

Cloudera Runtime 7.1.6

Ranger Auditing

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CLOUDERA

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Contents

Audit Overview.....	4
Managing Auditing with Ranger.....	4
View audit details.....	4
Create a read-only Admin user (Auditor).....	7
Ranger Audit Filters (Technical Preview).....	8
Changing Ranger audit storage location and migrating data.....	13

Audit Overview

Apache Ranger provides a centralized framework for collecting access audit history and reporting data, including filtering on various parameters. Ranger enhances audit information obtained from Hadoop components and provides insights through this centralized reporting capability.

Managing Auditing with Ranger

To explore options for auditing policies in Ranger, click Audit in the top menu.

Exclude Service Users : ☐

Entries : 1 to 25 of 149 Last Updated Time : 07/21/2019 12:24:11 PM

Policy ID	Policy Version	Event Time	Application	User	Service Name / Type	Resource Name / Type	Access Type	Result	Access Enforcer	Agent Host Name	Client IP	C
3	1	07/21/2019 12:21:35 PM	hbaseMaster	hbase	cm_hbase hbase	--	balance	Allowed	ranger-acl	dhoyle-7-1-1.vpc.cloudera.com		C
3	1	07/21/2019 12:16:30 PM	hbaseMaster	hbase	cm_hbase hbase	--	balance	Allowed	ranger-acl	dhoyle-7-1-1.vpc.cloudera.com		C
3	1	07/21/2019 12:11:30 PM	hbaseMaster	hbase	cm_hbase hbase	--	balance	Allowed	ranger-acl	dhoyle-7-1-1.vpc.cloudera.com		C
3	1	07/21/2019 12:06:30 PM	hbaseMaster	hbase	cm_hbase hbase	--	balance	Allowed	ranger-acl	dhoyle-7-1-1.vpc.cloudera.com		C

There are six tabs on the Audit page:

- Access
- Admin
- Login sessions
- Plugins
- Plugin Status
- User Sync

View audit details

How to view operation details in Ranger audits.

Procedure

To view details for a particular operation, click any tab, then Policy ID, Operation name, or Session ID.

Audit > Admin: Update

Ranger
Access Manager
Audit
Security Zone
Settings
admin

Access
Admin
Login Sessions
Plugins
Plugin Status
User Sync

START DATE: 07/21/2019

Exclude Service Users: ☐

Entries: 1 to 25 of 25

Policy ID	Policy Version	Event Time	Application	User	Service Name / Type	Resource Name / Type	Access Type	Result	Access	Access	Access
3	1	07/21/2019 12:51:30 PM	hbaseMaster	hbase	cm_hbase hbase	--	balance	Allowed	ranger-		
3	1	07/21/2019 12:46:30 PM	hbaseMaster	hbase	cm_hbase hbase	--	balance	Allowed	ranger-		
3	1	07/21/2019 12:41:30 PM	hbaseMaster	hbase	cm_hbase hbase	--	balance	Allowed	ranger-acl	dhoyle-7-1-1.vpc.cloudera.com	C
3	1	07/21/2019 12:36:30 PM	hbaseMaster	hbase	cm_hbase hbase	--	balance	Allowed	ranger-acl	dhoyle-7-1-1.vpc.cloudera.com	C
3	1	07/21/2019 12:31:31 PM	hbaseMaster	hbase	cm_hbase hbase	--	balance	Allowed	ranger-acl	dhoyle-7-1-1.vpc.cloudera.com	C
3	1	07/21/2019 12:26:30 PM	hbaseMaster	hbase	cm_hbase hbase	--	balance	Allowed	ranger-acl	dhoyle-7-1-1.vpc.cloudera.com	C

Policy Details

Service Name : cm_hbase
Service Type : hbase

Policy Details :

Policy Type

Policy ID

Version

Policy Name

HBase Table

HBase Column-family

HBase Column

Description

Audit Logging

Policy Labels

Access

3

1

all - table, column-family, column

Enabled

Includes

Includes

Policy for all - table, column-family, column

Yes

--

Allow Condition :

Version 1

OK

The screenshot shows the RANGER Admin interface's Access Logs section. At the top, there are navigation tabs for Access, Admin, Login Sessions, Plugins, Plugin Status, and User Sync. Below these is a search bar labeled "Search for your access logs...". On the right, it indicates "Entries : 1 to 25 of 70" and "Last Updated Time : [07/21/2019 01:09:40 PM]".

Operation	Audit Type	User	Date (Eastern Daylight Time)	Actions	Session Id
Service updated tag_service2	Ranger Service	admin	07/21/2019 01:09:34 PM	[Update]	48
Group created temp_employees	Ranger Group	admin	07/20/2019 02:15:05 PM	[Create]	30
Group created audit	Ranger Group	admin	07/18/2019 04:18:42 PM	[Create]	35
Export policies	Ranger Policy	admin	07/17/2019 03:06:22 PM	[Export JSON]	32
Service updated tag_service1	Ranger Service		07/15/2019 04:11:25 PM	[Update]	
Policy created EXPIRES_ON	Ranger Policy		07/15/2019 04:11:25 PM	[Create]	
Service created [REDACTED]	Ranger Service		07/15/2019 04:11:25 PM	[Create]	

Operation : update

Name : tag_service2

Date : 07/21/2019 01:09:34 PM Eastern Daylight Time

Updated By : admin

Service Details :

Fields	Old Value	New Value
Service Description	--	--
Service Name	tag_tag	tag_service2

[OK]

[Ranger](#)
[Access Manager](#)
[Audit](#)
[Security Zone](#)
[Settings](#)
admin

[illegible]

Audit > User Sync: Sync details

The screenshot shows the Ranger web interface with the 'User Sync' tab selected. A search bar at the top indicates 'START DATE: 07/21/2019'. Below the search bar, a status bar shows 'Entries: 1 to 25 of 803' and 'Last Updated Time: 07/21/2019 01:23:45 PM'. The main table displays sync events for 'rangerusersync' from a 'Unix' source. The table columns are: User Name, Sync Source, Number Of New (Users, Groups), Number Of Modified (Users, Groups), Event Time, and Sync Details. A modal window titled 'Sync Details' is open, showing the following information:

Name	Value
Unix	nss
File Name	/etc/passwd
Sync time	07/21/2019 10:21:48 AM
Last modified time	12/31/1969 04:00:00 PM
Minimum user id	500
Minimum group id	0
Total number of users synced	35
Total number of groups synced	39

Create a read-only Admin user (Auditor)

Creating a read-only Admin user (Auditor) enables compliance activities because this user can monitor policies and audit events, but cannot make changes.

About this task

When a user with the Auditor role logs in, they see a read-only view of Ranger policies and audit events. An Auditor can search and filter on access audit events, and access and view all tabs under Audit to understand access events. They cannot edit users or groups, export/import policies, or make changes of any kind.

Procedure

1. Select Settings > Users/Groups/Roles.
2. Click Add New User.

3. Complete the **User Detail** section, selecting Auditor as the role:

The screenshot shows the Ranger web interface for creating a user. The top navigation bar includes 'Ranger', 'Access Manager', 'Audit', 'Security Zone', and 'Settings'. The user 'admin' is logged in. The breadcrumb trail is 'Users/Groups/Roles > User Create'. The 'User Detail' section contains the following fields:

- User Name *: auditor1
- New Password *: [masked]
- Password Confirm *: [masked]
- First Name *: Audrey
- Last Name: [empty]
- Email Address: [empty]
- Select Role *: Auditor (selected from a dropdown)
- Group: audit (with a '+' button to add more groups)

At the bottom of the form are 'Save' and 'Cancel' buttons.

4. Click Save.

Ranger Audit Filters (Technical Preview)

You can use Ranger audit filters to control the amount of audit log data collected and stored on your cluster.

About Ranger audit filters

Ranger audit filters allow you to control the amount of audit log data for each Ranger service. Audit filters are defined using a JSON string that is added to each service configuration. The audit filter JSON string is a simplified form of the Ranger policy JSON.



Important:

Ranger Audit Filters is available for technical preview and considered to be under development. Do not use this feature in your production systems. If you have questions regarding Ranger Audit Filters, contact support by logging a case on the [Cloudera Support Portal](#).

Ranger audit filters format

Audit filters consist of a subset of Ranger policy attributes, along with access results attributes. These attributes define the audit filter rules.

```
{'resources':
{
  'database':{'values':['data','data2']},
  'table':{'values':['*']},
  'column':{'values':['*']}
},
'accessTypes':['select','insert'],
'users':['user1','user2'],
'groups':['no_audit_group'],
'roles':['role1','role2'],
'actions':['METADATA OPERATION','SHOW_ROLES'],
'accessResult': 'DENIED' or 'ALLOWED' or 'NOT_DETERMINED' or empty
```

```
'isAudited' : false
}
```

Ranger audit filters configuration

Ranger audit filters are configured by adding the audit filter JSON string as the value of the `ranger.plugin.audit.filters` configuration property in each Ranger service.

To configure resource-based audit filters, click the Edit icon for the applicable service in the Ranger Admin web UI. On the Edit Service page, click the Add (+) icon under Add New Configurations, then enter `ranger.plugin.audit.filters` in the Name box, and enter the audit filter JSON string in the Value box.

The screenshot shows the Ranger Admin web UI for editing a service. The 'Add New Configurations' table is as follows:

Name	Value	
tag.download.auth.users	hdfs	✕
policy.download.auth.use	hdfs	✕
ranger.plugin.audit.filters	{ 'accessResult': 'DENIED' }	✕

To configure tag-based audit filters, click the Edit icon for the applicable tag-based service in the Ranger Admin web UI. On the Edit Service page, click the Add (+) icon under Add New Configurations, then enter `ranger.plugin.audit.filters` in the Name box, and enter the audit filter JSON string in the Value box.

Ranger Access Manager Audit Security Zone Settings admin

Service Manager Edit Service

Edit Service

Service Details :

Service Name *

Display Name

Description

Active Status ☒ Enabled ☐ Disabled

Config Properties :

Add New Configurations

Name	Value
ranger.plugin.audit.filters	[{resources:{tag:{value

+

Test Connection

Save Cancel Delete

HDFS service audit filters example:

```
"serviceConfig": {
  "ranger.plugin.audit.filters":
  "[
    { 'accessResult': 'DENIED', 'isAudited': true},
    { 'users': ['unaudited-user1'], 'groups': ['unaudited-group1'], 'roles':
    ['unaudited-role1'], 'isAudited': false},
    { 'actions': [ 'listStatus', 'getfileinfo' ], 'accessTypes':['execute'],
    'isAudited': false},
    { 'resources': { 'path': { 'values': [ '/audited' ], 'isRecursive': true },
    'isAudited': true },
    { 'resources': { 'path': { 'values': [ '/unaudited' ], 'isRecursive': true },
    'isAudited': false }
  ]"
}
```

Hive service audit filters example:

```
"serviceConfig": {
  "ranger.plugin.audit.filters":
  "[ { 'accessResult': 'DENIED', 'isAudited': true},
    { 'resources': { 'database': { 'values': [ 'temp' ] }, 'table': { 'values': [ 'tempdata' ] },
    'column': { 'values': [ '*' ] }, 'isAudited': false },
    { 'resources': { 'database': { 'values': [ 'sys' ] }, 'table': { 'values': [ 'dump' ] },
    'users': [ 'user2' ], 'isAudited': false },
    { 'actions': [ 'METADATA OPERATION' ], 'isAudited': false },
  ]"
```

```
{'users':['superuser1'],'groups':['supergroup1'], 'isAudited': false} ]"
```

Tag-based service audit filters example:

```
"serviceConfig": {
  "ranger.plugin.audit.filters": "[ {'resources':{'tag':{'values':['NO_AUDIT']}}, 'isAudited': false},
  {'resources':{'tag':{'values':['SYS_DATA']}}, 'users':['user1'], 'isAudited':false},
  {'resources':{'tag':{'values':['HIPPA']}}, 'users':['user1'], 'isAudited':true} ]"
```

Audit filters details

- As shown in the examples above, audit filters are defined as a JSON list.
- When adding the JSON string to the Value box in each service configuration, you should only enter the text within the top-level brackets, as `ranger.plugin.audit.filters` is already set in the Name box in the UI. For the HDFS example above, you would enter:

```
[ {'accessResult': 'DENIED', 'isAudited': true},
  {'users': ['unaudited-user1'], 'groups': ['unaudited-group1'], 'roles': ['unaudited-role1'], 'isAudited': false},
  {'actions': [ 'listStatus', 'getfileinfo' ], 'accessTypes':['execute'], 'isAudited': false},
  {'resources':{'path':{'values':['/audited'],'isRecursive':true}}, 'isAudited': true},
  {'resources':{'path':{'values':['/unaudited'],'isRecursive':true}}, 'isAudited': false} ]
```

- Each value in the list is an audit filter, which takes the format of a simplified Ranger policy, along with access results fields.
- Audit filters are defined with rules on Ranger policy attributes and access result attributes.
 - Policy attributes: resources, users, groups, roles, accessTypes
 - Access result attributes: isAudited, actions, accessResult
- The following audit filter specifies that `accessResult=DENIED` will be audited. The `isAudited` flag specifies whether or not to audit.

```
{'accessResult': 'DENIED', 'isAudited': true}
```

- The following audit filter specifies that “resource => /unaudited” will not be audited.

```
{'resources':{'path':{'values':['/unaudited'],'isRecursive':true}, 'isAudited': false}
```

- The following audit filter specifies that access to resource `database=> sys table=> dump` by user “use2” will not be audited.

```
{'resources':{'database':{'values':['sys']}, 'table':{'values':dump}}, 'users':['user2'], 'isAudited': false }
```

- The following audit filter specifies that access result in actions => listStatus, getFileInfo and accessType => execute will not be audited.

```
{'actions': [ 'listStatus', 'getFileinfo' ], 'accessTypes':['execute'],
'isAudited': false}
```

- The following audit filter specifies that access by user "superuser1" and group "supergroup1" will not be audited.

```
{'users':['superuser1'], 'groups':['supergroup1'], 'isAudited': false}
```

- The following audit filter specifies that access to any resource tagged as NO_AUDIT will not be audited.

```
{'resources':{'tag':{'values':['NO_AUDIT']}}, 'isAudited': false}
```

Default audit filters

You can create default audit filters for each Ranger service, which can then be modified as needed by Admin users.

HDFS service:

```
"ranger.plugin.audit.filters":
"[ { 'accessResult': 'DENIED', 'isAudited': true},
{ 'resources': { 'path': { 'values': [ '/hive-staging', '/staging', '/sparkStaging',
'/_impala_insert_staging', '/user/history/done_intermediate', '/user/spark/s
park2ApplicationHistory',
'/user/spark/ApplicationHistory', '/user/hue/.cloudera_manager_hive_metast
ore_canary',
'/user/hue/.Trash/Current/user/hue/.cloudera_manager_hive_metastore_canary',
'/tmp', '/user/oozie/share/lib', '/hbase/archive', '/hbase/oldWALS', '/hba
se/MasterProcWALS' ],
'isRecursive': true } }, 'isAudited': false }, { 'actions': [ 'delete', 'rename' ],
'isAudited': true },
{ 'users': [ 'cloudera-scm', 'dr.who', 'hbase', 'hive', 'impala', 'mapred', 'solr', 's
park', 'hue' ],
'isAudited': false }, { 'users': [ 'hdfs' ], 'actions': [ 'listStatus', 'getFileinf
o', 'listCachePools',
'listCacheDirectives' ], 'isAudited': false }, { 'actions': [ 'getFileinfo' ],
'isAudited': true } ]"
```

HBase service:

```
"ranger.plugin.audit.filters": "[ { 'resources': { 'table': { 'values': [ '*-ROOT-*',
'*_META.*', '*_acl_*',
'hbase:meta', 'hbase:acl' ] } }, 'isAudited': false }, { 'resources': { 'table': { '
values': [ 'atlas_janus',
'ATLAS_ENTITY_AUDIT_EVENTS' ] }, 'column-family': { 'values': [ '*' ] }, 'column': { 'va
lues': [ '*' ] } },
'isAudited': false }, { 'users': [ 'hbase' ], 'actions': [ 'balance' ], 'isAudited':
false } ]"
```

Hive service:

```
"ranger.plugin.audit.filters": "[ { 'accessResult': 'DENIED', 'isAudited': tr
ue }, { 'accessTypes': [ '_any' ],
'isAudited': false }, { 'actions': [ 'METADATA OPERATION' ], 'isAudited': false },
{ 'users': [ 'hive', 'hue' ],
'actions': [ 'SHOW_ROLES' ], 'isAudited': false } ]"
```

Kafka service:

```
"ranger.plugin.audit.filters": "[{'resources': {'consumergroup': {'values': ['atlas', 'ranger_entities_consumer']}}, 'isAudited': false}, {'resources': {'topic': {'values': ['ATLAS_*']}}, 'isAudited': false}, {'users': ['rangertagsync', 'kafka', 'atlas'], 'isAudited': false}]"
```

ADLS service:

```
"ranger.plugin.audit.filters": "[ {'accessResult': 'DENIED', 'isAudited': true}, {'users': ['hive', 'hdfs', 'zeppelin', 'hbase', 'solr', 'kafka'], 'isAudited': false} ]"
```

Changing Ranger audit storage location and migrating data

How to change the location of existing and future Ranger audit data collected by Solr from HDFS to local or from local to HDFS.

Before you begin

- Stop Atlas from Cloudera Manager.
- If using Kerberos, set the SOLR_PROCESS_DIR environment variable.

```
# export SOLR_PROCESS_DIR=$(ls -ldtr /var/run/cloudera-scm-agent/process/*SOLR_SERVER | tail -1)
```

About this task

Starting with Cloudera Runtime version 7.1.4 / 7.2.2, the storage location for ranger audit data collected by Solr changed to local file system from HDFS, as was true for previous versions. The default storage location Ranger audit data storage location for Cloudera Runtime-7.1.4+ and Cloudera Runtime-7.2.2+ installations is local file system. After upgrading from an earlier Cloudera platform version, follow these steps to backup and migrate your Ranger audit data and change the location where Solr stores your future Ranger audit records.

- The default value of the index storage in the local file system is /var/lib/solr-infra. You can configure this, using Cloudera Manager Solr Configuration "Solr Data Directory" .
- The default value of the index storage in HDFS is /solr-infra. You can configure this, using Cloudera Manager Solr Configuration "HDFS Data Directory" .

Procedure

1. Create HDFS Directory to store the collection backups.

As an HDFS super user, run the following commands to create the backup directory:

```
# hdfs dfs -mkdir /solr-backups
# hdfs dfs -chown solr:solr /solr-backups
```

2. Obtain valid kerberos ticket for Solr user.

```
# kinit -kt solr.keytab solr/$(hostname -f)
```

3. Download the configs for the collection.

```
# solrctl instancedir --get ranger_audits /tmp/ranger_audits
```

```
# solrctl instancedir --get atlas_configs /tmp/atlas_configs
```

4. Modify the solrconfig.xml for each of the configs for which data needs to be stored in HDFS.

In /tmp/<config_name>/conf created during Step 3., edit properties in the solrconfig.xml file as follows:

- When migrating your data storage location from local file system to HDFS, replace these two lines:

```
<directoryFactory name="DirectoryFactory"
  class="${solr.directoryFactory:solr.NRTCachingDirectoryFactory}">
<lockType>${solr.lock.type:native}</lockType>
```

with

```
<directoryFactory name="DirectoryFactory"
  class="${solr.directoryFactory:org.apache.solr.core.HdfsDirectoryFactory}">
<lockType>${solr.lock.type:hdfs}</lockType>
```

- When migrating your data storage location from HDFS to local file system, replace these two lines:

```
<directoryFactory name="DirectoryFactory"
  class="${solr.directoryFactory:org.apache.solr.core.HdfsDirectoryFactory}">
<lockType>${solr.lock.type:hdfs}</lockType>
```

with

```
<directoryFactory name="DirectoryFactory"
  class="${solr.directoryFactory:solr.NRTCachingDirectoryFactory}">
<lockType>${solr.lock.type:native}</lockType>
```

5. Update the modified configs in Zookeeper.

```
# solrctl --jaas $SOLR_PROCESS_DIR/jaas.conf instancedir --update
atlas_configs /tmp/atlas_configs
```

```
# solrctl --jaas $SOLR_PROCESS_DIR/jaas.conf instancedir --update
ranger_audits /tmp/ranger_audits
```

6. Backup the Solr collections.

- When migrating your data storage location from local file system to HDFS, run:

```
# curl -k --negotiate -u : "https://$(hostname
-f):8995/solr/admin/collections?action=BACKUP&name=vertex_backup&col
lection=vertex_index&
location=hdfs://<Namenode_Hostname>:8020/solr-backups"
```

In the preceding command, the important points are name, collection, and location:

name

specifies the name of the backup. It should be unique per collection

collection

specifies the collection name for which the backup will be performed

location

specifies the HDFS path, where the backup will be stored

Repeat the curl command for different collections, modifying the parameters as necessary for each collection.

The expected output would be -

```
"responseHeader":{
```

```
"status":0,
"QTime":10567},
"success":{
  "Solr_Server_Hostname:8995_solr":{
    "responseHeader":{
      "status":0,
      "QTime":8959}}}}
```

- When migrating your data storage location from HDFS to local file system:

Refer to Back up a Solr collection for specific steps, and make the following adjustments:

- If TLS is enabled for the Solr service, specify the trust store and password by using the ZKCLI_JVM_FLAGS environment variable before you begin the procedure.

```
# export ZKCLI_JVM_FLAGS="-Djavax.net.ssl.trustStore=/path/to/
truststore.jks -Djavax.net.ssl.trustStorePassword="
```

- Create Snapshot

```
# solrctl --jaas $SOLR_PROCESS_DIR/jaas.conf collection --create-
snapshot <snapshot_name> -c <collection_name>
```

- or use the Solr API to take the backup:

```
curl -i -k --negotiate -u : "https://(hostname -f):8995/solr/admin/
collections?
action=BACKUP&name=ranger_audits_bkp&collection=ranger_audits&location=/
path/to/solr-backups"
```

- Export Snapshot

```
# solrctl --jaas $SOLR_PROCESS_DIR/jaas.conf collection
--export-snapshot <snapshot_name> -c <collection_name> -d
<destination_directory>
```



Note: The <destination_directory> is a HDFS path. The ownership of this directory should be solr:solr.

7. Delete the collections from the original location.

All instances of Solr service should be up, running, and healthy before deleting the collections. Use Cloudera Manager to check for any alerts or warnings for any of the instances. If alerts or warnings exist, fix those before deleting the collection.

```
# solrctl collection --delete edge_index
# solrctl collection --delete vertex_index
# solrctl collection --delete fulltext_index
# solrctl collection --delete ranger_audits
```

8. Verify that the collections are deleted from the original location.

```
# solrctl collection --list
```

This will give an empty result.

9. Verify that no leftover directories for any of the collections have been deleted.

- When migrating your data storage location from local file system to HDFS:

```
# cd /var/lib/solr-infra
```

Get the value of "Solr Data Directory, using Cloudera Manager Solr Configuration .

```
# ls -ltr
```

- When migrating your data storage location from HDFS to local file system, replace these two lines:

```
# hdfs dfs -ls /solr/<collection_name>
```



Note: If any directory name which starts with the collection name deleted in Step 7. exists, delete/ move the directory to another path.

10. Restore the collection from backup to the new location.

Refer to Restore a Solr collection, for more specific steps.

```
# curl -k --negotiate -u : "https://$(hostname -f):8995/solr/admin/collections?
action=RESTORE&name=<Name_of_backup>&location=hdfs:/
<<Namenode_Hostname>:8020/solr-backups&collection=<Collection_Name>"
```

```
# solrctl collection --restore ranger_audits
-l hdfs://<Namenode_Hostname>:8020/solr-backups
-b ranger_backup -i ranger1
```

The request id must be unique for each restore operation, as well as for each retry.

To check the status of restore operation:

```
# solrctl collection --request-status <requestId>
```



Note: If the Atlas Collections (vertex_index, fulltext_index and edge_index) restore operations fail, restart the solr service and rerun the restore command. Now, the restart operations should complete successfully.

11. Verify the Atlas & Ranger functionality.

Verify that both Atlas and Ranger audits functions properly, and that you can see the latest audits in Ranger Web UI and latest lineage in Atlas.

- To verify Atlas audits, create a test table in Hive, and then query the collections to see if you are able to view the data.
- You can also query the collections every 20-30 seconds (depending on how other services utilize Atlas/ Ranger), and verify if the "numDocs" value increases at every query.

```
# curl -k --negotiate -u : "https://$(hostname -f):8995/solr/edge_index/
select?q=%3A*&wt=json&ident=true&rows=0"
# curl -k --negotiate -u : "https://$(hostname -f):8995/solr/vertex_index/
select?q=%3A*&wt=json&ident=true&rows=0"
# curl -k --negotiate -u : "https://$(hostname -f):8995/solr/
fulltext_index/select?q=%3A*&wt=json&ident=true&rows=0"
# curl -k --negotiate -u : "https://$(hostname -f):8995/solr/
ranger_audits/select?q=%3A*&wt=json&ident=true&rows=0"
```