, maps, and keys in IdM by using Ansible](#)
6. [Using Ansible to add IdM users to a group that owns NFS shares](#)
7. [Configuring automount on an IdM client](#)
8. [Verifying that an IdM user can access NFS shares on an IdM client](#)

### 111.1. AUTOFS AND AUTOMOUNT IN IDM

The **autofs** service automates the mounting of directories, as needed, by directing the **automount**

daemon to mount directories when they are accessed. In addition, after a period of inactivity, **autofs** directs **automount** to unmount auto-mounted directories. Unlike static mounting, on-demand mounting saves system resources.

### Automount maps

On a system that utilizes **autofs**, the **automount** configuration is stored in several different files. The primary **automount** configuration file is **/etc/auto.master**, which contains the master mapping of **automount** mount points, and their associated resources, on a system. This mapping is known as *automount maps*.

The **/etc/auto.master** configuration file contains the *master map*. It can contain references to other maps. These maps can either be direct or indirect. Direct maps use absolute path names for their mount points, while indirect maps use relative path names.

### Automount configuration in IdM

While **automount** typically retrieves its map data from the local **/etc/auto.master** and associated files, it can also retrieve map data from other sources. One common source is an LDAP server. In the context of Identity Management (IdM), this is a 389 Directory Server.

If a system that uses **autofs** is a client in an IdM domain, the **automount** configuration is not stored in local configuration files. Instead, the **autofs** configuration, such as maps, locations, and keys, is stored as LDAP entries in the IdM directory. For example, for the **idm.example.com** IdM domain, the default *master map* is stored as follows:

```
dn:  
automountmapname=auto.master,cn=default,cn=automount,dc=idm,dc=example,dc=com  
objectClass: automountMap  
objectClass: top  
automountMapName: auto.master
```

### Additional resources

- [Mounting file systems on demand](#)

## 111.2. CONFIGURING AN IDM KEYTAB FOR AN NFS SERVER

Configure a Kerberos-aware NFS server so that users logged in to other Identity Management (IdM) clients can access directories and files on this NFS server.

The example describes how to configure NFS service running on **nfs-server.idm.example.com**.

### Prerequisites

- You are logged in as an IdM administrator.
- You have **root** access to the NFS server.
- You have [installed the required packages to export NFS shares](#) .
- [Optional] You have [configured the NFS server to run behind a firewall](#) .

### Procedure

1. On any IdM-enrolled host, add the NFS service to IdM:

```
$ ipa service-add nfs/nfs-server.idm.example.com
-----
Added service "nfs/nfs-server.idm.example.com@IDM.EXAMPLE.COM"
-----
Principal name: nfs/nfs-server.idm.example.com@IDM.EXAMPLE.COM
Principal alias: nfs/nfs-server.idm.example.com@IDM.EXAMPLE.COM
Managed by: nfs-server.idm.example.com
```

2. On the NFS server, obtain the keytab for the NFS service:

```
# ipa-getkeytab -p nfs/nfs-server.idm.example.com -k /etc/krb5.keytab
Keytab successfully retrieved and stored in: /etc/krb5.keytab
```

3. On the NFS server, restart the NFS service:

```
# systemctl restart nfs-server
```

4. On the NFS server, enable the NFS service:

```
# systemctl enable nfs-server
Created symlink /etc/systemd/system/multi-user.target.wants/nfs-server.service →
/usr/lib/systemd/system/nfs-server.service.
```

### 111.3. EXPORTING NFS SHARES IN IDM

As an Identity Management (IdM) system administrator, you can use an NFS server to share a directory with IdM users over the network.

#### Prerequisites

- You are logged in as an IdM administrator.
- You have **root** access to the NFS server.
- You have [installed the required packages to export NFS shares](#) .
- [Optional] You have [configured the NFS server to run behind a firewall](#) .

#### Procedure

1. Create the directory you want to export:

```
# mkdir -p /exports/project
```

2. Give the owner and group the rights to read, write and execute the directory:

```
# chmod 770 /exports/project
```

3. Add the **GSID** sticky bit so that any files created in the directory will have their group ownership set to that of the directory owner:

```
# chmod g+s /exports/project
```

4. Create a file in the directory with some content:

```
# echo "this is a read-write file" > /exports/project/rw_file
```

5. To a file in the **/etc/exports.d/** directory, add the following information:

- Which directory you want to export
- How you want users to authenticate to access the files in the directory
- What permissions you want users to have on the files in the directory

```
# echo "/exports/project *(sec=krb5,rw)" > /etc/exports.d/project.exports
```

**sec=krb5** uses the Kerberos V5 protocol instead of local UNIX UIDs and GIDs to authenticate users.

Alternatively, use **sec=krb5i** or **sec=krb5p**:

#### **sec=krb5i**

uses Kerberos V5 for user authentication and performs integrity checking of NFS operations using secure checksums to prevent data tampering.

#### **sec=krb5p**

uses Kerberos V5 for user authentication, integrity checking, and encrypts NFS traffic to prevent traffic sniffing. This is the most secure setting, but it also involves the most performance overhead.

6. Re-export all directories, synchronizing the main export table kept in **/var/lib/nfs/etab** with **/etc/exports** and files under **/etc/exports.d**:

```
# exportfs -r
```

7. Display the current export list suitable for **/etc/exports**:

```
# exportfs -s
/exports/project *
(sync,wdelay,hide,no_subtree_check,sec=krb5p,rw,secure,root_squash,no_all_squash)
```

#### Additional resources

- For information about **krb5** methods, see the **nfs** man page.

## 111.4. PREPARING YOUR ANSIBLE CONTROL NODE FOR MANAGING IDM

As a system administrator managing Identity Management (IdM), when working with Red Hat Ansible Engine, it is good practice to do the following:

- Create a subdirectory dedicated to Ansible playbooks in your home directory, for example **~/MyPlaybooks**.

- Copy and adapt sample Ansible playbooks from the `/usr/share/doc/ansible-freeipa/*` and `/usr/share/doc/rhel-system-roles/*` directories and subdirectories into your `~/MyPlaybooks` directory.
- Include your inventory file in your `~/MyPlaybooks` directory.

By following this practice, you can find all your playbooks in one place and you can run your playbooks without invoking root privileges.



## NOTE

You only need **root** privileges on the managed nodes to execute the **ipaserver**, **ipareplica**, **ipaclient**, **ipabackup**, **ipasmartcard\_server** and **ipasmartcard\_client** **ansible-freeipa** roles. These roles require privileged access to directories and the **dnf** software package manager.

Follow this procedure to create the `~/MyPlaybooks` directory and configure it so that you can use it to store and run Ansible playbooks.

## Prerequisites

- You have installed an IdM server on your managed nodes, *server.idm.example.com* and *replica.idm.example.com*.
- You have configured DNS and networking so you can log in to the managed nodes, *server.idm.example.com* and *replica.idm.example.com*, directly from the control node.
- You know the IdM **admin** password.

## Procedure

1. Create a directory for your Ansible configuration and playbooks in your home directory:

```
$ mkdir ~/MyPlaybooks/
```

2. Change into the `~/MyPlaybooks/` directory:

```
$ cd ~/MyPlaybooks
```

3. Create the `~/MyPlaybooks/ansible.cfg` file with the following content:

```
[defaults]
inventory = /home/your_username/MyPlaybooks/inventory

[privilege_escalation]
become=True
```

4. Create the `~/MyPlaybooks/inventory` file with the following content:

```
[ipaserver]
server.idm.example.com

[ipareplicas]
replica1.idm.example.com
```

```

replica2.idm.example.com

[ipacluster:children]
ipaserver
ipareplicas

[ipacluster:vars]
ipaadmin_password=SomeADMINpassword

[ipaclients]
ipaclient1.example.com
ipaclient2.example.com

[ipaclients:vars]
ipaadmin_password=SomeADMINpassword

```

This configuration defines two host groups, **eu** and **us**, for hosts in these locations. Additionally, this configuration defines the **ipaserver** host group, which contains all hosts from the **eu** and **us** groups.

5. [Optional] Create an SSH public and private key. To simplify access in your test environment, do not set a password on the private key:

```
$ ssh-keygen
```

6. Copy the SSH public key to the IdM **admin** account on each managed node:

```
$ ssh-copy-id admin@server.idm.example.com
$ ssh-copy-id admin@replica.idm.example.com
```

You must enter the IdM **admin** password when you enter these commands.

### Additional resources

- [Installing an Identity Management server using an Ansible playbook](#) .
- [How to build your inventory](#) .

## 111.5. CONFIGURING AUTOMOUNT LOCATIONS, MAPS, AND KEYS IN IDM BY USING ANSIBLE

As an Identity Management (IdM) system administrator, you can configure automount locations and maps in IdM so that IdM users in the specified locations can access shares exported by an NFS server by navigating to specific mount points on their hosts. Both the exported NFS server directory and the mount points are specified in the maps. In LDAP terms, a location is a container for such map entries.

The example describes how to use Ansible to configure the **raleigh** location and a map that mounts the **nfs-server.idm.example.com:/exports/project** share on the **/devel/project** mount point on the IdM client as a read-write directory.

### Prerequisites

- You know the IdM **admin** password.



- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the `secret.yml` Ansible vault stores your `ipaadmin_password`.

## Procedure

1. On your Ansible control node, navigate to your `~/MyPlaybooks/` directory:

```
$ cd ~/MyPlaybooks/
```

2. Copy the `automount-location-present.yml` Ansible playbook file located in the `/usr/share/doc/ansible-freeipa/playbooks/automount/` directory:

```
$ cp /usr/share/doc/ansible-freeipa/playbooks/automount/automount-location-present.yml automount-location-map-and-key-present.yml
```

3. Open the `automount-location-map-and-key-present.yml` file for editing.
4. Adapt the file by setting the following variables in the `ipaautomountlocation` task section:
  - Set the `ipaadmin_password` variable to the password of the IdM `admin`.
  - Set the `name` variable to `raleigh`.
  - Ensure that the `state` variable is set to `present`.
 This is the modified Ansible playbook file for the current example:

```
---
- name: Automount location present example
  hosts: ipaserver
  vars_files:
    - /home/user_name/MyPlaybooks/secret.yml
  tasks:
    - name: Ensure automount location is present
      ipaautomountlocation:
        ipaadmin_password: "{{ ipaadmin_password }}"
        name: raleigh
        state: present
```

5. Continue editing the `automount-location-map-and-key-present.yml` file:
  - a. In the `tasks` section, add a task to ensure the presence of an automount map:

```
[...]
vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
tasks:
[...]
```

```
- name: ensure map named auto.devel in location raleigh is created
  ipaautomountmap:
    ipaadmin_password: "{{ ipaadmin_password }}"
    name: auto.devel
    location: raleigh
    state: present
```

- b. Add another task to add the mount point and NFS server information to the map:

```
[...]
vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
tasks:
  [...]
  - name: ensure automount key /devel/project is present
    ipaautomountkey:
      ipaadmin_password: "{{ ipaadmin_password }}"
      location: raleigh
      mapname: auto.devel
      key: /devel/project
      info: nfs-server.idm.example.com:/exports/project
      state: present
```

- c. Add another task to ensure **auto.devel** is connected to **auto.master**:

```
[...]
vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
tasks:
  [...]
  - name: Ensure auto.devel is connected in auto.master:
    ipaautomountkey:
      ipaadmin_password: "{{ ipaadmin_password }}"
      location: raleigh
      mapname: auto.map
      key: /devel
      info: auto.devel
      state: present
```

6. Save the file.

7. Run the Ansible playbook and specify the playbook and inventory files:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory automount-
location-map-and-key-present.yml
```

## 111.6. USING ANSIBLE TO ADD IDM USERS TO A GROUP THAT OWNS NFS SHARES

As an Identity Management (IdM) system administrator, you can use Ansible to create a group of users that is able to access NFS shares, and add IdM users to this group.

This example describes how to use an Ansible playbook to ensure that the **idm\_user** account belongs to the **developers** group, so that **idm\_user** can access the **/exports/project** NFS share.

## Prerequisites

- You have **root** access to the **nfs-server.idm.example.com** NFS server, which is an IdM client located in the **raleigh** automount location.
- You know the IdM **admin** password.
- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the **ansible-freeipa** package on the Ansible controller.
  - The example assumes that in the **~/MyPlaybooks/** directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipaadmin\_password**.
  - In **~/MyPlaybooks/**, you have created the **automount-location-map-and-key-present.yml** file that already contains tasks from [Configuring automount locations, maps, and keys in IdM by using Ansible](#).

## Procedure

1. On your Ansible control node, navigate to the **~/MyPlaybooks/** directory:

```
$ cd ~/MyPlaybooks/
```

2. Open the **automount-location-map-and-key-present.yml** file for editing.
3. In the **tasks** section, add a task to ensure that the IdM **developers** group exists and **idm\_user** is added to this group:

```
[...]
vars_files:
  - /home/user_name/MyPlaybooks/secret.yml
tasks:
[...]
```

```
- ipagroup:
  ipaadmin_password: "{{ ipaadmin_password }}"
  name: developers
  user:
  - idm_user
  state: present
```

4. Save the file.
5. Run the Ansible playbook and specify the playbook and inventory files:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory automount-
location-map-and-key-present.yml
```

6. On the NFS server, change the group ownership of the **/exports/project** directory to **developers** so that every IdM user in the group can access the directory:

```
# chgrp developers /exports/project
```

## 111.7. CONFIGURING AUTOMOUNT ON AN IDM CLIENT

As an Identity Management (IdM) system administrator, you can configure automount services on an IdM client so that NFS shares configured for a location to which the client has been added are accessible to an IdM user automatically when the user logs in to the client. The example describes how to configure an IdM client to use automount services that are available in the **raleigh** location.

### Prerequisites

- You have **root** access to the IdM client.
- You are logged in as IdM administrator.
- The automount location exists. The example location is **raleigh**.

### Procedure

1. On the IdM client, enter the **ipa-client-automount** command and specify the location. Use the **-U** option to run the script unattended:

```
# ipa-client-automount --location raleigh -U
```

2. Stop the autofs service, clear the SSSD cache, and start the autofs service to load the new configuration settings:

```
# systemctl stop autofs ; sss_cache -E ; systemctl start autofs
```

## 111.8. VERIFYING THAT AN IDM USER CAN ACCESS NFS SHARES ON AN IDM CLIENT

As an Identity Management (IdM) system administrator, you can test if an IdM user that is a member of a specific group can access NFS shares when logged in to a specific IdM client.

In the example, the following scenario is tested:

- An IdM user named **idm\_user** belonging to the **developers** group can read and write the contents of the files in the **/devel/project** directory automounted on **idm-client.idm.example.com**, an IdM client located in the **raleigh** automount location.

### Prerequisites

- You have [configured an IdM keytab for an NFS server](#) and [exported an NFS share](#) .
- You have [configured automount locations, maps, and mount points in IdM](#) in which you configured how IdM users can access the NFS share.
- You have [used Ansible to add IdM users to the developers group that owns the NFS shares](#) .
- You have [configured automount on the IdM client](#).

## Procedure

1. Verify that the IdM user can access the **read-write** directory:

- a. Connect to the IdM client as the IdM user:

```
$ ssh idm_user@idm-client.idm.example.com
Password:
```

- b. Obtain the ticket-granting ticket (TGT) for the IdM user:

```
$ kinit idm_user
```

- c. [Optional] View the group membership of the IdM user:

```
$ ipa user-show idm_user
User login: idm_user
[...]
Member of groups: developers, ipausers
```

- d. Navigate to the **/devel/project** directory:

```
$ cd /devel/project
```

- e. List the directory contents:

```
$ ls
rw_file
```

- f. Add a line to the file in the directory to test the **write** permission:

```
$ echo "idm_user can write into the file" > rw_file
```

- g. [Optional] View the updated contents of the file:

```
$ cat rw_file
this is a read-write file
idm_user can write into the file
```

The output confirms that **idm\_user** can write into the file.

## CHAPTER 112. IDM LOG FILES AND DIRECTORIES

Use the following sections to monitor, analyze, and troubleshoot the individual components of Identity Management (IdM):

- [LDAP](#)
- [Apache web server](#)
- [Certificate system](#)
- [Kerberos](#)
- [DNS](#)
- [Custodia](#)

Additionally, you can monitor, analyze, and troubleshoot the [IdM server and client](#) and [enable audit logging on an IdM server](#).

### 112.1. IDM SERVER AND CLIENT LOG FILES AND DIRECTORIES

The following table presents directories and files that the Identity Management (IdM) server and client use to log information. You can use the files and directories for troubleshooting installation errors.

| Directory or File                             | Description   |
|---|---|
| <b>/var/log/ipaserver-install.log</b>         | The installation log for the IdM server.  |
| <b>/var/log/ipareplica-install.log</b>        | The installation log for the IdM replica.   |
| <b>/var/log/ipaclient-install.log</b>         | The installation log for the IdM client.  |
| <b>/var/log/sss/</b>                          | Log files for SSSD. You can <a href="#">enable detailed logging for SSSD in the sssd.conf file</a> or <a href="#">with the sssctl command</a> .   |
| <b>~/.ipa/log/cli.log</b>                     | The log file for errors returned by remote procedure calls (RPCs) and responses by the <b>ipa</b> utility. Created in the home directory for the <b>effective user</b> that runs the tools. This user might have a different user name than the IdM user principal, that is the IdM user whose ticket granting ticket (TGT) has been obtained before attempting to perform the failed <b>ipa</b> commands. For example, if you are logged in to the system as <b>root</b> and have obtained the TGT of IdMadmin, then the errors are logged in to the <b>/root/.ipa/log/cli.log</b> file. |
| <b>/etc/logrotate.d/</b>                      | The log rotation policies for DNS, SSSD, Apache, Tomcat, and Kerberos.  |
| <b>/etc/pki/pki-tomcat/logging.properties</b> | This link points to the default Certificate Authority logging configuration at <b>/usr/share/pki/server/conf/logging.properties</b> .   |


Additional resources

- [Troubleshooting IdM server installation](#)
- [Troubleshooting IdM client installation](#)
- [Troubleshooting IdM replica installation](#)
- [Troubleshooting authentication with SSSD in IdM](#)

112.2. DIRECTORY SERVER LOG FILES

The following table presents directories and files that the Identity Management (IdM) Directory Server (DS) instance uses to log information. You can use the files and directories for troubleshooting DS-related problems.

Table 112.1. Directory Server log files

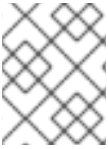
| Directory or file   | Description  |
|---|--|
| <code>/var/log/dirsrv/slaped-<i>REALM_NAME</i></code>       | Log files associated with the DS instance used by the IdM server. Most operational data recorded here are related to server-replica interactions.  |
| <code>/var/log/dirsrv/slaped-<i>REALM_NAME</i>audit</code>  | Contains audit trails of all DS operations when auditing is enabled in the DS configuration. <div><div><b>NOTE</b><p>You can also audit the Apache error logs, where the IdM API logs access. However, because changes can be made directly over LDAP too, Red Hat recommends enabling the more comprehensive <code>/var/log/dirsrv/slaped-<i>REALM_NAME</i>audit</code> log for auditing purposes.</p></div></div> |
| <code>/var/log/dirsrv/slaped-<i>REALM_NAME</i>access</code> | Contains detailed information about attempted access for the domain DS instance.   |
| <code>/var/log/dirsrv/slaped-<i>REALM_NAME</i>errors</code> | Contains detailed information about failed operations for the domain DS instance.  |

Additional resources

- [Monitoring Server and Database Activity](#)
- [Log File Reference](#)

112.3. ENABLING AUDIT LOGGING ON AN IDM SERVER

Follow this procedure to enable logging on an Identity Management (IdM) server for audit purposes. Using detailed logs, you can monitor data, troubleshoot issues, and examine suspicious activity on the network.

**NOTE**

The LDAP service may become slower if there are many LDAP changes logged, especially if the values are large.

**Prerequisites**

- The Directory Manager password

**Procedure**

1. Bind to the LDAP server:

```
$ ldapmodify -D "cn=Directory Manager" -W << EOF
```

2. Press [Enter].
3. Specify all the modifications you want to make, for example:

```
dn: cn=config
changetype: modify
replace: nsslapd-auditlog-logging-enabled
nsslapd-auditlog-logging-enabled: on
-
replace:nsslapd-auditlog
nsslapd-auditlog: /var/log/dirsrv/slapd-REALM_NAME/audit
-
replace:nsslapd-auditlog-mode
nsslapd-auditlog-mode: 600
-
replace:nsslapd-auditlog-maxlogsize
nsslapd-auditlog-maxlogsize: 100
-
replace:nsslapd-auditlog-logrotationtime
nsslapd-auditlog-logrotationtime: 1
-
replace:nsslapd-auditlog-logrotationtimeunit
nsslapd-auditlog-logrotationtimeunit: day
```

4. Indicate the end of the **ldapmodify** command by entering **EOF** on a new line.
5. Press [Enter] twice.
6. Repeat the previous steps on all the other IdM servers on which you want to enable audit logging.

**Verification**

- Open the **/var/log/dirsrv/slapd-REALM\_NAME/audit** file:

```
389-Directory/1.4.3.231 B2021.322.1803
server.idm.example.com:636 (/etc/dirsrv/slapd-IDM-EXAMPLE-COM)

time: 20220607102705
dn: cn=config
```



```

result: 0
changetype: modify
replace: nsslapd-auditlog-logging-enabled
nsslapd-auditlog-logging-enabled: on
[...]

```

The fact that the file is not empty anymore confirms that auditing is enabled.

## IMPORTANT

The system logs the bound LDAP distinguished name (DN) of the entry that makes a change. For this reason, you might have to post-process the log. For example, in the IdM Directory Server, it is an ID override DN that represents the identity of an AD user that modified a record:

```

$ modifiersName: ipaanchoruuid=:sid:s-1-5-21-19610888-1443184010-
1631745340-279100,cn=default trust
view,cn=views,cn=accounts,dc=idma,dc=idm,dc=example,dc=com

```

Use the `pysss_nss_idmap.getnamebysid` Python command to look up an AD user if you have the user SID:

```

>>> import pysss_nss_idmap
>>> pysss_nss_idmap.getnamebysid('S-1-5-21-1273159419-3736181166-
4190138427-500'))
{'S-1-5-21-1273159419-3736181166-4190138427-500': {'name':
'administrator@ad.vm', 'type': 3}}

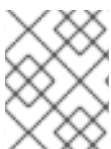
```

## Additional resources

- [Directory Server log files](#)
- The [How to enable Audit logging in IPA/IDM Server and Replica Servers](#) KCS solution

## 112.4. MODIFYING ERROR LOGGING ON AN IDM SERVER

Follow this procedure to obtain debugging information about specific types of errors. The example focuses on obtaining detailed error logs about replication by setting the error log level to 8192. To record a different type of information, select a different number from the table in [Error Log Logging Levels](#) in the Red Hat Directory Server documentation.



## NOTE

The LDAP service may become slower if there are many types of LDAP errors logged, especially if the values are large.

## Prerequisites

- The Directory Manager password.

## Procedure

1. Bind to the LDAP server:

```
$ ldapmodify -x -D "cn=directory manager" -w <password>
```

2. Press [Enter].
3. Specify the modifications you want to make. For example to collect only logs related to replication:

```
dn: cn=config
changetype: modify
add: nsslapd-errorlog-level
nsslapd-errorlog-level: 8192
```

4. Press [Enter] twice, to indicate the end of the **ldapmodify** instruction. This displays the **modifying entry "cn=config"** message.
5. Press [Ctrl+C] to exit the **ldapmodify** command.
6. Repeat the previous steps on all the other IdM servers on which you want to collect detailed logs about replication errors.



### IMPORTANT

After you finish troubleshooting, set **nsslapd-errorlog-level** back to 0 to prevent performance problems.

#### Additional resources

- [The Directory Server error logging levels](#)

## 112.5. THE IDM APACHE SERVER LOG FILES

The following table presents directories and files that the Identity Management (IdM) Apache Server uses to log information.

Table 112.2. Apache Server log files

| Directory or File                | Description  |
|----------------------------------|--|
| <b>/var/log/httpd/</b>           | Log files for the Apache web server.   |
| <b>/var/log/httpd/access_log</b> | Standard access and error logs for Apache servers. Messages specific to IdM are recorded along with the Apache messages because the IdM web UI and the RPC command-line interface use Apache. The access logs log mostly only the user principal and the URI used, which is often an RPC endpoint. The error logs contain the IdM server logs. |
| <b>/var/log/httpd/error_log</b>  |  |

#### Additional resources

- [Log Files](#) in the Apache documentation

## 112.6. CERTIFICATE SYSTEM LOG FILES IN IDM

The following table presents directories and files that the Identity Management (IdM) Certificate System uses to log information.

Table 112.3. Certificate System log files

| Directory or File  | Description  |
|--|--|
| <b>/var/log/pki/pki-ca-spawn.time_of_installation.log</b>  | The installation log for the IdM certificate authority (CA).   |
| <b>/var/log/pki/pki-kra-spawn.time_of_installation.log</b> | The installation log for the IdM Key Recovery Authority (KRA).   |
| <b>/var/log/pki/pki-tomcat/</b>                            | The top level directory for PKI operation logs. Contains CA and KRA logs.  |
| <b>/var/log/pki/pki-tomcat/ca/</b>                         | Directory with logs related to certificate operations. In IdM, these logs are used for service principals, hosts, and other entities which use certificates. |
| <b>/var/log/pki/pki-tomcat/kra</b>                         | Directory with logs related to KRA.  |
| <b>/var/log/messages</b>                                   | Includes certificate error messages among other system messages.   |

### Additional resources

- [Configuring subsystem logs](#) in the Red Hat Certificate System *Administration Guide*

## 112.7. KERBEROS LOG FILES IN IDM

The following table presents directories and files that Kerberos uses to log information in Identity Management (IdM).

Table 112.4. Kerberos Log Files

| Directory or File   | Description  |
|---|--|
| <b>/var/log/krb5kdc.log</b>   | The primary log file for the Kerberos KDC server.            |
| <b>/var/log/kadmind.log</b>   | The primary log file for the Kerberos administration server. |
| Locations for these files are configured in the <b>krb5.conf</b> file. They can be different on some systems. |  |

## 112.8. DNS LOG FILES IN IDM

The following table presents directories and files that DNS uses to log information in Identity Management (IdM).

Table 112.5. DNS log files

| Directory or File              | Description  |
|--------------------------------|--|
| <code>/var/log/messages</code> | <p>Includes DNS error messages and other system messages. DNS logging in this file is not enabled by default. To enable it, enter the <b># /usr/sbin/rndc querylog</b> command. The command results in the following lines being added to <b>var/log/messages</b>:</p> <p><b>Jun 26 17:37:33 r8server named-pkcs11[1445]: received control channel command 'querylog'</b></p> <p><b>Jun 26 17:37:33 r8server named-pkcs11[1445]: query logging is now on</b></p> <p>To disable logging, run the command again.</p> |

## 112.9. CUSTODIA LOG FILES IN IDM

The following table presents directories and files that Custodia uses to log information in Identity Management (IdM).

Table 112.6. Custodia Log Files

| Directory or File               | Description                                  |
|---------------------------------|--|
| <code>/var/log/custodia/</code> | Log file directory for the Custodia service. |

## 112.10. ADDITIONAL RESOURCES

- [Viewing Log Files](#). You can use **journalctl** to view the logging output of **systemd** unit files.

## CHAPTER 113. CONFIGURING SINGLE SIGN-ON FOR THE RHEL 8 WEB CONSOLE IN THE IDM DOMAIN

Learn how to use Single Sign-on (SSO) authentication provided by Identity Management (IdM) in the RHEL 8 web console.

Advantages:

- IdM domain administrators can use the RHEL 8 web console to manage local machines.
- Users with a Kerberos ticket in the IdM domain do not need to provide login credentials to access the web console.
- All hosts known to the IdM domain are accessible via SSH from the local instance of the RHEL 8 web console.
- Certificate configuration is not necessary. The console's web server automatically switches to a certificate issued by the IdM certificate authority and accepted by browsers.

This chapter covers the following steps to configure SSO for logging into the RHEL web console:

1. Add machines to the IdM domain using the RHEL 8 web console.  
For details, see [Joining a RHEL 8 system to an IdM domain using the web console](#) .
2. If you want to use Kerberos for authentication, you need to obtain a Kerberos ticket on your machine.  
For details, see [Logging in to the web console using Kerberos authentication](#) .
3. Allow administrators on the IdM server to run any command on any host.  
For details, see [Enabling admin sudo access to domain administrators on the IdM server](#)

### Prerequisites

- The RHEL web console installed on RHEL 8 systems.  
For details, see [Installing the web console](#) .
- IdM client installed on systems with the RHEL web console.  
For details, see [IdM client installation](#) .

## 113.1. JOINING A RHEL 8 SYSTEM TO AN IDM DOMAIN USING THE WEB CONSOLE

You can use the web console to join the Red Hat Enterprise Linux 8 system to the Identity Management (IdM) domain.

### Prerequisites

- The IdM domain is running and reachable from the client you want to join.
- You have the IdM domain administrator credentials.

### Procedure

1. Log into the RHEL web console.

For details, see [Logging in to the web console](#) .

2. In the **Configuration** field of the **Overview** tab click **Join Domain**.
3. In the **Join a Domain** dialog box, enter the host name of the IdM server in the **Domain Address** field.
4. In the **Domain administrator name** field, enter the user name of the IdM administration account.
5. In the **Domain administrator password**, add a password.
6. Click **Join**.

### Verification steps

1. If the RHEL 8 web console did not display an error, the system has been joined to the IdM domain and you can see the domain name in the **System** screen.
2. To verify that the user is a member of the domain, click the Terminal page and type the **id** command:

```
$ id
uid=548800004(example_user) gid=548800004(example_user)
groups=548800004(example_user) context=unconfined_u:unconfined_r:unconfined_t:s0-
s0:c0.c1023
```

### Additional resources

- [Planning Identity Management](#)
- [Installing Identity Management](#)

## 113.2. LOGGING IN TO THE WEB CONSOLE USING KERBEROS AUTHENTICATION

The following procedure describes steps on how to set up the RHEL 8 system to use Kerberos authentication.



### IMPORTANT

With SSO you usually do not have any administrative privileges in the web console. This only works if you configured passwordless sudo. The web console does not interactively ask for a sudo password.

### Prerequisites

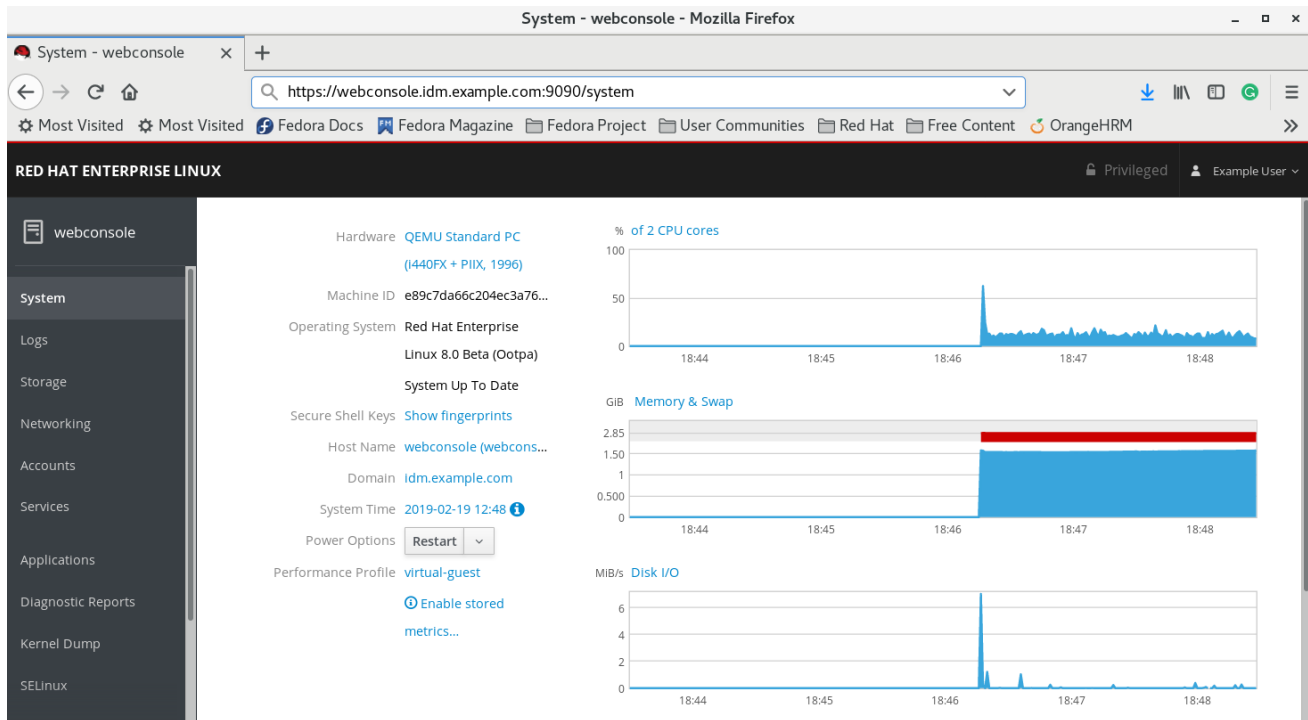
- IdM domain running and reachable in your company environment.  
For details, see [Joining a RHEL 8 system to an IdM domain using the web console](#) .
- Enable the **cockpit.socket** service on remote systems to which you want to connect and manage them with the RHEL web console.  
For details, see [Installing the web console](#) .

- If the system does not use a Kerberos ticket managed by the SSSD client, try to request the ticket with the **kinit** utility manually.

## Procedure

Log in to the RHEL web console with the following address: **https://dns\_name:9090**.

At this point, you are successfully connected to the RHEL web console and you can start with configuration.



## 113.3. ENABLING ADMIN SUDO ACCESS TO DOMAIN ADMINISTRATORS ON THE IDM SERVER

The following procedure describes steps on how to allow domain administrators to run any command on any host in the Identity Management (IdM) domain.

To accomplish this, enable sudo access to the **admins** user group created automatically during the IdM server installation.

All users added to the **admins** group will have sudo access if you run **ipa-adviser** script on the group.

### Prerequisites

- The server runs IdM 4.7.1 or later.

### Procedure

1. Connect to the IdM server.
2. Run the ipa-adviser script:

```
$ ipa-adviser enable-admins-sudo | sh -ex
```

If the console did not display an error, the **admins** group have admin permissions on all machines in the IdM domain.



## CHAPTER 114. USING CONSTRAINED DELEGATION IN IDM

Learn more about how you can use the constrained delegation feature in Identity Management (IdM):

- [Constrained delegation in Identity Management](#) describes how constrained delegation works.
- [Configuring a web console to allow a user authenticated with a smart card to SSH to a remote host without being asked to authenticate again](#) describes a use case for constrained delegation in the context of using the Red Hat Enterprise Linux web console to **SSH** to a remote host without requiring authentication.
- [Using Ansible to configure a web console to allow a user authenticated with a smart card to SSH to a remote host without being asked to authenticate again](#) describes a use case for constrained delegation in the context of using Ansible to configure the use of the Red Hat Enterprise Linux web console to **SSH** to a remote host without requiring authentication.
- [Configuring a web console client to allow a user authenticated with a smart card to run sudo without being asked to authenticate](#) describes a use case for constrained delegation in the context of using the Red Hat Enterprise Linux web console to run **sudo** without requiring authentication.
- [Using Ansible to configure a web console to allow a user authenticated with a smart card to run sudo without being asked to authenticate again](#) describes a use case for constrained delegation in the context of using Ansible to configure the use of the Red Hat Enterprise Linux web console to run **sudo** without requiring authentication.

### 114.1. CONSTRAINED DELEGATION IN IDENTITY MANAGEMENT

The Service for User to Proxy (**S4U2proxy**) extension provides a service that obtains a service ticket to another service on behalf of a user. This feature is known as **constrained delegation**. The second service is typically a proxy performing some work on behalf of the first service, under the authorization context of the user. Using constrained delegation eliminates the need for the user to delegate their full ticket-granting ticket (TGT).

Identity Management (IdM) traditionally uses the Kerberos **S4U2proxy** feature to allow the web server framework to obtain an LDAP service ticket on the user's behalf. The IdM-AD trust system also uses constrained delegation to obtain a **cifs** principal.

You can use the **S4U2proxy** feature to configure a web console client to allow an IdM user that has authenticated with a smart card to achieve the following:

- Run commands with superuser privileges on the RHEL host on which the web console service is running without being asked to authenticate again.
- Access a remote host using **SSH** and access services on the host without being asked to authenticate again.

#### Additional resources

- [Using Ansible to configure a web console to allow a user authenticated with a smart card to SSH to a remote host without being asked to authenticate again](#)
- [Using Ansible to configure a web console to allow a user authenticated with a smart card to run sudo without being asked to authenticate again](#)
- [S4U2proxy](#)

- [Service constrained delegation](#)

## 114.2. CONFIGURING A WEB CONSOLE TO ALLOW A USER AUTHENTICATED WITH A SMART CARD TO SSH TO A REMOTE HOST WITHOUT BEING ASKED TO AUTHENTICATE AGAIN

After you have logged in to a user account on the RHEL web console, as an Identity Management (IdM) system administrator you might need to connect to remote machines by using the **SSH** protocol. You can use the [constrained delegation](#) feature to use **SSH** without being asked to authenticate again.

Follow this procedure to configure the web console to use constrained delegation. In the example below, the web console session runs on the **myhost.idm.example.com** host and it is being configured to access the **remote.idm.example.com** host by using **SSH** on behalf of the authenticated user.

### Prerequisites

- You have obtained an IdM **admin** ticket-granting ticket (TGT).
- You have **root** access to **remote.idm.example.com**.
- The web console service is present in IdM.
- The **remote.idm.example.com** host is present in IdM.
- The web console has created an **S4U2Proxy** Kerberos ticket in the user session. To verify that this is the case, log in to the web console as an IdM user, open the **Terminal** page, and enter:

```
$ klist
Ticket cache: FILE:/run/user/1894000001/cockpit-session-3692.ccache
Default principal: user@IDM.EXAMPLE.COM

Valid starting    Expires          Service principal
07/30/21 09:19:06 07/31/21 09:19:06
HTTP/myhost.idm.example.com@IDM.EXAMPLE.COM
07/30/21 09:19:06 07/31/21 09:19:06 krbtgt/IDM.EXAMPLE.COM@IDM.EXAMPLE.COM
                    for client HTTP/myhost.idm.example.com@IDM.EXAMPLE.COM
```

### Procedure

1. Create a list of the target hosts that can be accessed by the delegation rule:
  - a. Create a service delegation target:

```
$ ipa servicedelegationtarget-add cockpit-target
```

- b. Add the target host to the delegation target:

```
$ ipa servicedelegationtarget-add-member cockpit-target \ --
principals=host/remote.idm.example.com@IDM.EXAMPLE.COM
```

2. Allow **cockpit** sessions to access the target host list by creating a service delegation rule and adding the **HTTP** service Kerberos principal to it:
  - a. Create a service delegation rule:

```
$ ipa servicedelegationrule-add cockpit-delegation
```

- b. Add the web console client to the delegation rule:

```
$ ipa servicedelegationrule-add-member cockpit-delegation \ --  
principals=HTTP/myhost.idm.example.com@IDM.EXAMPLE.COM
```

- c. Add the delegation target to the delegation rule:

```
$ ipa servicedelegationrule-add-target cockpit-delegation \ --  
servicedelegationtargets=cockpit-target
```

3. Enable Kerberos authentication on the **remote.idm.example.com** host:

- a. **SSH** to **remote.idm.example.com** as **root**.
- b. Open the **/etc/ssh/sshd\_config** file for editing.
- c. Enable **GSSAPIAuthentication** by uncommenting the **GSSAPIAuthentication no** line and replacing it with **GSSAPIAuthentication yes**.

4. Restart the **SSH** service on **remote.idm.example.com** so that the above changes take effect immediately:

```
$ systemctl try-restart sshd.service
```

#### Additional resources

- [Logging in to the web console with smart cards](#)
- [Constrained delegation in Identity Management](#)

### 114.3. USING ANSIBLE TO CONFIGURE A WEB CONSOLE TO ALLOW A USER AUTHENTICATED WITH A SMART CARD TO SSH TO A REMOTE HOST WITHOUT BEING ASKED TO AUTHENTICATE AGAIN

After you have logged in to a user account on the RHEL web console, as an Identity Management (IdM) system administrator you might need to connect to remote machines by using the **SSH** protocol. You can use the [constrained delegation](#) feature to use **SSH** without being asked to authenticate again.

Follow this procedure to use the **servicedelegationrule** and **servicedelegationtarget ansible-freeipa** modules to configure a web console to use constrained delegation. In the example below, the web console session runs on the **myhost.idm.example.com** host and it is being configured to access the **remote.idm.example.com** host by using **SSH** on behalf of the authenticated user.

#### Prerequisites

- The IdM **admin** password.
- **root** access to **remote.idm.example.com**.
- The web console service is present in IdM.

- The **remote.idm.example.com** host is present in IdM.
- The web console has created an **S4U2Proxy** Kerberos ticket in the user session. To verify that this is the case, log in to the web console as an IdM user, open the **Terminal** page, and enter:

```
$ klist
Ticket cache: FILE:/run/user/1894000001/cockpit-session-3692.ccache
Default principal: user@IDM.EXAMPLE.COM

Valid starting    Expires          Service principal
07/30/21 09:19:06 07/31/21 09:19:06
HTTP/myhost.idm.example.com@IDM.EXAMPLE.COM
07/30/21 09:19:06 07/31/21 09:19:06 krbtgt/IDM.EXAMPLE.COM@IDM.EXAMPLE.COM
for client HTTP/myhost.idm.example.com@IDM.EXAMPLE.COM
```

- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the `~/MyPlaybooks/` directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipadmin\_password**.

## Procedure

1. Navigate to your `~/MyPlaybooks/` directory:

```
$ cd ~/MyPlaybooks/
```

2. Create a **web-console-smart-card-ssh.yml** playbook with the following content:

- a. Create a task that ensures the presence of a delegation target:

```
---
- name: Playbook to create a constrained delegation target
  hosts: ipaserver

  vars_files:
    - /home/user_name/MyPlaybooks/secret.yml

  tasks:
    - name: Ensure servicedelegationtarget web-console-delegation-target is present
      ipaservicedelegationtarget:
        ipadmin_password: "{{ ipadmin_password }}"
        name: web-console-delegation-target
```

- b. Add a task that adds the target host to the delegation target:

```
- name: Ensure servicedelegationtarget web-console-delegation-target member
principal host/remote.idm.example.com@IDM.EXAMPLE.COM is present
ipaservicedelegationtarget:
  ipadmin_password: "{{ ipadmin_password }}"
```

```
name: web-console-delegation-target
principal: host/remote.idm.example.com@IDM.EXAMPLE.COM
action: member
```

- c. Add a task that ensures the presence of a delegation rule:

```
- name: Ensure servicedelegationrule delegation-rule is present
  ipaservicedelegationrule:
    ipaadmin_password: "{{ ipaadmin_password }}"
    name: web-console-delegation-rule
```

- d. Add a task that ensures that the Kerberos principal of the web console client service is a member of the constrained delegation rule:

```
- name: Ensure the Kerberos principal of the web console client service is added to the
  servicedelegationrule web-console-delegation-rule
  ipaservicedelegationrule:
    ipaadmin_password: "{{ ipaadmin_password }}"
    name: web-console-delegation-rule
    principal: HTTP/myhost.idm.example.com
    action: member
```

- e. Add a task that ensures that the constrained delegation rule is associated with the web-console-delegation-target delegation target:

```
- name: Ensure a constrained delegation rule is associated with a specific delegation
  target
  ipaservicedelegationrule:
    ipaadmin_password: "{{ ipaadmin_password }}"
    name: web-console-delegation-rule
    target: web-console-delegation-target
    action: member
```

3. Save the file.
4. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the **secret.yml** file, and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory web-console-
smart-card-ssh.yml
```

5. Enable Kerberos authentication on **remote.idm.example.com**:
  - a. **SSH** to **remote.idm.example.com** as **root**.
  - b. Open the **/etc/ssh/sshd\_config** file for editing.
  - c. Enable **GSSAPIAuthentication** by uncommenting the **GSSAPIAuthentication no** line and replacing it with **GSSAPIAuthentication yes**.

### Additional resources

- [Logging in to the web console with smart cards](#)

- [Constrained delegation in Identity Management](#)
- **README-servicedelegationrule.md** and **README-servicedelegationtarget.md** in the `/usr/share/doc/ansible-freeipa/` directory
- Sample playbooks in the `/usr/share/doc/ansible-freeipa/playbooks/servicedelegationtarget` and `/usr/share/doc/ansible-freeipa/playbooks/servicedelegationrule` directories

## 114.4. CONFIGURING A WEB CONSOLE TO ALLOW A USER AUTHENTICATED WITH A SMART CARD TO RUN SUDO WITHOUT BEING ASKED TO AUTHENTICATE AGAIN

After you have logged in to a user account on the RHEL web console, as an Identity Management (IdM) system administrator you might need to run commands with superuser privileges. You can use the [constrained delegation](#) feature to run **sudo** on the system without being asked to authenticate again.

Follow this procedure to configure a web console to use constrained delegation. In the example below, the web console session runs on the **myhost.idm.example.com** host.

### Prerequisites

- You have obtained an IdM **admin** ticket-granting ticket (TGT).
- The web console service is present in IdM.
- The **myhost.idm.example.com** host is present in IdM.
- You have [enabled admin sudo access to domain administrators on the IdM server](#) .
- The web console has created an **S4U2Proxy** Kerberos ticket in the user session. To verify that this is the case, log in to the web console as an IdM user, open the **Terminal** page, and enter:

```
$ klist
Ticket cache: FILE:/run/user/1894000001/cockpit-session-3692.ccache
Default principal: user@IDM.EXAMPLE.COM

Valid starting    Expires          Service principal
07/30/21 09:19:06 07/31/21 09:19:06
HTTP/myhost.idm.example.com@IDM.EXAMPLE.COM
07/30/21 09:19:06 07/31/21 09:19:06 krbtgt/IDM.EXAMPLE.COM@IDM.EXAMPLE.COM
for client HTTP/myhost.idm.example.com@IDM.EXAMPLE.COM
```

### Procedure

1. Create a list of the target hosts that can be accessed by the delegation rule:
  - a. Create a service delegation target:

```
$ ipa servicedelegationtarget-add cockpit-target
```

- b. Add the target host to the delegation target:

```
$ ipa servicedelegationtarget-add-member cockpit-target \ --
principals=host/myhost.idm.example.com@IDM.EXAMPLE.COM
```

2. Allow **cockpit** sessions to access the target host list by creating a service delegation rule and adding the **HTTP** service Kerberos principal to it:

- a. Create a service delegation rule:

```
$ ipa servicedelegationrule-add cockpit-delegation
```

- b. Add the web console service to the delegation rule:

```
$ ipa servicedelegationrule-add-member cockpit-delegation \ --  
principals=HTTP/myhost.idm.example.com@IDM.EXAMPLE.COM
```

- c. Add the delegation target to the delegation rule:

```
$ ipa servicedelegationrule-add-target cockpit-delegation \ --  
servicedelegationtargets=cockpit-target
```

3. Enable **pam\_sss\_gss**, the PAM module for authenticating users over the Generic Security Service Application Program Interface (GSSAPI) in cooperation with the System Security Services Daemon (SSSD):

- a. Open the **/etc/sss/sss.conf** file for editing.

- b. Specify that **pam\_sss\_gss** can provide authentication for the **sudo** and **sudo -i** commands in IdM your domain:

```
[domain/idm.example.com]  
pam_gssapi_services = sudo, sudo-i
```

- c. Save and exit the file.

- d. Open the **/etc/pam.d/sudo** file for editing.

- e. Insert the following line to the top of the **#%PAM-1.0** list to allow, but not require, GSSAPI authentication for **sudo** commands:

```
auth sufficient pam_sss_gss.so
```

- f. Save and exit the file.

4. Restart the **SSSD** service so that the above changes take effect immediately:

```
$ systemctl restart sssd
```

#### Additional resources

- [Logging in to the web console with smart cards](#)
- [Constrained delegation in Identity Management](#)

## 114.5. USING ANSIBLE TO CONFIGURE A WEB CONSOLE TO ALLOW A USER AUTHENTICATED WITH A SMART CARD TO RUN SUDO WITHOUT BEING ASKED TO AUTHENTICATE AGAIN

After you have logged in to a user account on the RHEL web console, as an Identity Management (IdM) system administrator you might need to run commands with superuser privileges. You can use the [constrained delegation](#) feature to run **sudo** on the system without being asked to authenticate again.

Follow this procedure to use the **ipaservicedelegationrule** and **ipaservicedelegationtarget ansible-freeipa** modules to configure a web console to use constrained delegation. In the example below, the web console session runs on the **myhost.idm.example.com** host.

## Prerequisites

- You have obtained an IdM **admin** ticket-granting ticket (TGT) by authenticating to the web console session with a smart card..
- The web console service has been enrolled into IdM.
- The **myhost.idm.example.com** host is present in IdM.
- You have [enabled admin sudo access to domain administrators on the IdM server](#) .
- The web console has created an **S4U2Proxy** Kerberos ticket in the user session. To verify that this is the case, log in to the web console as an IdM user, open the **Terminal** page, and enter:

```
$ klist
Ticket cache: FILE:/run/user/1894000001/cockpit-session-3692.ccache
Default principal: user@IDM.EXAMPLE.COM

Valid starting    Expires          Service principal
07/30/21 09:19:06 07/31/21 09:19:06
HTTP/myhost.idm.example.com@IDM.EXAMPLE.COM
07/30/21 09:19:06 07/31/21 09:19:06 krbtgt/IDM.EXAMPLE.COM@IDM.EXAMPLE.COM
                    for client HTTP/myhost.idm.example.com@IDM.EXAMPLE.COM
```

- You have configured your Ansible control node to meet the following requirements:
  - You are using Ansible version 2.14 or later.
  - You have installed the [ansible-freeipa](#) package on the Ansible controller.
  - The example assumes that in the **~/MyPlaybooks/** directory, you have created an [Ansible inventory file](#) with the fully-qualified domain name (FQDN) of the IdM server where you are configuring the constrained delegation.
  - The example assumes that the **secret.yml** Ansible vault stores your **ipadmin\_password**.

## Procedure

1. On your Ansible control node, navigate to your **~/MyPlaybooks/** directory:

```
$ cd ~/MyPlaybooks/
```

2. Create a **web-console-smart-card-sudo.yml** playbook with the following content:
  - a. Create a task that ensures the presence of a delegation target:

```
---
- name: Playbook to create a constrained delegation target
```



```
hosts: ipaserver
```

```
vars_files:
```

```
- /home/user_name/MyPlaybooks/secret.yml
```

```
tasks:
```

```
- name: Ensure servicedelegationtarget named sudo-web-console-delegation-target is present
```

```
  ipaservicedelegationtarget:
```

```
    ipaadmin_password: "{{ ipaadmin_password }}"
```

```
    name: sudo-web-console-delegation-target
```

- b. Add a task that adds the target host to the delegation target:

```
- name: Ensure that a member principal named
host/myhost.idm.example.com@IDM.EXAMPLE.COM is present in a service delegation
target named sudo-web-console-delegation-target
```

```
  ipaservicedelegationtarget:
```

```
    ipaadmin_password: "{{ ipaadmin_password }}"
```

```
    name: sudo-web-console-delegation-target
```

```
    principal: host/myhost.idm.example.com@IDM.EXAMPLE.COM
```

```
    action: member
```

- c. Add a task that ensures the presence of a delegation rule:

```
- name: Ensure servicedelegationrule named sudo-web-console-delegation-rule is present
```

```
  ipaservicedelegationrule:
```

```
    ipaadmin_password: "{{ ipaadmin_password }}"
```

```
    name: sudo-web-console-delegation-rule
```

- d. Add a task that ensures that the Kerberos principal of the web console service is a member of the constrained delegation rule:

```
- name: Ensure the Kerberos principal of the web console service is added to the
service delegation rule named sudo-web-console-delegation-rule
```

```
  ipaservicedelegationrule:
```

```
    ipaadmin_password: "{{ ipaadmin_password }}"
```

```
    name: sudo-web-console-delegation-rule
```

```
    principal: HTTP/myhost.idm.example.com
```

```
    action: member
```

- e. Add a task that ensures that the constrained delegation rule is associated with the sudo-web-console-delegation-target delegation target:

```
- name: Ensure a constrained delegation rule is associated with a specific delegation
target
```

```
  ipaservicedelegationrule:
```

```
    ipaadmin_password: "{{ ipaadmin_password }}"
```

```
    name: sudo-web-console-delegation-rule
```

```
    target: sudo-web-console-delegation-target
```

```
    action: member
```

3. Save the file.

4. Run the Ansible playbook. Specify the playbook file, the file storing the password protecting the **secret.yml** file, and the inventory file:

```
$ ansible-playbook --vault-password-file=password_file -v -i inventory web-console-smart-card-sudo.yml
```

5. Enable **pam\_sss\_gss**, the PAM module for authenticating users over the Generic Security Service Application Program Interface (GSSAPI) in cooperation with the System Security Services Daemon (SSSD):
  - a. Open the **/etc/sss/sss.conf** file for editing.
  - b. Specify that **pam\_sss\_gss** can provide authentication for the **sudo** and **sudo -i** commands in IdM your domain:

```
[domain/idm.example.com]
pam_gssapi_services = sudo, sudo-i
```

- c. Save and exit the file.
  - d. Open the **/etc/pam.d/sudo** file for editing.
  - e. Insert the following line to the top of the **#%PAM-1.0** list to allow, but not require, GSSAPI authentication for **sudo** commands:

```
auth sufficient pam_sss_gss.so
```

- f. Save and exit the file.
6. Restart the **SSSD** service so that the above changes take effect immediately:

```
$ systemctl restart sssd
```

## Additional resources

- [Constrained delegation in Identity Management](#)
- **README-servicedelegationrule.md** and **README-servicedelegationtarget.md** in the **/usr/share/doc/ansible-freeipa/** directory
- Sample playbooks in the **/usr/share/doc/ansible-freeipa/playbooks/servicedelegationtarget** and **/usr/share/doc/ansible-freeipa/playbooks/servicedelegationrule** directories

## 114.6. ADDITIONAL RESOURCES

- [Managing remote systems in the web console](#)