Use Astra Data Store

Astra Data Store

NetApp
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Manage Astra Data Store preview assets with kubectl commands

You can manage Astra Data Store preview assets by using kubectl commands and by using the Kubernetes API extension.

To learn how to deploy a sample app, see Deploy a test application.

For the following cluster maintenance information, see Manage the cluster:

- Place a node in maintenance mode
- Replace a drive
- Add a node
- Replace a node

What you'll need

- The Astra Data Store preview kubectl plugin you installed in Install Astra Data Store preview

List Kubernetes custom API resources for Astra Data Store preview

You can use kubectl commands inside of Kubernetes to interact with and observe the state of your Astra Data Store preview cluster.

Each item listed from the `api-resources` command represents a Kubernetes custom resource definition (CRD) that Astra Data Store preview uses internally to manage your cluster.

This list is particularly helpful to get shortnames of each Astra Data Store preview object to reduce your typing, as shown later.

1. Display a list of Kubernetes custom API resources for Astra Data Store preview :

   ```
   kubectl api-resources --api-group astrads.netapp.io
   ```

   Response:

```
NAME                    SHORTNAMES  APIGROUP            NAMESPACED  KIND
astradsversions          adsve      astrads.netapp.io   true
AstraDSVersion
astradsclusters          adscl      astrads.netapp.io   true
AstraDSCluster
astradslicenses          adsli      astrads.netapp.io   true
AstraDSLicense
astradsnodeinfoes        adsni      astrads.netapp.io   true
AstraDSNodeInfo
astradsvolumes           adsvo      astrads.netapp.io   true
AstraDSVolume
astradsqospolicies       adsqp      astrads.netapp.io   true
AstraDSQosPolicy
astradsexportpolicies    adsep      astrads.netapp.io   true
AstraDSExportPolicy
astradsvolumesnapshots   adsvs      astrads.netapp.io   true
AstraDSVolumeSnapshot
astradsvolumefiles       adsvf      astrads.netapp.io   true
AstraDSVolumeFiles
astradsautosupports      adsas      astrads.netapp.io   true
AstraDSAutoSupport
astradsfaileddrives      adsfd      astrads.netapp.io   true
AstraDSFailedDrive
astradsnodemanagements   adsnm      astrads.netapp.io   true
AstraDSNodeManagement
```

2. To get all the current Astra Data Store preview objects in your Kubernetes cluster, use the `kubectl get ads -A` command:

```
kubectl get ads -A
```

Response:

```
NAMESPACE        NAME                                          AGE
astrads-system   astradsqospolicy.astrads.netapp.io/bronze   45h
astrads-system   astradsqospolicy.astrads.netapp.io/gold     45h
astrads-system   astradsqospolicy.astrads.netapp.io/silver   45h

NAMESPACE        NAME
STATUS    VERSION       SERIAL NUMBER   MVIP           AGE
astrads-system   astradscluster.astrads.netapp.io/astrads-cluster-9f1
created   arda-9.11.1   e000000009      10.224.8.146   46h

NAMESPACE        NAME
```

```
AGE
astrads-system   astradsnodeinfo.astrads.netapp.io/englab.netapp.com
46h
astrads-system   astradsnodeinfo.astrads.netapp.io/englab.netapp.com
46h
astrads-system   astradsnodeinfo.astrads.netapp.io/englab.netapp.com
46h
astrads-system   astradsnodeinfo.astrads.netapp.io/englab.netapp.com
46h

NAMESPACE        NAME                                                AGE
astrads-system   astradsversion.astrads.netapp.io/astradsversion   46h

NAMESPACE        NAME                                               AGE
astrads-system   astradsvolumefiles.astrads.netapp.io/test23     27h
astrads-system   astradsvolumefiles.astrads.netapp.io/test234    27h
astrads-system   astradsvolumefiles.astrads.netapp.io/test2345   4h22m

NAMESPACE        NAME                                        SIZE   IP
CLUSTER             CREATED
astrads-system   astradsvolume.astrads.netapp.io/test234    21Gi
172.25.123.123   astrads-cluster-9f1  true
astrads-system   astradsvolume.astrads.netapp.io/test2345   21Gi
172.25.123.123   astrads-cluster-9f1  true

NAMESPACE        NAME
SEQUENCE COMPONENT      EVENT                    TRIGGER   PRIORITY  SIZE
STATE
astrads-system   astradsautosupport.astrads.netapp.io/controlplane-
adsclustercreatesuccess-20211214t 9        controlplane
adsclustercreatesuccess k8sEvent  notice    0      uploaded
astrads-system   astradsautosupport.astrads.netapp.io/controlplane-
daily-20211215t0                  15       controlplane   daily
periodic  notice    0      uploaded
astrads-system   astradsautosupport.astrads.netapp.io/controlplane-
daily-20211216t0                  20       controlplane   daily
periodic  notice    0      uploaded
astrads-system   astradsautosupport.astrads.netapp.io/storage-
callhome.dbs.cluster.cannot.sync.blocks 10      storage
callhome.dbs.cluster.cannot.sync.blocks   firetapEvent   emergency   0
uploaded

NAMESPACE        NAME                                    ADSCLUSTER
VALID PRODUCT          EVALUATION ENDDATE    VALIDATED
astrads-system   astradslicense.astrads.netapp.io/e0   astrads-cluster-
9f1 true  Astra Data Store true       2022-02-07 2021-12-16T20:43:23Z
```

3. Use one of the short names to show the current state of volumes in the cluster:

```
kubectl get adsvo -A
```

Response:

```
NAMESPACE        NAME       SIZE   IP               CLUSTER
CREATED
astrads-system   test234    21Gi   172.25.138.109   astrads-cluster-
9f1c99f   true
astrads-system   test2345   21Gi   172.25.138.111   astrads-cluster-
9f1c99f   true
```

Use the help option on the kubectl extension

The `kubectl astrads` command includes an `-h` switch that provides usage and flag documentation for your convenience.

1. Show help for all commands in the Astra Data Store preview kubectl extension:

```
kubectl astrads -h
```

Response:

```
A kubectl plugin for inspecting your AstraDS deployment

Usage:
  astrads [command]

Available Commands:
  asup        Manage AutoSupport
  clusters    Manage clusters
  drives      Manage drives in a cluster
  faileddrive Manage drive replacement in a cluster
  help        Help about any command
  license     Manage license in the astrads cluster
  maintenance Manage maintenance status of a node
  monitoring  Manage Monitoring Output
  nodes       Manage nodes in a cluster

Flags:
      --as string                      Username to impersonate for the
operation
```

```
      --as-group stringArray           Group to impersonate for the
operation, this flag can be
                                         repeated to specify multiple
groups.
      --cache-dir string               Default HTTP cache directory
                                         (default "/u/arda/.kube/http-
cache")
      --certificate-authority string   Path to a cert file for the
certificate authority
      --client-certificate string      Path to a client certificate file
for TLS
      --client-key string              Path to a client key file for TLS
      --cluster string                 The name of the kubeconfig
cluster to use
      --context string                 The name of the kubeconfig
context to use
  -h, --help                           help for astrads
        --insecure-skip-tls-verify       If true, the server's
certificate will not be checked
                                         for validity. This will make
your HTTPS connections insecure
        --kubeconfig string              Path to the kubeconfig file to
use for CLI requests.
    -n, --namespace string               If present, the namespace scope
for this CLI request
        --request-timeout string         The length of time to wait
before giving up on a single
                                         server request. Non-zero values
should contain a
                                         corresponding time unit (e.g.
1s, 2m, 3h).
                                         A value of zero means don't
timeout requests.
                                         (default "0")
    -s, --server string                  The address and port of the
Kubernetes API server
        --token string                   Bearer token for authentication
to the API server
        --user string                    The name of the kubeconfig user
to use
```

2. Use `astrads [command] --help` for more information about a command.

```
kubectl astrads asup collect --help
```

Response:

```
  Collect the autosupport bundle by specifying the component to collect.
It will default to manual event.

  Usage:
    astrads asup collect [flags]

  Examples:
    # Control plane collection
      kubectl astrads collect --component controlplane example1

      # Storage collection for single node
      kubectl astrads collect --component storage --nodes node1 example2

      # Storage collection for all nodes
      kubectl astrads collect --component storage --nodes all example3

      # Collect but don't upload to support
      kubectl astrads collect --component controlplane --local example4

      NOTE:
      --component storage and --nodes <name> are mutually inclusive.
      --component controlplane and --nodes <name> are mutually
exclusive.

    Flags:
      -c, --component string     Specify the component to collect:
[storage , controlplane , vasaprovider, all]
      -d, --duration int         Duration is the duration in hours from
the startTime for collection
                                   of AutoSupport.
                                   This should be a positive integer
      -e, --event string         Specify the callhome event to trigger.
(default "manual")
      -f, --forceUpload          Configure an AutoSupport to upload if
it is in the compressed state
                                   and not
                                   uploading because it was created with
the 'local' option or if
                                   automatic uploads of AutoSupports is
disabled
                                   at the cluster level.
      -h, --help                 help for collect
      -l, --local                Only collect and compress the
autosupport bundle. Do not upload
```

```
                                    to support.
                                    Use 'download' to copy the collected
bundle after it is in
                                    the 'compressed' state
           --nodes string           Specify nodes to collect for storage
component. (default "all")
      -t, --startTime string     StartTime is the starting time for
collection of AutoSupport.
                                    This should be in the ISO 8601 date
time format.
                                    Example format accepted:
                                    2021-01-01T15:20:25Z, 2021-01-
01T15:20:25-05:00
      -u, --usermessage string   UserMessage is the additional message
to include in the
                                    AutoSupport subject.
                                    (default "Manual event trigger from
CLI")
```

Deploy a test application

Here are steps to deploy a test application that you can use with Astra Data Store preview.

In this example, we use a Helm repository to deploy a MongoDB chart from Bitnami.

What you'll need

- Astra Data Store preview cluster deployed and configured
- Trident installation completed

Steps

1. Add a Helm repo from Bitnami:

```
helm repo add bitnami https://charts.bitnami.com/bitnami
```

2. Deploy MongoDB:

```
helm install mongohelm4 --set persistence.storageClass=trident-csi
bitnami/mongodb --namespace=ns-mongodb --create-namespace
```

3. Check the status of the MongoDB pod:

```
~% kubectl get pods -n ns-mongodb
NAME                       READY   STATUS    RESTARTS   AGE
mongodb-9846ff8b7-rfr4r   1/1     Running   0          67s
```

4. Verify the persistent volume claim (PVC) used by MongoDB:

```
~% kubectl get pvc -n ns-mongodb
NAME      STATUS   VOLUME                   CAPACITY   ACCESS MODES
STORAGECLASS   AGE
mongodb   Bound    pvc-1133453a-e2f5-48a5  8Gi        RWO
trident-csi    97s
```

5. List the volume by using the kubectl command `get astradsvolume`:

```
~% kubectl get astradsvolume pvc-1133453a-e2f5-48a5 -n astrads-system
NAME                     SIZE        IP            CLUSTER      CREATED
pvc-1133453a-e2f5-48a5   8830116Ki   10.192.2.192   jai-ads      true
```

6. Describe the volume by using the kubectl command `describe astradsvolume`:

```
~% kubectl describe astradsvolume pvc-1133453a-e2f5-48a5 -n astrads-
system
Name:         pvc-1133453a-e2f5-48a5-a06c-d14b8aa7be07
Namespace:    astrads-system
Labels:       astrads.netapp.io/cluster=jai-ads
              astrads.netapp.io/mip=10.192.1.39
              astrads.netapp.io/volumeUUID=cf33fd38-a451-596c-b656-
61b8270d2b5e
              trident.netapp.io/cloud=on-prem
              trident.netapp.io/creator=trident-dev
             trident.netapp.io/performance=premium
Annotations:  provisioning: {"provisioning":{"cloud":"on-
prem","creator":"trident-dev","performance":"premium"}}
              trident:
                {"trident":{"version":"21.10.0-test.jenkins-trident-
stable-v21.10-
2+e03219ce37294d9ba54ec476bbe788c1a7772548","backendUUID":"","platform":
...
API Version:  astrads.netapp.io/v1alpha1
Kind:         AstraDSVolume
Metadata:
  Creation Timestamp:  2021-12-08T19:35:26Z
```

```
  Finalizers:
    trident.netapp.io/astradsvolume-finalizer
    astrads.netapp.io/astradsvolume-finalizer
  Generation:  1
  Managed Fields:
    API Version:  astrads.netapp.io/v1alpha1
    Fields Type:  FieldsV1
    fieldsV1:
      f:metadata:
        f:labels:
          f:astrads.netapp.io/cluster:
          f:astrads.netapp.io/mip:
          f:astrads.netapp.io/volumeUUID:
      f:status:
        .:
        f:cluster:
        f:conditions:
        f:created:
        f:displayName:
        f:exportAddress:
        f:internalName:
        f:mip:
        f:permissions:
        f:qosPolicy:
        f:requestedSize:
        f:restoreCacheSize:
        f:size:
        f:snapshotReservePercent:
        f:state:
        f:volumePath:
        f:volumeUUID:
    Manager:      cluster-controller
    Operation:    Update
    Time:         2021-12-08T19:35:32Z
    API Version:  astrads.netapp.io/v1alpha1
    Fields Type:  FieldsV1
    fieldsV1:
      f:status:
        f:exportPolicy:
    Manager:      dms-controller
    Operation:    Update
    Subresource:  status
    Time:         2021-12-08T19:35:32Z
    API Version:  astrads.netapp.io/v1alpha1
    Fields Type:  FieldsV1
    fieldsV1:
```

```
      f:metadata:
        f:annotations:
          .:
          f:provisioning:
          f:trident:
        f:finalizers:
          v:"trident.netapp.io/astradsvolume-finalizer":
        f:labels:
          .:
          f:trident.netapp.io/cloud:
          f:trident.netapp.io/creator:
          f:trident.netapp.io/performance:
      f:spec:
        .:
        f:cluster:
        f:displayName:
        f:exportPolicy:
        f:noSnapDir:
        f:permissions:
        f:qosPolicy:
        f:size:
        f:snapshotReservePercent:
        f:type:
        f:volumePath:
    Manager:         trident_orchestrator
    Operation:       Update
    Time:            2021-12-08T19:35:34Z
  Resource Version:  12007115
  UID:               d522ae4f-e793-49ed-bbe0-9112d7f9167b
Spec:
  Cluster:                   jai-ads
  Display Name:              pvc-1133453a-e2f5-48a5-a06c-d14b8aa7be07
  Export Policy:             pvc-1133453a-e2f5-48a5-a06c-d14b8aa7be07
  No Snap Dir:               true
  Permissions:               0777
  Qos Policy:                silver
  Size:                      9042036412
  Snapshot Reserve Percent:  5
  Type:                      ReadWrite
  Volume Path:               /pvc-1133453a-e2f5-48a5-a06c-d14b8aa7be07
Status:
  Cluster:  jai-ads
  Conditions:
    Last Transition Time:    2021-12-08T19:35:32Z
    Message:                 Volume is online
    Reason:                  VolumeOnline
```

```
    Status:                  True
    Type:                    AstraDSVolumeOnline
    Last Transition Time:    2021-12-08T19:35:32Z
    Message:                 Volume creation request was successful
    Reason:                  VolumeCreated
    Status:                  True
    Type:                    AstraDSVolumeCreated
  Created:                   true
  Display Name:              pvc-1133453a-e2f5-48a5-a06c-d14b8aa7be07
  Export Address:            10.192.2.192
  Export Policy:             pvc-1133453a-e2f5-48a5-a06c-d14b8aa7be07
  Internal Name:             pvc_1133453a_e2f5_48a5_a06c_d14b8aa7be07
  Mip:                       10.192.1.192
  Permissions:               777
  Qos Policy:                silver
  Requested Size:            9042036412
  Restore Cache Size:        0
  Size:                      8830116Ki
  Snapshot Reserve Percent:  5
  State:                     online
  Volume Path:               /pvc-1133453a-e2f5-48a5-a06c-d14b8aa7be07
  Volume UUID:               cf33fd38-a451-596c-b656-61b8270d2b5e
Events:
  Type    Reason         Age   From                  Message
  ----    ------         ----  ----                  -------
  Normal  VolumeCreated  3m9s  ADSClusterController  Volume creation
request was successful
```

Manage the cluster

You can manage the cluster by using kubectl commands with Astra Data Store preview.

- Add a node
- Place a node in maintenance mode
- Replace a node
- Replace a drive

What you'll need

- System with kubectl and kubectl-astrads plugin installed. See Install Astra Data Store preview.

Add a node

The node that you are adding should be part of the Kubernetes cluster and should have a configuration that is similar to the other nodes in the cluster.

Steps

1. If the new node's dataIP is not already part of the ADSCluster CR, do the following:
   a. Edit the astradscluster CR and add the additional dataIP in the ADS Data Networks Addresses field:

      ```
      ~% kubectl edit astradscluster <cluster-name> -n astrads-system
      ```

      Response:

      ```
      adsDataNetworks:
          -addresses:  dataIP1,dataIP2,dataIP3,dataIP4,*newdataIP*
      ```

   b. Save the CR.
   c. Add the node to the Astra Data Store preview cluster:

      ```
      ~% kubectl astrads nodes add --cluster <cluster-name>
      ```

2. Otherwise, just add the nodes:

   ```
   ~% kubectl astrads nodes add --cluster <cluster-name>
   ```

3. Verify that the node has been added:

   ```
   ~% kubectl astrads nodes list
   ```

Place a node in maintenance mode

When you need to perform host maintenance or package upgrades, you should place the node in maintenance mode.

The node must already be part of the Astra Data Store preview cluster.

When a node is in maintenance mode, you cannot add a node to the cluster. In this example, we will place node `nhcitjj1525` into mainteance mode.

Steps

1. Display the node details:

   ```
   ~% kubectl get nodes
   ```

   Response:

```
NAME              STATUS   ROLES                  AGE     VERSION
nhcitjj1525       Ready    <none>                 3d18h   v1.20.0
nhcitjj1526       Ready    <none>                 3d18h   v1.20.0
nhcitjj1527       Ready    <none>                 3d18h   v1.20.0
nhcitjj1528       Ready    <none>                 3d18h   v1.20.0
scs000039783-1    Ready    control-plane,master   3d18h   v1.20.0
```

2. Ensure that the node is not already in maintenance mode:

```
~% kubectl astrads maintenance list
```

Response (there are no nodes already in maintenance mode):

```
NAME    NODE NAME  IN MAINTENANCE  MAINTENANCE STATE       MAINTENANCE
VARIANT
```

3. Enable maintenance mode.

```
~% kubectl astrads maintenance create <cr-name> --node-name=<<node
-name>> --variant=Node
```

Sample:

```
~% kubectl astrads maintenance create maint1 --node-name="nhcitjj1525"
--variant=Node
Maintenance mode astrads-system/maint1 created
```

4. List the nodes.

```
~% kubectl astrads nodes list
```

Response:

```
NODE NAME       NODE STATUS     CLUSTER NAME
nhcitjj1525     Added           ftap-astra-012
...
```

5. Check the status of the maintenance mode:

```
~% kubectl astrads maintenance list
```

Response:

```
NAME    NODE NAME       IN MAINTENANCE  MAINTENANCE STATE
MAINTENANCE VARIANT
node4   nhcitjj1525     true            ReadyForMaintenance     Node
```

The `In Maintenance` mode starts as `false` and changes to `true`.
The `Maintenance State` changes from `PreparingForMaintenance` to `ReadyforMaintenance`.

6. After the node maintenance is complete, disable maintenance mode:

```
~% kubectl astrads maintenance update maint1 --node-name="nhcitjj1525"
--variant=None
```

7. Ensure that the node is no longer in maintenance mode:

```
~% kubectl astrads maintenance list
```

Replace a node

Use kubectl commands with Astra Data Store preview to replace a failed node in a cluster.

Steps

1. List all the nodes:

```
~% kubectl astrads nodes list
```

Response:

```
NODE NAME           NODE STATUS    CLUSTER NAME
sti-rx2540-534d..   Added       cluster-multinodes-21209
sti-rx2540-535d...  Added       cluster-multinodes-21209
...
```

2. Describe the cluster:

```
~% kubectl astrads clusters list
```

Response:

```
CLUSTER NAME               CLUSTER STATUS  NODE COUNT
cluster-multinodes-21209   created         4
```

3. Verify that `Node HA` is marked as `false` on the failed node:

```
~% kubectl describe astradscluster -n astrads-system
```

Response:

```
Name:         cluster-multinodes-21209
Namespace:    astrads-system
Labels:       <none>
Annotations:  kubectl.kubernetes.io/last-applied-configuration:

{"apiVersion":"astrads.netapp.io/v1alpha1","kind":"AstraDSCluster","meta
data":{"annotations":{},"name":"cluster-multinodes-21209","namespa...
API Version:  astrads.netapp.io/v1alpha1
Kind:         AstraDSCluster

State:               Disabled
Variant:             None
Node HA:             false
Node ID:             4
Node Is Reachable:   false
Node Management IP:  172.21.192.192
Node Name:           sti-rx2540-532d.ctl.gdl.englab.netapp.com
Node Role:           Storage
Node UUID:           6f6b88f3-8411-56e5-b1f0-a8e8d0c946db
Node Version:        12.75.0.6167444
Status:              Added
```

4. Modify the astradscluster CR to remove the failed node by decrementing the value of `AdsNode Count' to 3:

```
cat manifests/astradscluster.yaml
```

Response:

```
apiVersion: astrads.netapp.io/v1alpha1
kind: AstraDSCluster
```

```
metadata:
  name: cluster-multinodes-21209
  namespace: astrads-system
spec:
  # ADS Node Configuration per node settings
  adsNodeConfig:
    # Specify CPU limit for ADS components
    # Supported value: 9
    cpu: 9
    # Specify Memory Limit in GiB for ADS Components.
    # Your kubernetes worker nodes need to have at least this much RAM
free
    # for ADS to function correctly
    # Supported value: 34
    memory: 34
    # [Optional] Specify raw storage consumption limit. The operator
will only select drives for a node up to this limit
    capacity: 600
    # [Optional] Set a cache device if you do not want auto detection
e.g. /dev/sdb
    # cacheDevice: ""
    # Set this regex filter to select drives for ADS cluster
    # drivesFilter: ".*"

  # [Optional] Specify node selector labels to select the nodes for
creating ADS cluster
  # adsNodeSelector:
  #   matchLabels:
  #     customLabelKey: customLabelValue

  # Specify the number of nodes that should be used for creating ADS
cluster
  adsNodeCount: 3

  # Specify the IP address of a floating management IP routable from any
worker node in the cluster
  mvip: "172..."

  # Comma separated list of floating IP addresses routable from any host
where you intend to mount a NetApp Volume
  # at least one per node must be specified
  # addresses: 10.0.0.1,10.0.0.2,10.0.0.3,10.0.0.4,10.0.0.5
  # netmask: 255.255.255.0
  adsDataNetworks:
    - addresses: "172..."
      netmask: 255.255.252.0
```

```
  # [Optional] Provide a k8s label key that defines which protection
domain a node belongs to
  # adsProtectionDomainKey: ""

  # [Optional] Provide a monitoring config to be used to setup/configure
a monitoring agent.
  monitoringConfig:
   namespace: "netapp-monitoring"
   repo: "docker.repo.eng.netapp.com/global/astra"

  autoSupportConfig:
    # AutoUpload defines the flag to enable or disable AutoSupport
upload in the cluster (true/false)
    autoUpload: true
    # Enabled defines the flag to enable or disable automatic
AutoSupport collection.
    # When set to false, periodic and event driven AutoSupport
collection would be disabled.
    # It is still possible to trigger an AutoSupport manually while
AutoSupport is disabled
    # enabled: true
    # CoredumpUpload defines the flag to enable or disable the upload of
coredumps for this ADS Cluster
    # coredumpUpload: false
    # HistoryRetentionCount defines the number of local (not uploaded)
AutoSupport Custom Resources to retain in the cluster before deletion
    historyRetentionCount: 25
    # DestinationURL defines the endpoint to transfer the AutoSupport
bundle collection
    destinationURL: "https://testbed.netapp.com/put/AsupPut"
    # ProxyURL defines the URL of the proxy with port to be used for
AutoSupport bundle transfer
    # proxyURL:
    # Periodic defines the config for periodic/scheduled AutoSupport
objects
    periodic:
      # Schedule defines the Kubernetes Cronjob schedule
      - schedule: "0 0 * * *"
        # PeriodicConfig defines the fields needed to create the
Periodic AutoSupports
        periodicconfig:
        - component:
            name: storage
            event: dailyMonitoring
```

```
          userMessage: Daily Monitoring Storage AutoSupport bundle
          nodes: all
        - component:
            name: controlplane
            event: daily
          userMessage: Daily Control Plane AutoSupport bundle
```

5. Verify the node is removed from the cluster:

```
~% kubectl get nodes --show-labels
```

Response:

```
NAME                  STATUS   ROLES                AGE   VERSION
LABELS
sti-astramaster-237   Ready control-plane,master   24h   v1.20.0
sti-rx2540-532d       Ready  <none>                24h   v1.20.0
sti-rx2540-533d       Ready  <none>                24h
```

```
~% kubectl astrads nodes list
```

Response:

```
NODE NAME         NODE STATUS     CLUSTER NAME
sti-rx2540-534d   Added           cluster-multinodes-21209
sti-rx2540-535d   Added           cluster-multinodes-21209
sti-rx2540-536d   Added           cluster-multinodes-21209
```

```
~% kubectl get nodes --show-labels
```

Response:

```
NAME                STATUS   ROLES                  AGE   VERSION
LABELS
sti-astramaster-237 Ready    control-plane,master   24h   v1.20.0
beta.kubernetes.io/arch=amd64,
sti-rx2540-532d     Ready    <none>                 24h   v1.20.0
astrads.netapp.io/node-removal
```

```
~% kubectl describe astradscluster -n astrads-system
```

Response:

```
Name:         cluster-multinodes-21209
Namespace:    astrads-system
Labels:       <none>
Kind:         AstraDSCluster
Metadata:
...
```

6. Add a node to the cluster for replacement by modifying the cluster CR. The node count increments to 4. Verify that new node is picked up for addition.

```
rvi manifests/astradscluster.yaml
cat manifests/astradscluster.yaml
apiVersion: astrads.netapp.io/v1alpha1
kind: AstraDSCluster
metadata:
  name: cluster-multinodes-21209
  namespace: astrads-system
```

```
~% kubectl apply -f manifests/astradscluster.yaml
```

Response:

```
astradscluster.astrads.netapp.io/cluster-multinodes-21209 configured
```

```
~% kubectl get pods -n astrads-system
```

Response:

```
NAME                                READY   STATUS    RESTARTS   AGE
astrads-cluster-controller...       1/1     Running   1          24h
astrads-deployment-support...       3/3     Running   0          24h
astrads-ds-cluster-multinodes-21209 1/1     Running
```

```
~% kubectl astrads nodes list
```

Response:

```
NODE NAME                NODE STATUS     CLUSTER NAME
sti-rx2540-534d...       Added           cluster-multinodes-21209
sti-rx2540-535d...       Added           cluster-multinodes-21209
```

```
~% kubectl astrads clusters list
```

Response:

```
CLUSTER NAME                    CLUSTER STATUS  NODE COUNT
cluster-multinodes-21209        created         4
```

```
~% kubectl astrads drives list
```

Response:

```
DRIVE NAME    DRIVE ID    DRIVE STATUS   NODE NAME     CLUSTER NAME
scsi-36000..  c3e197f2... Active         sti-rx2540... cluster-
multinodes-21209
```

Replace a drive

When a drive fails in a cluster, the drive must be replaced as soon as possible to ensure data integrity. When a drive fails, you will see failed drive information in cluster CR node status, cluster health condition information, and the metrics endpoint.

Example of cluster showing failed drive in nodeStatuses.driveStatuses

```
$ kubectl get adscl -A -o yaml
```

Response:

```
...
apiVersion: astrads.netapp.io/v1alpha1
kind: AstraDSCluster
...
nodeStatuses:
  - driveStatuses:
    - driveID: 31205e51-f592-59e3-b6ec-185fd25888fa
      driveName: scsi-36000c290ace209465271ed6b8589b494
      drivesStatus: Failed
    - driveID: 3b515b09-3e95-5d25-a583-bee531ff3f31
      driveName: scsi-36000c290ef2632627cb167a03b431a5f
      drivesStatus: Active
    - driveID: 0807fa06-35ce-5a46-9c25-f1669def8c8e
      driveName: scsi-36000c292c8fc037c9f7e97a49e3e2708
      drivesStatus: Active
...
```

Example of new AstraDSFailedDrive CR

The failed drive CR is created automtically in the cluster with a name corresponding to the UUID of the failed drive.

```
$ kubectl get adsfd -A -o yaml
```

Response:

```
...
apiVersion: astrads.netapp.io/v1alpha1
kind: AstraDSFailedDrive
metadata:
    name: c290a-5000-4652c-9b494
    namespace: astrads-system
spec:
  executeReplace: false
  replaceWith: ""
 status:
   cluster: arda-6e4b4af
   failedDriveInfo:
     failureReason: AdminFailed
     inUse: false
     name: scsi-36000c290ace209465271ed6b8589b494
     path: /dev/disk/by-id/scsi-36000c290ace209465271ed6b8589b494
     present: true
     serial: 6000c290ace209465271ed6b8589b494
     node: sti-rx2540-300b.ctl.gdl.englab.netapp.com
   state: ReadyToReplace
```

```
~% kubectl astrads faileddrive list --cluster arda-6e4b4af
```

Response:

```
NAME       NODE                              CLUSTER        STATE
AGE
6000c290   sti-rx2540-300b.lab.netapp.com   ard-6e4b4af    ReadyToReplace
13m
```

Steps

1. List possible replacement drives with the `kubectl astrads show-replacements` command, which filters drives that fit replacement restrictions (unused in cluster, not mounted, no partitions, and equal or larger than failed drive).

   To list all drives without filtering possible replacement drives, add `--all` to `show-replacements` command.

   ```
   ~%  kubectl astrads faileddrive show-replacements --cluster ard-6e4b4af
   --name 6000c290
   ```

   Response:

```
NAME  IDPATH              SERIAL  PARTITIONCOUNT   MOUNTED   SIZE
sdh   /scsi-36000c29417   45000c  0                false     100GB
```

2. Use the `replace` command to replace the drive with the passed serial number. The command completes the replacement or fails if `--wait` time elapses.

```
~% kubectl astrads faileddrive replace --cluster arda-6e4b4af --name
6000c290 --replaceWith 45000c --wait
Drive replacement completed successfully
```

If `kubectl astrads faileddrive replace` is executed using an inappropriate `--replaceWith` serial number, an error appears similar to this:

```
~% kubectl astrads replacedrive replace --cluster astrads-cluster-
f51b10a --name 6000c2927 --replaceWith BAD_SERIAL_NUMBER
Drive 6000c2927 replacement started
Failed drive 6000c2927 has been set to use BAD_SERIAL_NUMBER as a
replacement
...
Drive replacement didn't complete within 25 seconds
Current status: {FailedDriveInfo:{InUse:false Present:true Name:scsi-
36000c2 FiretapUUID:444a5468 Serial:6000c Path:/scsi-36000c
FailureReason:AdminFailed Node:sti-b200-0214a.lab.netapp.com}
Cluster:astrads-cluster-f51b10a State:ReadyToReplace
Conditions:[{Message: "Replacement drive serial specified doesn't
exist", Reason: "DriveSelectionFailed", Status: False, Type:' Done"]}
```

3. To re-run drive replacement use `--force` with the previous command:

```
~%  kubectl astrads replacedrive replace --cluster astrads-cluster-
f51b10a --name 6000c2927 --replaceWith VALID_SERIAL_NUMBER --force
```

For more information

- Manage Astra Data Store preview assets with kubectl commands

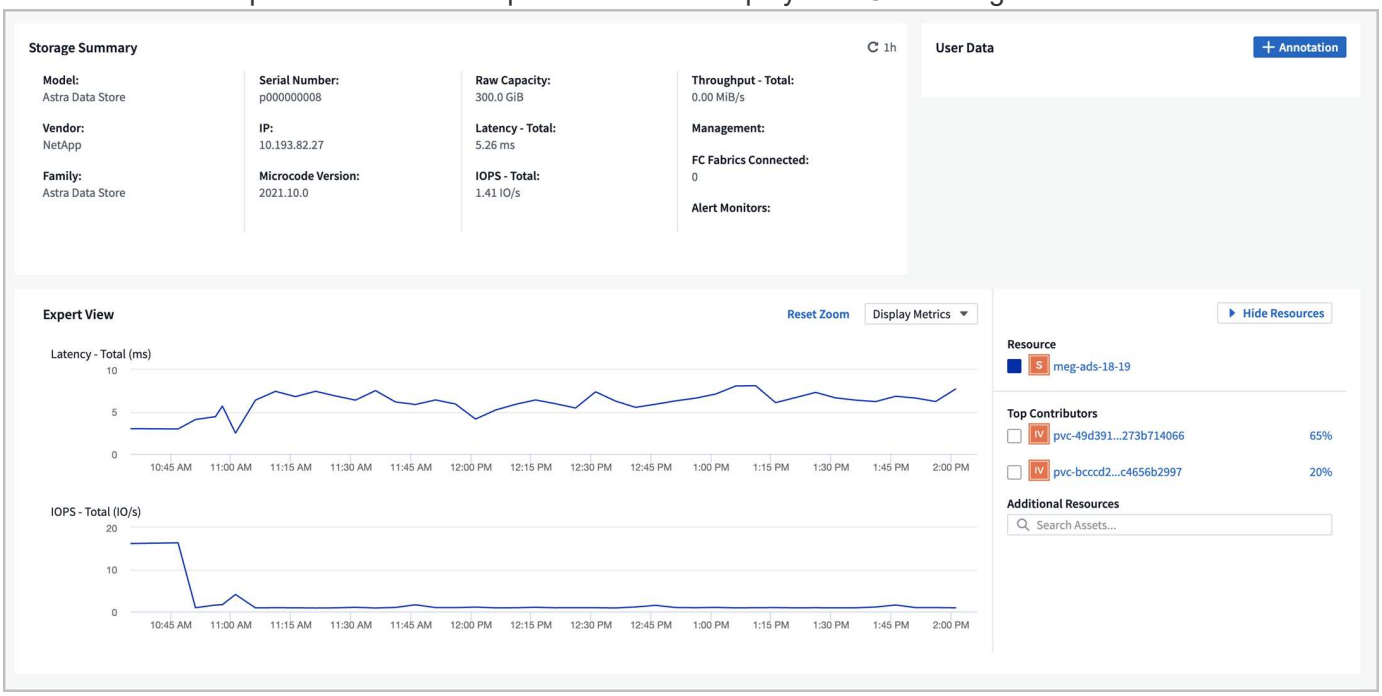
Monitor metrics with Cloud Insights

You can monitor Astra Data Store preview metrics using Cloud Insights.

- Complete Cloud Insights connection prerequisite tasks

- Acquisition Unit storage
- Download and run the installation script
- Edit the Cloud Insights connection
- Disconnect from Cloud Insights

Here are some sample Astra Data Store preview metrics displayed in Cloud Insights:



You can also display a list of metrics generated in Astra Data Store preview by using the Open Metrics API help.

Complete Cloud Insights connection prerequisite tasks

Prior to connecting Astra Data Store with Cloud Insights, you need to complete these tasks:

- Install the Astra Data Store Monitoring Operator that is part of the Astra Data Store preview installation instructions.
- Install the kubectl-astrads binary that is part of the Astra Data Store preview installation instructions.
- Create a Cloud Insights account.
- Ensure that the following commands are available: `awk, curl, grep` and `jq`

Gather the following information:

- **Cloud Insights API access token** with Read/Write permissions to the categories: Acquisition Unit, Data Collection, Data Ingestion and Log Ingestion. This will be used for the read/write operations, setting up the Acquisition Unit, and setting up data ingest processes.
- **Kubernetes API server IP address and port**. This is used to monitor the Astra Data Store preview cluster.
- **Kubernetes API token**. This is used to call Kubernetes APIs.
- **Persistent volume configuration**. Information about how persistent volumes are provisioned.

Acquisition Unit storage

The Acquisition Unit requires three persistent volumes for storing installation files, configuration data and logs. The Monitoring Operator uses the default storage class to create persistent volume claims. You can specify a different storage class name using the `-s` option when running the installer script.

If your Kubernetes cluster does not have a storage provisioner (such as NetApp Trident), you can provide a local filesystem path using the `-r` option when running the installer script. When the `-r` option is set, the installer script creates three persistent volumes inside the provided directory. This directory requires a minimum of 150 GB free space.

Download and run the installation script

Cloud Insights provides a Bash script to enable Astra Data Store preview monitoring via the Monitoring Operator. The install script will install an Acquisition Unit with the Astra Data Store collector, a Telegraf agent, and a Fluent Bit agent.

The Cloud Insights tenant domain name and selected Cloud Insights API access token will be embedded in the installer script when it is downloaded.

Then, metrics will be sent as follows:

- Telegraf will send metrics to the Cloud Insights data lake.
- Fluent Bit will send logs to the log ingestion service.

Display installer script help

The full help text for the installer script is shown below:

Display installer script help text:

```
./cloudinsights-ads-monitoring.sh -h
```

Response:

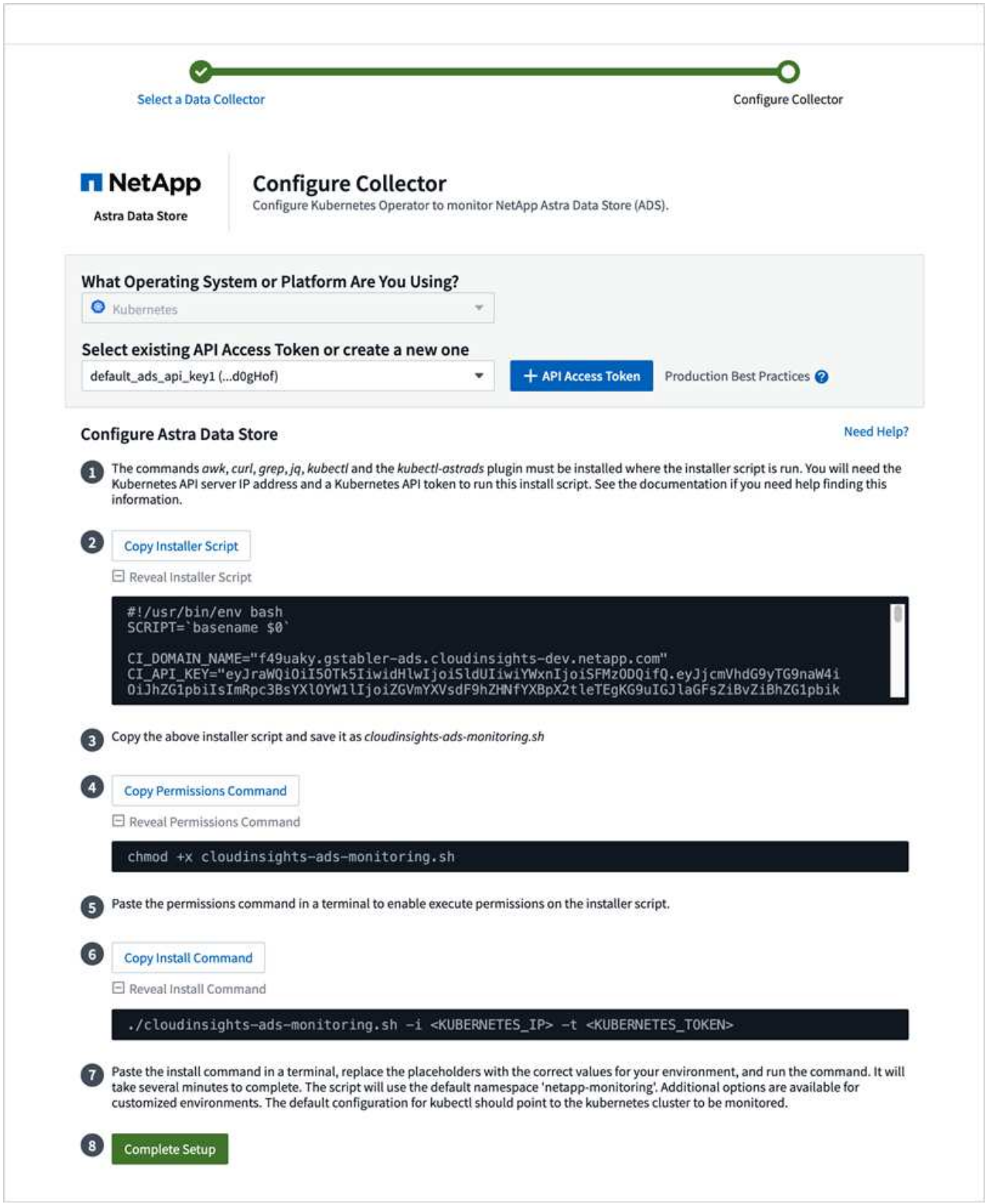
```
USAGE: cloudinsights-ads-monitoring.sh [OPTIONS]
Configure monitoring of Astra Data Store by Cloud Insights.
OPTIONS:
  -h                      Display this help message.
  -d ci_domain_name       Cloud Insights tenant domain name.
  -i kubernetes_ip        Kubernetes API server IP address.
  -k ci_api_key           Cloud Insights API Access Token.
  -n namespace            Namespace for monitoring components. (default:
netapp-monitoring)
  -p kubernetes_port      Kubernetes API server port. (default: 6443)
  -r root_pv_dir          Create 3 Persistent Volumes in this directory
for the Acquisition Unit.
                          Only specify this option if there is no Storage
Provisioner installed and the PVs do not already exist.
  -s storage_class        Storage Class name for provisioning Acquisition
Unit PVs. If not specified, the default storage class will be used.
  -t kubernetes_token     Kubernetes API server token.
```

Run the install script

1. Create a Cloud Insights account, if you don't already have one.
2. Log in to Cloud Insights.
3. From the Cloud Insights menu, click on **Admin** > **Data Collectors**.
4. Click on **+ Data Collector** to add a new collector.

5. Click on the **Astra Data Store** tile.
6. Select the correct Cloud Insights API access token or create a new one.
7. Follow the instructions to download the installer script, update the permissions, and run the script.

   The script contains your Cloud Insights tenant URL and the selected Cloud Insights API access token.



8. Click **Complete Setup** after the script completes.

   After the installation script completes, the Astra Data Store collector appears in the Datasources list.

If the script exits due to an error, you can run it again later once the error is resolved. The script supports additional parameters such as the Monitoring Operator namespace and Kubernetes API server port if your environment does not use the default settings. Use the `-h` option in `./cloudinsights-ads-monitoring.sh -h` to see the usage and help text.

The installation script produces output that looks like this when the configuration is successful:

```
Configuring Cloud Insights monitoring for Astra Data Store . . .
Configuring monitoring namespace
...
Configuring output sink and Fluent Bit plugins
Configuring Telegraf plugins
Configuring Acquisition Unit
...
Acquisition Unit has been installed successfully.
Configuring Astra Data Store data collector
Astra Data Store collector data '<CLUSTER_NAME>' created
Configuration done!
```

Example Agent CR

Below is an example of what the `monitoring-netapp` agent CR will look like after running the installer script.

```
spec:
 au:
   isEnabled: true
   storageClassName: auto-sc
 cluster-name: meg-ads-21-22-29-30
 docker-repo: docker.repo.eng.netapp.com/global/astra
 fluent-bit:
 - name: ads-tail
   outputs:
   - sink: ADS_STDOUT
   substitutions:
   - key: TAG
     value: firetapems
   - key: LOG_FILE
     values:
     - /var/log/firetap/*/ems/ems
     - /var/log/firetap/ems/*/ems/ems
   - key: ADS_CLUSTER_NAME
     value: meg-ads-21-22-28-29-30
 - name: agent
 - name: ads-tail-ci
```

```
    outputs:
    - sink: CI
    substitutions:
    - key: TAG
      value: netapp.ads
    - key: LOG_FILE
      values:
      - /var/log/firetap/*/ems/ems
      - /var/log/firetap/ems/*/ems/ems
    - key: ADS_CLUSTER_NAME
      value: meg-ads-21-22-28-29-30
  output-sink:
  - api-key: abcd
    domain-name: bzl9ngz.gst-adsdemo.ci-dev.netapp.com
    name: CI
  serviceAccount: sa-netapp-monitoring
  telegraf:
  - name: ads-open-metric
    outputs:
    - sink: CI
    run-mode:
    - ReplicaSet
    substitutions:
    - key: URLS
      values:
      - http://astrads-metrics-service.astrads-
system.svc.cluster.local:9341
    - key: METRIC_TYPE
      value: ads-metric
    - key: ADS_CATEGORY
      value: netapp_ads
    - key: ADS_CLUSTER_NAME
      value: meg-ads-21-22-28-29-30
  - name: agent
status:
  au-pod-status: UP
  au-uuid: eddeccc6-3aa3-4dd2-a98c-220085fae6a9
```

Edit the Cloud Insights connection

You can later edit the Kubernetes API token or the Cloud Insights API access token:

- If you want to update Kubernetes API token, you should edit the Astra Data Store collector from the Cloud Insights UI.
- If you want to update the Cloud Insights API access token used for telemetry and logs, you should edit the Monitoring Operator CR using kubectl commands.

Update the Kubernetes API token

1. Log in to Cloud Insights.
2. Select **Admin** > **Data Collectors** to access the Data Collectors page.
3. Find the entry for the Astra Data Store cluster.
4. Click on the menu on the right side of the page, and select **Edit**.
5. Update the Kubernetes API Token field with the new value.
6. Select **Save Collector**.

Update the Cloud Insights API access token

1. Log in to Cloud Insights.
2. Create a new Cloud Insights API access token by selecting **Admin** > **API Access** and clicking **+API Access Token**.
3. Edit the Agent CR:

```
kubectl --namespace netapp-monitoring edit agent agent-monitoring-netapp
```

4. Locate the `output-sink` section and find the entry with the name `CI`.
5. For the label `api-key`, replace the current value with the new Cloud Insights API access token.

   The section looks something like this:

```
output-sink:
 - api-key: <api key value>
   domain-name: <tenant url>
   name: CI
```

6. Save and quit the editor window.

The Monitoring Operator will update Telegraf and Fluent Bit to use the new Cloud Insights API access token.

Disconnect from Cloud Insights

To disconnect from Cloud Insights, you will need to delete the Astra Data Store collector from the Cloud Insights UI first. After that is complete, you can remove the Acquisition Unit, Telegraf and Fluent Bit configurations from the Monitoring Operator.

Remove the Astra Data Store preview collector

1. Log in to Cloud Insights.
2. Select **Admin** > **Data Collectors** to access the Data Collectors page.
3. Find the entry for the Astra Data Store cluster.
4. Select the menu on the right side of the screen, and select **Delete**.

5. Click **Delete** on the confirmation page.

Remove the Acquisition Unit, Telegraf and Fluent Bit

1. Edit the Agent CR:

```
kubectl --namespace netapp-monitoring edit agent agent-monitoring-netapp
```

2. Locate the `au` section and set `isEnabled` to `false`
3. Locate the `fluent-bit` section and remove the plugin named `ads-tail-ci`. If there are no more plugins, you can remove the `fluent-bit` section.
4. Locate the `telegraf` section and remove the plugin named `ads-open-metric`. If there are no more plugins, you can remove the `telegraf` section.
5. Locate the `output-sink` section and remove the sink named `CI`.
6. Save and quit the editor window.

   The Monitoring Operator will update the Telegraf and Fluent Bit configurations and delete the Acquisition Unit pod.

7. If you used local directories for the Acquisition Unit PVs instead of a Storage Provisioner, delete the PVs:

```
kubectl delete pv au-lib au-log au-pv
```

   Then, delete the actual directories on the node where the Acquisition Unit was running.

8. After the Acquisition Unit pod has been deleted, you can delete the Acquisition Unit from Cloud Insights.
   a. In the Cloud Insights menu, select **Admin** > **Data Collectors**.
   b. Click on the **Acquisition Units** tab.
   c. Click on the menu next to the Acquisition Unit pod.
   d. Select **Delete**.

The Monitoring Operator updates the Telegraf and Fluent Bit configurations and removes the Acquisition Unit.

Open Metrics API help

Here is a list of APIs that you can use to gather metrics from Astra Data Store preview.

- The "HELP" line describes the metric.
- The "TYPE" line indicates whether the metric is a gauge or a counter.

```
# HELP astrads_cluster_capacity_logical_percent Percentage cluster logical
capacity that is used (0-100)
# TYPE astrads_cluster_capacity_logical_percent gauge
# HELP astrads_cluster_capacity_max_logical Max Logical capacity of the
```

```
cluster in bytes
# TYPE astrads_cluster_capacity_max_logical gauge
# HELP astrads_cluster_capacity_max_physical The sum of the space in the
cluster in bytes for storing data after provisioning efficiencies, data
reduction algorithms and replication schemes are applied
# TYPE astrads_cluster_capacity_max_physical gauge
# HELP astrads_cluster_capacity_ops The IO operations capacity of the
cluster
# TYPE astrads_cluster_capacity_ops gauge
# HELP astrads_cluster_capacity_physical_percent The percentage of cluster
physical capacity that is used (0-100)
# TYPE astrads_cluster_capacity_physical_percent gauge
# HELP astrads_cluster_capacity_used_logical The sum of the bytes of data
in all volumes in the cluster before provisioning efficiencies, data
reduction algorithms and replication schemes are applied
# TYPE astrads_cluster_capacity_used_logical gauge
# HELP astrads_cluster_capacity_used_physical Used Physical capacity of a
cluster in bytes
# TYPE astrads_cluster_capacity_used_physical gauge
# HELP astrads_cluster_other_latency The sum of the accumulated latency in
seconds for other IO operations of all the volumes in a cluster. Divide by
astrads_cluster_other_ops to get the average latency per other operation
# TYPE astrads_cluster_other_latency counter
# HELP astrads_cluster_other_ops The sum of the other IO operations of all
the volumes in a cluster
# TYPE astrads_cluster_other_ops counter
# HELP astrads_cluster_read_latency The sum of the accumulated latency in
seconds of read IO operations of all the volumes in a cluster. Divide by
astrads_cluster_read_ops to get the average latency per read operation
# TYPE astrads_cluster_read_latency counter
# HELP astrads_cluster_read_ops The sum of the read IO operations of all
the volumes in a cluster
# TYPE astrads_cluster_read_ops counter
# HELP astrads_cluster_read_throughput The sum of the read throughput of
all the volumes in a cluster in bytes
# TYPE astrads_cluster_read_throughput counter
# HELP astrads_cluster_storage_efficiency Efficacy of data reduction
technologies. (logical used / physical used)
# TYPE astrads_cluster_storage_efficiency gauge
# HELP astrads_cluster_total_latency The sum of the accumulated latency in
seconds of all IO operations of all the volumes in a cluster. Divide by
astrads_cluster_total_ops to get average latency per operation
# TYPE astrads_cluster_total_latency counter
# HELP astrads_cluster_total_ops The sum of the IO operations of all the
volumes in a cluster
# TYPE astrads_cluster_total_ops counter
```

```
# HELP astrads_cluster_total_throughput The sum of the read and write
throughput of all the volumes in a cluster in bytes
# TYPE astrads_cluster_total_throughput counter
# HELP astrads_cluster_utilization_factor The ratio of the current cluster
IO operations based on recent IO sizes to the cluster iops capacity. (0.0
- 1.0)
# TYPE astrads_cluster_utilization_factor gauge
# HELP astrads_cluster_volume_used The sum of used capacity of all the
volumes in a cluster in bytes
# TYPE astrads_cluster_volume_used gauge
# HELP astrads_cluster_write_latency The sum of the accumulated latency in
seconds of write IO operations of all the volumes in a cluster. Divide by
astrads_cluster_write_ops to get the average latency per write operation
# TYPE astrads_cluster_write_latency counter
# HELP astrads_cluster_write_ops The sum of the write IO operations of all
the volumes in a cluster
# TYPE astrads_cluster_write_ops counter
# HELP astrads_cluster_write_throughput The sum of the write throughput of
all the volumes in a cluster in bytes
# TYPE astrads_cluster_write_throughput counter
# HELP astrads_disk_base_seconds Base for busy, pending and queued.
Seconds since collection began
# TYPE astrads_disk_base_seconds counter
# HELP astrads_disk_busy Seconds the disk was busy. 100 *
(astrads_disk_busy / astrads_disk_base_seconds) = percent busy (0-100)
# TYPE astrads_disk_busy counter
# HELP astrads_disk_capacity Raw Capacity of a disk in bytes
# TYPE astrads_disk_capacity gauge
# HELP astrads_disk_io_pending Summation of the count of pending io
operations for a disk times time. Divide by astrads_disk_base_seconds to
get the average pending operation count
# TYPE astrads_disk_io_pending counter
# HELP astrads_disk_io_queued Summation of the count of queued io
operations for a disk times time. Divide by astrads_disk_base_seconds to
get the average queued operations count
# TYPE astrads_disk_io_queued counter
# HELP astrads_disk_read_latency Total accumulated latency in seconds for
disk reads. Divide by astrads_disk_read_ops to get the average latency per
read operation
# TYPE astrads_disk_read_latency counter
# HELP astrads_disk_read_ops Total number of read operations for a disk
# TYPE astrads_disk_read_ops counter
# HELP astrads_disk_read_throughput Total bytes read from a disk
# TYPE astrads_disk_read_throughput counter
# HELP astrads_disk_write_latency Total accumulated latency in seconds for
disk writes. Divide by astrads_disk_write_ops to get the average latency
```

```
per write operation
# TYPE astrads_disk_write_latency counter
# HELP astrads_disk_write_ops Total number of write operations for a disk
# TYPE astrads_disk_write_ops counter
# HELP astrads_disk_write_throughput Total bytes written to a disk
# TYPE astrads_disk_write_throughput counter
# HELP astrads_value_scrape_duration Duration to scrape values
# TYPE astrads_value_scrape_duration gauge
# HELP astrads_volume_capacity_available The minimum of the available
capacity of a volume and the available capacity of the cluster in bytes
# TYPE astrads_volume_capacity_available gauge
# HELP astrads_volume_capacity_available_logical Logical available
capacity of a volume in bytes
# TYPE astrads_volume_capacity_available_logical gauge
# HELP astrads_volume_capacity_percent Percentage of volume capacity
available (0-100). (capacity available / provisioned) * 100
# TYPE astrads_volume_capacity_percent gauge
# HELP astrads_volume_capacity_provisioned Provisioned capacity of a
volume in bytes after setting aside the snapshot reserve. (size - snapshot
reserve = provisioned)
# TYPE astrads_volume_capacity_provisioned gauge
# HELP astrads_volume_capacity_size Total capacity of a volume in bytes
# TYPE astrads_volume_capacity_size gauge
# HELP astrads_volume_capacity_snapshot_reserve_percent Snapshot reserve
percentage of a volume (0-100)
# TYPE astrads_volume_capacity_snapshot_reserve_percent gauge
# HELP astrads_volume_capacity_snapshot_used The amount of volume snapshot
data that is not in the active file system in bytes
# TYPE astrads_volume_capacity_snapshot_used gauge
# HELP astrads_volume_capacity_used Used capacity of a volume in bytes.
This is bytes in the active filesystem unless snapshots are consuming more
than the snapshot reserve. (bytes in the active file system + MAX(0,
snapshot_used-(snapshot_reserve_percent/100*size))
# TYPE astrads_volume_capacity_used gauge
# HELP astrads_volume_other_latency Total accumulated latency in seconds
for operations on a volume that are neither read or write. Divide by
astrads_volume_other_ops to get the average latency per other operation
# TYPE astrads_volume_other_latency counter
# HELP astrads_volume_other_ops Total number of operations for a volume
that are neither read or write
# TYPE astrads_volume_other_ops counter
# HELP astrads_volume_read_latency Total accumulated read latency in
seconds for a volume. Divide by astrads_volume_read_ops to get the average
latency per read operation
# TYPE astrads_volume_read_latency counter
# HELP astrads_volume_read_ops Total number of read operations for a
```

```
volume
# TYPE astrads_volume_read_ops counter
# HELP astrads_volume_read_throughput Total read throughput for a volume
in bytes
# TYPE astrads_volume_read_throughput counter
# HELP astrads_volume_total_latency Total accumulated latency in seconds
for all operations on a volume. Divide by astrads_volume_total_ops to get
the average latency per operation
# TYPE astrads_volume_total_latency counter
# HELP astrads_volume_total_ops Total number of operations for a volume
# TYPE astrads_volume_total_ops counter
# HELP astrads_volume_total_throughput Total thoughput for a volume in
bytes
# TYPE astrads_volume_total_throughput counter
# HELP astrads_volume_write_latency Total accumulated write latency in
seconds for volume. Divide by astrads_volume_write_ops to get the average
latency per write operation
# TYPE astrads_volume_write_latency counter
# HELP astrads_volume_write_ops Total number of write operations for a
volume
# TYPE astrads_volume_write_ops counter
# HELP astrads_volume_write_throughput Total write thoughput for a volume
in bytes
# TYPE astrads_volume_write_throughput counter
```

Monitor metrics with Prometheus and Grafana

You can monitor Astra Data Store preview metrics with Prometheus and Grafana. You can configure Prometheus to gather metrics from the Astra Data Store preview Kubernetes cluster metrics endpoint, and you can use Grafana to visualize the metrics data.

What you'll need

- Make sure that you have downloaded and installed the Prometheus and Grafana packages on the Astra Data Store preview cluster or a different cluster that can communicate with the Astra Data Store preview cluster. Follow the instructions in the official documentation to install each tool:
  - Install Prometheus
  - Install Grafana
- Prometheus and Grafana need to be able to communicate with the Astra Data Store preview Kubernetes cluster. If Prometheus and Grafana are not installed on the Astra Data Store preview cluster, you need to make sure they can communicate with the metrics service running on the Astra Data Store preview cluster.

Configure Prometheus

Astra Data Store preview exposes a metrics service on TCP port 9341 in the Kubernetes cluster. You need to configure Prometheus to collect metrics from this service.

Steps

1. Edit the `prometheus.yml` configuration file for your Prometheus installation.
2. Add a service target that points to the Astra Data Store preview service name and its port. For example:

```
scrape_configs:
static_configs:
- targets: ['astrads-metrics-service.astrads-system:9341']
```

3. Start the Prometheus service.

Configure Grafana

You can configure Grafana to display the metrics collected by Prometheus.

Steps

1. Edit the `datasources.yaml` configuration file for your Grafana installation.
2. Add Prometheus as a data source. For example:

```
apiVersion: 1

datasources:
  - name: astradatastore-prometheus
    type: prometheus
    access: proxy
    url: http://localhost:9090
    jsonData:
      manageAlerts: false
```

3. Start the Grafana service.
4. Follow the instructions in the Grafana documentation to get started.

Import Grafana dashboard templates

The bundle file you downloaded to install Astra Data Store preview includes Grafana dashboard template files that you can import from within Grafana. These dashboard templates can help you see the types of metrics that are available from Astra Data Store preview and how you can view them.

Steps

1. Open the Astra Data Store preview `.tar.gz` bundle.
2. Open the `manifests` directory.
3. Extract the `grafana_cluster.json` and `grafana_volume.json` files.
4. Using the Grafana web UI, import the dashboard template files in to Grafana.

Configure and monitor event logs

To monitor Event Management System (EMS) logs, you can do the following high level tasks:

- Configure monitoring in the Astra Data Store preview cluster custom resource (CR)
- Set up Cloud Insights
- Stream event logs to Elastic.

Configure monitoring in the Astra Data Store preview cluster custom resource (CR)

If the monitoring option has not been configured on the Astra Data Store preview cluster CR, you can set it up using `astrads` extensions.

Enter:

```
~% kubectl astrads monitoring setup -n <NAMESPACE OF AGENT INSTALLED>
   -r <DOCKER REPO TO FIND FLUENT/TELEGRAF ETC IMAGES>
```

where:

- Namespace of agent installed: Enter the namespace for the Monitoring agent, which is the default name of the monitoring-netapp CR for the Monitoring Operator.
- `-r` is optional to set up the Docker registry where the Fluent or Telegraf images are located. By default, the path is set to `docker.repo.eng.netapp.com/global/astra`, which you can change.

Set up Cloud Insights

To view the logs, setting up Cloud Insights is optional; however, it is helpful to view data using Cloud Insights. See how to set up NetApp Cloud Insights for use with Astra Data Store preview.

Stream event logs to Elastic

To stream EMS events and other pod logs to a third-party endpoint such as Elastic, use the `astrads` extensions.

Enter:

```
~% kubectl astrads monitoring --host <ELASTIC HOST NAME> --port <ELASTIC
HOST PORT> es
```

The Elastic host name can be an IP address.

Use Astra Control Center with Astra Data Store preview

You can use the Astra Control Center user interface (UI) to perform Astra Data Store preview tasks.

Set up Astra Control Center for Astra Data Store preview

To use the Astra Control Center UI for Astra Data Store preview, you need to complete these tasks:

- Add the underlying Kubernetes cluster running Astra Data Store to Astra Control Center.
- Add Astra Data Store preview as a storage backend to Astra Control Center.

> If you add a storage backend and no Kubernetes clusters with Astra Data Store preview exist, you'll need to first add a cluster.

What you can do in Astra Control Center

After you set up Astra Control Center for Astra Data Store preview, you can then use the Astra Control Center UI to accomplish these tasks:

- Monitor the health of your Astra Data Store preview assets using Astra Control Center.
- Manage the Astra Data Store preview backend storage.
- Monitor nodes, disks, and persistent volume claims (PVCs).

For more information

- Astra family introduction
- Astra Control Center documentation
- Astra Control API

Uninstall Astra Data Store preview with an automated script

To uninstall Astra Data Store preview and control plane, you will remove workloads, bindings, volumes, export policies, the Astra Data Store cluster, license, deployment environment, and the Astra Data Store preview namespace.

Alternatively, you can uninstall Astra Data Store preview without a script.

What you'll need

- Root administrative permissions

About this task

The Astra Data Store preview uninstallation process guides you through the following high-level steps:

- Remove existing workloads and bindings
- Uninstall Astra Data Store cluster
- Validate the removal of the astrads-system namespace
- Ensure containers are not running on worker nodes
- Delete OpenShift Container Platform resources
- Troubleshoot the Astra Data Store preview uninstall process

Remove existing workloads and bindings

Before uninstalling Astra Data Store preview, you must first remove the following

- All application workloads that use Astra Data Store preview as the storage backend
- Trident bindings that use Astra Data Store preview as a backend

This ensures that your Kubernetes environment is left in a clean state, which is important if you reinstall.

Uninstall Astra Data Store cluster

To uninstall Astra Data Store preview, you can use the `uninstall.sh` script in your Astra Data Store tar file that was downloaded from the NetApp Support Site.

1. Locate the `uninstall.sh` in the `manifests` directory.
2. Run the following `sed` command:

```
sed -i -e 's~netappsdsoperator.yaml~astradsoperator.yaml~' uninstall.sh
```

3. Run the following script indicating what you want to uninstall:

```
./uninstall.sh

You must run this script with an argument specifying what should be
uninstalled
To uninstall the ADS cluster run ./uninstall.sh cluster
To uninstall everything run ./uninstall all
```

4. If you want to uninstall just the cluster, enter `uninstall.sh <cluster>`

   Otherwise, if you want to uninstall everything, enter `uninstall.sh`

   > In most cases you will uninstall everything. You might want to uninstall just the cluster if you wanted to redeploy the cluster subsequently.

5. At the prompt, confirm that you want to continue and enter `erasedata`

   Response:

```
./uninstall.sh all

Enter 'erasedata' to confirm you want proceed with the uninstall:
erasedata
+-----------------------------------------------------+
| Wed Feb  2 10:14:01 EST 2022                        |
| ADS cluster uninstall started                       |
```

```
+-----------------------------------------------------+
Deleting astradsvolumes
Deleted astradsvolumes
Deleting astradsexportpolicies
Deleted astradsexportpolicies
Deleting astradsvolumesnapshots
Deleted astradsvolumesnapshots
Deleting astradsclusters
Deleting astradsclusters
Deleting astradslicenses
Deleted astradslicenses

+-----------------------------------------------------+
| Wed Feb  2 10:15:18 EST 2022                        |
| ADS cluster uninstall done                          |
+-----------------------------------------------------+

+-----------------------------------------------------+
| Wed Feb  2 10:15:18 EST 2022                        |
| ADS system uninstall started                        |
+-----------------------------------------------------+
Removing astradsversion
astradsversion.astrads.netapp.io "astradsversion" deleted
Removed astradsversion
Removing daemonsets
daemonset.apps "astrads-ds-nodeinfo-astradsversion" deleted
Removed daemonsets
Removing deployments
deployment.apps "astrads-cluster-controller" deleted
deployment.apps "astrads-license-controller" deleted
deployment.apps "astrads-operator" deleted
Removed deployments
Removing all other AstraDS resources
namespace "astrads-system" deleted
customresourcedefinition.apiextensions.k8s.io
"astradsautosupports.astrads.netapp.io" deleted
customresourcedefinition.apiextensions.k8s.io
"astradscloudsnapshots.astrads.netapp.io" deleted
customresourcedefinition.apiextensions.k8s.io
"astradsclusters.astrads.netapp.io" deleted
customresourcedefinition.apiextensions.k8s.io
"astradsexportpolicies.astrads.netapp.io" deleted
customresourcedefinition.apiextensions.k8s.io
"astradsfaileddrives.astrads.netapp.io" deleted
customresourcedefinition.apiextensions.k8s.io
"astradslicenses.astrads.netapp.io" deleted
```

```
customresourcedefinition.apiextensions.k8s.io
"astradsnfsoptions.astrads.netapp.io" deleted
customresourcedefinition.apiextensions.k8s.io
"astradsnodeinfoes.astrads.netapp.io" deleted
customresourcedefinition.apiextensions.k8s.io
"astradsnodemanagements.astrads.netapp.io" deleted
customresourcedefinition.apiextensions.k8s.io
"astradsqospolicies.astrads.netapp.io" deleted
customresourcedefinition.apiextensions.k8s.io
"astradsversions.astrads.netapp.io" deleted
customresourcedefinition.apiextensions.k8s.io
"astradsvolumefiles.astrads.netapp.io" deleted
customresourcedefinition.apiextensions.k8s.io
"astradsvolumes.astrads.netapp.io" deleted
customresourcedefinition.apiextensions.k8s.io
"astradsvolumesnapshots.astrads.netapp.io" deleted
role.rbac.authorization.k8s.io "astrads-astrads-system-admin-role"
deleted
role.rbac.authorization.k8s.io "astrads-astrads-system-reader-role"
deleted
role.rbac.authorization.k8s.io "astrads-astrads-system-writer-role"
deleted
role.rbac.authorization.k8s.io "astrads-leader-election-role" deleted
role.rbac.authorization.k8s.io "astrads-manager-role" deleted
clusterrole.rbac.authorization.k8s.io "astrads-astrads-admin-
clusterrole" deleted
clusterrole.rbac.authorization.k8s.io "astrads-astrads-reader-
clusterrole" deleted
clusterrole.rbac.authorization.k8s.io "astrads-astrads-writer-
clusterrole" deleted
clusterrole.rbac.authorization.k8s.io "astrads-astradsautosupport-
editor-role" deleted
clusterrole.rbac.authorization.k8s.io "astrads-astradsautosupport-
viewer-role" deleted
clusterrole.rbac.authorization.k8s.io "astrads-astradscloudsnapshot-
editor-role" deleted
clusterrole.rbac.authorization.k8s.io "astrads-astradscloudsnapshot-
viewer-role" deleted
clusterrole.rbac.authorization.k8s.io "astrads-astradscluster-editor-
role" deleted
clusterrole.rbac.authorization.k8s.io "astrads-astradscluster-viewer-
role" deleted
clusterrole.rbac.authorization.k8s.io "astrads-astradsexportpolicy-
editor-role" deleted
clusterrole.rbac.authorization.k8s.io "astrads-astradsexportpolicy-
viewer-role" deleted
```

```
clusterrole.rbac.authorization.k8s.io "astrads-astradsfaileddrive-
editor-role" deleted
clusterrole.rbac.authorization.k8s.io "astrads-astradsfaileddrive-
viewer-role" deleted
clusterrole.rbac.authorization.k8s.io "astrads-astradslicense-editor-
role" deleted
clusterrole.rbac.authorization.k8s.io "astrads-astradslicense-viewer-
role" deleted
clusterrole.rbac.authorization.k8s.io "astrads-astradsnfsoption-editor-
role" deleted
clusterrole.rbac.authorization.k8s.io "astrads-astradsnfsoption-viewer-
role" deleted
clusterrole.rbac.authorization.k8s.io "astrads-astradsnodeinfo-editor-
role" deleted
clusterrole.rbac.authorization.k8s.io "astrads-astradsnodeinfo-viewer-
role" deleted
clusterrole.rbac.authorization.k8s.io "astrads-astradsnodemanagement-
editor-role" deleted
clusterrole.rbac.authorization.k8s.io "astrads-astradsnodemanagement-
viewer-role" deleted
clusterrole.rbac.authorization.k8s.io "astrads-astradsqospolicy-viewer-
role" deleted
clusterrole.rbac.authorization.k8s.io "astrads-astradsversion-editor-
role" deleted
clusterrole.rbac.authorization.k8s.io "astrads-astradsversion-viewer-
role" deleted
clusterrole.rbac.authorization.k8s.io "astrads-astradsvolume-editor-
role" deleted
clusterrole.rbac.authorization.k8s.io "astrads-astradsvolume-viewer-
role" deleted
clusterrole.rbac.authorization.k8s.io "astrads-astradsvolumefile-editor-
role" deleted
clusterrole.rbac.authorization.k8s.io "astrads-astradsvolumefile-viewer-
role" deleted
clusterrole.rbac.authorization.k8s.io "astrads-astradsvolumesnapshot-
editor-role" deleted
clusterrole.rbac.authorization.k8s.io "astrads-astradsvolumesnapshot-
viewer-role" deleted
clusterrole.rbac.authorization.k8s.io "astrads-manager-role" deleted
rolebinding.rbac.authorization.k8s.io "astrads-astrads-admin-
rolebinding" deleted
rolebinding.rbac.authorization.k8s.io "astrads-astrads-reader-
rolebinding" deleted
rolebinding.rbac.authorization.k8s.io "astrads-astrads-writer-
rolebinding" deleted
rolebinding.rbac.authorization.k8s.io "astrads-leader-election-
```

```
rolebinding" deleted
rolebinding.rbac.authorization.k8s.io "astrads-manager-rolebinding"
deleted
clusterrolebinding.rbac.authorization.k8s.io "astrads-astrads-admin-
rolebinding" deleted
clusterrolebinding.rbac.authorization.k8s.io "astrads-astrads-reader-
rolebinding" deleted
clusterrolebinding.rbac.authorization.k8s.io "astrads-astrads-writer-
rolebinding" deleted
clusterrolebinding.rbac.authorization.k8s.io "astrads-manager-
rolebinding" deleted
configmap "astrads-autosupport-cm" deleted
configmap "astrads-firetap-cm" deleted
configmap "astrads-kevents-asup" deleted
configmap "astrads-metrics-cm" deleted
secret "astrads-autosupport-certs" deleted
+-----------------------------------------------------+
| Wed Feb  2 10:16:36 EST 2022                        |
| ADS system uninstall done                           |
+-----------------------------------------------------+
```

Validate the removal of the astrads-system namespace

Ensure that the following command returns no result:

```
kubectl get ns | grep astrads-system
```

Ensure containers are not running on worker nodes

Validate that containers such as `firetap` or `netwd` are not running on the worker nodes.
Run the following on each node.

```
ssh <mynode1>
# runc list
```

Delete OpenShift Container Platform resources

If you installed Astra Data Store preview on Red Hat OpenShift Container Platform (OCP), you can uninstall OCP security context constraints (SCC) and rolebindings resources.

OpenShift uses security context constraints (SCC) that control the actions that a pod can perform.

After you complete the standard uninstall process, complete these steps.

1. Remove SCC resources:

```
oc delete -f ads_privileged_scc.yaml
```

2. Remove rolebindings resources:

```
oc delete -f oc_role_bindings.yaml
```

> Ignore "resources not found" errors in these steps.

3. Remove `/var/lib/kubelet/config.yaml` from all Kubernetes nodes.

Troubleshoot the Astra Data Store preview uninstall process

The Astra Data Store preview uninstall process in Kubernetes v1.20 can occasionally cause pods to remain in a terminating state.

If this issue occurs, run the following command to force delete all pods in the `astrads-system` namespace:

```
kubectl delete pods --all  -n astrads-system   --force --grace-period 0
```

Uninstall Astra Data Store preview without a script

To uninstall Astra Data Store preview manually without an automated script, you will remove workloads, bindings, volumes, export policies, clusters, license, deployment environment, and the Astra Data Store preview namespace.

Alternatively, you can uninstall Astra Data Store preview with a script.

What you'll need

- Root administrative permissions

About this task

The Astra Data Store preview uninstallation process guides you through the following high-level steps:

- Remove existing workloads and bindings
- Uninstall the Astra Data Store preview cluster and control plane
- Delete the license
- Delete the Astra Data Store preview installation
- Validate the removal of the astrads-system namespace
- Ensure containers are not running on worker nodes
- Delete OpenShift Container Platform resources
- Troubleshoot the Astra Data Store preview uninstall process

Remove existing workloads and bindings

Before uninstalling Astra Data Store preview, you must first remove the following

- All application workloads that use Astra Data Store preview as the storage backend
- Trident bindings that use Astra Data Store preview as a backend

This ensures that your Kubernetes environment is left in a clean state, which is important if you reinstall.

Uninstall the Astra Data Store preview cluster and control plane

Follow the steps below to uninstall Astra Data Store preview manually.

Delete the volumes and export policies

Before deleting the cluster, you should delete the Astra Data Store preview volumes and export policy.

If you do not first delete volumes and export policies, the cluster deletion process pauses until the Astra Data Store preview volumes objects are deleted. It is more efficient to remove those items before starting to delete the cluster.

Steps

1. Delete the volumes:

```
~% kubectl delete astradsvolumes --all -A
~% kubectl get astradsvolumes -A
```

2. Delete the export policies:

```
~% kubectl delete astradsexportpolicies --all -A
~% kubectl get astradsexportpolicies -A
```

Delete the Astra Data Store preview cluster

Deleting the cluster deletes only the Astra Data Store preview cluster object custom resource (CR) along with cluster-scoped resources.

The operator, nodeinfo pods, and the cluster controller (which are Kubernetes-scoped resources) remain even after the cluster is deleted.

Deleting the cluster also uninstalls the underlying operating system from the nodes, which will stop the `firetap` and `netwd` services.

The uninstaller takes about a minute to finish. Then, the removal of the Astra Data Store preview cluster-scoped resources starts.

1. Delete the cluster:

```
~% kubectl delete astradsclusters --all -A
~% kubectl get astradsclusters -A
```

Delete the license

1. ssh to each worker node in the cluster and validate that `firetap` or `netwd` are not running in the worker nodes.
2. Delete the Astra Data Store preview license:

```
~% kubectl delete astradslicenses --all -A
~% kubectl get astradslicenses -A
```

Delete the Astra Data Store preview installation

Delete the controllers, operators, namespace, and support pods in the cluster.

1. Delete the Astra Data Store preview installation object:

```
~% kubectl delete astradsversion astradsversion -n astrads-system
~% kubectl get astradsversion -n astrads-system
```

2. Delete the data store DaemonSets and all Astra Data Store preview controller resources:

```
~% kubectl delete ds --all -n astrads-system
~% kubectl get ds -n astrads-system

~% kubectl delete deployments --all -n astrads-system
~% kubectl get deployments -n astrads-system
```

3. Delete remaining artifacts and the operator yaml file:

```
~% kubectl delete -f ./manifests/astradsoperator.yaml
~% kubectl get pods -n astrads-system
```

Validate the removal of the astrads-system namespace

Ensure that the following command returns no result:

```
~% kubectl get ns | grep astrads-system
```

Ensure containers are not running on worker nodes

Validate that containers such as `firetap` or `netwd` are not running on the worker nodes.
Run the following on each node.

```
ssh <mynode1>
# runc list
```

Delete OpenShift Container Platform resources

If you installed Astra Data Store preview on Red Hat OpenShift Container Platform (OCP), you can uninstall OCP security context constraints (SCC) and rolebindings resources.

OpenShift uses security context constraints (SCC) that control the actions that a pod can perform.

After you complete the standard uninstall process, complete these steps.

1. Remove SCC resources:

   ```
   oc delete -f ads_privileged_scc.yaml
   ```

2. Remove rolebindings resources:

   ```
   oc delete -f oc_role_bindings.yaml
   ```

   Ignore "resources not found errors" in these steps.

3. Remove `/var/lib/kubelet/config.yaml` from all Kubernetes nodes.

Manual deletion sample

The following shows a sample of an execution manual uninstallation script.

```
$ kubectl delete astradsvolumes --all -A
No resources found
$ kubectl delete astradsexportpolicies --all -A
No resources found
$ kubectl delete astradsclusters --all -A
astradscluster.astrads.netapp.io "astrads-sti-c6220-09-10-11-12" deleted

$ kubectl delete astradslicenses --all -A
astradslicense.astrads.netapp.io "e900000005" deleted

$ kubectl delete astradsdeployment astradsdeployment -n astrads-system
astradsdeployment.astrads.netapp.io "astradsdeployment" deleted
```

```
$ kubectl delete ds --all -n astrads-system
daemonset.apps "astrads-ds-astrads-sti-c6220-09-10-11-12" deleted
daemonset.apps "astrads-ds-nodeinfo-astradsdeployment" deleted
daemonset.apps "astrads-ds-support" deleted

$ kubectl delete deployments --all -n astrads-system
deployment.apps "astrads-cluster-controller" deleted
deployment.apps "astrads-deployment-support" deleted
deployment.apps "astrads-license-controller" deleted
deployment.apps "astrads-operator" deleted

$ kubectl delete -f /.../firetap/sds/manifests/netappsdsoperator.yaml
namespace "astrads-system" deleted
customresourcedefinition.apiextensions.k8s.io
"astradsautosupports.astrads.netapp.io" deleted
customresourcedefinition.apiextensions.k8s.io
"astradscloudsnapshots.astrads.netapp.io" deleted
customresourcedefinition.apiextensions.k8s.io
"astradsclusters.astrads.netapp.io" deleted
customresourcedefinition.apiextensions.k8s.io
"astradsdeployments.astrads.netapp.io" deleted
customresourcedefinition.apiextensions.k8s.io
"astradsexportpolicies.astrads.netapp.io" deleted
customresourcedefinition.apiextensions.k8s.io
"astradsfaileddrives.astrads.netapp.io" deleted
customresourcedefinition.apiextensions.k8s.io
"astradslicenses.astrads.netapp.io" deleted
customresourcedefinition.apiextensions.k8s.io
"astradsnfsoptions.astrads.netapp.io" deleted
customresourcedefinition.apiextensions.k8s.io
"astradsnodeinfoes.astrads.netapp.io" deleted
customresourcedefinition.apiextensions.k8s.io
"astradsqospolicies.astrads.netapp.io" deleted
customresourcedefinition.apiextensions.k8s.io
"astradsvolumefiles.astrads.netapp.io" deleted
customresourcedefinition.apiextensions.k8s.io
"astradsvolumes.astrads.netapp.io" deleted
customresourcedefinition.apiextensions.k8s.io
"astradsvolumesnapshots.astrads.netapp.io" deleted
role.rbac.authorization.k8s.io "astrads-leader-election-role" deleted
clusterrole.rbac.authorization.k8s.io "astrads-astradscloudsnapshot-
editor-role" deleted
clusterrole.rbac.authorization.k8s.io "astrads-astradscloudsnapshot-
viewer-role" deleted
clusterrole.rbac.authorization.k8s.io "astrads-astradscluster-editor-role"
```

```
deleted
clusterrole.rbac.authorization.k8s.io "astrads-astradscluster-viewer-role"
deleted
clusterrole.rbac.authorization.k8s.io "astrads-astradslicense-editor-role"
deleted
clusterrole.rbac.authorization.k8s.io "astrads-astradslicense-viewer-role"
deleted
clusterrole.rbac.authorization.k8s.io "astrads-astradsvolume-editor-role"
deleted
clusterrole.rbac.authorization.k8s.io "astrads-astradsvolume-viewer-role"
deleted
clusterrole.rbac.authorization.k8s.io "astrads-autosupport-editor-role"
deleted
clusterrole.rbac.authorization.k8s.io "astrads-autosupport-viewer-role"
deleted
clusterrole.rbac.authorization.k8s.io "astrads-manager-role" deleted
clusterrole.rbac.authorization.k8s.io "astrads-metrics-reader" deleted
clusterrole.rbac.authorization.k8s.io "astrads-netappexportpolicy-editor-
role" deleted
clusterrole.rbac.authorization.k8s.io "astrads-netappexportpolicy-viewer-
role" deleted
clusterrole.rbac.authorization.k8s.io "astrads-netappsdsdeployment-editor-
role" deleted
clusterrole.rbac.authorization.k8s.io "astrads-netappsdsdeployment-viewer-
role" deleted
clusterrole.rbac.authorization.k8s.io "astrads-netappsdsnfsoption-editor-
role" deleted
clusterrole.rbac.authorization.k8s.io "astrads-netappsdsnfsoption-viewer-
role" deleted
clusterrole.rbac.authorization.k8s.io "astrads-netappsdsnodeinfo-editor-
role" deleted
clusterrole.rbac.authorization.k8s.io "astrads-netappsdsnodeinfo-viewer-
role" deleted
clusterrole.rbac.authorization.k8s.io "astrads-proxy-role" deleted
rolebinding.rbac.authorization.k8s.io "astrads-leader-election-
rolebinding" deleted
clusterrolebinding.rbac.authorization.k8s.io "astrads-manager-rolebinding"
deleted
clusterrolebinding.rbac.authorization.k8s.io "astrads-proxy-rolebinding"
deleted
configmap "astrads-autosupport-cm" deleted
configmap "astrads-firetap-cm" deleted
configmap "astrads-fluent-bit-cm" deleted
configmap "astrads-kevents-asup" deleted
configmap "astrads-metrics-cm" deleted
service "astrads-operator-metrics-service" deleted
```

```
 Error from server (NotFound): error when deleting
"/.../export/firetap/sds/manifests/netappsdsoperator.yaml":
deployments.apps "astrads-operator" not found

$ kubectl get ns | grep astrads-system

[root@sti-rx2540-535c ~]# runc list
ID      PID     STATUS    BUNDLE       CREATED    OWNER
```

Troubleshoot the Astra Data Store preview uninstall process

The Astra Data Store preview uninstall process in Kubernetes v1.20 can occasionally cause pods to remain in a terminating state.

If this issue occurs, run the following command to force delete all pods in the `astrads-system` namespace:

```
kubectl delete pods --all  -n astrads-system   --force --grace-period 0
```