Cloudera Runtime 7.1.0

Configuring Apache Ranger Authentication with UNIX, LDAP, or AD

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https://docs.cloudera.com/

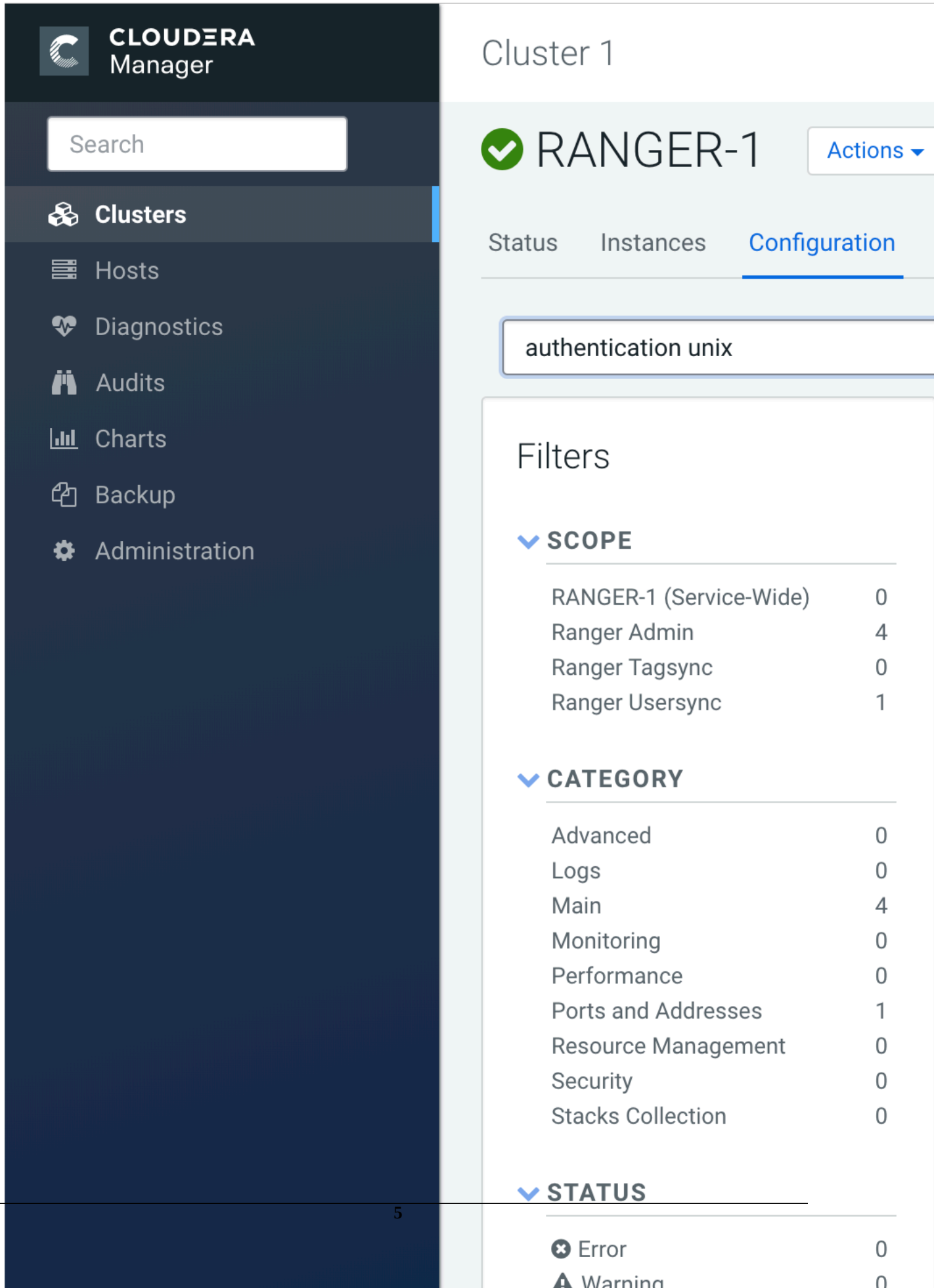
Legal Notice

Contents

Configuring Ranger Authentication with UNIX, LDAP, or AD

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


CLOUDERA
Manager
Search
Clusters
Hosts
Diagnostics
Audits
Charts
Backup
Administration
Cluster 1
RANGER-1
Actions
Status
Instances
Configuration
authentication unix
Filters
SCOPE
RANGER-1 (Service-Wide) 0
Ranger Admin 4
Ranger Tagsync 0
Ranger Usersync 1
CATEGORY
Advanced 0
Logs 0
Main 4
Monitoring 0
Performance 0
Ports and Addresses 1
Resource Management 0
Security 0
Stacks Collection 0
STATUS
Error 0

Related Information

Cloudera Management Console

Configure Ranger authentication for UNIX

How to configure Ranger to use UNIX for user authentication.

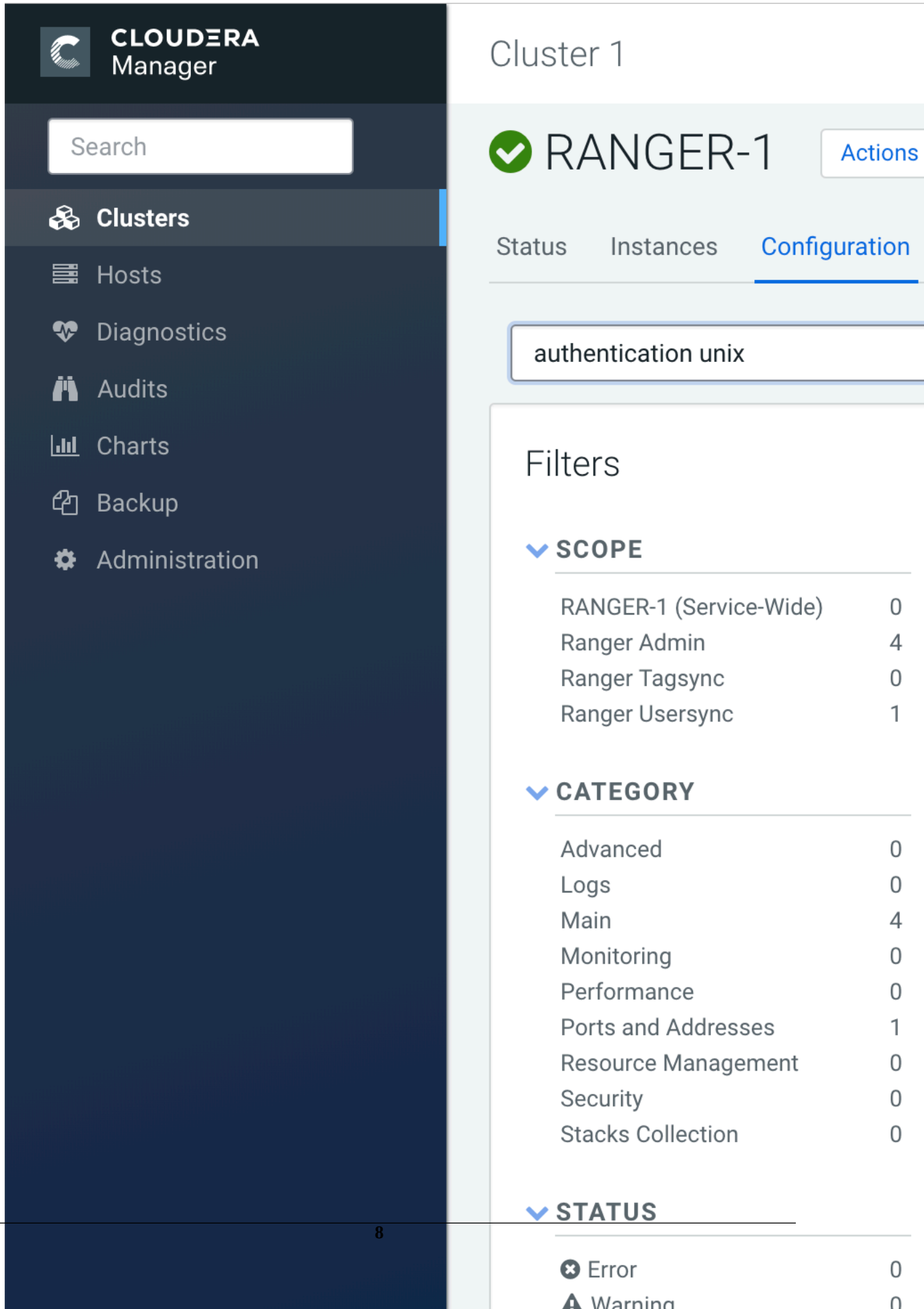
About this task

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


CLOUDERA Manager
Search
Clusters
Hosts
Diagnostics
Audits
Charts
Backup
Administration
Cluster 1
RANGER-1
Actions
Status
Instances
Configuration
authentication unix
Filters
SCOPE
RANGER-1 (Service-Wide) 0
Ranger Admin 4
Ranger Tagsync 0
Ranger Usersync 1
CATEGORY
Advanced 0
Logs 0
Main 4
Monitoring 0
Performance 0
Ports and Addresses 1
Resource Management 0
Security 0
Stacks Collection 0
STATUS
Error 0
Warning 0

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 auther
Allow remote Login	Flag to enable/disable remote login. Only used if the Authentication method is UNIX.	TRUE	TRUE	No.
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, i selecte
ranger.unixauth.service.port	The port number where the ranger-usersync module is running the UNIX Authentication Service.	5151	5151	Yes, i selecte

Related Information

Cloudera Management Console

Configure Ranger authentication for AD

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

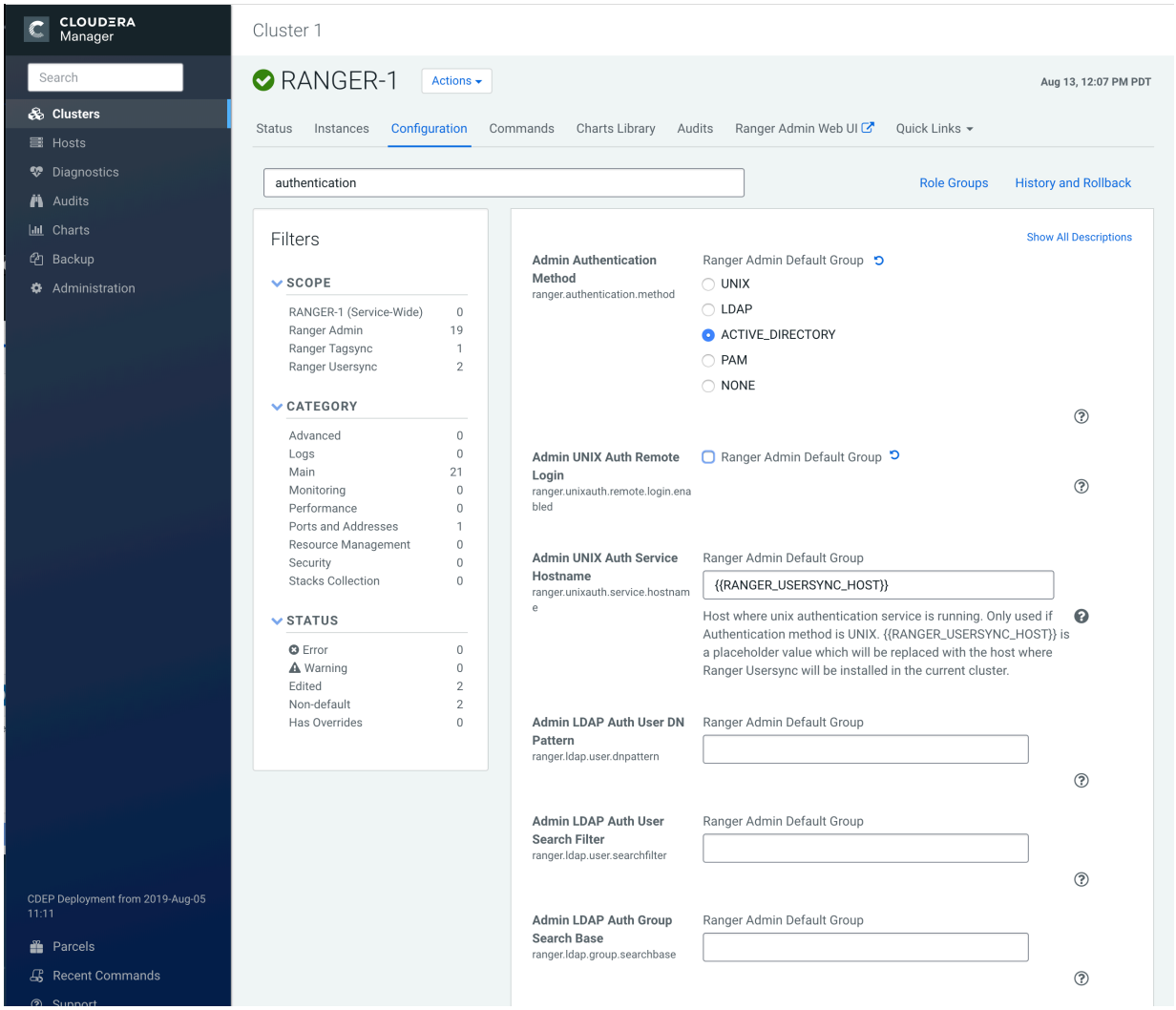
About this task

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

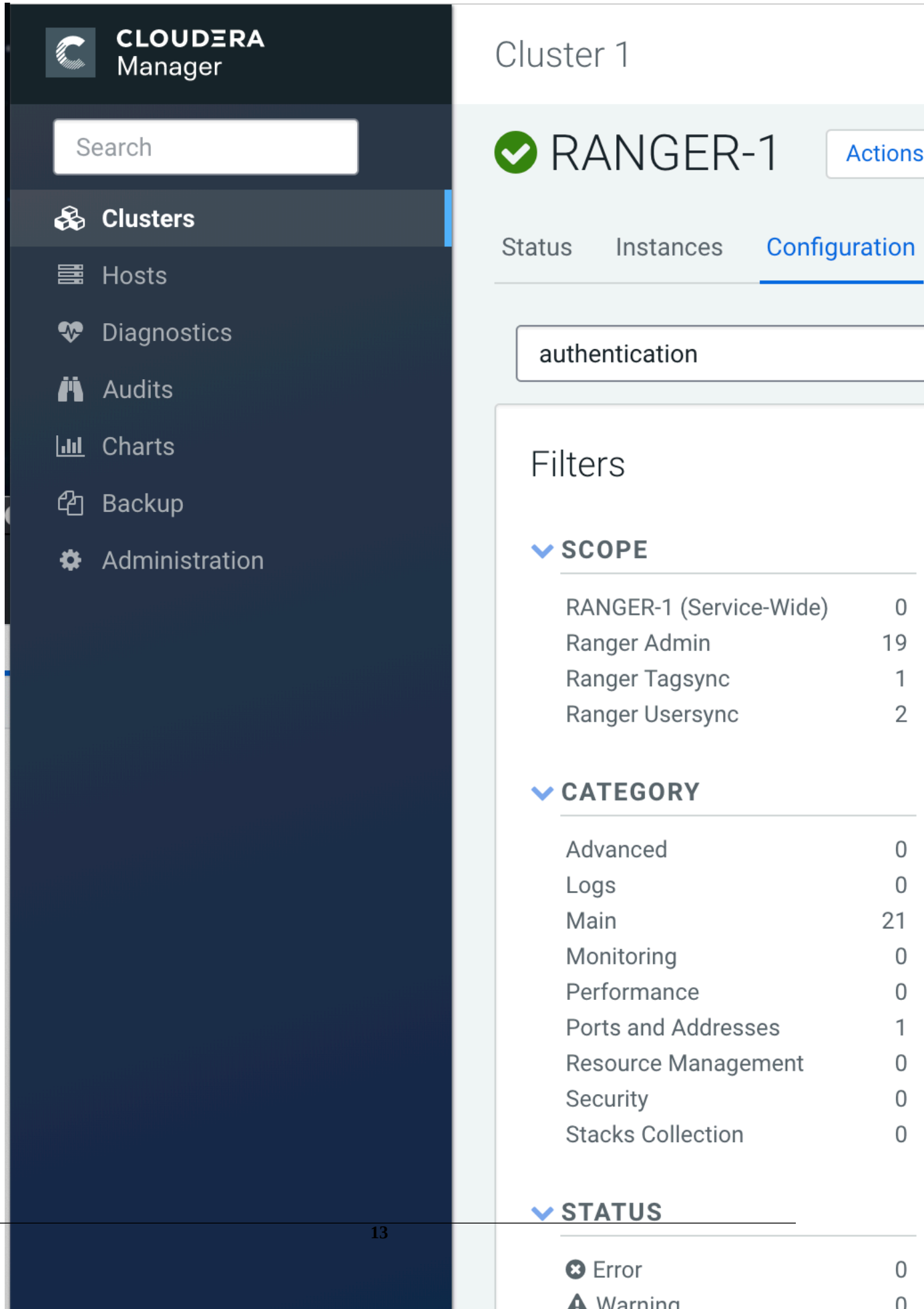
About this task

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


CLOUDERA
Manager
Search
Clusters
Hosts
Diagnostics
Audits
Charts
Backup
Administration
Cluster 1
RANGER-1
Actions
Status
Instances
Configuration
authentication
Filters
SCOPE
RANGER-1 (Service-Wide) 0
Ranger Admin 19
Ranger Tagsync 1
Ranger Usersync 2
CATEGORY
Advanced 0
Logs 0
Main 21
Monitoring 0
Performance 0
Ports and Addresses 1
Resource Management 0
Security 0
Stacks Collection 0
STATUS
Error 0

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
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.

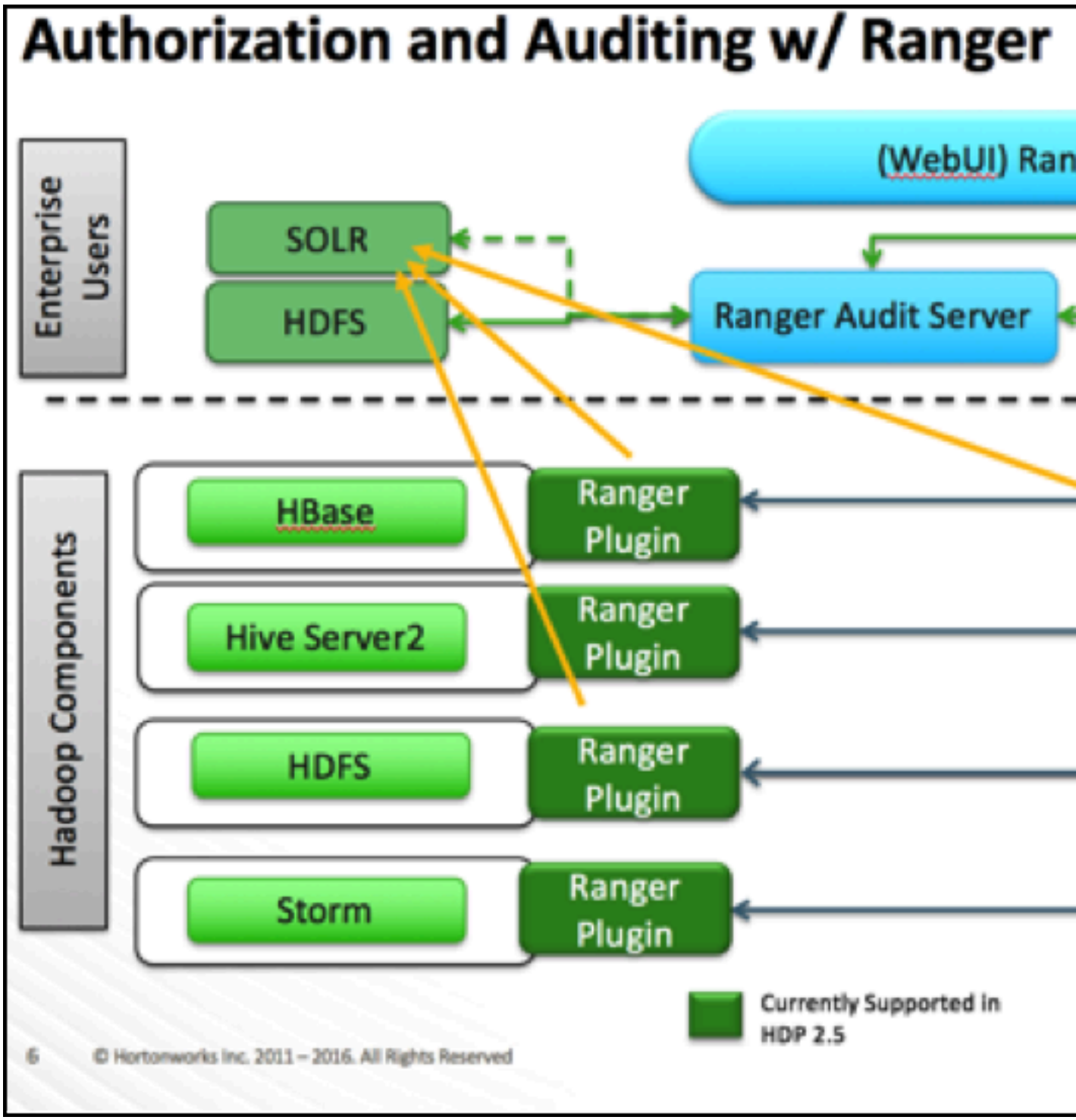
Related Information

Cloudera Management Console

Ranger AD Integration

A conceptual overview of Ranger-AD integration architecture.

Ranger AD Integration: Architecture Overview



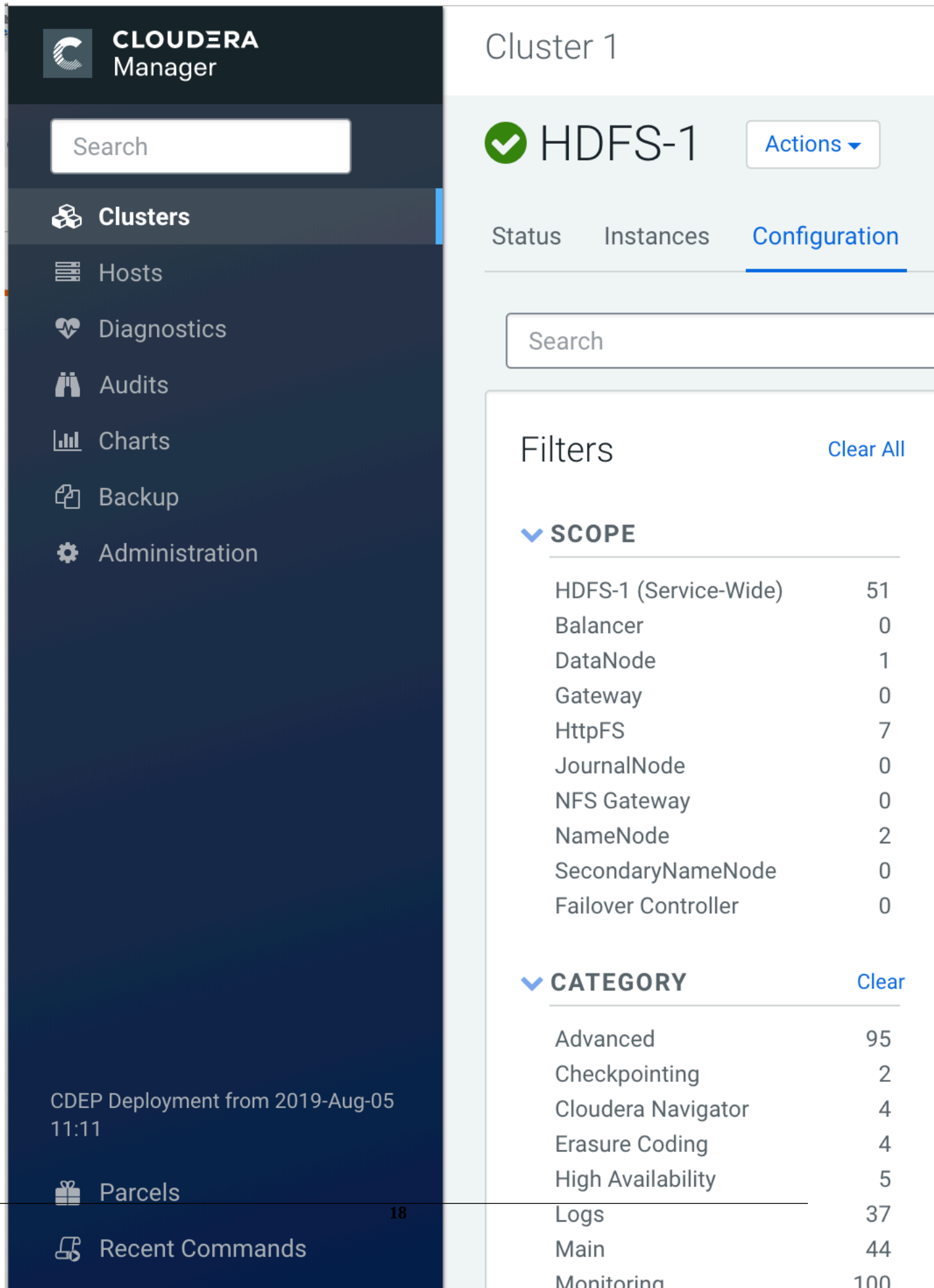
When a Ranger plugin for a component (such as HBase or HDFS) is activated, Ranger is in full control of any access. There is two-way communication between the Ranger plugin and the Ranger (Admin) Policy Server (RPS):

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).

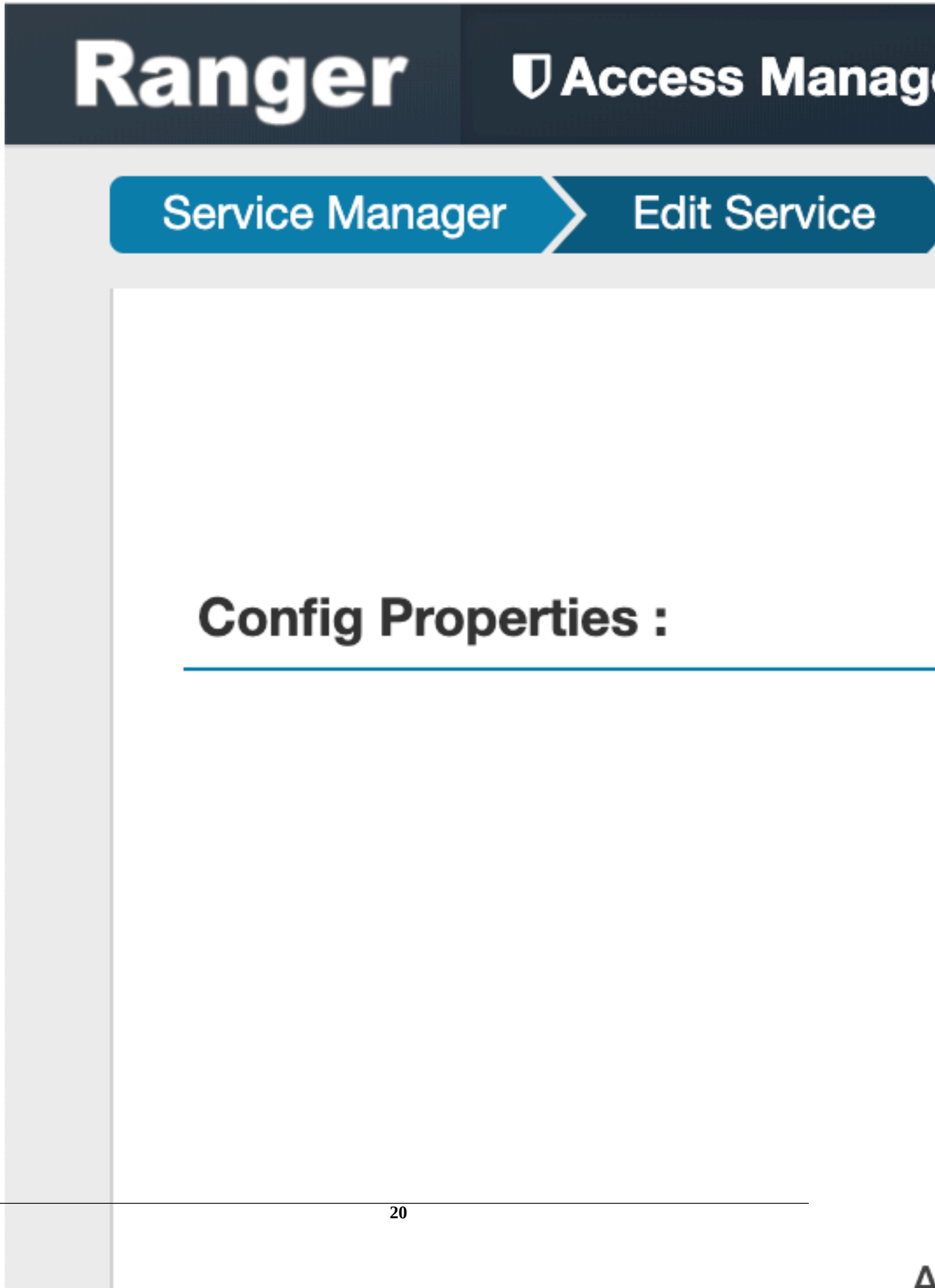
The first communication channel (Plugin to RPS) is essential for the plugin to function, whereas the second (RPS to components) is optional. It would still be possible to define and enforce policies without the second channel, but you would not have autocomplete during policy definition.

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:

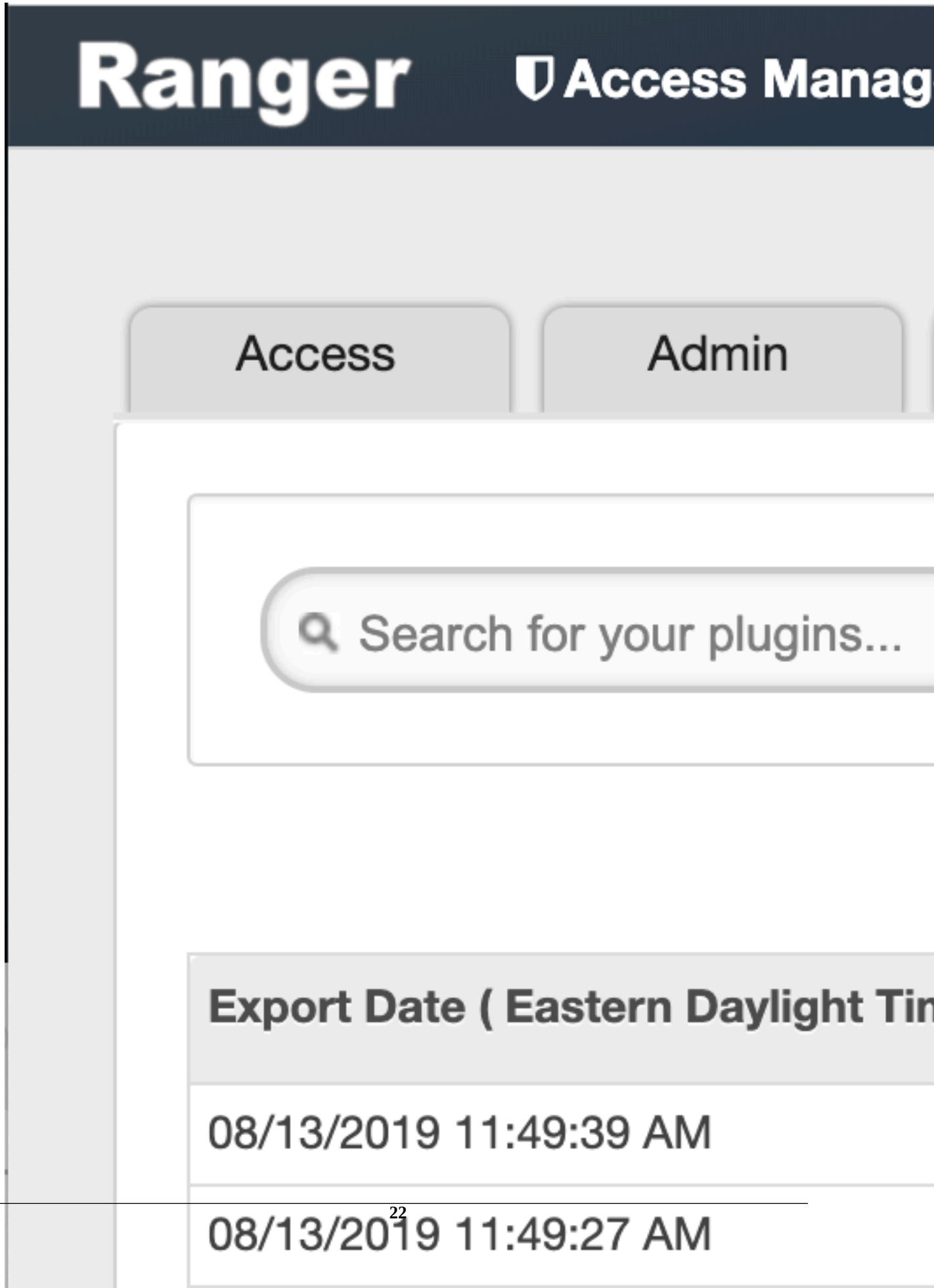

CLOUDERA Manager
Search
Clusters
Hosts
Diagnostics
Audits
Charts
Backup
Administration
CDEP Deployment from 2019-Aug-05 11:11
Parcels
Recent Commands
Cluster 1
HDFS-1
Actions
Status
Instances
Configuration
Search
Filters
Clear All
SCOPE
HDFS-1 (Service-Wide) 51
Balancer 0
DataNode 1
Gateway 0
HttpFS 7
JournalNode 0
NFS Gateway 0
NameNode 2
SecondaryNameNode 0
Failover Controller 0
CATEGORY
Clear
Advanced 95
Checkpointing 2
Cloudera Navigator 4
Erasure Coding 4
High Availability 5
Logs 37
Main 44
Monitoring 100

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:


Ranger
Access Manag
Service Manager
Edit Service
Config Properties :

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.

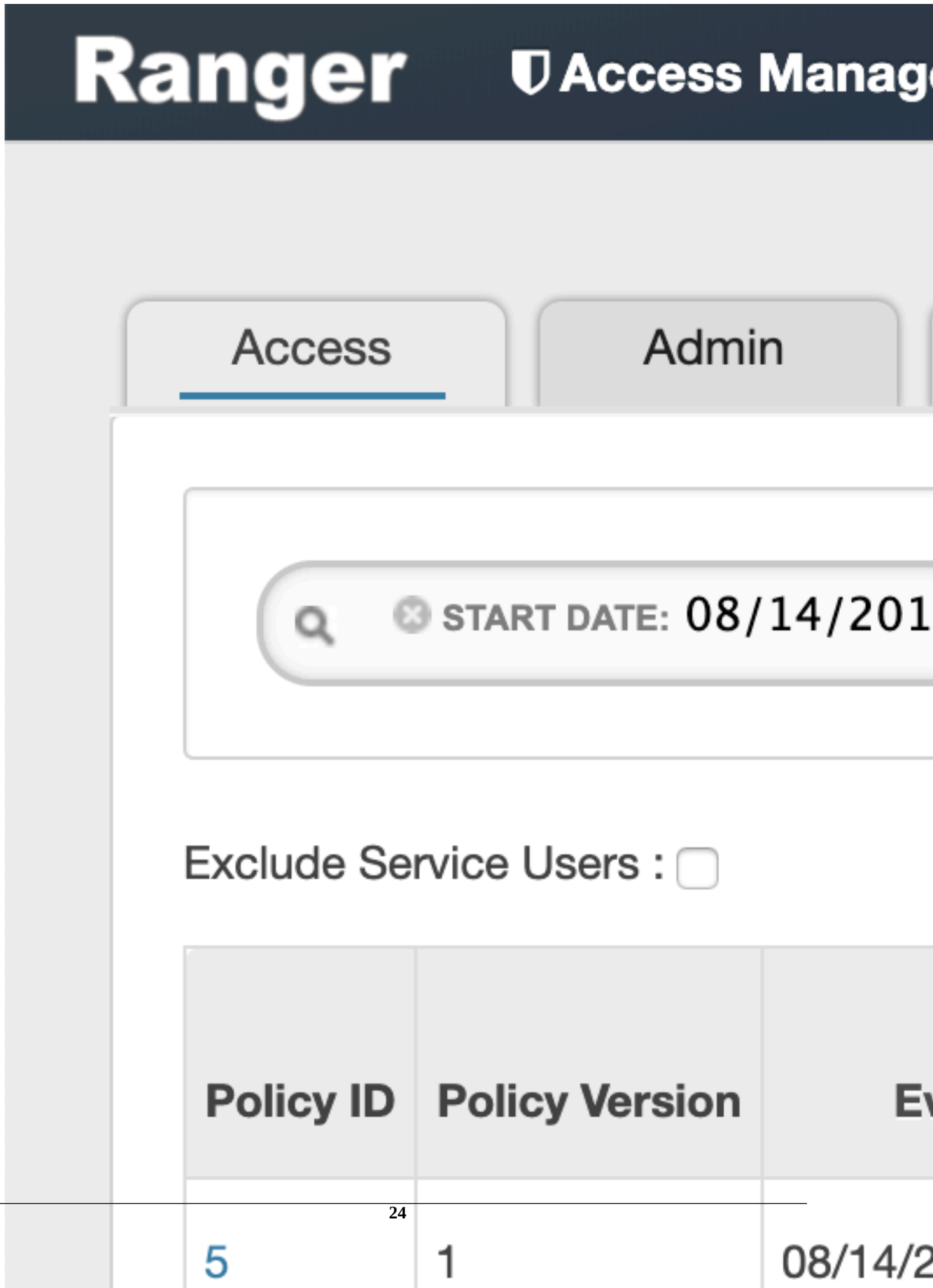
To verify if the paramount first communication channel (Plugins to RPS) works, select Audit > Plugins in Ranger:


Ranger
Access Manag
Access
Admin
Search for your plugins...
Export Date (Eastern Daylight Tin
08/13/2019 11:49:39 AM
08/13/2019 11:49:27 AM

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.


Ranger
Access Manag
Access
Admin
START DATE: 08/14/201
Exclude Service Users :
Policy ID
Policy Version
Ev
5
1
08/14/2

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

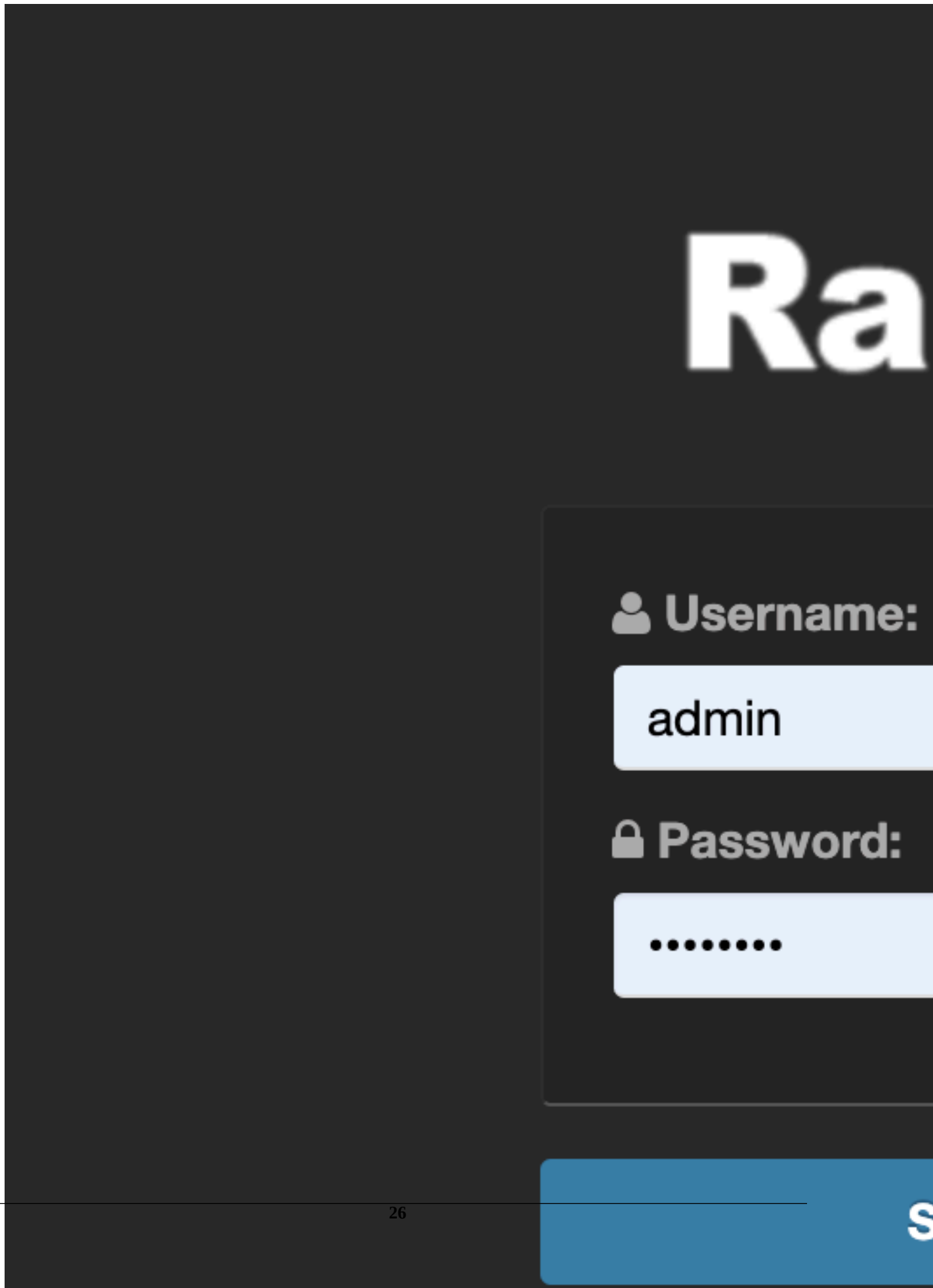
Rangers AD Integration has 2 levels:

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.

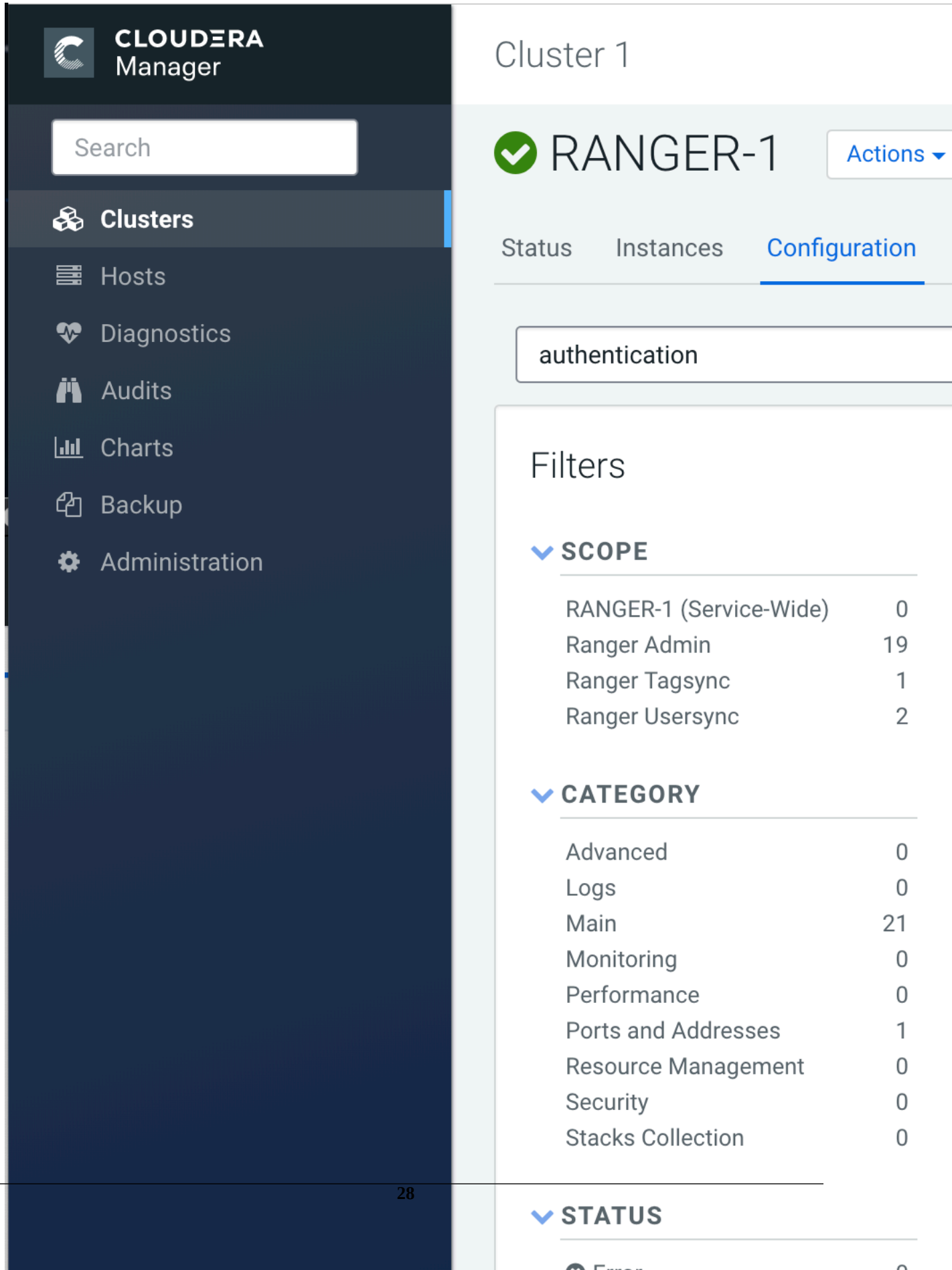
This is an extra AD level filter option on top of Kerberos authentication that maps to:


Ra
Username:
admin
Password:

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 :

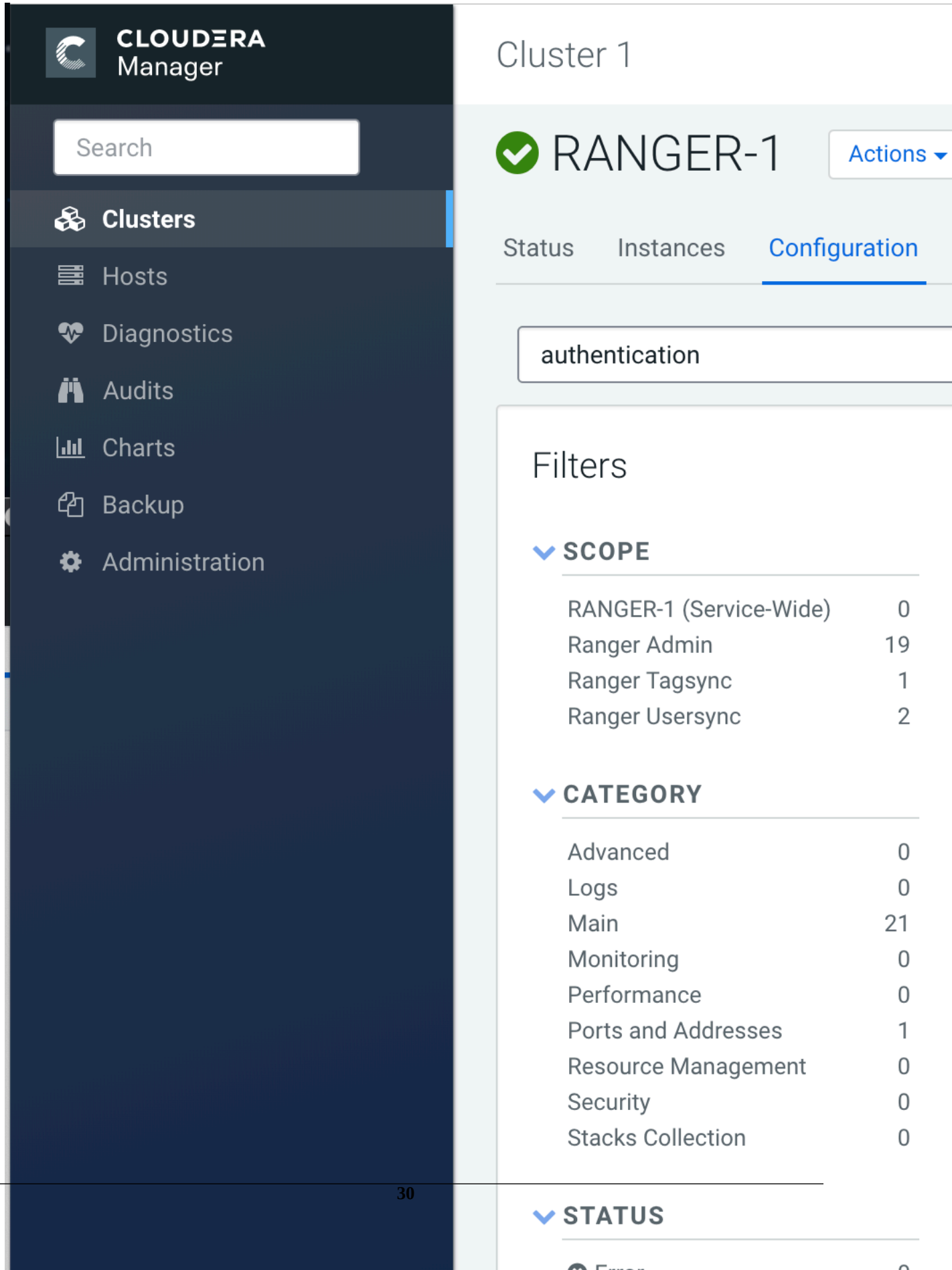
(&(memberOf=CN=Hdp_admins,OU=Company,OU=User Accounts,OU=CorpUsers,DC=field,DC=hortonworks,DC=com)(sAMAccountName={0}))

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 rang er.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=fiel d,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.

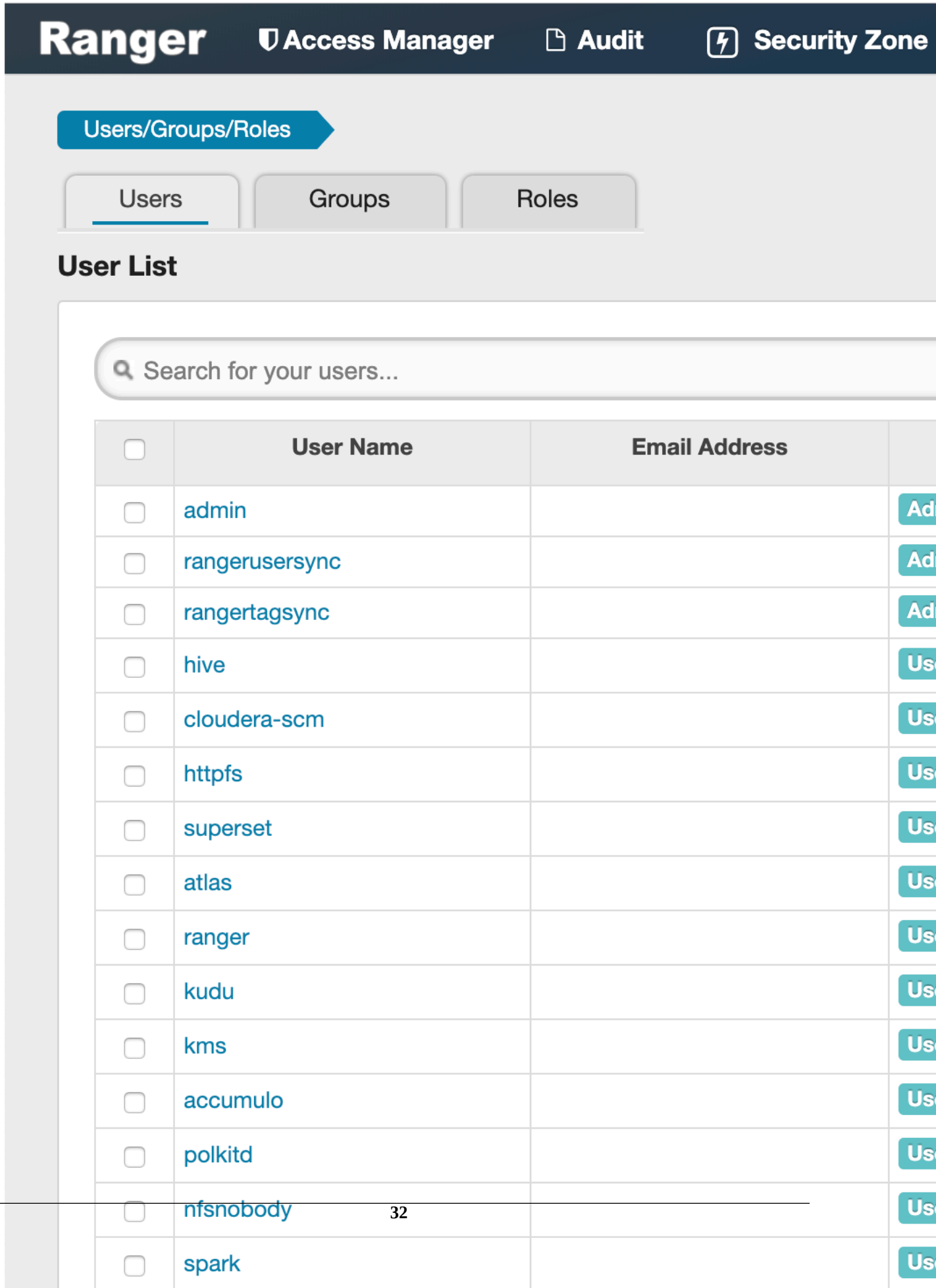
Ranger has a very simple approach to the internal user list that is kept in a relational schema. This list contains all users that were synced with AD ever, and all those users can potentially log in to the Ranger UI. But only Admin users can really do any policy-related things in the Ranger UI (see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

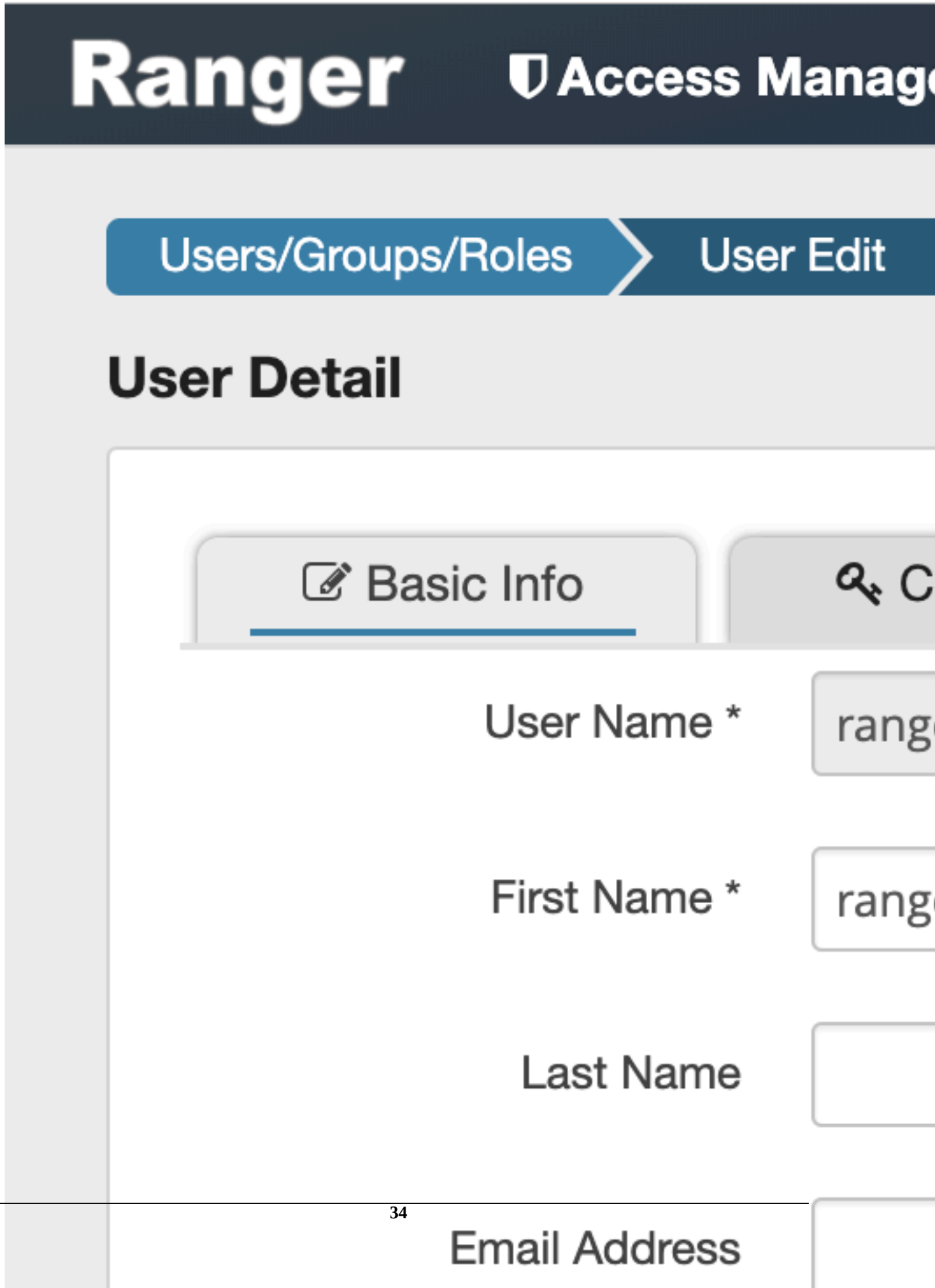
Ranger UI authorization

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.


Ranger
Access Manager
Audit
Security Zone
Users/Groups/Roles
Users
Groups
Roles
User List
Search for your users...
User Name
Email Address
admin
rangerusersync
rangertagsync
hive
cloudera-scm
httpfs
superset
atlas
ranger
kudu
kms
accumulo
polkitd
nfsnobody
spark

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


Ranger
Access Manag
Users/Groups/Roles
User Edit
User Detail
Basic Info
C
User Name *
rang
First Name *
rang
Last Name
Email Address

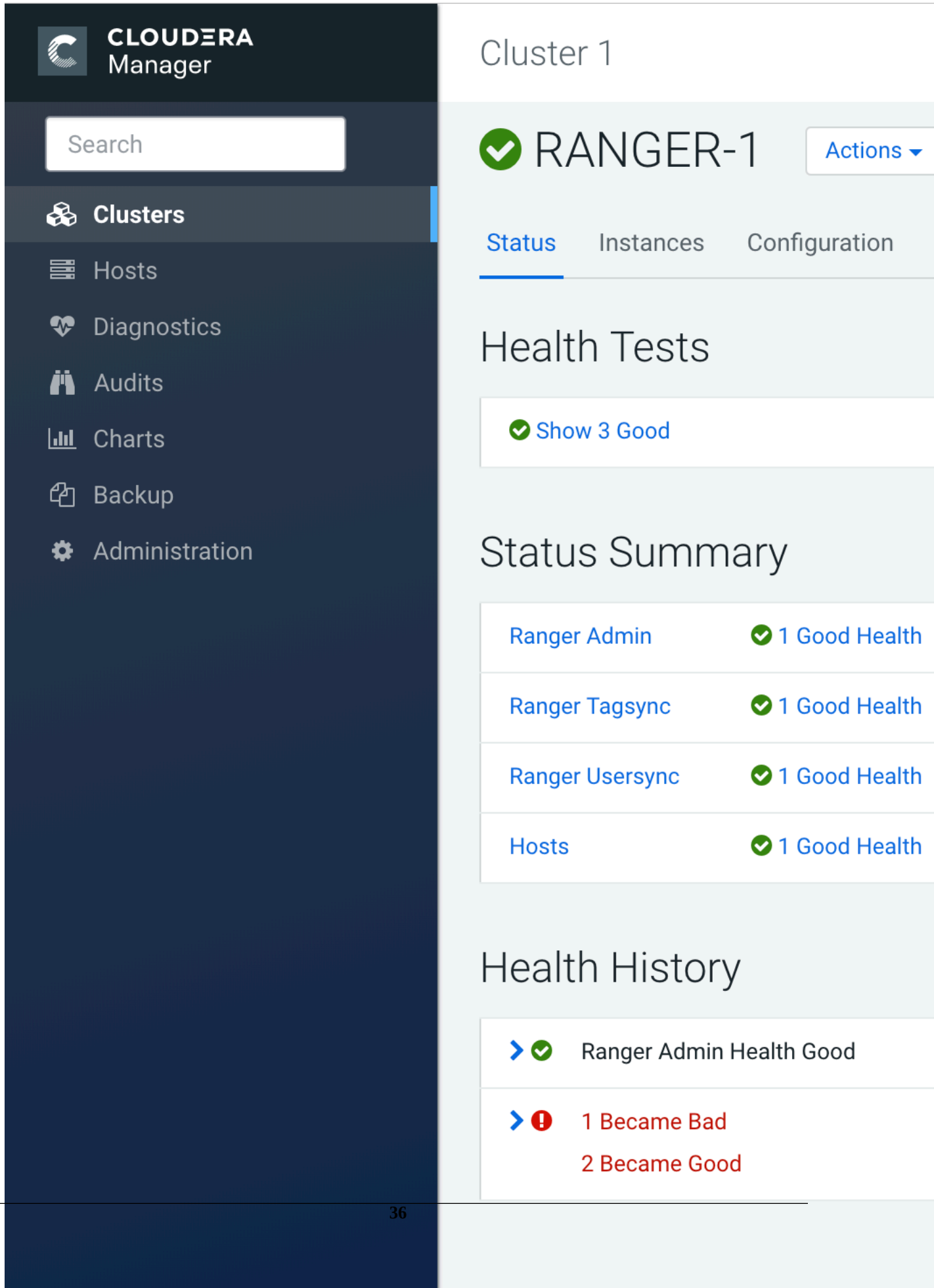
Only users with the Admin role can edit Ranger policies.

Ranger Usersync

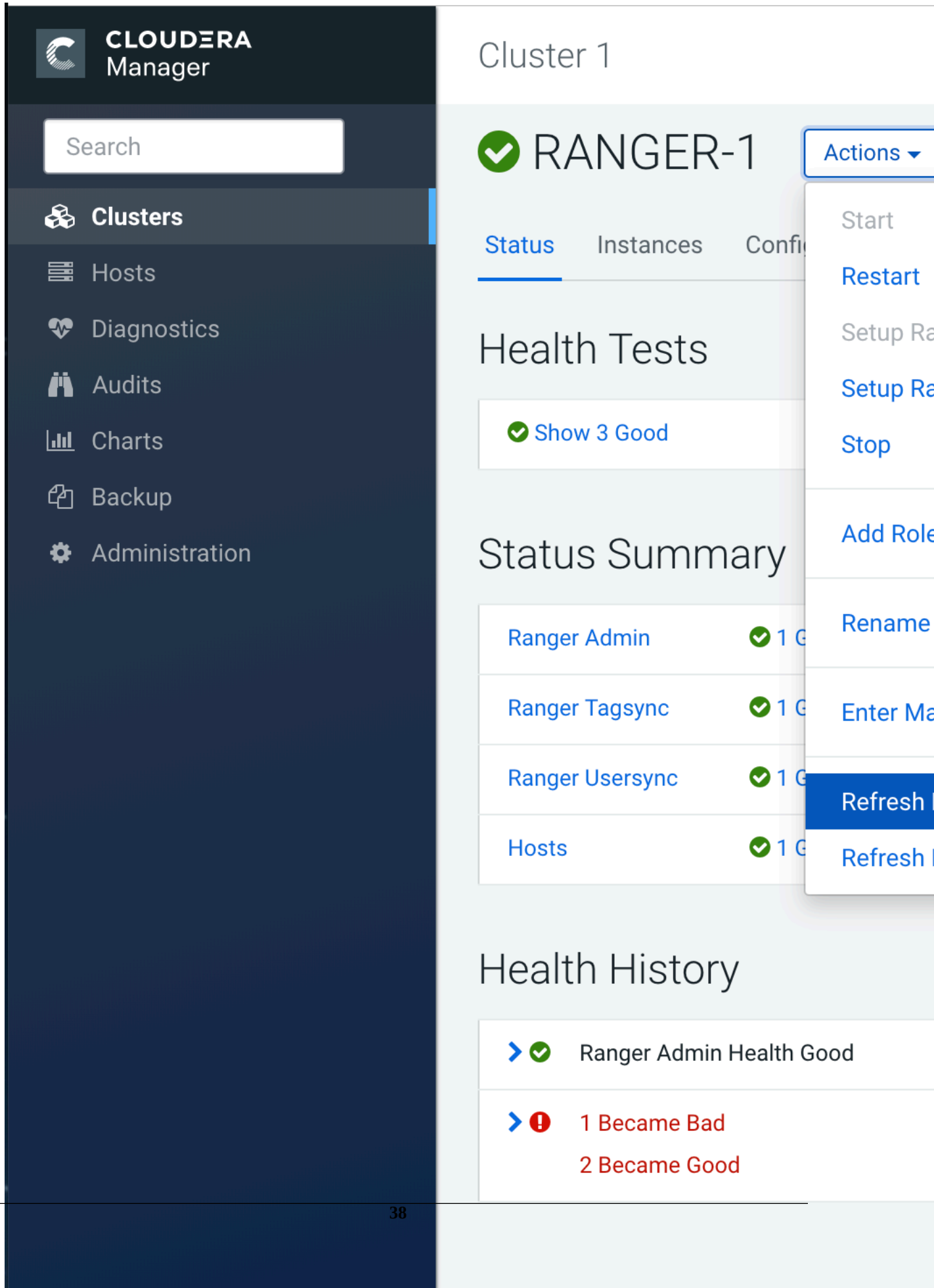
Reference information on Ranger usersync, when configuring Ranger AD integration.

A vital part of the Ranger architecture is the ability to get users and groups from the corporate AD to use in policy definitions.

Ranger usersync runs as separate daemon:


CLOUDERA
Manager
Search
Clusters
Hosts
Diagnostics
Audits
Charts
Backup
Administration
Cluster 1
RANGER-1
Actions
Status
Instances
Configuration
Health Tests
Show 3 Good
Status Summary
Ranger Admin
1 Good Health
Ranger Tagsync
1 Good Health
Ranger Usersync
1 Good Health
Hosts
1 Good Health
Health History
Ranger Admin Health Good
1 Became Bad
2 Became Good

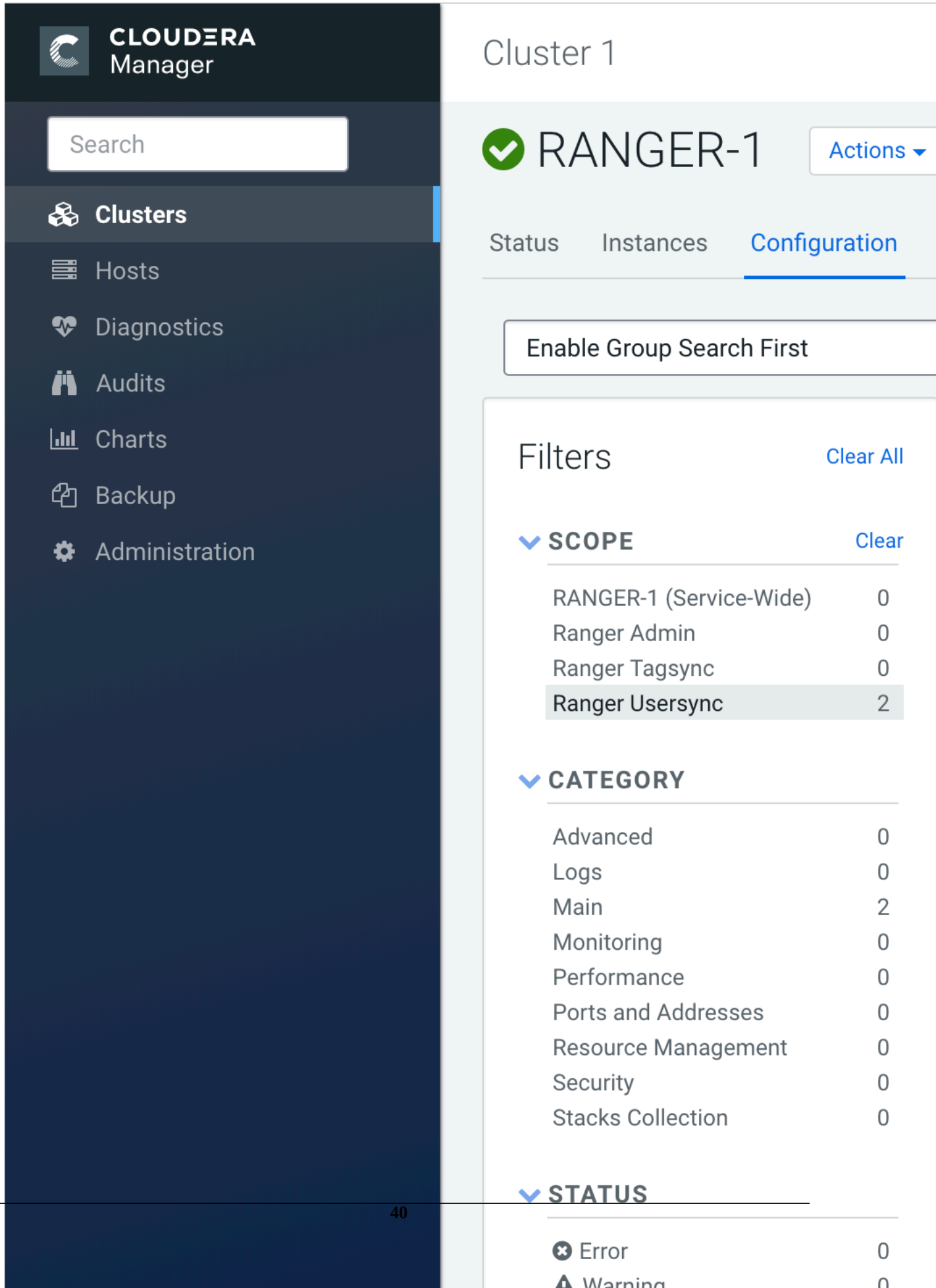
It can also be refreshed using the Actions drop-down.


CLOUDERA
Manager
Search
Clusters
Hosts
Diagnostics
Audits
Charts
Backup
Administration
Cluster 1
RANGER-1
Actions
Start
Restart
Setup Ra
Setup Ra
Stop
Add Role
Rename
Enter Ma
Refresh
Refresh
Status
Instances
Confi
Health Tests
Show 3 Good
Status Summary
Ranger Admin
Ranger Tagsync
Ranger Usersync
Hosts
Health History
Ranger Admin Health Good
1 Became Bad
2 Became Good

Ranger Usersync Configuration

Usersync has a lot of moving parts and can have very different outcomes. Two main sets of properties govern the way users and groups are synchronized.

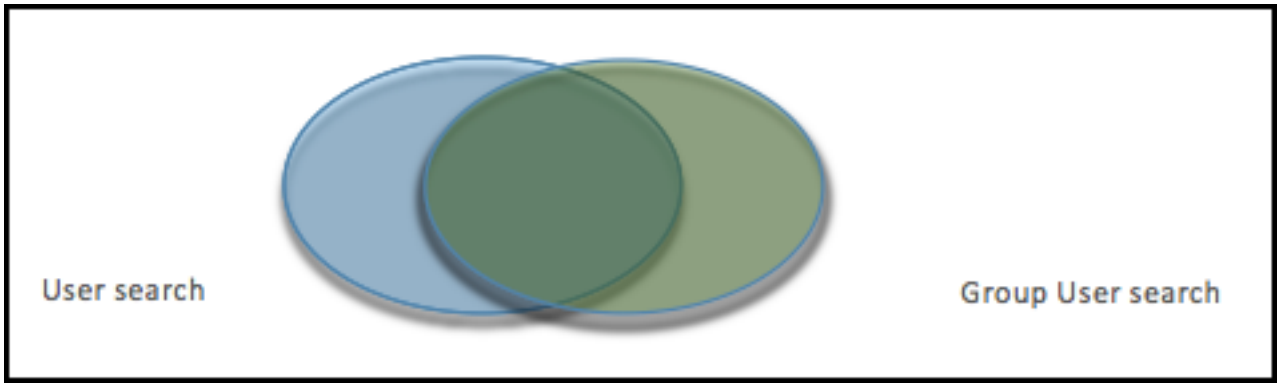
Without Enable Group Search First, the primary access pattern is user-based, and groups are only searched/added based on the users it finds first. In contrast, with Enable Group Search First enabled, the primary access pattern is group-based (in turn based on the group search filter) and users are only searched/added based on the group memberships it finds first.


CLOUDERA Manager
Search
Clusters
Hosts
Diagnostics
Audits
Charts
Backup
Administration
Cluster 1
RANGER-1
Actions
Status
Instances
Configuration
Enable Group Search First
Filters
Clear All
SCOPE
Clear
RANGER-1 (Service-Wide) 0
Ranger Admin 0
Ranger Tagsync 0
Ranger Usersync 2
CATEGORY
Advanced 0
Logs 0
Main 2
Monitoring 0
Performance 0
Ports and Addresses 0
Resource Management 0
Security 0
Stacks Collection 0
STATUS
Error 0

```
OU=CorpUsers,DC=field,DC=hortonworks,DC=com

Value of ‘User Search Filter’:
(|(memberOf=CN=Hdp_admins,OU=Company,OU=User Accounts,OU=CorpUsers,DC=field
,DC=hortonworks,DC=com)(memberOf=CN=Hdp_users,OU=Company,OU=User Accounts,OU
=CorpUsers,DC=field,DC=hortonworks,DC=com))
Value of ‘User Group Name Attribute’:
sAMAccountName

Value of ‘Group Search Base’:
(|(CN=Hdp_users)(CN=Hdp_admins))
```



Be aware that the filters on the group level limit the returns on the user search, and vice versa. In the graph above if the left oval represents the results of all users queried by the user configuration settings, and the right oval represents all users queried by the group configuration settings, the eventual set of users that make it to Ranger usersync is the overlap between the two.

Therefore it is recommended that you set the filters on both ends exactly the same to potentially have a 100% overlap in the ovals.

In the example configuration above, the scope of the usersync would be all members of the "Hdp_admins" and "Hdp_users" groups.

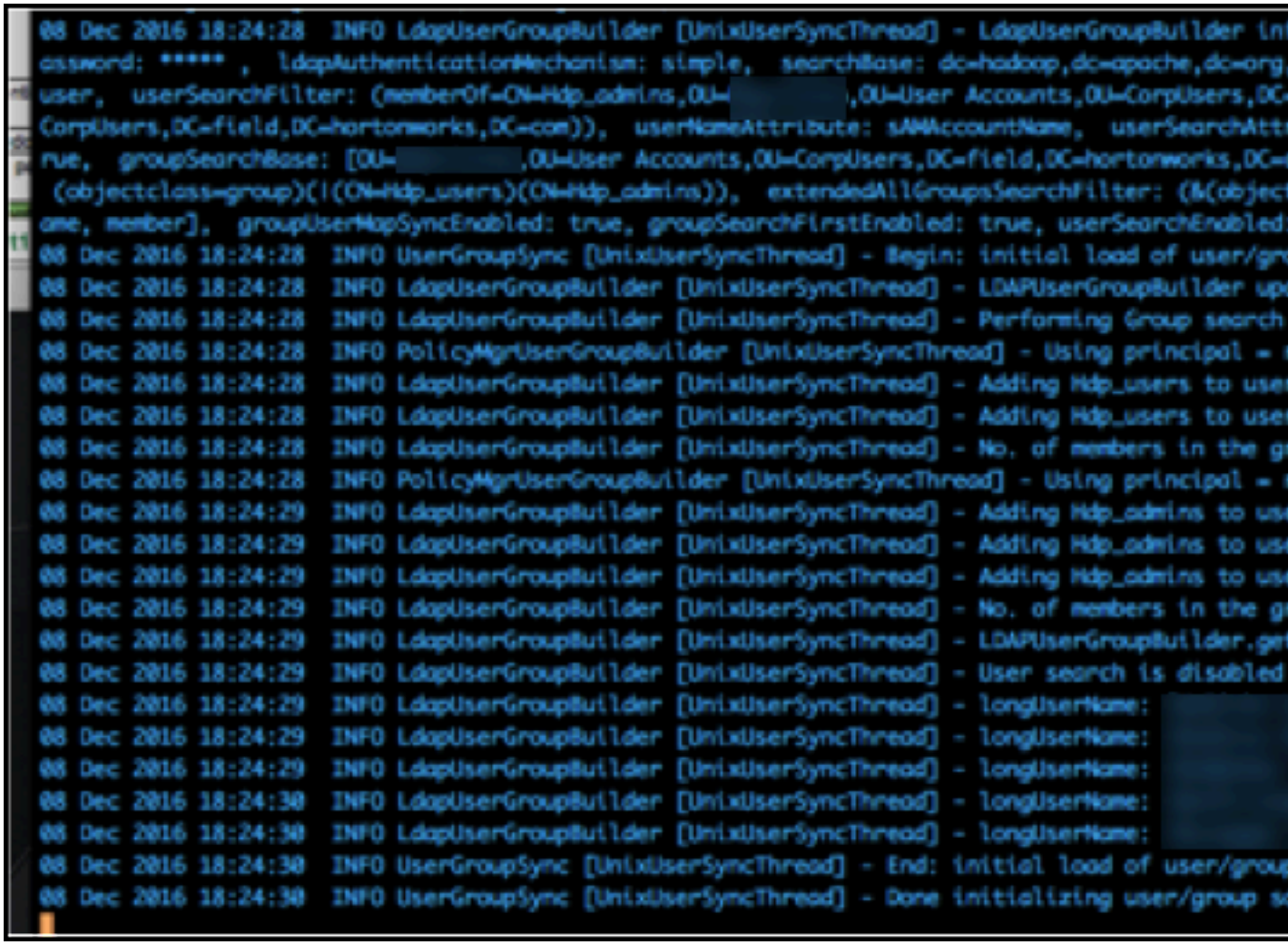
The best of both worlds is to have both Enable Group Search First and Enable User Search enabled.

The logging of a run of the usersync daemon can be retrieved from /var/log/ranger/usersync/usersync.log on the server hosting Ranger Admin. A successful run might output logging like below:

From that log it clearly shows that the groups are synced first and that all users belonging to those groups are then retrieved according to its own settings, after which the user parts are enriched/overwritten by the returns from the user queries.

Beware:

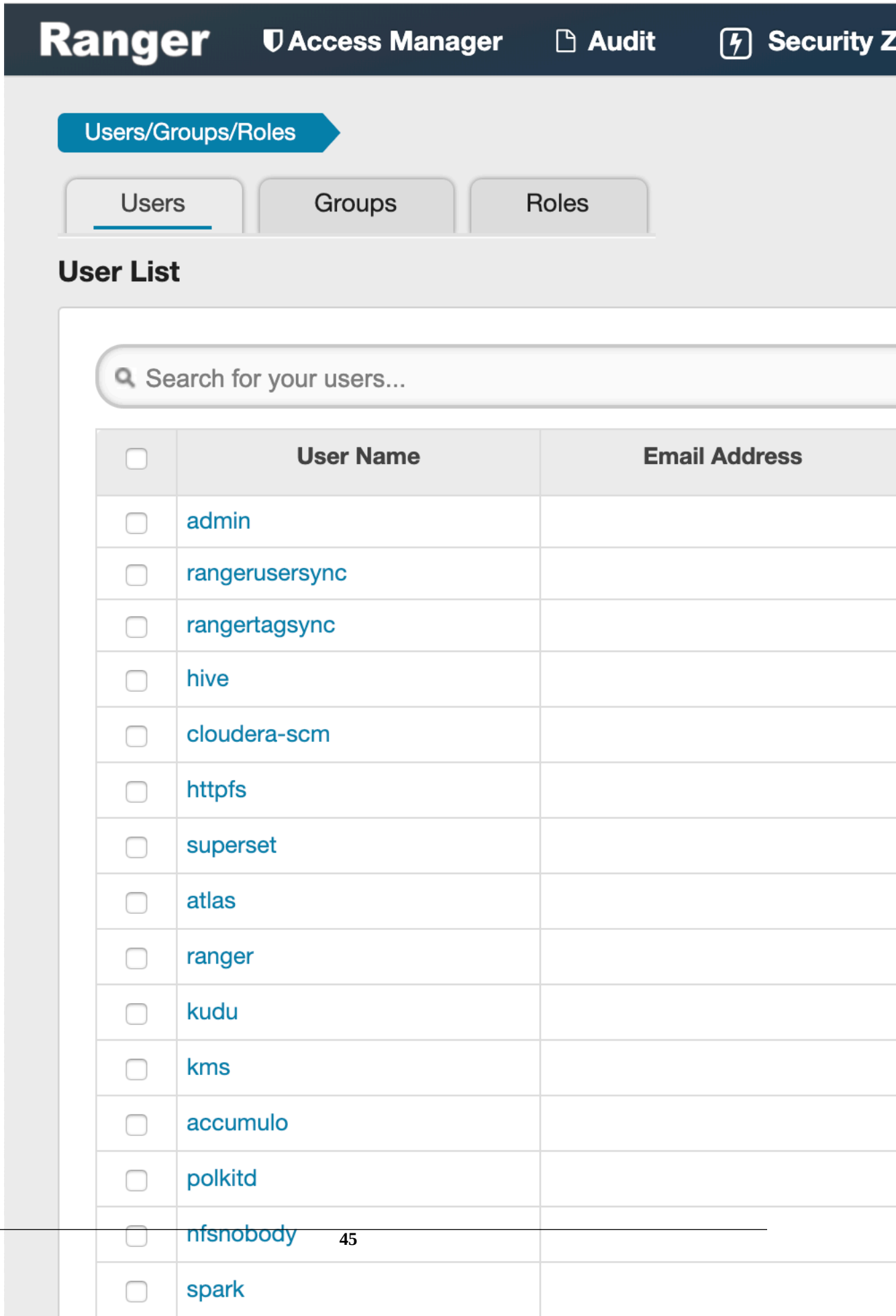
If you don’t enable Enable User Search, that enrichment does NOT happen. Logging for such a run looks like this:



The result in the Ranger UI are other user names (LongUserName) derived from "member" group attributes full DN. You get the long name "James Kirk’ in the Ranger userlist in stead of "j.kirk". Ranger does not treat those as one and the same user. Policies that are defined for user "k.reshi" will not map to the user "Kvothe Reshi", and vice versa. To prevent any confusion it is probably best to delete the long username versions from the Rangers user list.

Important:

On the first page of Rangers user list there are many system users. Most of them were put there by the Ranger installer and during the plugins installs:


Ranger
Access Manager
Audit
Security Z
Users/Groups/Roles
Users
Groups
Roles
User List
Search for your users...
User Name
Email Address
admin
rangerusersync
rangertagsync
hive
cloudera-scm
httpfs
superset
atlas
ranger
kudu
kms
accumulo
polkitd
nfsnobody
spark

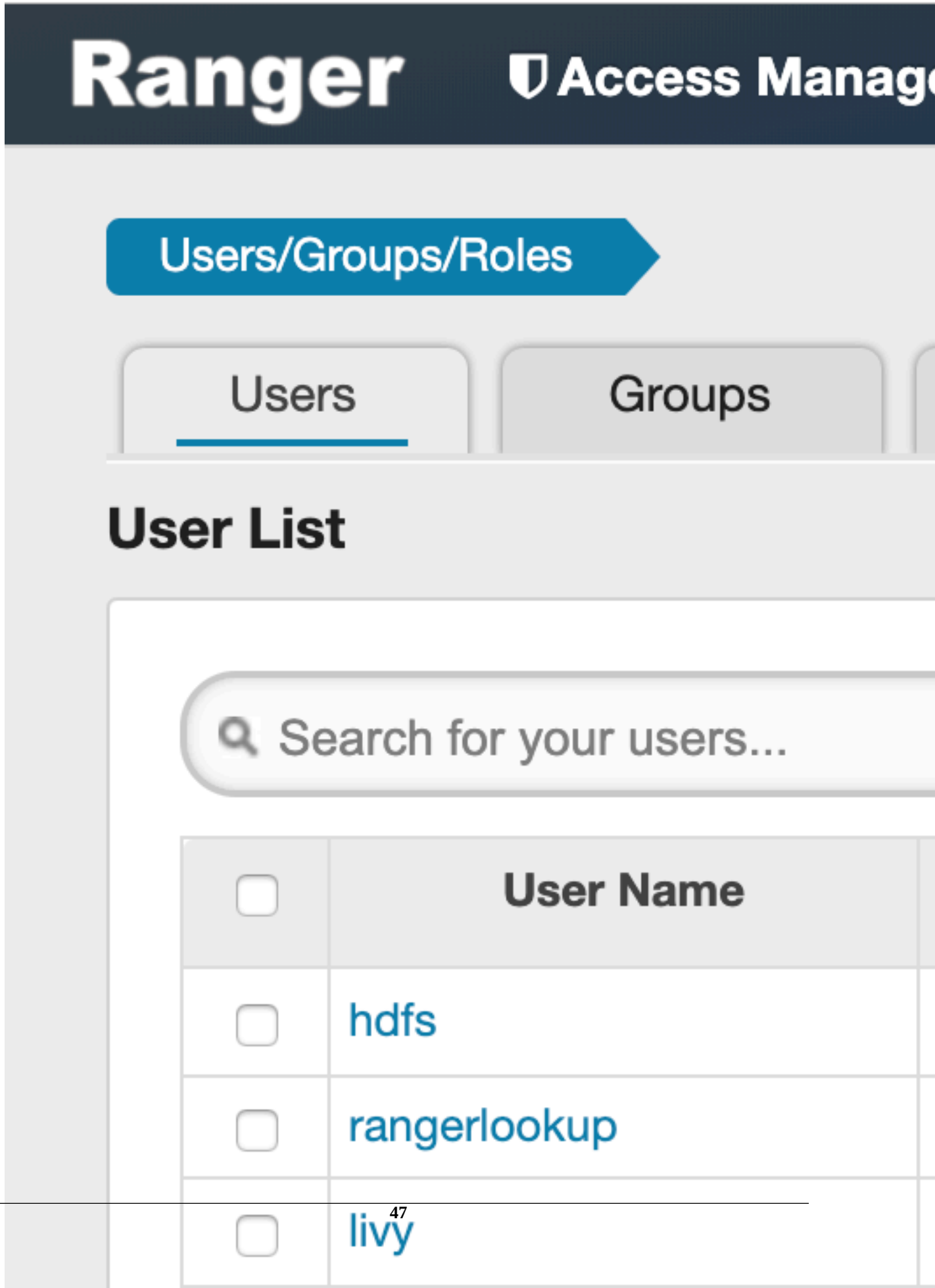
Do NOT remove these system users!

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.


Ranger
Access Manag
Users/Groups/Roles
Users
Groups
User List
Search for your users...
User Name
hdfs
rangerlookup
livy

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.

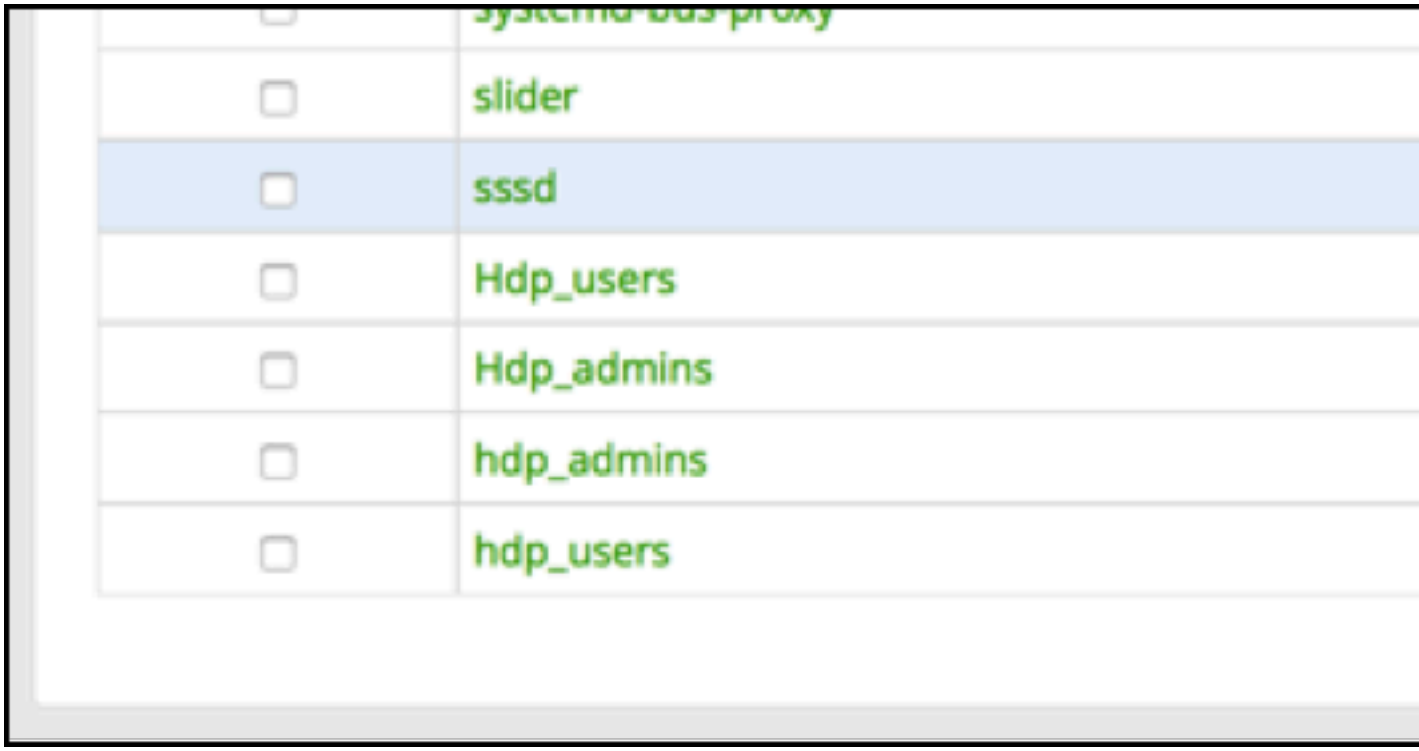
Most HDP components get the group information for a user via the SSSD daemon. When asked for the groups the user ‘d.threpe’ belongs to we get:

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

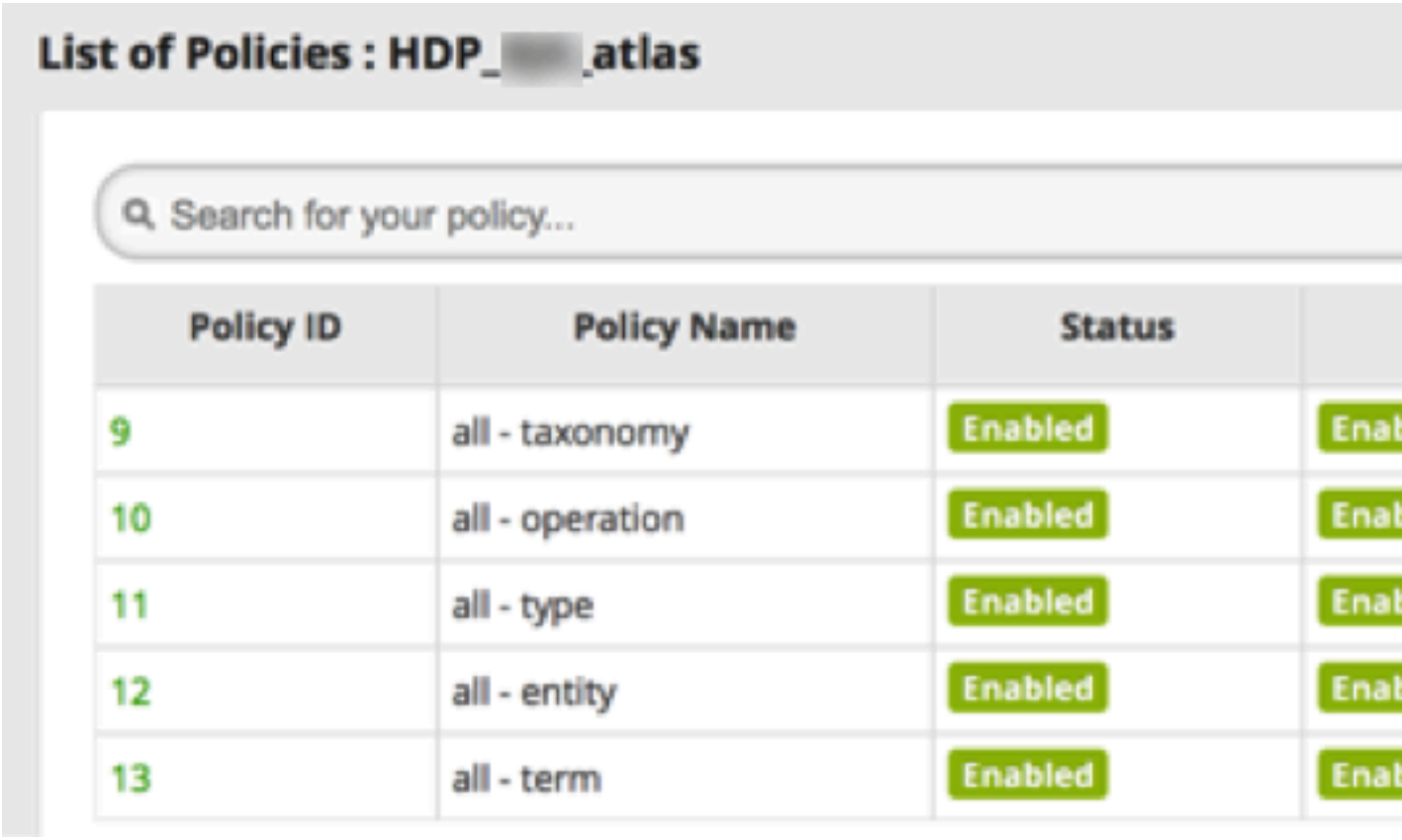
So ‘hdp_admins’ all in lower case. Ranger does not treat this as the same value as ‘Hdp_admins’ which came via the group sync and was applied to some policies.

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.