Cloudera Runtime 7.1.6

Configuring Apache Ranger Authentication with UNIX, LDAP, or AD

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Contents

Configuring Ranger Authentication with UNIX, LDAP, AD, or PAM

This section describes how to configure the authentication method that determines who is allowed to log in to the Ranger web UI. The options are local UNIX, LDAP, AD, or PAM.

Note: In CDP Public Cloud, identity management is provided by FreeIPA, and configured using the Management Console. Therefore for CDP Public Cloud you should leave the Admin Authentication Method set to the UNIX authentication settings. For more information on FreeIPA, see Managing FreeIPA in the Identify Management documentation.

Related Information

Cloudera Management Console

CDP Cloud Management Console: Managing user access and authorization

Managing FreeIPA

Configure Ranger authentication for UNIX

How to configure Ranger to use UNIX for user authentication.

About this task

Note: In CDP Public Cloud, identity management is provided by FreeIPA, and configured using the Management Console. Therefore for CDP Public Cloud you should leave the Admin Authentication Method set to the UNIX authentication settings. For more information on FreeIPA, see Managing FreeIPA in the Identify Management documentation.

Procedure

1. In Cloudera Manager, select Ranger, then click the Configuration tab.
2. To display the UNIX authentication settings, type "authentication unix" in the Search box.

3. Configure the following settings for UNIX authentication, then click Save Changes.

Table 1: UNIX Authentication Settings

Configuration Property	Description	Default Value	Example Value	Requi
Admin Authentication Method	The Ranger authentication method.	UNIX	UNIX	Yes, t authen
Allow remote Login	Flag to enable/disable remote login. Only used if the Authentication method is UNIX.	TRUE	TRUE	No.

Configuration Property	Description	Default Value	Example Value	Requi
ranger.unixauth.service.hostname	The FQDN of the host where the UNIX authentication service is running. Only used if the Authentication method is UNIX. {{RANGER_USERSYNC_HOST}} is a placeholder value that is replaced with the host where Ranger Usersync is installed in the cluster.	localhost	myunixhost.domain.com	Yes, it selecte
ranger.unixauth.service.port	The port number where the ranger-usersync module is running the UNIX Authentication Service.	5151	5151	Yes, it selecte

Related Information

Cloudera Management Console

Configure Ranger authentication for AD

How to configure Ranger to use Active Directory (AD) for user authentication.

About this task

Note: In CDP Public Cloud, identity management is provided by FreeIPA, and configured using the Management Console. Therefore for CDP Public Cloud you should leave the Admin Authentication Method set to the UNIX authentication settings. For more information on FreeIPA, see Managing FreeIPA in the Identify Management documentation.

Procedure

1. In Cloudera Manager, select Ranger, then click the Configuration tab.

2. To display the authentication settings, type "authentication" in the Search box. You may need to scroll down to see the AD settings.

3. Configure the following settings for AD authentication, then click Save Changes.

Property	Description	Default value	Sample values
Admin Authentication Method	The Ranger authentication method.	UNIX	ACTIVE_DIRECTORY
Admin AD Auth Base DN ranger.ldap.ad.base.dn	The Distinguished Name (DN) of the starting point for directory server searches.	N/A	dc=example,dc=com
Admin AD Auth Bind DN ranger.ldap.ad.bind.dn	The full Distinguished Name (DN), including Common Name (CN) of an LDAP user account that has privileges to search for users.	N/A	cn=adadmin,cn=Users,dc=example,dc=com
Admin AD Auth Bind Password ranger.ldap.ad.bind.password	Password for the bind.dn.	N/A	Secret123!
Admin AD Auth Domain Name ranger.ldap.ad.domain	The domain name of the AD Authentication service.	N/A	dc=example,dc=com

Property	Description	Default value	Sample values
Admin AD Auth Referral ranger.ldap.ad.referral*	See below.	ignore	follow | ignore | throw
Admin AD Auth URL ranger.ldap.ad.url	The AD server URL.	N/A	
Admin AD Auth User Search Filter ranger.ldap.ad.user.searchfilter	The search filter used for Bind Authentication.	N/A	

* There are three possible values for ranger.ldap.ad.referral: follow, throw, and ignore. The recommended setting is follow.

When searching a directory, the server might return several search results, along with a few continuation references that show where to obtain further results. These results and references might be interleaved at the protocol level.

- When this property is set to follow, the AD service provider processes all of the normal entries first, and then follows the continuation references.
- When this property is set to throw, all of the normal entries are returned in the enumeration first, before theReferralException is thrown. By contrast, a "referral" error response is processed immediately when this property is set to follow or throw.
- When this property is set to ignore, it indicates that the server should return referral entries as ordinary entries (or plain text). This might return partial results for the search. In the case of AD, a PartialResultException is returned when referrals are encountered while search results are processed.

Related Information

Cloudera Management Console

Configure Ranger authentication for LDAP

How to configure Ranger to use LDAP for user authentication.

About this task

Note: In CDP Public Cloud, identity management is provided by FreeIPA, and configured using the Management Console. Therefore for CDP Public Cloud you should leave the Admin Authentication Method set to the UNIX authentication settings. For more information on FreeIPA, see Managing FreeIPA in the Identify Management documentation.

Procedure

1. In Cloudera Manager, select Ranger, then click the Configuration tab.

2. To display the authentication settings, type "authentication" in the Search box. You may need to scroll down to see all of the LDAP settings.

3. Configure the following settings for LDAP authentication, then click Save Changes.

Property	Description	Default value	Sample values
Admin Authentication Method	The Ranger authentication method.	UNIX	LDAP
Admin LDAP Auth Group Search Base ranger.ldap.group.searchbase	The LDAP group search base.	N/A	(|(CN=Hdp_users) (CN=Hdp_admins))
Admin LDAP Auth Group Search Filter ranger.ldap.group.searchfilter	The LDAP group search filter.	N/A	
Admin LDAP Auth URL ranger.ldap.url	The LDAP server URL	N/A	ldap://localhost:389 or ldaps:// localhost:636

Property	Description	Default value	Sample values
Admin LDAP Auth Bind User ranger.ldap.bind.dn	Full distinguished name (DN), including common name (CN), of an LDAP user account that has privileges to search for users. This user is used for searching the users. This could be a read-only LDAP user.	N/A	cn=admin,dc=example,dc=com
Admin LDAP Auth Bind User Password ranger.ldap.bind.password	Password for the account that can search for users.	N/A	Secret123!
Admin LDAP Auth User Search Filter ranger.ldap.user.searchfilter	The LDAP user search filter.	N/A	
Admin LDAP Auth Base DN ranger.ldap.base.dn	The Distinguished Name (DN) of the starting point for directory server searches.	N/A	dc=example,dc=com
Admin LDAP Auth Group Role Attribute ranger.ldap.group.roleattribute	The LDAP group role attribute.	N/A	cn
Admin LDAP Auth Referral ranger.ldap.referral*	See below.	ignore	follow	ignore	throw
Admin LDAP Auth User DN Pattern ranger.ldap.user.dnpattern	The LDAP user DN.	N/A	uid={0},ou=users,dc=xasecure,dc=net

* There are three possible values for ranger.ldap.ad.referral: follow, throw, and ignore. The recommended setting is follow.

When searching a directory, the server might return several search results, along with a few continuation references that show where to obtain further results. These results and references might be interleaved at the protocol level.

• When this property is set to follow, the AD service provider processes all of the normal entries first, and then follows the continuation references.
• When this property is set to throw, all of the normal entries are returned in the enumeration first, before the ReferralException is thrown. By contrast, a "referral" error response is processed immediately when this property is set to follow or throw.
• When this property is set to ignore, it indicates that the server should return referral entries as ordinary entries (or plain text). This might return partial results for the search. In the case of AD, a PartialResultException is returned when referrals are encountered while search results are processed.

Related Information
Cloudera Management Console

Configure Ranger authentication for PAM

How to configure Ranger to use PAM for user authentication.

About this task

Note: In CDP Public Cloud, identity management is provided by FreeIPA, and configured using the Management Console. Therefore for CDP Public Cloud you should leave the Admin Authentication Method set to the UNIX authentication settings. For more information on FreeIPA, see Managing FreeIPA in the Identify Management documentation.

Procedure

1. In Cloudera Manager, select Ranger, then click the Configuration tab.
2. Under Admin Authentication Method, select PAM, then click Save Changes.

3. Create the following two PAM files:
   • /etc/pam.d/ranger-admin with the following content:

```
#%PAM-1.0
auth sufficient pam_unix.so
auth sufficient pam_sss.so
account sufficient pam_unix.so
account sufficient pam_sss.so
```

   • /etc/pam.d/ranger-remote with the following content:

```
#%PAM-1.0
auth sufficient pam_unix.so
auth sufficient pam_sss.so
account sufficient pam_unix.so
```
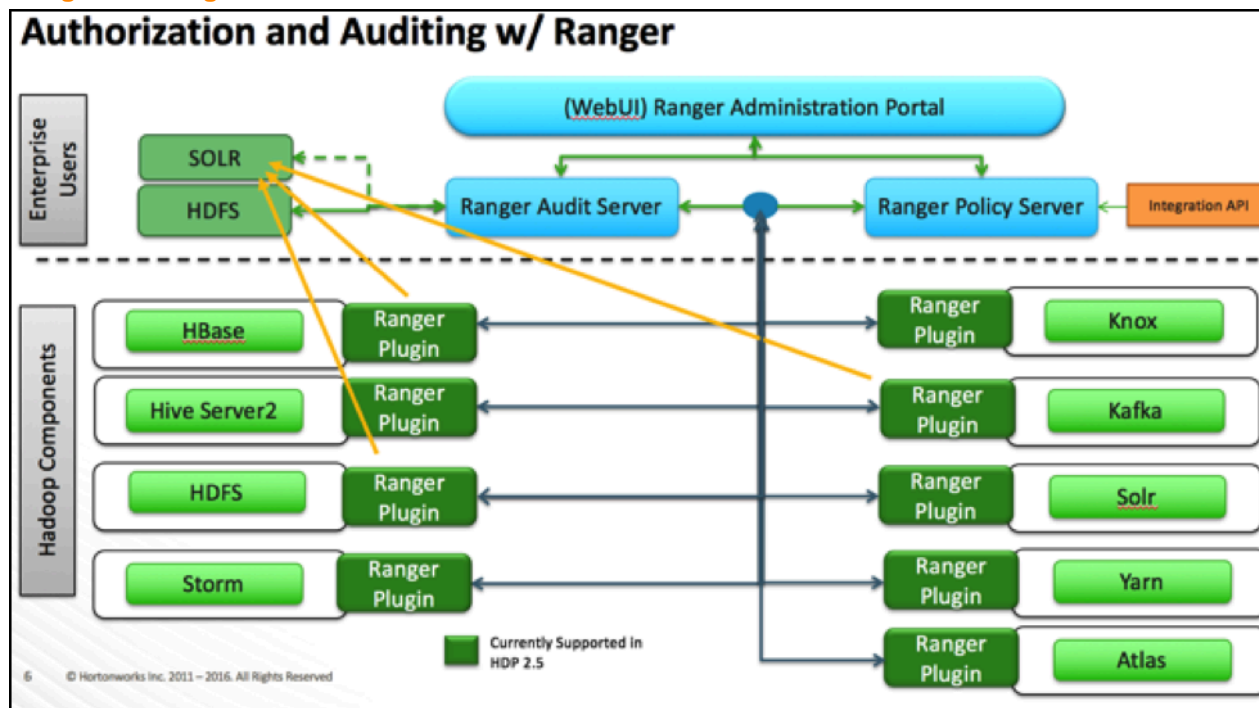
```
account sufficient pam_sss.so
```

4. Confirm that the /etc/shadow file has 444 permissions.
5. Select Actions > Restart to restart Ranger.

Ranger AD Integration

A conceptual overview of Ranger-AD integration architecture.

**Ranger AD Integration: Architecture Overview**

When a Ranger plugin for a component (such as HBase or HDFS) is activated, Ranger is in full control of any access. There is two-way communication between the Ranger plugin and the Ranger (Admin) Policy Server (RPS):

1. Plugins to RPS: Ranger plugins regularly call the RPS to see if new policies were defined in the Ranger Administration Portal (RAP). Generally it takes approximately 30 seconds for a policy to be updated.
2. RPS to components: The RPS queries the component for meta objects that live on the component to base policies upon (this provides the autocomplete and drop-down list when defining policies).

The first communication channel (Plugin to RPS) is essential for the plugin to function, whereas the second (RPS to components) is optional. It would still be possible to define and enforce policies without the second channel, but you would not have autocomplete during policy definition.

Configuration details on both communication channels are configured in both Cloudera Manager and in the Ranger Administration Portal.

Example for HDFS plugin on a kerberized cluster:
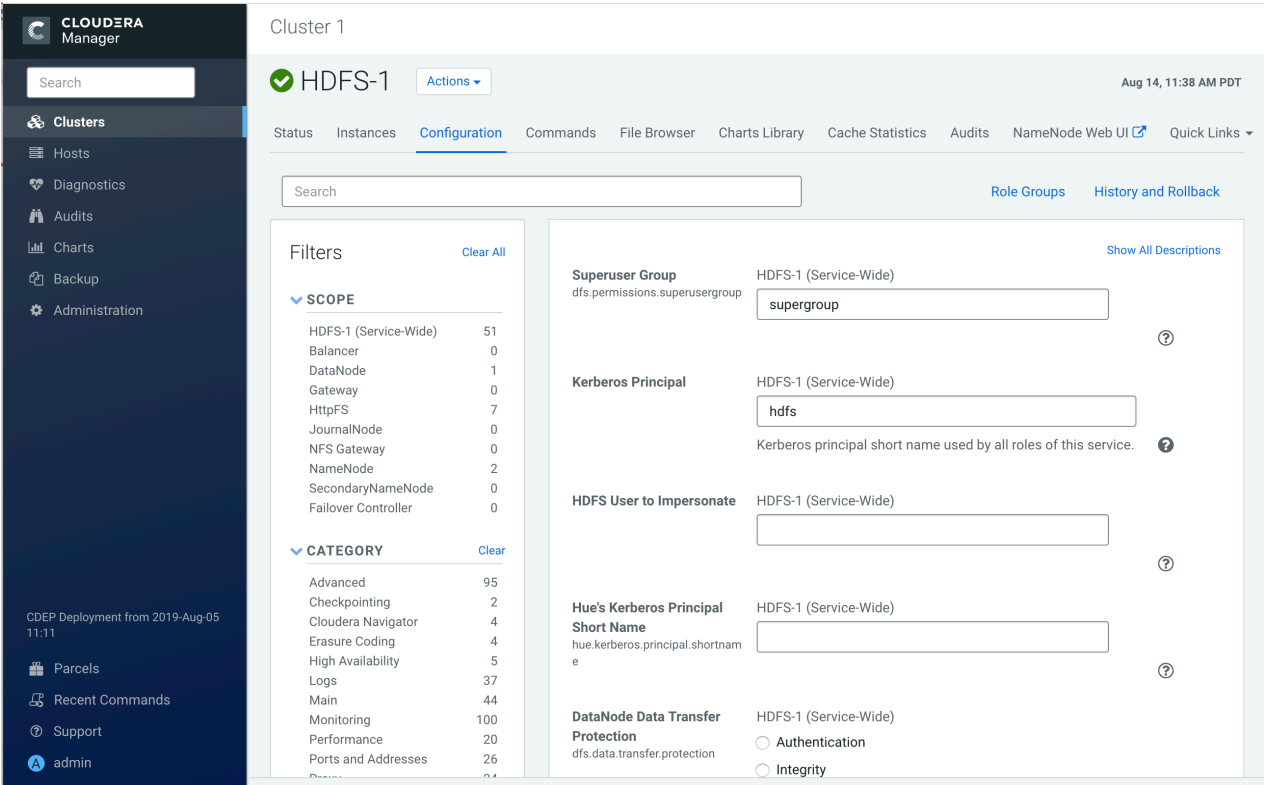
The Kerberos principal short name for the HDFS service,"hdfs", is the one that is involved the second communication channel (RPS to components) for getting metadata from HDFS (such as HDFS folders) across. The settings on the HDFS configuration must match those set in Ranger (by selecting Access > Manager > Resource Based Policies, then selecting the Edit icon for the HDFS service:

To verify the second communication channel (RPS to components) click Test Connection for the applicable service (as shown above for the HDFS service). A confirmation message appears if the connection works successfully.

To verify if the paramount first communication channel (Plugins to RPS) works, select Audit > Plugins in Ranger:

Ranger AD Integration: Ranger Audit

Ranger plugins furthermore send their audit event (whether access was granted or not and based on which policy) directly to the configured sink for audits, which can be HDFS, Solr or both. This is indicated by the yellow arrows in the architectural graph.

The audit access tab on the RAP (Audit > Access) is only populated if Solr is used as the sink.

This screen points out an important Ranger feature. When the plugin is enabled AND no specific policy is in place for access to some object, the plugin will fall back to enforcing the standard component-level Access Control Lists (ACLs). For HDFS that would be the user : rwx / group : rwx / other : rwx ACLs on folders and files.

Once this defaulting to component ACLs happens, the audit events list a " - " in the Policy ID column instead of a policy number. If a Ranger policy was in control of allowing/denying access, the policy number is shown.

Ranger AD Integration: Overview

Rangers AD Integration has 2 levels:

1. Ranger UI authentication (which users can log in to Ranger itself).
2. Ranger user/group sync (which users/groups to define policies for)

Ranger UI authentication

Reference information on Ranger UI authentication, when configuring Ranger AD integration.

This is an extra AD level filter option on top of Kerberos authentication that maps to:
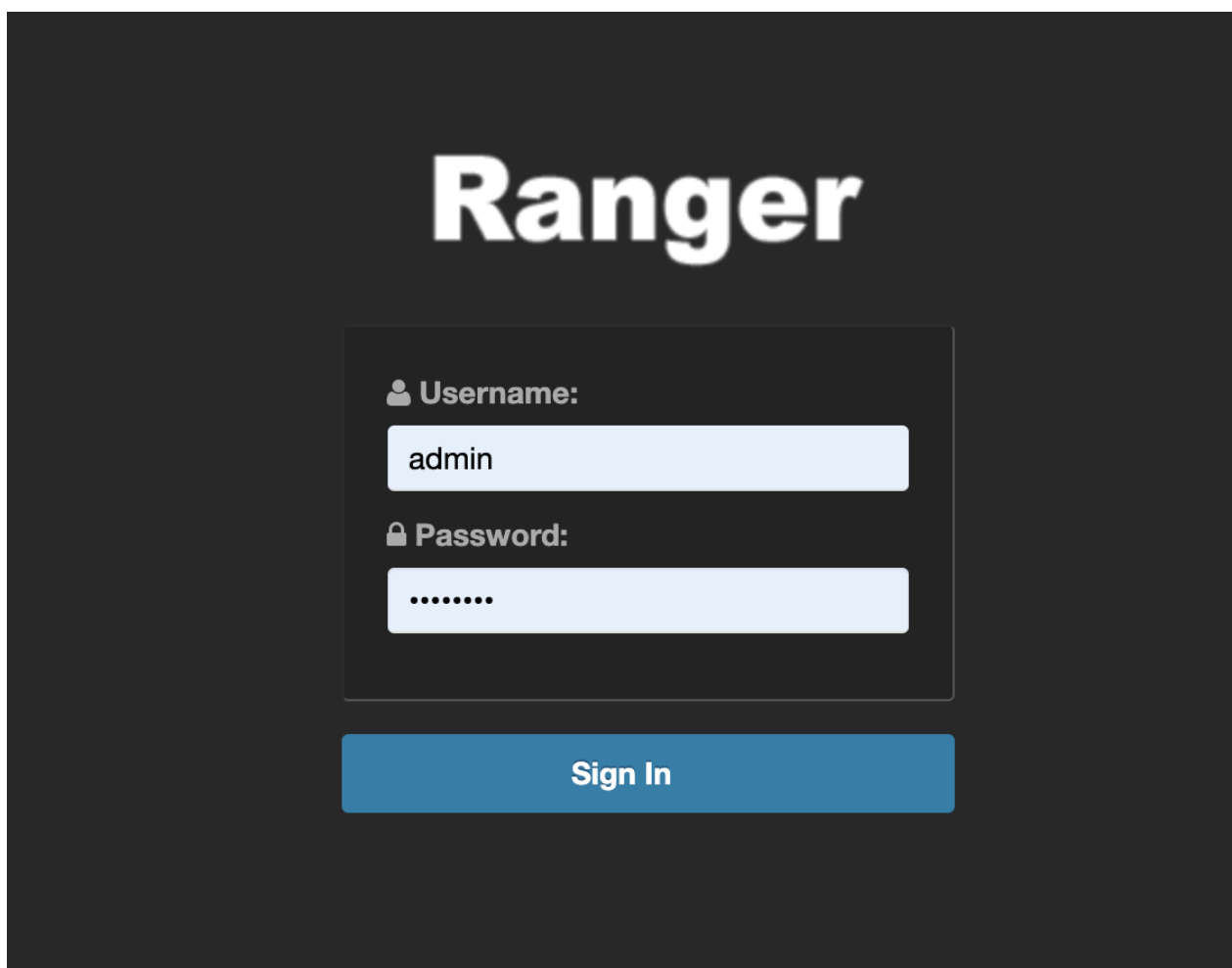
For AD there are two options for defining who can access the Ranger UI: LDAP or ACTIVE_DIRECTORY. There is not a huge amount of difference between them, but they are separate sets of properties.

ACTIVE_DIRECTORY

In Cloudera Manager, select Ranger, then click the Configuration tab.To display the authentication settings, type "authentication" in the Search box. You may need to scroll down to see the AD settings.

The ranger.ldap.ad.base.dn property determines the base of any search, so users not on this OU tree path can not be authenticated.

The ranger.ldap.ad.user.searchfilter poperty is a dynamic filter that maps the user name in the Ranger web UI login screen to sAMAccountName. For example, the AD sAMAccountName property has example values like k.reshi and d.alora so make sure to enter a matching value for 'Username' in the logon dialogue.

With ACTIVE_DIRECTORY it is not possible to limit the scope of users that can access the Ranger UI any further by refining the value of the ranger.ldap.ad.user.searchfilter property even further to :

(&(memberOf=CN=Hdp_admins,OU=Company,OU=User   Accounts,OU=CorpUsers,DC=field,DC=hortonwor ks,DC=com)(sAMAccountName={0}))

This does NOT work with the ACTIVE_DIRECTORY option.

LDAP

The LDAP properties allow for more fine tuning.

In Cloudera Manager, select Ranger, then click the Configuration tab.To display the authentication settings, type "authentication" in the Search box. You may need to scroll down to see all of the LDAP settings.

There is one catch: the ranger.ldap.user.dnpattern is evaluated first. Consider the following example value:

CN={0},OU=London,OU=Company,OU=User   Accounts,OU=CorpUsers,DC=field,DC=hortonworks,DC=com

This would work, but has two side effects:

- Users would have to log on with their 'long username' (like 'Kvothe Reshi / Denna Alora'), which would also mean that policies would have to be updated using that long name instead of the k.reshi short name variant.
- Traversing AD by DN patterns does not allow for applying group filters at all. In the syntax above, only users directly in OU=London would be able to log on.

This adverse behavior can be avoided by intentionally putting a DN pattern (DC=intentionally,DC=wrong) in the ranger.ldap.user.dnpattern property, AND a valid filter in User Search Filter:

(&(objectclass=user)(memberOf=CN=Hdp_admins,OU=Company,OU=User   Accounts,OU=CorpUsers,DC=field,DC=hortonworks,DC=com)(sAMAccountName={0}))

This works because the filter is only applied after the DN pattern query on AD does not return anything. If it does, the User Search Filter is not applied.

Ranger has a very simple approach to the internal user list that is kept in a relational schema. This list contains all users that were synced with AD ever, and all those users can potentially log in to the Ranger UI. But only Admin users can really do any policy-related things in the Ranger UI (see next section).

Be aware that all of this is only about authentication to Ranger. Someone from the 'Hdp_admins' group would still not have a Ranger admin role.

Related Information

Configure Ranger authentication for LDAP

Ranger UI authorization

Reference information on Ranger UI authorization, when configuring Ranger AD integration.

To configure the users, groups, and roles that can access the Ranger portal or its services, select Settings > Users/Groups/Roles in the top menu.

A user can be a User, Admin, or Auditor:

Only users with the Admin role can edit Ranger policies.

Ranger Usersync

How to configure Ranger Usersync to sync users and groups from AD/LDAP

Overview

The Ranger usersync service syncs users, groups, and group memberships from various sources, such as Unix, File, or AD/LDAP into Ranger. Ranger usersync provides a set of rich and flexible configuration properties to sync users, groups, and group memberships from AD/LDAP supporting a wide variety of use cases.

As a Ranger administrator, you will work with users and groups to configure policies in Ranger and administer access to the Ranger UI. You will use group memberships only to administer access to the Ranger UI. You must first understand the specific use-case before syncing users, groups, and group memberships from AD/LDAP. For example, if you want to configure only group-level policies, then you must sync groups to Ranger, but syncing users and group memberships to Ranger is not required.

Determining the users and groups to sync to Ranger:

Typically, you must complete a three-step process to define the complete set of users and groups that you will sync to Ranger:

1. Define the customer use-case.

3 common use cases:

- A customer Admin or Data Admin wants to configure only group-level policies and restrict access to the Ranger UI to only a few users.
- A customer's Admin or Data Admin wants to configure only group-level policies and restrict access to the Ranger UI to only members of a group.
- A customer's Admin or Data Admin wants to configure mostly group-level policies and a few user- level policies.

2. Define all relevant sync source details. For every use-case, at least four key questions must by answered:

- What groups will sync to Ranger?
- Which organizational units (OUs) in AD/LDAP contain these groups?
- What users will sync to Ranger?
- Which organizational units (OUs) in AD/LDAP contain these users?

3. Configure Usersync properties.

This topic describes an example set of Usersync configuration properties and values, based on a simple use-case and example AD source repository.

Example Use Case:

First, consider the following use-case, in order to better understand how to configure Usersync properties:

A customers Admin or Data Admin wants to configure only group-level policies and restrict access to the Ranger UI to only members of a group.

Example AD environment:

Configuring Ranger Usersync with AD/LDAP depends highly on the customer environment. You must understand the organization of users and groups in the customer environment. This illustration shows users and groups organized in an Active Directory environment.

Figure 1: Example Active Directory Structure
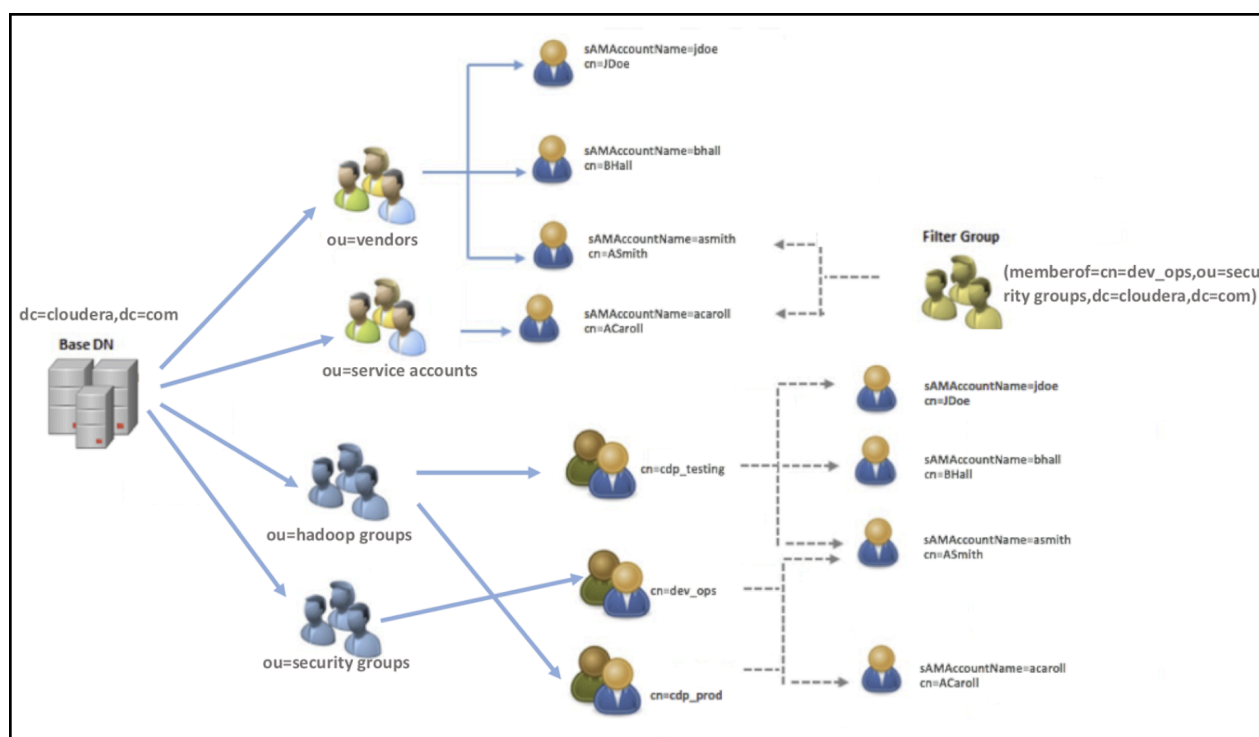
Answering the key user and group questions, based on the example AD structure:

In this example, the customer wants to configure group-level policies for groups cdp_testing and cdp_prod and wants to provide admin access to the Ranger UI only for users in the dev_ops group.

Based on the example Active Directory structure, answers to the four key user/group questions are:

Q1: What groups will be synced to Ranger?

    A1: cdp_testing, cdp_prod, and dev_ops

Q2: What OUs contain these groups in AD?

    A2: hadoop groups and security groups

Q3: What users will be synced to Ranger?

> A3: asmith and acaroll (these users are dev_ops group members)

Q4: What OUs contain these users in AD?

> A4: vendors and service accounts

To find the specific answers to these questions in a particular environment, use a tool such as Ldapsearch, as shown in the following examples.

- Example: Ldapsearch command to search a particular group cdp_testing and determine what attributes are available for the group.

Figure 2: Using Ldapsearch to find a specific group

```
ldapsearch -x -LLL -h 10.10.10.10:389 -D 'cn=administrator,CN=Users,dc=cloudera,dc=com' -W
-b 'ou=Hadoop Groups,dc=cloudera,dc=com' 'cn=cdp_testing'
Enter LDAP Password:
dn: CN=cdp_testing,ou=Hadoop Groups,dc=cloudera,dc=com
objectClass: top
objectClass: group
cn: cdp_testing
member: CN=ASmith,ou=Hadoop Users,dc=cloudera,dc=com
member: CN=BHall,ou=Hadoop Users,dc=cloudera,dc=com
member: CN=JDoe,ou=Hadoop Users,dc=cloudera,dc=com
distinguishedName: CN=cdp_testing,ou=Hadoop Groups,dc=cloudera,dc=com
instanceType: 4
name: cdp_testing
sAMAccountName: cdp_testing
```

Above output shows all the available attributes for cn=cdp_testing. The highlighted attributes are those of interest for usersync configuration. In this case, cdp_testing has three "member" attributes: ASmith, BHall, and JDoe.

- Example: Ldapsearch command to search a particular user ASmith and determine what attributes are available for the user.

Figure 3: Using Ldapsearch to find a specific user

```
ldapsearch -x -LLL -h 10.10.10.10:389 -D 'cn=administrator,CN=Users,dc=cloudera,dc=com'
-W -b 'ou=Hadoop Users,dc=cloudera,dc=com' 'samaccountname=ASmith
Enter LDAP Password:
dn: CN=ASmith,ou=Hadoop Users,dc=cloudera,dc=com
objectClass: top
objectClass: person
objectClass: organizationalPerson
objectClass: user
cn: ASmith
sn: Smith
givenName: Andy
distinguishedName: CN=ASmith,ou=Hadoop Users,dc=cloudera,dc=com
instanceType: 4
memberOf: CN=cdp_testing,ou=Hadoop Groups,dc=cloudera,dc=com
memberOf: CN=dev_ops,ou=Hadoop Groups,dc=cloudera,dc=com
memberOf: CN=cdp_prod,ou=Hadoop Groups,dc=cloudera,dc=com
primaryGroupID: 513
logonCount: 0
sAMAccountName: ASmith
```

Above output shows all the available attributes for a user. The highlighted attributes are those of interest for usersync configuration. In this case, ASmith is a "memberof" 3 groups - cdp_testing, dev_ops, and cdp_prod.

Do NOT remove these system users!

There are basic access policies based on those system users designed to keep a Ranger-governed component working after Ranger is given all control over that component's authorizations. Without those policies/users many components may not function as expected.

Ranger user management

Reference information on Ranger user management, when configuring Ranger AD integration.

To delete a user, select the check box for the user in the User Name list, then click the red Delete button. Ranger removes the user from all policies.

Known issue: Ranger group mapping

For Ranger AD integration, there is an issue with Ranger not being able to map a user on a group 'Hdp_admins' to a policy that allows/denies access to the group 'Hdp_admins'. The issue is the upper case characters that might be in a AD group name definition.

Most HDP components get the group information for a user via the SSSD daemon. When asked for the groups the user 'd.threpe' belongs to we get:

```
[centos@rjk-hdp25-m-01 ~]$ groups d.threpe
d.threpe : domain_users hdp_admins hadoop
```

So 'hdp_admins' all in lower case. Ranger does not treat this as the same value as 'Hdp_admins' which came via the group sync and was applied to some policies.

There is no way to make the group sync write or retrieve the group names all in lower case since there is no AD attribute that rewrites it in lowercase.

This issue can be worked around fortunately (till it gets solved). The solution is to define a local group in Ranger as a shadow group of a real group from AD, but then all in lower case:

If we now create policies and use that lower case 'shadow' group literal the result is that policies are correctly mapped to the AD groups again:

*The 'Hdp_admins' entry does not have to be there, it is shown for clarification only. 'hdp_admins' is necessary to make it work.