



Installation overview

Astra Control Center

NetApp
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Installation overview

Choose and complete one of the following Astra Control Center installation procedures:

- [Install Astra Control Center using the standard process](#)
- [\(If you use Red Hat OpenShift\) Install Astra Control Center using OpenShift OperatorHub](#)
- [Install Astra Control Center with a Cloud Volumes ONTAP storage backend](#)

Depending on your environment, there might be additional configuration needed after you install Astra Control Center:

- [Configure Astra Control Center after installation](#)

Install Astra Control Center using the standard process

To install Astra Control Center, download the installation bundle from the NetApp Support Site and perform the following steps. You can use this procedure to install Astra Control Center in internet-connected or air-gapped environments.

Expand for other installation procedures

- **Install with Red Hat OpenShift OperatorHub:** Use this [alternative procedure](#) to install Astra Control Center on OpenShift using OperatorHub.
- **Install in the public cloud with Cloud Volumes ONTAP backend:** Use [these procedures](#) to install Astra Control Center in Amazon Web Services (AWS), Google Cloud Platform (GCP), or Microsoft Azure with a Cloud Volumes ONTAP storage backend.

For a demonstration of the Astra Control Center installation process, see [this video](#).

Before you begin

- **Meet environmental prerequisites:** Before you begin installation, prepare your environment for Astra Control Center deployment.



Deploy Astra Control Center in a third fault domain or secondary site. This is recommended for app replication and seamless disaster recovery.

- **Ensure healthy services:** Check that all API services are in a healthy state and available:

```
kubectl get apiservices
```

- **Ensure a routable FQDN:** The Astra FQDN you plan to use can be routed to the cluster. This means that you either have a DNS entry in your internal DNS server or you are using a core URL route that is already registered.
- **Configure cert manager:** If a cert manager already exists in the cluster, you need to perform some [prerequisite steps](#) so that Astra Control Center does not attempt to install its own cert manager. By default, Astra Control Center installs its own cert manager during installation.

- **Access the NetApp Astra Control image registry:**

You have the option to obtain installation images and functionality enhancements for Astra Control, such as Astra Control Provisioner, from the NetApp image registry.

Expand for steps

1. Record your Astra Control account ID that you'll need to log in to the registry.

You can see your account ID in the Astra Control Service web UI. Select the figure icon at the top right of the page, select **API access**, and write down your account ID.

2. From the same page, select **Generate API token** and copy the API token string to the clipboard and save it in your editor.
3. Log into the Astra Control registry:

```
docker login cr.astra.netapp.io -u <account-id> -p <api-token>
```

- **Consider a service mesh:** It is strongly recommended that Astra Control host cluster communications channels be secured using a [supported service mesh](#).

Istio service mesh details

For Istio service mesh use, you'll need to do the following:

- Add an `istio-injection:enabled` [label](#) to the Astra namespace prior to deploying Astra Control Center.
- Use the Generic [ingress setting](#) and provide an alternative ingress for [external load balancing](#).
- For Red Hat OpenShift clusters, you need to define `NetworkAttachmentDefinition` on all associated Astra Control Center namespaces (`netapp-acc-operator`, `netapp-acc`, `netapp-monitoring` for application clusters, or any custom namespaces that have been substituted).

```
cat <<EOF | oc -n netapp-acc-operator create -f -  
apiVersion: "k8s.cni.cncf.io/v1"  
kind: NetworkAttachmentDefinition  
metadata:  
  name: istio-cni  
EOF  
  
cat <<EOF | oc -n netapp-acc create -f -  
apiVersion: "k8s.cni.cncf.io/v1"  
kind: NetworkAttachmentDefinition  
metadata:  
  name: istio-cni  
EOF  
  
cat <<EOF | oc -n netapp-monitoring create -f -  
apiVersion: "k8s.cni.cncf.io/v1"  
kind: NetworkAttachmentDefinition  
metadata:  
  name: istio-cni  
EOF
```

- **ONTAP SAN driver only:** If you are using an ONTAP SAN driver, be sure that multipath is enabled on all your Kubernetes clusters.

Steps

To install Astra Control Center, do the following steps:

- [Download and extract Astra Control Center](#)
- [Install the NetApp Astra kubectl plugin](#)
- [Add the images to your local registry](#)
- [Set up namespace and secret for registries with auth requirements](#)
- [Install the Astra Control Center operator](#)

- [Configure Astra Control Center](#)
- [Complete Astra Control Center and operator installation](#)
- [Verify system status](#)
- [Set up ingress for load balancing](#)
- [Log in to the Astra Control Center UI](#)



Do not delete the Astra Control Center operator (for example, `kubectl delete -f astra_control_center_operator_deploy.yaml`) at any time during Astra Control Center installation or operation to avoid deleting pods.

Download and extract Astra Control Center

You can choose to download the Astra Control Center bundle from the NetApp Support Site or use Docker to pull the bundle from the Astra Control Service image registry.

NetApp Support Site

1. Download the bundle containing Astra Control Center (astra-control-center-[version].tar.gz) from the [Astra Control Center downloads page](#).
2. (Recommended but optional) Download the certificates and signatures bundle for Astra Control Center (astra-control-center-certs-[version].tar.gz) to verify the signature of the bundle.

Expand for details

```
tar -vxzf astra-control-center-certs-[version].tar.gz
```

```
openssl dgst -sha256 -verify certs/AstraControlCenter-public.pub
-signature certs/astra-control-center-[version].tar.gz.sig
astra-control-center-[version].tar.gz
```

The output will show **Verified OK** after successful verification.

3. Extract the images from the Astra Control Center bundle:

```
tar -vxzf astra-control-center-[version].tar.gz
```

Astra Control image registry

1. Log in to Astra Control Service.
2. On the Dashboard, select **Deploy a self-managed instance of Astra Control**.
3. Follow the instructions to log in to the Astra Control image registry, pull the Astra Control Center installation image, and extract the image.

Install the NetApp Astra kubectl plugin

You can use the NetApp Astra kubectl command line plugin to push images to a local Docker repository.

Before you begin

NetApp provides plugin binaries for different CPU architectures and operating systems. You need to know which CPU and operating system you have before you perform this task.

If you already have the plugin installed from a previous installation, [make sure you have the latest version](#) before completing these steps.

Steps

1. List the available NetApp Astra kubectl plugin binaries:



The kubectl plugin library is part of the tar bundle and is extracted into the folder `kubectl-astra`.

```
ls kubectl-astra/
```

2. Move the file you need for your operating system and CPU architecture into the current path and rename it to `kubectl-astra`:

```
cp kubectl-astra/<binary-name> /usr/local/bin/kubectl-astra
```

Add the images to your local registry

1. Complete the appropriate step sequence for your container engine:

Docker

- Change to the root directory of the tarball. You should see the `acc.manifest.bundle.yaml` file and these directories:

```
acc/  
kubectl-astra/  
acc.manifest.bundle.yaml
```

- Push the package images in the Astra Control Center image directory to your local registry. Make the following substitutions before running the `push-images` command:

- Replace `<BUNDLE_FILE>` with the name of the Astra Control bundle file (`acc.manifest.bundle.yaml`).
- Replace `<MY_FULL_REGISTRY_PATH>` with the URL of the Docker repository; for example, "`https://<docker-registry>`".
- Replace `<MY_REGISTRY_USER>` with the user name.
- Replace `<MY_REGISTRY_TOKEN>` with an authorized token for the registry.

```
kubectl astra packages push-images -m <BUNDLE_FILE> -r  
<MY_FULL_REGISTRY_PATH> -u <MY_REGISTRY_USER> -p  
<MY_REGISTRY_TOKEN>
```

Podman

- Change to the root directory of the tarball. You should see this file and directory:

```
acc/  
kubectl-astra/  
acc.manifest.bundle.yaml
```

- Log in to your registry:

```
podman login <YOUR_REGISTRY>
```

- Prepare and run one of the following scripts that is customized for the version of Podman you use. Substitute `<MY_FULL_REGISTRY_PATH>` with the URL of your repository that includes any sub-directories.

```
<strong>Podman 4</strong>
```

```

export REGISTRY=<MY_FULL_REGISTRY_PATH>
export PACKAGE_NAME=acc
export PACKAGE_VERSION=23.10.0-68
export DIRECTORY_NAME=acc
for astra_image_file in $(ls ${DIRECTORY_NAME}/images/*.tar) ; do
  astra_image=$(podman load --input ${astr_image_file} | sed 's/Loaded image: //')
  astra_image_no_path=$(echo ${astr_image} | sed 's/:.*//')
  podman tag ${astr_image_no_path} ${REGISTRY}/netapp/astra/
  ${PACKAGE_NAME}/${PACKAGE_VERSION}/${astr_image_no_path}
  podman push ${REGISTRY}/netapp/astra/${PACKAGE_NAME}/${{
  PACKAGE_VERSION}/${astr_image_no_path}
done

```

Podman 3

```

export REGISTRY=<MY_FULL_REGISTRY_PATH>
export PACKAGE_NAME=acc
export PACKAGE_VERSION=23.10.0-68
export DIRECTORY_NAME=acc
for astra_image_file in $(ls ${DIRECTORY_NAME}/images/*.tar) ; do
  astra_image=$(podman load --input ${astr_image_file} | sed 's/Loaded image: //')
  astra_image_no_path=$(echo ${astr_image} | sed 's/:.*//')
  podman tag ${astr_image_no_path} ${REGISTRY}/netapp/astra/
  ${PACKAGE_NAME}/${PACKAGE_VERSION}/${astr_image_no_path}
  podman push ${REGISTRY}/netapp/astra/${PACKAGE_NAME}/${{
  PACKAGE_VERSION}/${astr_image_no_path}
done

```



The image path the script creates should resemble the following, depending on your registry configuration:

<https://downloads.example.io/docker-astra-control-prod/netapp/astra/acc/23.10.0-68/image:version>

Set up namespace and secret for registries with auth requirements

1. Export the kubeconfig for the Astra Control Center host cluster:

```
export KUBECONFIG=[file path]
```



Before you complete the installation, be sure your kubeconfig is pointing to the cluster where you want to install Astra Control Center.

2. If you use a registry that requires authentication, you need to do the following:

Expand for steps

- a. Create the `netapp-acc-operator` namespace:

```
kubectl create ns netapp-acc-operator
```

- b. Create a secret for the `netapp-acc-operator` namespace. Add Docker information and run the following command:

The placeholder `your_registry_path` should match the location of the images that you uploaded earlier (for example, `[Registry_URL]/netapp/astra/astracc/23.10.0-68`).

```
kubectl create secret docker-registry astra-registry-cred -n netapp-acc-operator --docker-server=[your_registry_path] --docker-username=[username] --docker-password=[token]
```

If you delete the namespace after the secret is generated, recreate the namespace and then regenerate the secret for the namespace.

- c. Create the `netapp-acc` (or custom-named) namespace.

```
kubectl create ns [netapp-acc or custom namespace]
```

- d. Create a secret for the `netapp-acc` (or custom-named) namespace. Add Docker information and run the following command:

```
kubectl create secret docker-registry astra-registry-cred -n [netapp-acc or custom namespace] --docker-server=[your_registry_path] --docker-username=[username] --docker-password=[token]
```

Install the Astra Control Center operator

1. Change the directory:

```
cd manifests
```

2. Edit the Astra Control Center operator deployment YAML

(`astra_control_center_operator_deploy.yaml`) to refer to your local registry and secret.

```
vim astra_control_center_operator_deploy.yaml
```



An annotated sample YAML follows these steps.

- If you use a registry that requires authentication, replace the default line of `imagePullSecrets: []` with the following:

```
imagePullSecrets: [ {name: astra-registry-cred} ]
```

- Change `ASTRA_IMAGE_REGISTRY` for the `kube-rbac-proxy` image to the registry path where you pushed the images in a [previous step](#).
- Change `ASTRA_IMAGE_REGISTRY` for the `acc-operator-controller-manager` image to the registry path where you pushed the images in a [previous step](#).

Expand for sample astra_control_center_operator_deploy.yaml

```
apiVersion: apps/v1
kind: Deployment
metadata:
  labels:
    control-plane: controller-manager
  name: acc-operator-controller-manager
  namespace: netapp-acc-operator
spec:
  replicas: 1
  selector:
    matchLabels:
      control-plane: controller-manager
  strategy:
    type: Recreate
  template:
    metadata:
      labels:
        control-plane: controller-manager
    spec:
      containers:
        - args:
            - --secure-listen-address=0.0.0.0:8443
            - --upstream=http://127.0.0.1:8080/
            - --logtostderr=true
            - --v=10
          image: ASTRA_IMAGE_REGISTRY/kube-rbac-proxy:v4.8.0
          name: kube-rbac-proxy
          ports:
            - containerPort: 8443
              name: https
        - args:
            - --health-probe-bind-address=:8081
            - --metrics-bind-address=127.0.0.1:8080
            - --leader-elect
          env:
            - name: ACCOP_LOG_LEVEL
              value: "2"
            - name: ACCOP_HELM_INSTALLTIMEOUT
              value: 5m
          image: ASTRA_IMAGE_REGISTRY/acc-operator:23.10.72
          imagePullPolicy: IfNotPresent
          livenessProbe:
            httpGet:
              path: /healthz
```

```
  port: 8081
  initialDelaySeconds: 15
  periodSeconds: 20
  name: manager
  readinessProbe:
    httpGet:
      path: /readyz
      port: 8081
    initialDelaySeconds: 5
    periodSeconds: 10
  resources:
    limits:
      cpu: 300m
      memory: 750Mi
    requests:
      cpu: 100m
      memory: 75Mi
  securityContext:
    allowPrivilegeEscalation: false
imagePullSecrets: []
  securityContext:
    runAsUser: 65532
  terminationGracePeriodSeconds: 10
```

3. Install the Astra Control Center operator:

```
kubectl apply -f astra_control_center_operator_deploy.yaml
```

Expand for sample response:

```
namespace/netapp-acc-operator created
customresourcedefinition.apiextensions.k8s.io/astracontrolcenters.as
tra.netapp.io created
role.rbac.authorization.k8s.io/acc-operator-leader-election-role
created
clusterrole.rbac.authorization.k8s.io/acc-operator-manager-role
created
clusterrole.rbac.authorization.k8s.io/acc-operator-metrics-reader
created
clusterrole.rbac.authorization.k8s.io/acc-operator-proxy-role
created
rolebinding.rbac.authorization.k8s.io/acc-operator-leader-election-
rolebinding created
clusterrolebinding.rbac.authorization.k8s.io/acc-operator-manager-
rolebinding created
clusterrolebinding.rbac.authorization.k8s.io/acc-operator-proxy-
rolebinding created
configmap/acc-operator-manager-config created
service/acc-operator-controller-manager-metrics-service created
deployment.apps/acc-operator-controller-manager created
```

4. Verify pods are running:

```
kubectl get pods -n netapp-acc-operator
```

Configure Astra Control Center

1. Edit the Astra Control Center custom resource (CR) file (`astra_control_center.yaml`) to make account, support, registry, and other necessary configurations:

```
vim astra_control_center.yaml
```



An annotated sample YAML follows these steps.

2. Modify or confirm the following settings:

accountName

Setting	Guidance	Type	Example
accountName	Change the accountName string to the name you want to associate with the Astra Control Center account. There can be only one accountName.	string	Example

astraVersion

Setting	Guidance	Type	Example
astraVersion	The version of Astra Control Center to deploy. No action is needed for this setting as the value will be pre-populated.	string	23.10.0-68

astraAddress

Setting	Guidance	Type	Example
astraAddress	<p>Change the <code>astraAddress</code> string to the FQDN (recommended) or IP address you want to use in your browser to access Astra Control Center. This address defines how Astra Control Center will be found in your data center and is the same FQDN or IP address you provisioned from your load balancer when you completed Astra Control Center requirements.</p> <p>NOTE: Do not use <code>http://</code> or <code>https://</code> in the address. Copy this FQDN for use in a later step.</p>	string	astra.example.com

autoSupport

Your selections in this section determine whether you will participate in NetApp's pro-active support application, Digital Advisor, and where data is sent. An internet connection is required (port 442), and all support data is anonymized.

Setting	Use	Guidance	Type	Example
autoSupport.enrolled	Either enrolled or url fields must be selected	Change enrolled for AutoSupport to false for sites without internet connectivity or retain true for connected sites. A setting of true enables anonymous data to be sent to NetApp for support purposes. The default election is false and indicates no support data will be sent to NetApp.	Boolean	false (this value is the default)
autoSupport.url	Either enrolled or url fields must be selected	This URL determines where the anonymous data will be sent.	string	https://support.netapp.com/asupprod/post/1.0/postAsup

email

Setting	Guidance	Type	Example
email	Change the email string to the default initial administrator address. Copy this email address for use in a later step . This email address will be used as the username for the initial account to log in to the UI and will be notified of events in Astra Control.	string	admin@example.com

firstName

Setting	Guidance	Type	Example
firstName	The first name of the default initial administrator associated with the Astra account. The name used here will be visible in a heading in the UI after your first login.	string	SRE

lastName

Setting	Guidance	Type	Example
lastName	The last name of the default initial administrator associated with the Astra account. The name used here will be visible in a heading in the UI after your first login.	string	Admin

imageRegistry

Your selections in this section define the container image registry that is hosting the Astra application images, Astra Control Center Operator, and Astra Control Center Helm repository.

Setting	Use	Guidance	Type	Example
imageRegistry.name	Required	The name of the image registry where you pushed the images in the previous step . Do not use <code>http://</code> or <code>https://</code> in the registry name.	string	example.registry.com/astra
imageRegistry.secret	Required if the string you entered for <code>imageRegistry.name</code> requires a secret. IMPORTANT: If you are using a registry that does not require authorization, you must delete this `secret line within <code>imageRegistry</code> or the installation will fail.	The name of the Kubernetes secret used to authenticate with the image registry.	string	astra-registry-cred

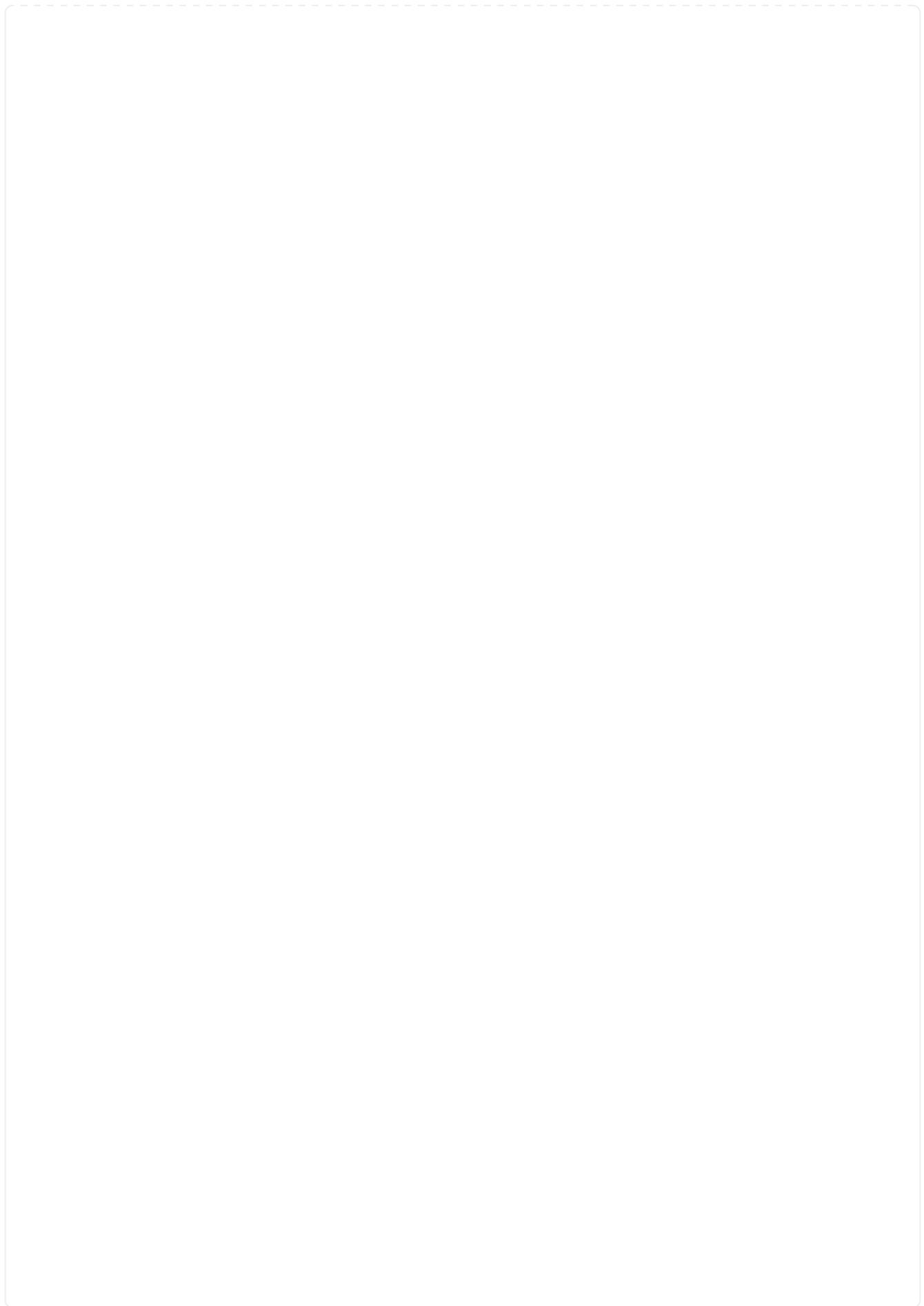
storageClass

Setting	Guidance	Type	Example
storageClass	<p>Change the <code>storageClass</code> value from <code>ontap-gold</code> to another Astra Trident <code>storageClass</code> resource as required by your installation. Run the command <code>kubectl get sc</code> to determine your existing configured storage classes. One of the Astra Trident-based storage classes must be entered in the manifest file (<code>astra-control-center-<version>.manifest</code>) and will be used for Astra PVs. If it is not set, the default storage class will be used.</p> <p>NOTE: If a default storage class is configured, ensure that it is the only storage class that has the default annotation.</p>	string	<code>ontap-gold</code>

volumeReclaimPolicy

Setting	Guidance	Type	Options
volumeReclaimPolicy	<p>This sets the reclaim policy for Astra's PVs. Setting this policy to <code>Retain</code> retains persistent volumes after Astra is deleted. Setting this policy to <code>Delete</code> deletes persistent volumes after astra is deleted. If this value is not set, the PVs are retained.</p>	string	<ul style="list-style-type: none">• <code>Retain</code> (This is the default value)• <code>Delete</code>

ingressType



Setting	Guidance	Type	Options
ingressType	<p>Use one of the following ingress types:</p> <p>Generic <code>(ingressType: "Generic") (Default)</code> Use this option when you have another ingress controller in use or would prefer to use your own ingress controller. After Astra Control Center is deployed, you will need to configure the ingress controller to expose Astra Control Center with a URL.</p> <p>IMPORTANT: If you intend to use a service mesh with Astra Control Center, you must select Generic as ingress type and set up your own ingress controller.</p> <p>AccTraefik <code>(ingressType: "AccTraefik")</code> Use this option when you would prefer not to configure an ingress controller. This deploys the Astra Control Center <code>traefik</code> gateway as a Kubernetes LoadBalancer type service.</p> <p>Astra Control Center uses a service of the type "LoadBalancer" (<code>svc/traefik</code> in the Astra Control Center namespace), and requires that it be assigned an accessible external IP address. If load balancers are permitted in your environment and you don't already have one</p>	string	<ul style="list-style-type: none"> • Generic (this is the default value) • AccTraefik

scaleSize

Setting	Guidance	Type	Options
scaleSize	<p>By default, Astra will use High Availability (HA) scaleSize of Medium, which deploys most services in HA and deploys multiple replicas for redundancy. With scaleSize as Small, Astra will reduce the number of replicas for all services except for essential services to reduce consumption.</p> <p>TIP: Medium deployments consist of around 100 pods (not including transient workloads. 100 pods is based on a three master node and three worker node configuration). Be aware of per-pod network limit constraints that might be an issue in your environment, especially when considering disaster recovery scenarios.</p>	string	<ul style="list-style-type: none">• Small• Medium (This is the default value)

astraResourcesScaler

Setting	Guidance	Type	Options
astraResourcesScaler	<p>Scaling options for AstraControlCenter Resource limits. By default, Astra Control Center deploys with resource requests set for most of the components within Astra. This configuration allows the Astra Control Center software stack to perform better in environments under increased application load and scale.</p> <p>However, in scenarios using smaller development or test clusters, the CR field <code>astraResourcesScaler</code> may be set to <code>Off</code>. This disables resource requests and allows for deployment on smaller clusters.</p>	string	<ul style="list-style-type: none">• Default (This is the default value)• Off

additionalValues



Add the following additional values to the Astra Control Center CR to prevent a known issue in installation:

```
additionalValues:  
  keycloak-operator:  
    livenessProbe:  
      initialDelaySeconds: 180  
    readinessProbe:  
      initialDelaySeconds: 180
```

- For Astral Control Center and Cloud Insights communication, TLS certificate verification is disabled by default. You can enable TLS certification verification for communication between Cloud Insights and both the Astra Control Center host cluster and managed cluster by adding the following section in additionalValues.

```
additionalValues:  
  netapp-monitoring-operator:  
    config:  
      ciSkipTlsVerify: false  
  cloud-insights-service:  
    config:  
      ciSkipTlsVerify: false  
  telemetry-service:  
    config:  
      ciSkipTlsVerify: false
```

Your selections in this section determine how Astra Control Center should handle CRDs.

Setting	Guidance	Type	Example
crds.externalCertManager	<p>If you use an external cert manager, change <code>externalCertManager</code> to <code>true</code>. The default <code>false</code> causes Astra Control Center to install its own cert manager CRDs during installation.</p> <p>CRDs are cluster-wide objects and installing them might have an impact on other parts of the cluster. You can use this flag to signal to Astra Control Center that these CRDs will be installed and managed by the cluster administrator outside of Astra Control Center.</p>	Boolean	<code>False</code> (this value is the default)
crds.externalTraefik	<p>By default, Astra Control Center will install required Traefik CRDs. CRDs are cluster-wide objects and installing them might have an impact on other parts of the cluster. You can use this flag to signal to Astra Control Center that these CRDs will be installed and managed by the cluster administrator outside of Astra Control Center.</p>	Boolean	<code>False</code> (this value is the default)



Be sure that you have selected the correct storage class and ingress type for your configuration before completing installation.

Expand for sample astra_control_center.yaml

```
apiVersion: astra.netapp.io/v1
kind: AstraControlCenter
metadata:
  name: astra
spec:
  accountName: "Example"
  astraVersion: "ASTRA_VERSION"
  astraAddress: "astra.example.com"
  autoSupport:
    enrolled: true
  email: "[admin@example.com]"
  firstName: "SRE"
  lastName: "Admin"
  imageRegistry:
    name: "[your_registry_path]"
    secret: "astra-registry-cred"
  storageClass: "ontap-gold"
  volumeReclaimPolicy: "Retain"
  ingressType: "Generic"
  scaleSize: "Medium"
  astraResourcesScaler: "Default"
  additionalValues:
    keycloak-operator:
      livenessProbe:
        initialDelaySeconds: 180
      readinessProbe:
        initialDelaySeconds: 180
  crds:
    externalTraefik: false
    externalCertManager: false
```

Complete Astra Control Center and operator installation

1. If you didn't already do so in a previous step, create the `netapp-acc` (or custom) namespace:

```
kubectl create ns [netapp-acc or custom namespace]
```

2. If you are using a service mesh with Astra Control Center, add the following label to the `netapp-acc` or custom namespace:



Your ingress type (ingressType) must be set to `Generic` in the Astra Control Center CR before proceeding with this command.

```
kubectl label ns [netapp-acc or custom namespace] istio-injection:enabled
```

3. (Recommended) [Enable strict MTLs](#) for Istio service mesh:

```
kubectl apply -n istio-system -f - <<EOF
apiVersion: security.istio.io/v1beta1
kind: PeerAuthentication
metadata:
  name: default
spec:
  mtls:
    mode: STRICT
EOF
```

4. Install Astra Control Center in the `netapp-acc` (or your custom) namespace:

```
kubectl apply -f astra_control_center.yaml -n [netapp-acc or custom namespace]
```



The Astra Control Center operator will run an automatic check for environment requirements. Missing [requirements](#) can cause your installation to fail or Astra Control Center to not operate properly. See the [next section](#) to check for warning messages related to the automatic system check.

Verify system status

You can verify system status using `kubectl` commands. If you prefer to use OpenShift, you can use comparable `oc` commands for verification steps.

Steps

1. Verify that the installation process did not produce warnings messages related to the validation checks:

```
kubectl get acc [astra or custom Astra Control Center CR name] -n [netapp-acc or custom namespace] -o yaml
```



Additional warning messages are also reported in the Astra Control Center operator logs.

2. Correct any issues with your environment that were reported by the automated requirements checks.



You can correct issues by ensuring that your environment meets the [requirements](#) for Astra Control Center.

3. Verify that all system components installed successfully.

```
kubectl get pods -n [netapp-acc or custom namespace]
```

Each pod should have a status of **Running**. It may take several minutes before the system pods are deployed.

Expand for sample response

NAME	READY	STATUS
RESTARTS	AGE	
acc-helm-repo-6cc7696d8f-pmhm8 9h	1/1	Running 0
activity-597fb656dc-5rd4l 9h	1/1	Running 0
activity-597fb656dc-mqmcw 9h	1/1	Running 0
api-token-authentication-62f84 9h	1/1	Running 0
api-token-authentication-68nlf 9h	1/1	Running 0
api-token-authentication-ztgrm 9h	1/1	Running 0
asup-669d4ddbc4-fnmwp (9h ago) 9h	1/1	Running 1
authentication-78789d7549-1k686 9h	1/1	Running 0
bucketservice-65c7d95496-24x7l (9h ago) 9h	1/1	Running 3
cert-manager-c9f9fbf9f-k8zq2 9h	1/1	Running 0
cert-manager-c9f9fbf9f-qj1zm 9h	1/1	Running 0
cert-manager-cainjector-dbbbd8447-b5ql1 9h	1/1	Running 0
cert-manager-cainjector-dbbbd8447-p5whs 9h	1/1	Running 0
cert-manager-webhook-6f97bb7d84-4722b 9h	1/1	Running 0
cert-manager-webhook-6f97bb7d84-86kv5 9h	1/1	Running 0
certificates-59d9f6f4bd-2j899 9h	1/1	Running 0
certificates-59d9f6f4bd-9d9k6 9h	1/1	Running 0
certificates-expiry-check-28011180--1-81kxz 9h	0/1	Completed 0
cloud-extension-5c9c9958f8-jdhrp 9h	1/1	Running 0
cloud-insights-service-5cdd5f7f-pp8r5 9h	1/1	Running 0
composite-compute-66585789f4-hxn5w 9h	1/1	Running 0

composite-volume-68649f68fd-tb7p4 9h	1/1	Running	0	
credentials-dfc844c57-jsx92 9h	1/1	Running	0	
credentials-dfc844c57-xw26s 9h	1/1	Running	0	
entitlement-7b47769b87-4jb6c 9h	1/1	Running	0	
features-854d8444cc-c24b7 9h	1/1	Running	0	
features-854d8444cc-dv6sm 9h	1/1	Running	0	
fluent-bit-ds-9tlv4 9h	1/1	Running	0	
fluent-bit-ds-bpkcb 9h	1/1	Running	0	
fluent-bit-ds-cxmwx 9h	1/1	Running	0	
fluent-bit-ds-jgnhc 9h	1/1	Running	0	
fluent-bit-ds-vtr6k 9h	1/1	Running	0	
fluent-bit-ds-vxqd5 9h	1/1	Running	0	
graphql-server-7d4b9d44d5-zdbf5 9h	1/1	Running	0	
identity-6655c48769-4pwk8 9h	1/1	Running	0	
influxdb2-0 9h	1/1	Running	0	
keycloak-operator-55479d6fc6-slvmt 9h	1/1	Running	0	
krakend-f487cb465-78679 9h	1/1	Running	0	
krakend-f487cb465-rjsxx 9h	1/1	Running	0	
license-64cbc7cd9c-qxsr8 9h	1/1	Running	0	
login-ui-5db89b5589-ndb96 9h	1/1	Running	0	
loki-0 9h	1/1	Running	0	
metrics-facade-8446f64c94-x8h7b 9h	1/1	Running	0	
monitoring-operator-6b44586965-pvc14 9h	2/2	Running	0	

nats-0		1/1	Running	0
9h				
nats-1		1/1	Running	0
9h				
nats-2		1/1	Running	0
9h				
nautilus-85754d87d7-756qb		1/1	Running	0
9h				
nautilus-85754d87d7-q8j7d		1/1	Running	0
9h				
openapi-5f9cc76544-7fnjm		1/1	Running	0
9h				
openapi-5f9cc76544-vzr7b		1/1	Running	0
9h				
packages-5db49f8b5-1rzhd		1/1	Running	0
9h				
polaris-consul-consul-server-0		1/1	Running	0
9h				
polaris-consul-consul-server-1		1/1	Running	0
9h				
polaris-consul-consul-server-2		1/1	Running	0
9h				
polaris-keycloak-0	(9h ago)	1/1	Running	2
9h				
polaris-keycloak-1		1/1	Running	0
9h				
polaris-keycloak-2		1/1	Running	0
9h				
polaris-keycloak-db-0		1/1	Running	0
9h				
polaris-keycloak-db-1		1/1	Running	0
9h				
polaris-keycloak-db-2		1/1	Running	0
9h				
polaris-mongodb-0		1/1	Running	0
9h				
polaris-mongodb-1		1/1	Running	0
9h				
polaris-mongodb-2		1/1	Running	0
9h				
polaris-ui-66fb99479-qp9gq		1/1	Running	0
9h				
polaris-vault-0		1/1	Running	0
9h				
polaris-vault-1		1/1	Running	0
9h				

polaris-vault-2		1/1	Running	0
9h				
public-metrics-76fbf9594d-zmxzw		1/1	Running	0
9h				
storage-backend-metrics-7d7fbc9cb9-1md25		1/1	Running	0
9h				
storage-provider-5bdd456c4b-2fftc		1/1	Running	0
9h				
task-service-87575df85-dnn2q		1/1	Running	3
(9h ago) 9h				
task-service-task-purge-28011720--1-q6w4r		0/1	Completed	0
28m				
task-service-task-purge-28011735--1-vk6pd		1/1	Running	0
13m				
telegraf-ds-2r2kw		1/1	Running	0
9h				
telegraf-ds-6s9d5		1/1	Running	0
9h				
telegraf-ds-96j17		1/1	Running	0
9h				
telegraf-ds-hbp84		1/1	Running	0
9h				
telegraf-ds-plwzv		1/1	Running	0
9h				
telegraf-ds-sr22c		1/1	Running	0
9h				
telegraf-rs-4sbg8		1/1	Running	0
9h				
telemetry-service-fb9559f7b-mk917		1/1	Running	3
(9h ago) 9h				
tenancy-559bbc6b48-5msgg		1/1	Running	0
9h				
traefik-d997b8877-7xpf4		1/1	Running	0
9h				
traefik-d997b8877-9xv96		1/1	Running	0
9h				
trident-svc-585c97548c-d25z5		1/1	Running	0
9h				
vault-controller-88484b454-2d6sr		1/1	Running	0
9h				
vault-controller-88484b454-fc5cz		1/1	Running	0
9h				
vault-controller-88484b454-jktld		1/1	Running	0
9h				

4. (Optional) Watch the acc-operator logs to monitor progress:

```
kubectl logs deploy/acc-operator-controller-manager -n netapp-acc-operator -c manager -f
```



accHost cluster registration is one of the last operations, and if it fails it will not cause deployment to fail. In the event of a cluster registration failure indicated in the logs, you can attempt registration again through the [Add cluster workflow in the UI](#) or API.

5. When all the pods are running, verify that the installation was successful (READY is True) and get the initial setup password you will use when you log in to Astra Control Center:

```
kubectl get AstraControlCenter -n [netapp-acc or custom namespace]
```

Response:

NAME	UUID	VERSION	ADDRESS
READY			
astra	9aa5fdae-4214-4cb7-9976-5d8b4c0ce27f	23.10.0-68	
10.111.111.111	True		



Copy the UUID value. The password is ACC- followed by the UUID value (ACC- [UUID] or, in this example, ACC-9aa5fdae-4214-4cb7-9976-5d8b4c0ce27f).

Set up ingress for load balancing

You can set up a Kubernetes ingress controller that manages external access to services. These procedures give setup examples for an ingress controller if you used the default of `ingressType: "Generic"` in the Astra Control Center custom resource (`astra_control_center.yaml`). You do not need to use this procedure if you specified `ingressType: "AccTraefik"` in the Astra Control Center custom resource (`astra_control_center.yaml`).

After Astra Control Center is deployed, you will need to configure the ingress controller to expose Astra Control Center with a URL.

Setup steps differ depending on the type of ingress controller you use. Astra Control Center supports many ingress controller types. These setup procedures provide example steps for some common ingress controller types.

Before you begin

- The required [ingress controller](#) should already be deployed.
- The [ingress class](#) corresponding to the ingress controller should already be created.

Steps for Istio ingress

1. Configure Istio ingress.



This procedure assumes that Istio is deployed using the "default" configuration profile.

2. Gather or create the desired certificate and private key file for the Ingress Gateway.

You can use a CA-signed or self-signed certificate. The common name must be the Astra address (FQDN).

Sample command:

```
openssl req -x509 -nodes -days 365 -newkey rsa:2048 -keyout tls.key  
-out tls.crt
```

3. Create a secret `tls` secret name of type `kubernetes.io/tls` for a TLS private key and certificate in the `istio-system` namespace as described in TLS secrets.

Sample command:

```
kubectl create secret tls [tls secret name] --key="tls.key"  
--cert="tls.crt" -n istio-system
```



The name of the secret should match the `spec.tls.secretName` provided in `istio-ingress.yaml` file.

4. Deploy an ingress resource in the `netapp-acc` (or custom-named) namespace using the `v1` resource type for a schema (`istio-ingress.yaml` is used in this example):

```

apiVersion: networking.k8s.io/v1
kind: IngressClass
metadata:
  name: istio
spec:
  controller: istio.io/ingress-controller
---
apiVersion: networking.k8s.io/v1
kind: Ingress
metadata:
  name: ingress
  namespace: [netapp-acc or custom namespace]
spec:
  ingressClassName: istio
  tls:
  - hosts:
    - <ACC address>
    secretName: [tls secret name]
  rules:
  - host: [ACC address]
    http:
      paths:
      - path: /
        pathType: Prefix
        backend:
          service:
            name: traefik
            port:
              number: 80

```

5. Apply the changes:

```
kubectl apply -f istio-ingress.yaml
```

6. Check the status of the ingress:

```
kubectl get ingress -n [netapp-acc or custom namespace]
```

Response:

NAME	CLASS	HOSTS	ADDRESS	PORTS	AGE
ingress	istio	astra.example.com	172.16.103.248	80, 443	1h

7. Finish Astra Control Center installation.

Steps for Nginx ingress controller

1. Create a secret of type `kubernetes.io/tls` for a TLS private key and certificate in `netapp-acc` (or custom-named) namespace as described in [TLS secrets](#).
2. Deploy an ingress resource in `netapp-acc` (or custom-named) namespace using the `v1` resource type for a schema (`nginx-Ingress.yaml` is used in this example):

```
apiVersion: networking.k8s.io/v1
kind: Ingress
metadata:
  name: netapp-acc-ingress
  namespace: [netapp-acc or custom namespace]
spec:
  ingressClassName: [class name for nginx controller]
  tls:
  - hosts:
    - <ACC address>
      secretName: [tls secret name]
  rules:
  - host: <ACC address>
    http:
      paths:
      - path:
        backend:
          service:
            name: traefik
            port:
              number: 80
      pathType: ImplementationSpecific
```

3. Apply the changes:

```
kubectl apply -f nginx-Ingress.yaml
```



NetApp recommends installing the nginx controller as a deployment rather than a daemonSet.

Steps for OpenShift ingress controller

1. Procure your certificate and get the key, certificate, and CA files ready for use by the OpenShift route.
2. Create the OpenShift route:

```
oc create route edge --service=traefik --port=web -n [netapp-acc or  
custom namespace] --insecure-policy=Redirect --hostname=<ACC  
address> --cert=cert.pem --key=key.pem
```

Log in to the Astra Control Center UI

After installing Astra Control Center, you will change the password for the default administrator and log in to the Astra Control Center UI dashboard.

Steps

1. In a browser, enter the FQDN (including the `https://` prefix) you used in the `astraAddress` in the `astra_control_center.yaml` CR when [you installed Astra Control Center](#).
2. Accept the self-signed certificates if prompted.

 You can create a custom certificate after login.

3. At the Astra Control Center login page, enter the value you used for `email` in `astra_control_center.yaml` CR when [you installed Astra Control Center](#), followed by the initial setup password (ACC-[UUID]).

 If you enter an incorrect password three times, the admin account will be locked for 15 minutes.

4. Select **Login**.
5. Change the password when prompted.

 If this is your first login and you forget the password and no other administrative user accounts have yet been created, contact [NetApp Support](#) for password recovery assistance.

6. (Optional) Remove the existing self-signed TLS certificate and replace it with a [custom TLS certificate signed by a Certificate Authority \(CA\)](#).

Troubleshoot the installation

If any of the services are in `Error` status, you can inspect the logs. Look for API response codes in the 400 to 500 range. Those indicate the place where a failure happened.

Options

- To inspect the Astra Control Center operator logs, enter the following:

```
kubectl logs deploy/acc-operator-controller-manager -n netapp-acc-operator -c manager -f
```

- To check the output of the Astra Control Center CR:

```
kubectl get acc -n [netapp-acc or custom namespace] -o yaml
```

What's next

- (Optional) Depending on your environment, complete post-installation [configuration steps](#).
- Complete the deployment by performing [setup tasks](#).

Configure an external cert manager

If a cert manager already exists in your Kubernetes cluster, you need to perform some prerequisite steps so that Astra Control Center does not install its own cert manager.

Steps

1. Confirm that you have a cert manager installed:

```
kubectl get pods -A | grep 'cert-manager'
```

Sample response:

cert-manager	essential-cert-manager-84446f49d5-sf2zd	1/1
Running	0	6d5h
cert-manager	essential-cert-manager-cainjector-66dc99cc56-9ldmt	1/1
Running	0	6d5h
cert-manager	essential-cert-manager-webhook-56b76db9cc-fjqrq	1/1
Running	0	6d5h

2. Create a certificate/key pair for the astraAddress FQDN:

```
openssl req -x509 -nodes -days 365 -newkey rsa:2048 -keyout tls.key -out tls.crt
```

Sample response:

```
Generating a 2048 bit RSA private key
.....+++
.....+++
writing new private key to 'tls.key'
```

3. Create a secret with previously generated files:

```
kubectl create secret tls selfsigned-tls --key tls.key --cert tls.crt -n <cert-manager-namespace>
```

Sample response:

```
secret/selfsigned-tls created
```

4. Create a ClusterIssuer file that is **exactly** the following but includes the namespace location where your cert-manager pods are installed:

```
apiVersion: cert-manager.io/v1
kind: ClusterIssuer
metadata:
  name: astra-ca-clusterissuer
  namespace: <cert-manager-namespace>
spec:
  ca:
    secretName: selfsigned-tls
```

```
kubectl apply -f ClusterIssuer.yaml
```

Sample response:

```
clusterissuer.cert-manager.io/astra-ca-clusterissuer created
```

5. Verify that the ClusterIssuer has come up correctly. Ready must be True before you can proceed:

```
kubectl get ClusterIssuer
```

Sample response:

NAME	READY	AGE
astra-ca-clusterissuer	True	9s

6. Complete the [Astra Control Center installation process](#). There is a [required configuration step for the Astra Control Center cluster YAML](#) in which you change the CRD value to indicate that the cert manager is externally installed. You must complete this step during installation so that Astra Control Center recognizes the external cert manager.

Install Astra Control Center using OpenShift OperatorHub

If you use Red Hat OpenShift, you can install Astra Control Center using the Red Hat certified operator. Use this procedure to install Astra Control Center from the [Red Hat Ecosystem Catalog](#) or using the Red Hat OpenShift Container Platform.

After you complete this procedure, you must return to the installation procedure to complete the [remaining steps](#) to verify installation success and log on.

Before you begin

- **Meet environmental prerequisites:** [Before you begin installation, prepare your environment for Astra Control Center deployment](#).
- **Ensure healthy cluster operators and API services:**

- From your OpenShift cluster, ensure all cluster operators are in a healthy state:

```
oc get clusteroperators
```

- From your OpenShift cluster, ensure all API services are in a healthy state:

```
oc get apiservices
```

- **Ensure a routable FQDN:** The Astra FQDN you plan to use can be routed to the cluster. This means that you either have a DNS entry in your internal DNS server or you are using a core URL route that is already registered.
- **Obtain OpenShift Permissions:** You'll need all necessary permissions and access to the Red Hat OpenShift Container Platform to perform the installation steps described.
- **Configure a cert manager:** If a cert manager already exists in the cluster, you need to perform some [prerequisite steps](#) so that Astra Control Center does not install its own cert manager. By default, Astra Control Center installs its own cert manager during installation.
- **Consider a service mesh:** It is strongly recommended that Astra Control host cluster communications channels be secured using a [supported service mesh](#).

Istio service mesh details

For Istio service mesh use, you'll need to do the following:

- Add an `istio-injection:enabled` label to the Astra namespace prior to deploying Astra Control Center.
- Use the Generic [ingress setting](#) and provide an alternative ingress for [external load balancing](#).
- For Red Hat OpenShift clusters, you'll need to define `NetworkAttachmentDefinition` on all associated Astra Control Center namespaces (`netapp-acc-operator`, `netapp-acc`, `netapp-monitoring` for application clusters, or any custom namespaces that have been substituted).

```
cat <<EOF | oc -n netapp-acc-operator create -f -  
apiVersion: "k8s.cni.cncf.io/v1"  
kind: NetworkAttachmentDefinition  
metadata:  
  name: istio-cni  
EOF  
  
cat <<EOF | oc -n netapp-acc create -f -  
apiVersion: "k8s.cni.cncf.io/v1"  
kind: NetworkAttachmentDefinition  
metadata:  
  name: istio-cni  
EOF  
  
cat <<EOF | oc -n netapp-monitoring create -f -  
apiVersion: "k8s.cni.cncf.io/v1"  
kind: NetworkAttachmentDefinition  
metadata:  
  name: istio-cni  
EOF
```

- **Kubernetes ingress controller:** If you have a Kubernetes ingress controller that manages external access to services, such as load balancing in a cluster, you need to set it up for use with Astra Control Center:

- a. Create the operator namespace:

```
oc create namespace netapp-acc-operator
```

- b. [Complete setup](#) for your ingress controller type.

- **ONTAP SAN driver only:** If you are using an ONTAP SAN driver, be sure that multipath is enabled on all

your Kubernetes clusters.

Steps

- [Download and extract Astra Control Center](#)
- [Install the NetApp Astra kubectl plugin](#)
- [Add the images to your local registry](#)
- [Find the operator install page](#)
- [Install the operator](#)
- [Install Astra Control Center](#)

Download and extract Astra Control Center

You can choose to download the Astra Control Center bundle from the NetApp Support Site or use Docker to pull the bundle from the Astra Control Service image registry.

NetApp Support Site

1. Download the bundle containing Astra Control Center (astra-control-center-[version].tar.gz) from the [Astra Control Center downloads page](#).
2. (Recommended but optional) Download the certificates and signatures bundle for Astra Control Center (astra-control-center-certs-[version].tar.gz) to verify the signature of the bundle.

Expand for details

```
tar -vxzf astra-control-center-certs-[version].tar.gz
```

```
openssl dgst -sha256 -verify certs/AstraControlCenter-public.pub
-signature certs/astra-control-center-[version].tar.gz.sig
astra-control-center-[version].tar.gz
```

The output will show `Verified OK` after successful verification.

3. Extract the images from the Astra Control Center bundle:

```
tar -vxzf astra-control-center-[version].tar.gz
```

Astra Control image registry

1. Log in to Astra Control Service.
2. On the Dashboard, select **Deploy a self-managed instance of Astra Control**.
3. Follow the instructions to log in to the Astra Control image registry, pull the Astra Control Center installation image, and extract the image.

Install the NetApp Astra kubectl plugin

You can use the NetApp Astra kubectl command line plugin to push images to a local Docker repository.

Before you begin

NetApp provides plugin binaries for different CPU architectures and operating systems. You need to know which CPU and operating system you have before you perform this task.

Steps

1. List the available NetApp Astra kubectl plugin binaries, and note the name of the file you need for your operating system and CPU architecture:



The kubectl plugin library is part of the tar bundle and is extracted into the folder `kubectl-astra`.

```
ls kubectl-astra/
```

2. Move the correct binary into the current path and rename it to kubectl-astra:

```
cp kubectl-astra/<binary-name> /usr/local/bin/kubectl-astra
```

Add the images to your local registry

1. Complete the appropriate step sequence for your container engine:

Docker

- Change to the root directory of the tarball. You should see the `acc.manifest.bundle.yaml` file and these directories:

```
acc/  
kubectl-astra/  
acc.manifest.bundle.yaml
```

- Push the package images in the Astra Control Center image directory to your local registry. Make the following substitutions before running the `push-images` command:

- Replace `<BUNDLE_FILE>` with the name of the Astra Control bundle file (`acc.manifest.bundle.yaml`).
- Replace `<MY_FULL_REGISTRY_PATH>` with the URL of the Docker repository; for example, "`https://<docker-registry>`".
- Replace `<MY_REGISTRY_USER>` with the user name.
- Replace `<MY_REGISTRY_TOKEN>` with an authorized token for the registry.

```
kubectl astra packages push-images -m <BUNDLE_FILE> -r  
<MY_FULL_REGISTRY_PATH> -u <MY_REGISTRY_USER> -p  
<MY_REGISTRY_TOKEN>
```

Podman

- Change to the root directory of the tarball. You should see this file and directory:

```
acc/  
kubectl-astra/  
acc.manifest.bundle.yaml
```

- Log in to your registry:

```
podman login <YOUR_REGISTRY>
```

- Prepare and run one of the following scripts that is customized for the version of Podman you use. Substitute `<MY_FULL_REGISTRY_PATH>` with the URL of your repository that includes any sub-directories.

```
<strong>Podman 4</strong>
```

```

export REGISTRY=<MY_FULL_REGISTRY_PATH>
export PACKAGE_NAME=acc
export PACKAGE_VERSION=23.10.0-68
export DIRECTORY_NAME=acc
for astra_image_file in $(ls ${DIRECTORY_NAME}/images/*.tar) ; do
  astra_image=$(podman load --input ${astr_image_file} | sed 's/Loaded image: //')
  astra_image_no_path=$(echo ${astr_image} | sed 's:.*::')
  podman tag ${astr_image_no_path} ${REGISTRY}/netapp/astra/
  ${PACKAGE_NAME}/${PACKAGE_VERSION}/${astr_image_no_path}
  podman push ${REGISTRY}/netapp/astra/${PACKAGE_NAME}/${{
  PACKAGE_VERSION}/${astr_image_no_path}
done

```

Podman 3

```

export REGISTRY=<MY_FULL_REGISTRY_PATH>
export PACKAGE_NAME=acc
export PACKAGE_VERSION=23.10.0-68
export DIRECTORY_NAME=acc
for astra_image_file in $(ls ${DIRECTORY_NAME}/images/*.tar) ; do
  astra_image=$(podman load --input ${astr_image_file} | sed 's/Loaded image: //')
  astra_image_no_path=$(echo ${astr_image} | sed 's:.*::')
  podman tag ${astr_image_no_path} ${REGISTRY}/netapp/astra/
  ${PACKAGE_NAME}/${PACKAGE_VERSION}/${astr_image_no_path}
  podman push ${REGISTRY}/netapp/astra/${PACKAGE_NAME}/${{
  PACKAGE_VERSION}/${astr_image_no_path}
done

```



The image path the script creates should resemble the following, depending on your registry configuration:

<https://downloads.example.io/docker-astra-control-prod/netapp/astra/acc/23.10.0-68/image:version>

Find the operator install page

1. Complete one of the following procedures to access the operator install page:

- From Red Hat OpenShift web console:
 - Log in to the OpenShift Container Platform UI.
 - From the side menu, select **Operators > OperatorHub**.



You can upgrade only to the current version of Astra Control Center using this operator.

- Search for and select the NetApp Astra Control Center operator.

The screenshot shows the Red Hat OpenShift Container Platform web console. The left sidebar is open, showing various navigation options like Home, Overview, Projects, Search, API Explorer, Events, Operators (with OperatorHub selected), Workloads, Networking, Storage, Builds, Monitoring, and Compute. The main content area is titled 'OperatorHub' and shows a search bar with 'netapp' entered. A list of operators is displayed, including 'BeeGFS CSI Driver' and 'netapp-acc-operator'. The 'netapp-acc-operator' card is expanded, showing its details: name 'netapp-acc-operator', provider 'NetApp', capability level 'Basic Install', source 'Certified', provider 'NetApp', repository 'N/A', container image 'N/A', created at 'N/A', and support 'NetApp'. There is also a note about Astra Control Center and a 'How to deploy Astra Control' section.

- From Red Hat Ecosystem Catalog:
 - Select the NetApp Astra Control Center [operator](#).
 - Select **Deploy and Use**.

The screenshot shows the Red Hat Ecosystem Catalog. The top navigation bar includes the Red Hat logo, 'Red Hat Ecosystem Catalog', 'Hardware', 'Software', 'Cloud & service providers', 'Help', 'Resources', and 'All Red Hat'. Below the navigation, the breadcrumb navigation shows 'Home > Software > OpenShift operators > Astra Control Center'. The main content area is titled 'Astra Control Center' and is provided by 'NetApp'. It features a 'Deploy and use' button, a 'Overview' tab (which is selected), 'Features & benefits', 'Documentation', 'Deploy & use', 'FAQs', and 'Get support'. A 'Have feedback?' button is located in the bottom right corner.

Install the operator

1. Complete the **Install Operator** page and install the operator:



The operator will be available in all cluster namespaces.

- a. Select the operator namespace or `netapp-acc-operator` namespace will be created automatically as part of the operator installation.
- b. Select a manual or automatic approval strategy.



Manual approval is recommended. You should only have a single operator instance running per cluster.

- c. Select **Install**.



If you selected a manual approval strategy, you will be prompted to approve the manual install plan for this operator.

2. From the console, go to the OperatorHub menu and confirm that the operator installed successfully.

Install Astra Control Center

1. From the console within the **Astra Control Center** tab of the Astra Control Center operator, select **Create AstraControlCenter**.

The screenshot shows the 'Astra Control Center' tab of the Astra Control Center operator. The 'Astra Control Center' tab is selected and highlighted in blue. The page displays the 'netapp-acc-operator' operator with version 23.4.0. The 'Actions' button is visible. The 'Astra Control Center' tab shows a list of AstraControlCenters with a 'Create AstraControlCenter' button.

2. Complete the **Create AstraControlCenter** form field:

- a. Keep or adjust the Astra Control Center name.
- b. Add labels for the Astra Control Center.
- c. Enable or disable Auto Support. Retaining Auto Support functionality is recommended.
- d. Enter the Astra Control Center FQDN or IP address. Do not enter `http://` or `https://` in the address field.
- e. Enter the Astra Control Center version; for example, 23.10.0-68.
- f. Enter an account name, email address, and admin last name.
- g. Choose a volume reclaim policy of Retain, Recycle, or Delete. The default value is Retain.

h. Select the `scaleSize` of the installation.



By default, Astra will use High Availability (HA) `scaleSize` of `Medium`, which deploys most services in HA and deploys multiple replicas for redundancy. With `scaleSize` as `Small`, Astra will reduce the number of replicas for all services except for essential services to reduce consumption.

i. Select the ingress type:

- **Generic** (`ingressType: "Generic"`) (Default)

Use this option when you have another ingress controller in use or would prefer to use your own ingress controller. After Astra Control Center is deployed, you will need to configure the [ingress controller](#) to expose Astra Control Center with a URL.

- **AccTraefik** (`ingressType: "AccTraefik"`)

Use this option when you would prefer not to configure an ingress controller. This deploys the Astra Control Center `traefik` gateway as a Kubernetes "LoadBalancer" type service.

Astra Control Center uses a service of the type "LoadBalancer" (`svc/traefik` in the Astra Control Center namespace), and requires that it be assigned an accessible external IP address. If load balancers are permitted in your environment and you don't already have one configured, you can use MetalLB or another external service load balancer to assign an external IP address to the service. In the internal DNS server configuration, you should point the chosen DNS name for Astra Control Center to the load-balanced IP address.



For details about the service type of "LoadBalancer" and ingress, refer to [Requirements](#).

j. In **Image Registry**, enter your local container image registry path. Do not enter `http://` or `https://` in the address field.

k. If you use an image registry that requires authentication, enter the image secret.



If you use a registry that requires authentication, [create a secret on the cluster](#).

l. Enter the admin first name.

m. Configure resources scaling.

n. Provide the default storage class.



If a default storage class is configured, ensure that it is the only storage class that has the default annotation.

o. Define CRD handling preferences.

3. Select the YAML view to review the settings you have selected.

4. Select **Create**.

Create a registry secret

If you use a registry that requires authentication, create a secret on the OpenShift cluster and enter the secret name in the [Create AstraControlCenter form field](#).

1. Create a namespace for the Astra Control Center operator:

```
oc create ns [netapp-acc-operator or custom namespace]
```

2. Create a secret in this namespace:

```
oc create secret docker-registry astra-registry-cred n [netapp-acc-operator or custom namespace] --docker-server=[your_registry_path] --docker-username=[username] --docker-password=[token]
```



Astra Control supports Docker registry secrets only.

3. Complete the remaining fields in [the Create AstraControlCenter form field](#).

What's next

Complete the [remaining steps](#) to verify that Astra Control Center installed successfully, set up an ingress controller (optional), and log in to the UI. Additionally, you will need to perform [setup tasks](#) after completing installation.

Install Astra Control Center with a Cloud Volumes ONTAP storage backend

With Astra Control Center, you can manage your apps in a hybrid cloud environment with self-managed Kubernetes clusters and Cloud Volumes ONTAP instances. You can deploy Astra Control Center in your on-premise Kubernetes clusters or in one of the self-managed Kubernetes clusters in the cloud environment.

With one of these deployments, you can perform app data management operations using Cloud Volumes ONTAP as a storage backend. You can also configure an S3 bucket as the backup target.

To install Astra Control Center in Amazon Web Services (AWS), Google Cloud Platform (GCP) and Microsoft Azure with a Cloud Volumes ONTAP storage backend, perform the following steps depending on your cloud environment.

- [Deploy Astra Control Center in Amazon Web Services](#)
- [Deploy Astra Control Center in Google Cloud Platform](#)
- [Deploy Astra Control Center in Microsoft Azure](#)

You can manage your apps in distributions with self-managed Kubernetes clusters, such with OpenShift Container Platform (OCP). Only self-managed OCP clusters are validated for deploying Astra Control Center.

Deploy Astra Control Center in Amazon Web Services

You can deploy Astra Control Center on a self-managed Kubernetes cluster hosted on an Amazon Web Services (AWS) public cloud.

What you'll need for AWS

Before you deploy Astra Control Center in AWS, you will need the following items:

- Astra Control Center license. Refer to [Astra Control Center licensing requirements](#).
- [Meet Astra Control Center requirements](#).
- NetApp Cloud Central account
- If using OCP, Red Hat OpenShift Container Platform (OCP) permissions (on namespace level to create pods)
- AWS credentials, Access ID and Secret Key with permissions that enable you to create buckets and connectors
- AWS account Elastic Container Registry (ECR) access and login
- AWS hosted zone and Amazon Route 53 entry required to access the Astra Control UI

Operational environment requirements for AWS

Astra Control Center requires the following operational environment for AWS:

- Red Hat OpenShift Container Platform 4.11 through 4.13



Ensure that the operating environment you choose to host Astra Control Center meets the basic resource requirements outlined in the environment's official documentation.

Astra Control Center requires the following resources in addition to the environment's resource requirements:

Component	Requirement
Backend NetApp Cloud Volumes ONTAP storage capacity	At least 300GB available
Worker nodes (AWS EC2 requirement)	At least 3 worker nodes total, with 4 vCPU cores and 12GB RAM each
Load balancer	Service type "LoadBalancer" available for ingress traffic to be sent to services in the operational environment cluster
FQDN	A method for pointing the FQDN of Astra Control Center to the load balanced IP address
Astra Trident (installed as part of the Kubernetes cluster discovery in NetApp BlueXP, formerly Cloud Manager)	Astra Trident 23.01 or newer installed and configured and NetApp ONTAP version 9.9.1 or newer as a storage backend

Component	Requirement
Image registry	<p>NetApp provides a registry that you can use to obtain Astra Control Center build images: http://netappdownloads.jfrog.io/docker-astra-control-prod</p> <p>Contact NetApp Support to obtain instructions on using this image registry during the Astra Control Center installation process.</p> <p>If you are unable to access the NetApp image registry, you must have an existing private registry, such as AWS Elastic Container Registry (ECR), to which you can push Astra Control Center build images. You need to provide the URL of the image registry where you will upload the images.</p> <p> The Astra Control Center hosted cluster and the managed cluster must have access to the same image registry to be able to back up and restore apps using the Restic-based image.</p>
Astra Trident / ONTAP configuration	<p>Astra Control Center requires that a storage class be created and set as the default storage class. Astra Control Center supports the following ONTAP Kubernetes storage classes that are created when you import your Kubernetes cluster into NetApp BlueXP (formerly Cloud Manager). These are provided by Astra Trident:</p> <ul style="list-style-type: none"> • vsaworkingenvironment-<>-ha-nas csi.trident.netapp.io • vsaworkingenvironment-<>-ha-san csi.trident.netapp.io • vsaworkingenvironment-<>-single-nas csi.trident.netapp.io • vsaworkingenvironment-<>-single-san csi.trident.netapp.io



These requirements assume that Astra Control Center is the only application running in the operational environment. If the environment is running additional applications, adjust these minimum requirements accordingly.



The AWS registry token expires in 12 hours, after which you will have to renew the Docker image registry secret.

Overview of deployment for AWS

Here is an overview of the process to install Astra Control Center for AWS with Cloud Volumes ONTAP as a storage backend.

Each of these steps is explained in more detail below.

1. [Ensure that you have sufficient IAM permissions.](#)

2. [Install a RedHat OpenShift cluster on AWS.](#)
3. [Configure AWS.](#)
4. [Configure NetApp BlueXP for AWS.](#)
5. [Install Astra Control Center for AWS.](#)

Ensure that you have sufficient IAM permissions

Ensure that you have sufficient IAM roles and permissions that enable you to install a RedHat OpenShift cluster and a NetApp BlueXP (formerly Cloud Manager) Connector.

See [Initial AWS credentials](#).

Install a RedHat OpenShift cluster on AWS

Install a RedHat OpenShift Container Platform cluster on AWS.

For installation instructions, see [Installing a cluster on AWS in OpenShift Container Platform](#).

Configure AWS

Next, configure AWS to create a virtual network, set up EC2 compute instances, and create an AWS S3 bucket. If you cannot access the [NetApp Astra Control Center image registry](#), you will also need to create an Elastic Container Registry (ECR) to host the Astra Control Center images, and push the images to this registry.

Follow the AWS documentation to complete the following steps. See [AWS installation documentation](#).

1. Create an AWS virtual network.
2. Review the EC2 compute instances. This can be a bare metal server or VMs in AWS.
3. If the instance type does not already match the Astra minimum resource requirements for master and worker nodes, change the instance type in AWS to meet the Astra requirements. Refer to [Astra Control Center requirements](#).
4. Create at least one AWS S3 bucket to store your backups.
5. (Optional) If you cannot access the [NetApp image registry](#), do the following:
 - a. Create an AWS Elastic Container Registry (ECR) to host all the Astra Control Center images.



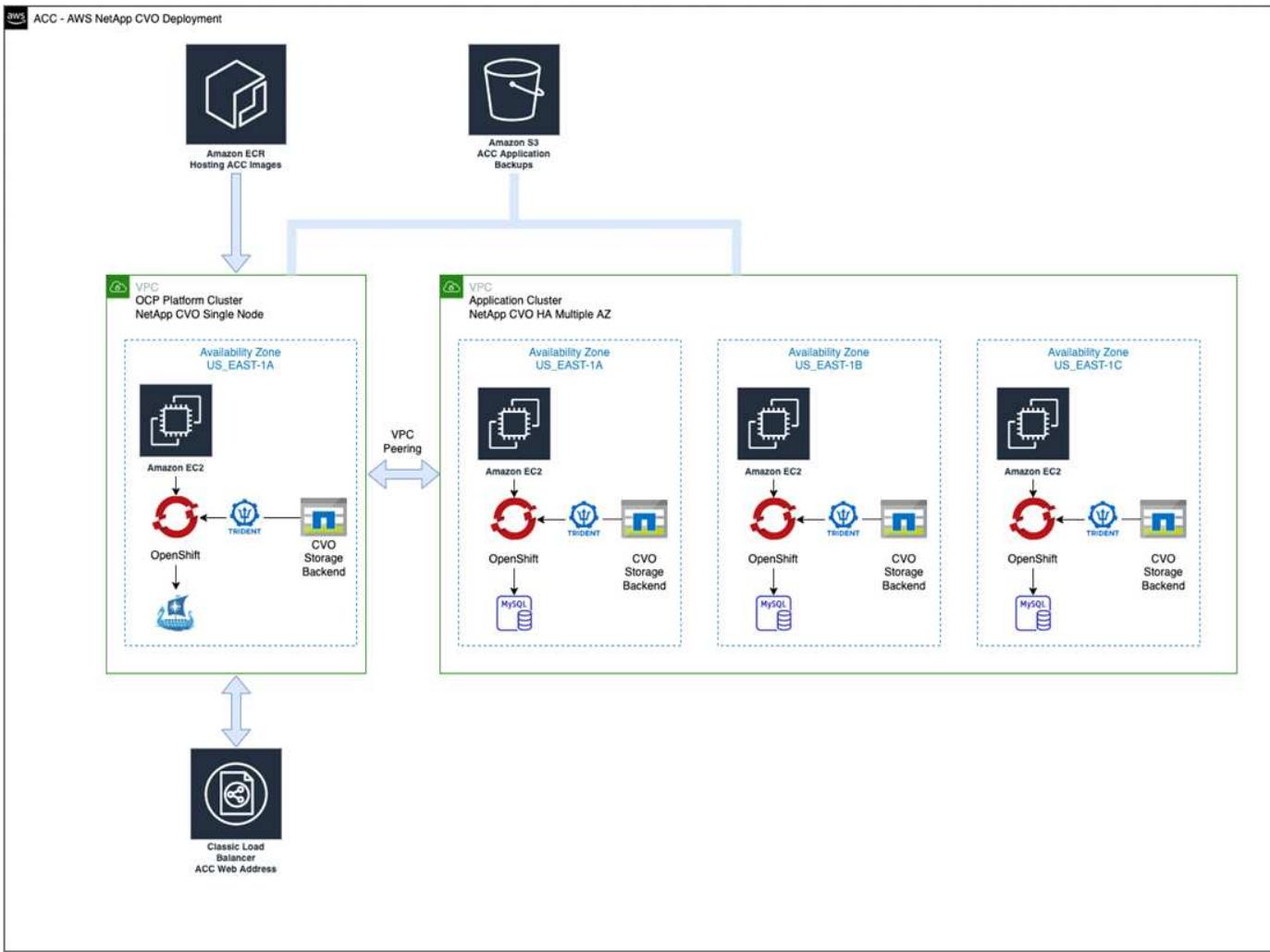
If you do not create the ECR, Astra Control Center cannot access monitoring data from a cluster containing Cloud Volumes ONTAP with an AWS backend. The issue is caused when the cluster you try to discover and manage using Astra Control Center does not have AWS ECR access.

- b. Push the Astra Control Center images to your defined registry.



The AWS Elastic Container Registry (ECR) token expires after 12 hours and causes cross-cluster clone operations to fail. This issue occurs when managing a storage backend from Cloud Volumes ONTAP configured for AWS. To correct this issue, authenticate with the ECR again and generate a new secret for clone operations to resume successfully.

Here's an example of an AWS deployment:



Configure NetApp BlueXP for AWS

Using NetApp BlueXP (formerly Cloud Manager), create a workspace, add a connector to AWS, create a working environment, and import the cluster.

Follow the BlueXP documentation to complete the following steps. See the following:

- [Getting started with Cloud Volumes ONTAP in AWS](#).
- [Create a connector in AWS using BlueXP](#)

Steps

1. Add your credentials to BlueXP.
2. Create a workspace.
3. Add a connector for AWS. Choose AWS as the Provider.
4. Create a working environment for your cloud environment.
 - a. Location: "Amazon Web Services (AWS)"
 - b. Type: "Cloud Volumes ONTAP HA"
5. Import the OpenShift cluster. The cluster will connect to the working environment you just created.
 - a. View the NetApp cluster details by selecting **K8s > Cluster list > Cluster Details**.

- b. In the upper right corner, note the Astra Trident version.
- c. Note the Cloud Volumes ONTAP cluster storage classes showing NetApp as the provisioner.

This imports your Red Hat OpenShift cluster and assigns it a default storage class. You select the storage class.

Astra Trident is automatically installed as part of the import and discovery process.

6. Note all the persistent volumes and volumes in this Cloud Volumes ONTAP deployment.



Cloud Volumes ONTAP can operate as a single node or in High Availability. If HA is enabled, note the HA status and node deployment status running in AWS.

Install Astra Control Center for AWS

Follow the standard [Astra Control Center installation instructions](#).



AWS uses the Generic S3 bucket type.

Deploy Astra Control Center in Google Cloud Platform

You can deploy Astra Control Center on a self-managed Kubernetes cluster hosted on a Google Cloud Platform (GCP) public cloud.

What you'll need for GCP

Before you deploy Astra Control Center in GCP, you will need the following items:

- Astra Control Center license. Refer to [Astra Control Center licensing requirements](#).
- [Meet Astra Control Center requirements](#).
- NetApp Cloud Central account
- If using OCP, Red Hat OpenShift Container Platform (OCP) 4.11 through 4.13
- If using OCP, Red Hat OpenShift Container Platform (OCP) permissions (on namespace level to create pods)
- GCP Service Account with permissions that enable you to create buckets and connectors

Operational environment requirements for GCP



Ensure that the operating environment you choose to host Astra Control Center meets the basic resource requirements outlined in the environment's official documentation.

Astra Control Center requires the following resources in addition to the environment's resource requirements:

Component	Requirement
Backend NetApp Cloud Volumes ONTAP storage capacity	At least 300GB available
Worker nodes (GCP compute requirement)	At least 3 worker nodes total, with 4 vCPU cores and 12GB RAM each

Component	Requirement
Load balancer	Service type "LoadBalancer" available for ingress traffic to be sent to services in the operational environment cluster
FQDN (GCP DNS zone)	A method for pointing the FQDN of Astra Control Center to the load balanced IP address
Astra Trident (installed as part of the Kubernetes cluster discovery in NetApp BlueXP, formerly Cloud Manager)	Astra Trident 23.01 or newer installed and configured and NetApp ONTAP version 9.9.1 or newer as a storage backend
Image registry	<p>NetApp provides a registry that you can use to obtain Astra Control Center build images:</p> <p>http://netappdownloads.jfrog.io/docker-astra-control-prod</p> <p>Contact NetApp Support to obtain instructions on using this image registry during the Astra Control Center installation process.</p> <p>If you are unable to access the NetApp image registry, you must have an existing private registry, such as Google Container Registry, to which you can push Astra Control Center build images. You need to provide the URL of the image registry where you will upload the images.</p> <p> You need to enable anonymous access to pull Restic images for backups.</p>
Astra Trident / ONTAP configuration	<p>Astra Control Center requires that a storage class be created and set as the default storage class. Astra Control Center supports the following ONTAP Kubernetes storage classes that are created when you import your Kubernetes cluster into NetApp BlueXP. These are provided by Astra Trident:</p> <ul style="list-style-type: none"> • vsaworkingenvironment-<>-ha-nas csi.trident.netapp.io • vsaworkingenvironment-<>-ha-san csi.trident.netapp.io • vsaworkingenvironment-<>-single-nas csi.trident.netapp.io • vsaworkingenvironment-<>-single-san csi.trident.netapp.io



These requirements assume that Astra Control Center is the only application running in the operational environment. If the environment is running additional applications, adjust these minimum requirements accordingly.

Overview of deployment for GCP

Here is an overview of the process to install Astra Control Center on a self-managed OCP cluster in GCP with Cloud Volumes ONTAP as a storage backend.

Each of these steps is explained in more detail below.

1. [Install a RedHat OpenShift cluster on GCP](#).
2. [Create a GCP Project and Virtual Private Cloud](#).
3. [Ensure that you have sufficient IAM permissions](#).
4. [Configure GCP](#).
5. [Configure NetApp BlueXP for GCP](#).
6. [Install Astra Control Center for GCP](#).

Install a RedHat OpenShift cluster on GCP

The first step is to install a RedHat OpenShift cluster on GCP.

For installation instructions, see the following:

- [Installing an OpenShift cluster in GCP](#)
- [Creating a GCP Service Account](#)

Create a GCP Project and Virtual Private Cloud

Create at least one GCP Project and Virtual Private Cloud (VPC).



OpenShift might create its own resource groups. In addition to these, you should also define a GCP VPC. Refer to OpenShift documentation.

You might want to create a platform cluster resource group and a target app OpenShift cluster resource group.

Ensure that you have sufficient IAM permissions

Ensure that you have sufficient IAM roles and permissions that enable you to install a RedHat OpenShift cluster and a NetApp BlueXP (formerly Cloud Manager) Connector.

See [Initial GCP credentials and permissions](#).

Configure GCP

Next, configure GCP to create a VPC, set up compute instances, and create a Google Cloud Object Storage. If you cannot access the [NetApp Astra Control Center image registry](#), you will also need to create a Google Container Registry to host the Astra Control Center images, and push the images to this registry.

Follow the GCP documentation to complete the following steps. See [Installing OpenShift cluster in GCP](#).

1. Create a GCP Project and VPC in the GCP that you plan on using for the OCP cluster with CVO backend.
2. Review the compute instances. This can be a bare metal server or VMs in GCP.
3. If the instance type does not already match the Astra minimum resource requirements for master and worker nodes, change the instance type in GCP to meet the Astra requirements. Refer to [Astra Control](#)

Center requirements.

4. Create at least one GCP Cloud Storage Bucket to store your backups.
5. Create a secret, which is required for bucket access.
6. (Optional) If you cannot access the [NetApp image registry](#), do the following:
 - a. Create a Google Container Registry to host the Astra Control Center images.
 - b. Set up Google Container Registry access for Docker push/pull for all the Astra Control Center images.

Example: Astra Control Center images can be pushed to this registry by entering the following script:

```
gcloud auth activate-service-account <service account email address>
--key-file=<GCP Service Account JSON file>
```

This script requires an Astra Control Center manifest file and your Google Image Registry location.
Example:

```
manifestfile=acc.manifest.bundle.yaml
GCP_CR_REGISTRY=<target GCP image registry>
ASTRA_REGISTRY=<source Astra Control Center image registry>

while IFS= read -r image; do
    echo "image: $ASTRA_REGISTRY/$image $GCP_CR_REGISTRY/$image"
    root_image=${image%:*}
    echo $root_image
    docker pull $ASTRA_REGISTRY/$image
    docker tag $ASTRA_REGISTRY/$image $GCP_CR_REGISTRY/$image
    docker push $GCP_CR_REGISTRY/$image
done < acc.manifest.bundle.yaml
```

7. Set up DNS zones.

Configure NetApp BlueXP for GCP

Using NetApp BlueXP (formerly Cloud Manager), create a workspace, add a connector to GCP, create a working environment, and import the cluster.

Follow the BlueXP documentation to complete the following steps. See [Getting started with Cloud Volumes ONTAP in GCP](#).

Before you begin

- Access to the GCP Service Account with the required IAM permissions and roles

Steps

1. Add your credentials to BlueXP. See [Adding GCP accounts](#).
2. Add a connector for GCP.
 - a. Choose "GCP" as the Provider.

- b. Enter GCP credentials. See [Creating a connector in GCP from BlueXP](#).
 - c. Ensure that the connector is running and switch to that connector.
3. Create a working environment for your cloud environment.
 - a. Location: "GCP"
 - b. Type: "Cloud Volumes ONTAP HA"
4. Import the OpenShift cluster. The cluster will connect to the working environment you just created.
 - a. View the NetApp cluster details by selecting **K8s > Cluster list > Cluster Details**.
 - b. In the upper right corner, note the Trident version.
 - c. Note the Cloud Volumes ONTAP cluster storage classes showing "NetApp" as the provisioner.

This imports your Red Hat OpenShift cluster and assigns it a default storage class. You select the storage class.
Astra Trident is automatically installed as part of the import and discovery process.

5. Note all the persistent volumes and volumes in this Cloud Volumes ONTAP deployment.



Cloud Volumes ONTAP can operate as a single node or in High Availability (HA). If HA is enabled, note the HA status and node deployment status running in GCP.

Install Astra Control Center for GCP

Follow the standard [Astra Control Center installation instructions](#).



GCP uses the Generic S3 bucket type.

1. Generate the Docker Secret to pull images for the Astra Control Center installation:

```
kubectl create secret docker-registry <secret name> --docker
--server=<Registry location> --docker-username=_json_key --docker
--password="$(cat <GCP Service Account JSON file>)" --namespace=pccloud
```

Deploy Astra Control Center in Microsoft Azure

You can deploy Astra Control Center on a self-managed Kubernetes cluster hosted on a Microsoft Azure public cloud.

What you'll need for Azure

Before you deploy Astra Control Center in Azure, you will need the following items:

- Astra Control Center license. Refer to [Astra Control Center licensing requirements](#).
- [Meet Astra Control Center requirements](#).
- NetApp Cloud Central account
- If using OCP, Red Hat OpenShift Container Platform (OCP) 4.11 through 4.13
- If using OCP, Red Hat OpenShift Container Platform (OCP) permissions (on namespace level to create

pods)

- Azure credentials with permissions that enable you to create buckets and connectors

Operational environment requirements for Azure

Ensure that the operating environment you choose to host Astra Control Center meets the basic resource requirements outlined in the environment's official documentation.

Astra Control Center requires the following resources in addition to the environment's resource requirements:

Refer to [Astra Control Center operational environment requirements](#).

Component	Requirement
Backend NetApp Cloud Volumes ONTAP storage capacity	At least 300GB available
Worker nodes (Azure compute requirement)	At least 3 worker nodes total, with 4 vCPU cores and 12GB RAM each
Load balancer	Service type "LoadBalancer" available for ingress traffic to be sent to services in the operational environment cluster
FQDN (Azure DNS zone)	A method for pointing the FQDN of Astra Control Center to the load balanced IP address
Astra Trident (installed as part of the Kubernetes cluster discovery in NetApp BlueXP)	Astra Trident 23.01 or newer installed and configured and NetApp ONTAP version 9.9.1 or newer will be used as a storage backend
Image registry	<p>NetApp provides a registry that you can use to obtain Astra Control Center build images:</p> <p>http://netappdownloads.jfrog.io/docker-astra-control-prod</p> <p>Contact NetApp Support to obtain instructions on using this image registry during the Astra Control Center installation process.</p> <p>If you are unable to access the NetApp image registry, you must have an existing private registry, such as Azure Container Registry (ACR), to which you can push Astra Control Center build images. You need to provide the URL of the image registry where you will upload the images.</p> <p> You need to enable anonymous access to pull Restic images for backups.</p>

Component	Requirement
Astra Trident / ONTAP configuration	<p>Astra Control Center requires that a storage class be created and set as the default storage class. Astra Control Center supports the following ONTAP Kubernetes storage classes that are created when you import your Kubernetes cluster into NetApp BlueXP. These are provided by Astra Trident:</p> <ul style="list-style-type: none"> • <code>vsaworkingenvironment-<>-ha-nas</code> <code>csi.trident.netapp.io</code> • <code>vsaworkingenvironment-<>-ha-san</code> <code>csi.trident.netapp.io</code> • <code>vsaworkingenvironment-<>-single-nas</code> <code>csi.trident.netapp.io</code> • <code>vsaworkingenvironment-<>-single-san</code> <code>csi.trident.netapp.io</code>



These requirements assume that Astra Control Center is the only application running in the operational environment. If the environment is running additional applications, adjust these minimum requirements accordingly.

Overview of deployment for Azure

Here is an overview of the process to install Astra Control Center for Azure.

Each of these steps is explained in more detail below.

1. [Install a RedHat OpenShift cluster on Azure](#).
2. [Create Azure resource groups](#).
3. [Ensure that you have sufficient IAM permissions](#).
4. [Configure Azure](#).
5. [Configure NetApp BlueXP \(formerly Cloud Manager\) for Azure](#).
6. [Install and configure Astra Control Center for Azure](#).

Install a RedHat OpenShift cluster on Azure

The first step is to install a RedHat OpenShift cluster on Azure.

For installation instructions, see the following:

- [Installing OpenShift cluster on Azure](#).
- [Installing an Azure account](#).

Create Azure resource groups

Create at least one Azure resource group.



OpenShift might create its own resource groups. In addition to these, you should also define Azure resource groups. Refer to OpenShift documentation.

You might want to create a platform cluster resource group and a target app OpenShift cluster resource group.

Ensure that you have sufficient IAM permissions

Ensure that you have sufficient IAM roles and permissions that enable you to install a RedHat OpenShift cluster and a NetApp BlueXP Connector.

See [Azure credentials and permissions](#).

Configure Azure

Next, configure Azure to create a virtual network, set up compute instances, and create an Azure Blob container. If you cannot access the [NetApp Astra Control Center image registry](#), you will also need to create an Azure Container Registry (ACR) to host the Astra Control Center images, and push the images to this registry.

Follow the Azure documentation to complete the following steps. See [Installing OpenShift cluster on Azure](#).

1. Create an Azure virtual network.
2. Review the compute instances. This can be a bare metal server or VMs in Azure.
3. If the instance type does not already match the Astra minimum resource requirements for master and worker nodes, change the instance type in Azure to meet the Astra requirements. Refer to [Astra Control Center requirements](#).
4. Create at least one Azure Blob container to store your backups.
5. Create a storage account. You will need a storage account to create a container to be used as a bucket in Astra Control Center.
6. Create a secret, which is required for bucket access.
7. (Optional) If you cannot access the [NetApp image registry](#), do the following:
 - a. Create an Azure Container Registry (ACR) to host the Astra Control Center images.
 - b. Set up ACR access for Docker push/pull for all the Astra Control Center images.
 - c. Push the Astra Control Center images to this registry using the following script:

```
az acr login -n <AZ ACR URL/Location>
This script requires the Astra Control Center manifest file and your
Azure ACR location.
```

Example:

```

manifestfile=acc.manifest.bundle.yaml
AZ_ACR_REGISTRY=<target Azure ACR image registry>
ASTRA_REGISTRY=<source Astra Control Center image registry>

while IFS= read -r image; do
    echo "image: $ASTRA_REGISTRY/$image $AZ_ACR_REGISTRY/$image"
    root_image=${image%:*}
    echo $root_image
    docker pull $ASTRA_REGISTRY/$image
    docker tag $ASTRA_REGISTRY/$image $AZ_ACR_REGISTRY/$image
    docker push $AZ_ACR_REGISTRY/$image
done < acc.manifest.bundle.yaml

```

8. Set up DNS zones.

Configure NetApp BlueXP (formerly Cloud Manager) for Azure

Using BlueXP (formerly Cloud Manager), create a workspace, add a connector to Azure, create a working environment, and import the cluster.

Follow the BlueXP documentation to complete the following steps. See [Getting started with BlueXP in Azure](#).

Before you begin

Access to the Azure account with the required IAM permissions and roles

Steps

1. Add your credentials to BlueXP.
2. Add a connector for Azure. See [BlueXP policies](#).
 - a. Choose **Azure** as the Provider.
 - b. Enter Azure credentials, including the application ID, client secret, and directory (tenant) ID.

See [Creating a connector in Azure from BlueXPr](#).

3. Ensure that the connector is running and switch to that connector.

Cloud Manager

Account: netapp.com-05... | Workspace: Workspace-1 | Connector: TestazHA

Connectors | Add Connector | Manage Connectors

Add Credentials | Credentials Type | Define Credentials | Marketplace Subscription | 4

Define Microsoft Azure Credentials

Credentials Name: Application (client) ID:

Client Secret: Directory (tenant) ID:

I have verified that the Azure role assigned to the Active Directory service principal matches Cloud Manager policy requirements.

Previous | Next | Switch | Cancel |

Search Connectors: Azure | westus2 | Active

- azurecloudmanager | Go to Local UI | Active
- cvo-aws-connector | Go to Local UI | Active
- cvo-connector-gcp | Go to Local UI | Active
- TestazHA | Go to Local UI | Active
- azure-connector | Go to Local UI | Inactive

4. Create a working environment for your cloud environment.

- Location: "Microsoft Azure".
- Type: "Cloud Volumes ONTAP HA".

Cloud Manager

Account: netapp.com-05... | Workspace: Workspace-1 | Connector: TestazHA

Add Working Environment | Choose a Location |

Choose a Location

Microsoft Azure | AWS | Google Cloud Platform | On-Premises

Choose Type

Cloud Volumes ONTAP | Cloud Volumes ONTAP HA | Azure NetApp Files | Kubernetes Cluster

If you want to discover an existing Cloud Volumes ONTAP HA in Azure, [Click Here](#)

Next |

5. Import the OpenShift cluster. The cluster will connect to the working environment you just created.

- View the NetApp cluster details by selecting **K8s > Cluster list > Cluster Details**.

- b. In the upper right corner, note the Astra Trident version.
- c. Note the Cloud Volumes ONTAP cluster storage classes showing NetApp as the provisioner.

This imports your Red Hat OpenShift cluster and assigns a default storage class. You select the storage class.

Astra Trident is automatically installed as part of the import and discovery process.

6. Note all the persistent volumes and volumes in this Cloud Volumes ONTAP deployment.
7. Cloud Volumes ONTAP can operate as a single node or in High Availability. If HA is enabled, note the HA status and node deployment status running in Azure.

Install and configure Astra Control Center for Azure

Install Astra Control Center with the standard [installation instructions](#).

Using Astra Control Center, add an Azure bucket. Refer to [Set up Astra Control Center and add buckets](#).

Configure Astra Control Center after installation

Depending on your environment, there might be additional configuration needed after you install Astra Control Center.

Remove resource limitations

Some environments use the ResourceQuotas and LimitRanges objects to prevent the resources in a namespace from consuming all available CPU and memory on the cluster. Astra Control Center does not set maximum limits, so it will not be in compliance with those resources. If your environment is configured this way, you need to remove those resources from the namespaces where you plan to install Astra Control Center.

You can use the following steps to retrieve and remove these quotas and limits. In these examples, the

command output is shown immediately after the command.

Steps

1. Get the resource quotas in the netapp-acc (or custom-named) namespace:

```
kubectl get quota -n [netapp-acc or custom namespace]
```

Response:

NAME	AGE	REQUEST	LIMIT
pods-high	16s	requests.cpu: 0/20, requests.memory: 0/100Gi	
		limits.cpu: 0/200, limits.memory: 0/1000Gi	
pods-low	15s	requests.cpu: 0/1, requests.memory: 0/1Gi	
		limits.cpu: 0/2, limits.memory: 0/2Gi	
pods-medium	16s	requests.cpu: 0/10, requests.memory: 0/20Gi	
		limits.cpu: 0/20, limits.memory: 0/200Gi	

2. Delete all of the resource quotas by name:

```
kubectl delete resourcequota pods-high -n [netapp-acc or custom namespace]
```

```
kubectl delete resourcequota pods-low -n [netapp-acc or custom namespace]
```

```
kubectl delete resourcequota pods-medium -n [netapp-acc or custom namespace]
```

3. Get the limit ranges in the netapp-acc (or custom-named) namespace:

```
kubectl get limits -n [netapp-acc or custom namespace]
```

Response:

NAME	CREATED AT
cpu-limit-range	2022-06-27T19:01:23Z

4. Delete the limit ranges by name:

```
kubectl delete limitrange cpu-limit-range -n [netapp-acc or custom namespace]
```

Add a custom TLS certificate

Astra Control Center uses a self-signed TLS certificate by default for ingress controller traffic (only in certain configurations) and web UI authentication with web browsers. You can remove the existing self-signed TLS certificate and replace it with a TLS certificate signed by a Certificate Authority (CA).

The default, self-signed certificate is used for two types of connections:

- HTTPS connections to the Astra Control Center web UI
- Ingress controller traffic (only if the `ingressType: "AccTraefik"` property was set in the `astra_control_center.yaml` file during Astra Control Center installation)

Replacing the default TLS certificate replaces the certificate used for authentication for these connections.

Before you begin

- Kubernetes cluster with Astra Control Center installed
- Administrative access to a command shell on the cluster to run `kubectl` commands
- Private key and certificate files from the CA

Remove the self-signed certificate

Remove the existing self-signed TLS certificate.

1. Using SSH, log in to the Kubernetes cluster that hosts Astra Control Center as an administrative user.
2. Find the TLS secret associated with the current certificate using the following command, replacing `<ACC-deployment-namespace>` with the Astra Control Center deployment namespace:

```
kubectl get certificate -n <ACC-deployment-namespace>
```

3. Delete the currently installed secret and certificate using the following commands:

```
kubectl delete cert cert-manager-certificates -n <ACC-deployment-namespace>
```

```
kubectl delete secret secure-testing-cert -n <ACC-deployment-namespace>
```

Add a new certificate using the command line

Add a new TLS certificate that is signed by a CA.

1. Use the following command to create the new TLS secret with the private key and certificate files from the CA, replacing the arguments in brackets <> with the appropriate information:

```
kubectl create secret tls <secret-name> --key <private-key-filename>
--cert <certificate-filename> -n <ACC-deployment-namespace>
```

2. Use the following command and example to edit the cluster Custom Resource Definition (CRD) file and change the `spec.selfSigned` value to `spec.ca.secretName` to refer to the TLS secret you created earlier:

```
kubectl edit clusterissuers.cert-manager.io/cert-manager-certificates -n
<ACC-deployment-namespace>
```

CRD:

```
#spec:
#  selfSigned: {}

spec:
  ca:
    secretName: <secret-name>
```

3. Use the following command and example output to validate that the changes are correct and the cluster is ready to validate certificates, replacing <ACC-deployment-namespace> with the Astra Control Center deployment namespace:

```
kubectl describe clusterissuers.cert-manager.io/cert-manager-
certificates -n <ACC-deployment-namespace>
```

Response:

```
Status:
  Conditions:
    Last Transition Time: 2021-07-01T23:50:27Z
    Message: Signing CA verified
    Reason: KeyPairVerified
    Status: True
    Type: Ready
  Events: <none>
```

4. Create the `certificate.yaml` file using the following example, replacing the placeholder values in brackets `<>` with appropriate information:

```
apiVersion: cert-manager.io/v1
kind: Certificate
metadata:
  name: <certificate-name>
  namespace: <ACC-deployment-namespace>
spec:
  secretName: <certificate-secret-name>
  duration: 2160h # 90d
  renewBefore: 360h # 15d
  dnsNames:
    - <astra.dnsname.example.com> #Replace with the
    correct Astra Control Center DNS address
  issuerRef:
    kind: ClusterIssuer
    name: cert-manager-certificates
```

5. Create the certificate using the following command:

```
kubectl apply -f certificate.yaml
```

6. Using the following command and example output, validate that the certificate has been created correctly and with the arguments you specified during creation (such as name, duration, renewal deadline, and DNS names).

```
kubectl describe certificate -n <ACC-deployment-namespace>
```

Response:

```

Spec:
  Dns Names:
    astra.example.com
  Duration: 125h0m0s
  Issuer Ref:
    Kind: ClusterIssuer
    Name: cert-manager-certificates
  Renew Before: 61h0m0s
  Secret Name: <certificate-secret-name>
Status:
  Conditions:
    Last Transition Time: 2021-07-02T00:45:41Z
    Message: Certificate is up to date and has not expired
    Reason: Ready
    Status: True
    Type: Ready
  Not After: 2021-07-07T05:45:41Z
  Not Before: 2021-07-02T00:45:41Z
  Renewal Time: 2021-07-04T16:45:41Z
  Revision: 1
  Events: <none>

```

7. Edit the TLS stores CRD to point to your new certificate secret name using the following command and example, replacing the placeholder values in brackets <> with appropriate information

```
kubectl edit tlsstores.traefik.io -n <ACC-deployment-namespace>
```

CRD:

```

...
spec:
  defaultCertificate:
    secretName: <certificate-secret-name>

```

8. Edit the ingress CRD TLS option to point to your new certificate secret using the following command and example, replacing the placeholder values in brackets <> with appropriate information:

```
kubectl edit ingressroutes.traefik.io -n <ACC-deployment-namespace>
```

CRD:

```
...  
  tls:  
    secretName: <certificate-secret-name>
```

9. Using a web browser, browse to the deployment IP address of Astra Control Center.
10. Verify that the certificate details match the details of the certificate you installed.
11. Export the certificate and import the result into the certificate manager in your web browser.

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