Installation and configuration

FlexPod

NetApp
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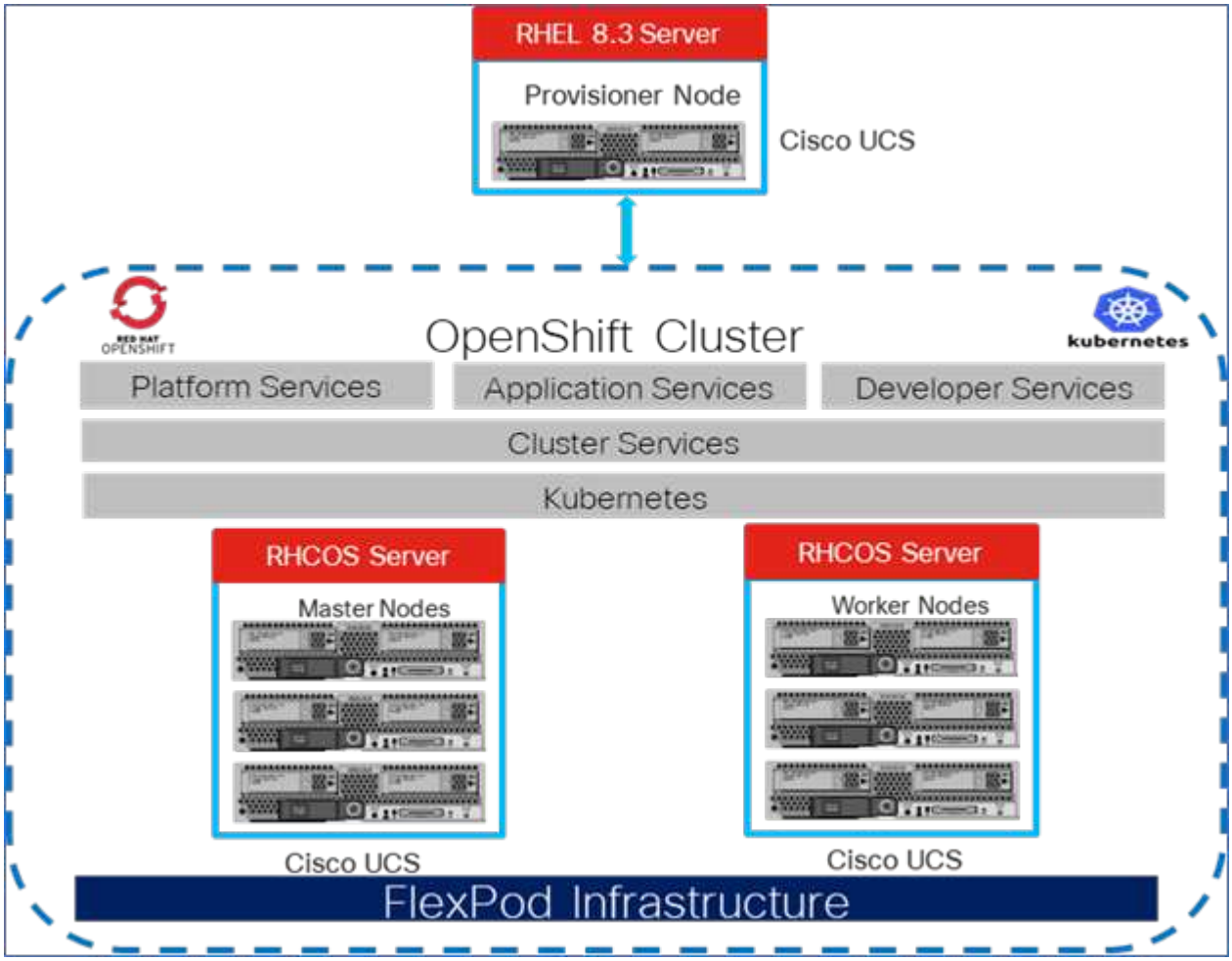
Installation and configuration

FlexPod for OpenShift Container Platform 4 bare-metal installation

Previous: Solution components.

To understand FlexPod for OpenShift Container Platform 4 bare-metal design, deployment details, and the NetApp Astra Trident installation and configuration, see FlexPod with OpenShift Cisco Validated Design and Deployment guide (CVD). This CVD covers FlexPod and OpenShift Container Platform deployment using Ansible. The CVD also provide detailed information about preparing worker nodes, Astra Trident installation, storage backend, and storage class configurations, which are the few prerequisites for deploying and configuring Astra Control Center.

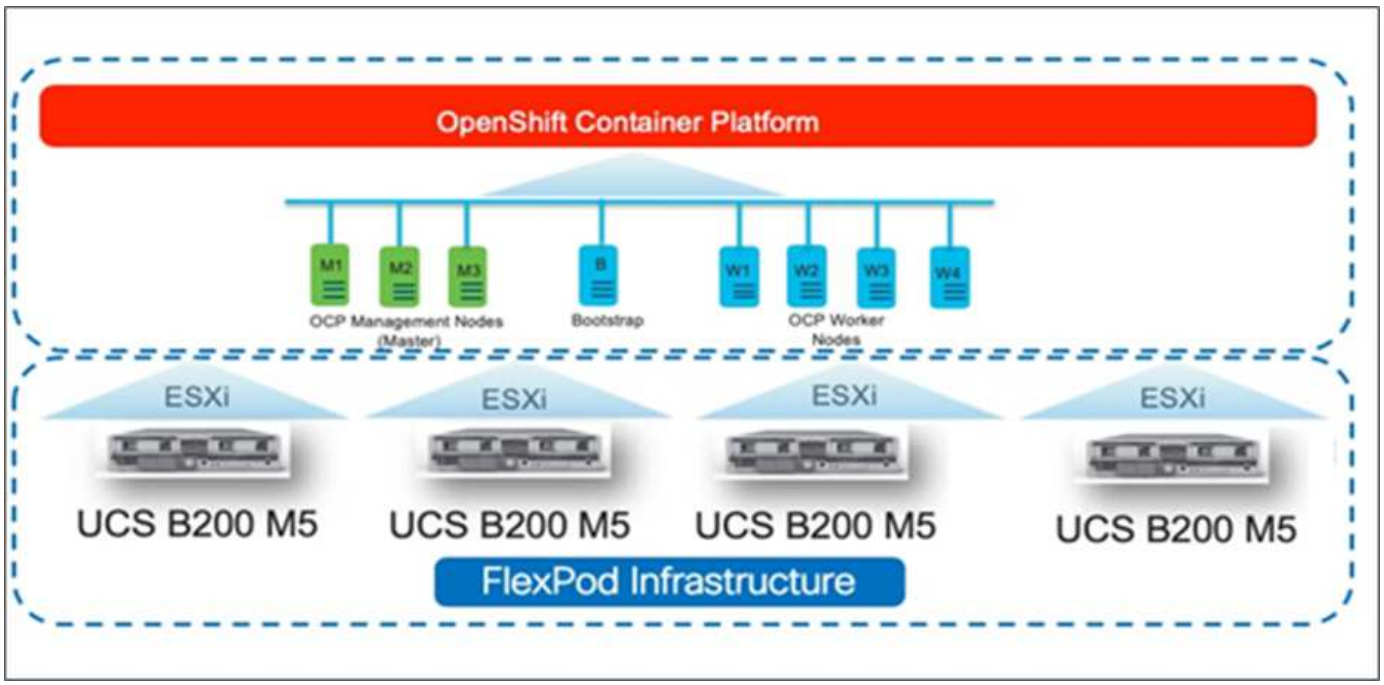
The following figure illustrates the OpenShift Container Platform 4 Bare Metal on FlexPod.



FlexPod for OpenShift Container Platform 4 on VMware installation

For more information about deploying Red Hat OpenShift Container Platform 4 on FlexPod running VMware vSphere, see FlexPod Datacenter for OpenShift Container Platform 4.

The following figure illustrates FlexPod for OpenShift Container Platform 4 on vSphere.



Next: Red Hat OpenShift on AWS.

Red Hat OpenShift on AWS

Previous: FlexPod for OpenShift Container Platform 4 bare-metal installation.

A separate self-managed OpenShift Container Platform 4 cluster is deployed on AWS as a DR site. The master and worker nodes span across three availability zones for high availability.

```
[ec2-user@ip-172-30-164-92 ~]$ oc get nodes
NAME                                STATUS   ROLES    AGE   VERSION
ip-172-30-164-128.ec2.internal   Ready    worker   29m   v1.22.8+f34b40c
ip-172-30-164-209.ec2.internal   Ready    master   36m   v1.22.8+f34b40c
ip-172-30-165-160.ec2.internal   Ready    master   33m   v1.22.8+f34b40c
ip-172-30-165-93.ec2.internal    Ready    worker   30m   v1.22.8+f34b40c
ip-172-30-166-162.ec2.internal   Ready    master   36m   v1.22.8+f34b40c
ip-172-30-166-51.ec2.internal    Ready    worker   28m   v1.22.8+f34b40c
```

OpenShift is deployed as a private cluster into an existing VPC on AWS. A private OpenShift Container Platform cluster does not expose external endpoints and is accessible from only an internal network and is not visible to the internet. A single-node NetApp Cloud Volumes ONTAP is deployed using NetApp Cloud Manager, which provides a storage backend to Astra Trident.

For more information about installing OpenShift on AWS, see OpenShift documentation.

Next: NetApp Cloud Volumes ONTAP.

NetApp Cloud Volumes ONTAP

Previous: Red Hat OpenShift on AWS.

The NetApp Cloud Volumes ONTAP instance is deployed on AWS, and it serves as backend storage to Astra Trident. Before adding a Cloud Volumes ONTAP working environment, a Connector must be deployed. The Cloud Manager prompts you if you try to create your first Cloud Volumes ONTAP working environment without a Connector in place. To deploy a Connector in AWS, see Create a Connector.

To deploy Cloud Volumes ONTAP on AWS, see Quick Start for AWS.

After Cloud Volumes ONTAP is deployed, you can install Astra Trident and configure the storage backend and snapshot class on the OpenShift Container Platform cluster.

Next: Astra Control Center installation on OpenShift Container Platform.

Astra Control Center installation on OpenShift Container Platform

Previous: NetApp Cloud Volumes ONTAP.

You can install Astra Control Center either on OpenShift cluster running on FlexPod or on AWS with a Cloud Volumes ONTAP storage backend. In this solution, Astra Control Center is deployed on the OpenShift bare-metal cluster.

Astra Control Center can be installed using the standard process described here or from the Red Hat OpenShift OperatorHub. Astra Control Operator is a Red Hat certified operator. In this solution, Astra Control Center is installed using the Red Hat OperatorHub.

Environment requirements

- Astra Control Center supports multiple Kubernetes distributions; for Red Hat OpenShift, the supported versions include Red Hat OpenShift Container Platform 4.8 or 4.9.
- Astra Control Center requires the following resources in addition to the environment's and the end-user's application resource requirements:

Components	Requirement
Storage backend capacity	At least 500GB available
Worker nodes	At least 3 worker nodes, with 4 CPU cores and 12GB RAM each
Fully qualified domain name (FQDN) address	An FQDN address for Astra Control Center
Astra Trident	Astra Trident 21.04 or newer installed and configured
Ingress controller or load balancer	Configure the ingress controller to expose Astra Control Center with a URL or load balancer to provide IP address which will resolve to the FQDN

- You must have an existing private image registry to which you can push the Astra Control Center build images. You need to provide the URL of the image registry where you upload the images.

Some images are pulled while executing certain workflows, and containers are created and destroyed when necessary.

- Astra Control Center requires that a storage class be created and set as the default storage class. Astra Control Center supports the following ONTAP drivers provided by Astra Trident:
  - ontap-nas
  - ontap-nas-flexgroup
  - ontap-san
  - ontap-san-economy

We assume that the deployed OpenShift clusters have Astra Trident installed and configured with an ONTAP backend, and a default storage class is also defined.

- For application cloning in OpenShift environments, Astra Control Center needs to allow OpenShift to mount volumes and change the ownership of files. To modify the ONTAP export policy to allow these operations, run the following commands:

```
export-policy rule modify -vserver <storage virtual machine name>
-policyname <policy name> -ruleindex 1 -superuser sys
export-policy rule modify -vserver <storage virtual machine name>
-policyname <policy name> -ruleindex 1 -anon 65534
```

To add a second OpenShift operational environment as a managed compute resource, make sure that the Astra Trident Volume snapshot feature is enabled. To enable and test volume snapshots with Astra Trident, see the official Astra Trident instructions.

- A VolumeSnapClass should be configured on all Kubernetes clusters from where the applications is managed. This could also include the K8s cluster on which Astra Control Center is installed. Astra Control Center can manage applications on the K8s cluster on which it is running.

Application management requirements

- **Licensing.** To manage applications using Astra Control Center, you need an Astra Control Center license.
- **Namespaces.** A namespace is the largest entity that can be managed as an application by Astra Control Center. You can choose to filter out components based on the application labels and custom labels in an existing namespace and manage a subset of resources as an application.
- **StorageClass.** If you install an application with a StorageClass explicitly set and you need to clone the application, the target cluster for the clone operation must have the originally specified StorageClass. Cloning an application with an explicitly set StorageClass to a cluster that does not have the same StorageClass fails.
- **Kubernetes resources.** Applications that use Kubernetes resources not captured by Astra Control might not have full application data management capabilities. Astra Control can capture the following Kubernetes resources:

Kubernetes resources		
ClusterRole	ClusterRoleBinding	ConfigMap
CustomResourceDefinition	CustomResource	CronJob
DaemonSet	HorizontalPodAutoscaler	Ingress
DeploymentConfig	MutatingWebhook	PersistentVolumeClaim
Pod	PodDisruptionBudget	PodTemplate
NetworkPolicy	ReplicaSet	Role
RoleBinding	Route	Secret
ValidatingWebhook		

Install Astra Control Center using OpenShift OperatorHub

The following procedure installs Astra Control Center using Red Hat OperatorHub. In this solution, Astra Control Center is installed on a bare-metal OpenShift cluster running on FlexPod.

1. Download the Astra Control Center bundle (`astra-control-center-[version].tar.gz`) from the NetApp Support site.
2. Download the .zip file for the Astra Control Center certificates and keys from the NetApp Support site.
3. Verify the signature of the bundle.

```
openssl dgst -sha256 -verify astra-control-center[version].pub
-signature <astra-control-center[version].sig astra-control-
center[version].tar.gz
```

4. Extract the Astra images.

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

5. Change to the Astra directory.

```
cd astra-control-center-[version]
```

6. Add the images to your local registry.

```
For Docker:
docker login [your_registry_path]OR
For Podman:
podman login [your_registry_path]
```

7. Use the appropriate script to load the images, tag the images, and push them to your local registry.

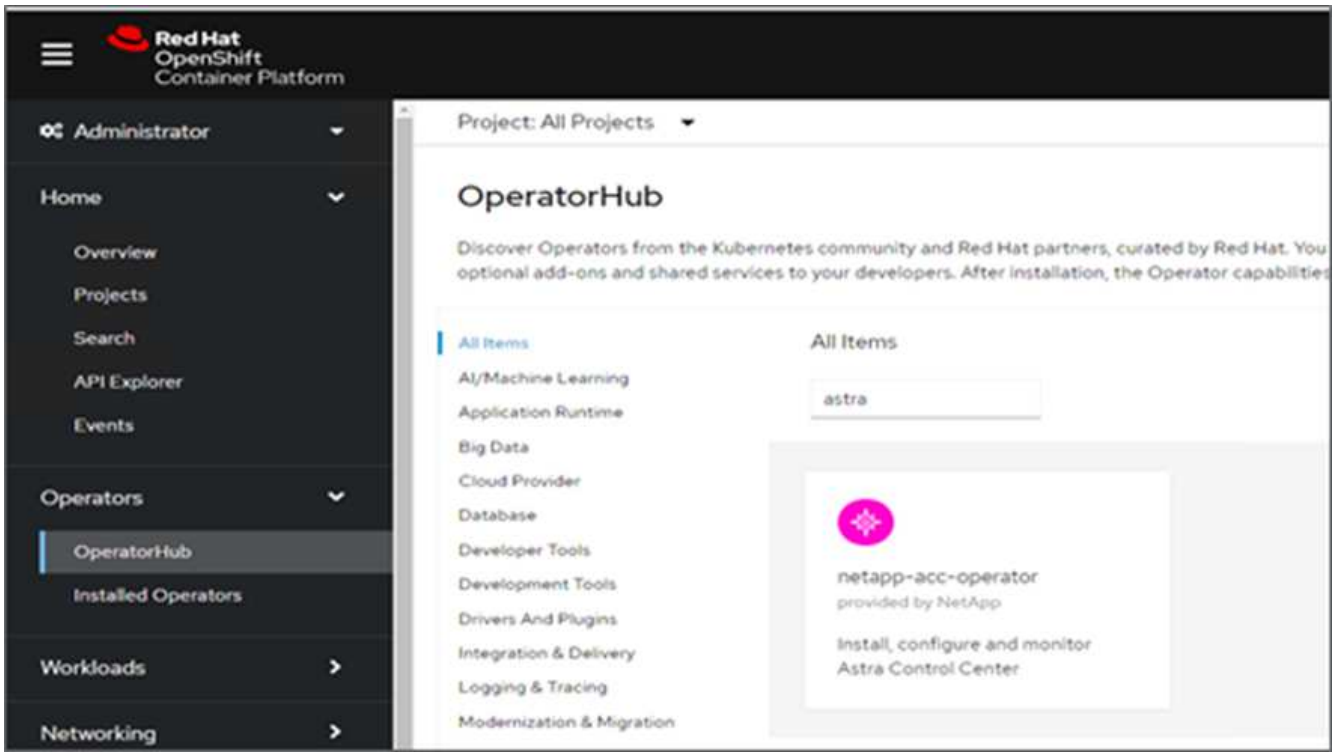
   For Docker:

```
export REGISTRY=[Docker_registry_path]
for astraImageFile in $(ls images/*.tar) ; do
  # Load to local cache. And store the name of the loaded image trimming
the 'Loaded images: '
  astraImage=$(docker load --input ${astraImageFile} | sed 's/Loaded
image: //')
  astraImage=$(echo ${astraImage} | sed 's!localhost/!!')
  # Tag with local image repo.
  docker tag ${astraImage} ${REGISTRY}/${astraImage}
  # Push to the local repo.
  docker push ${REGISTRY}/${astraImage}
done
```

   For Podman:

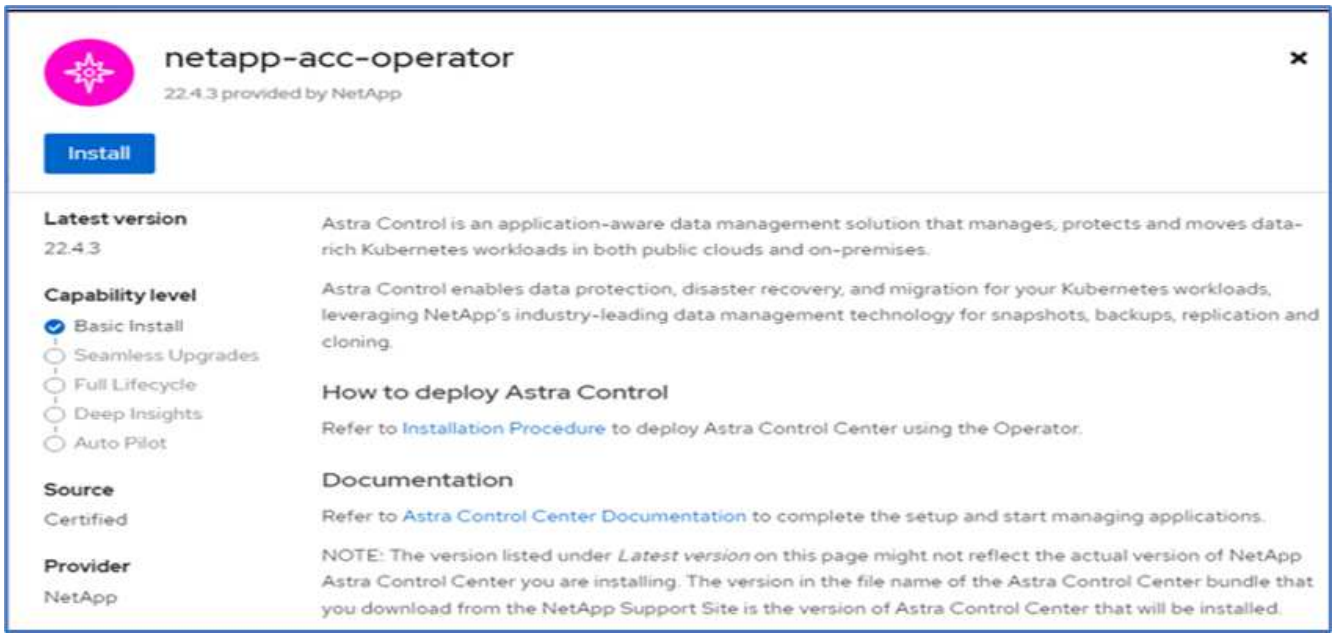
```
export REGISTRY=[Registry_path]
for astraImageFile in $(ls images/*.tar) ; do
  # Load to local cache. And store the name of the loaded image trimming
the 'Loaded images: '
  astraImage=$(podman load --input ${astraImageFile} | sed 's/Loaded
image(s): //')
  astraImage=$(echo ${astraImage} | sed 's!localhost/!!')
  # Tag with local image repo.
  podman tag ${astraImage} ${REGISTRY}/${astraImage}
  # Push to the local repo.
  podman push ${REGISTRY}/${astraImage}
done
```

8. Log into the bare-metal OpenShift cluster web console. From the side menu, select Operators > OperatorHub. Enter `astra` to list the `netapp-acc-operator`.

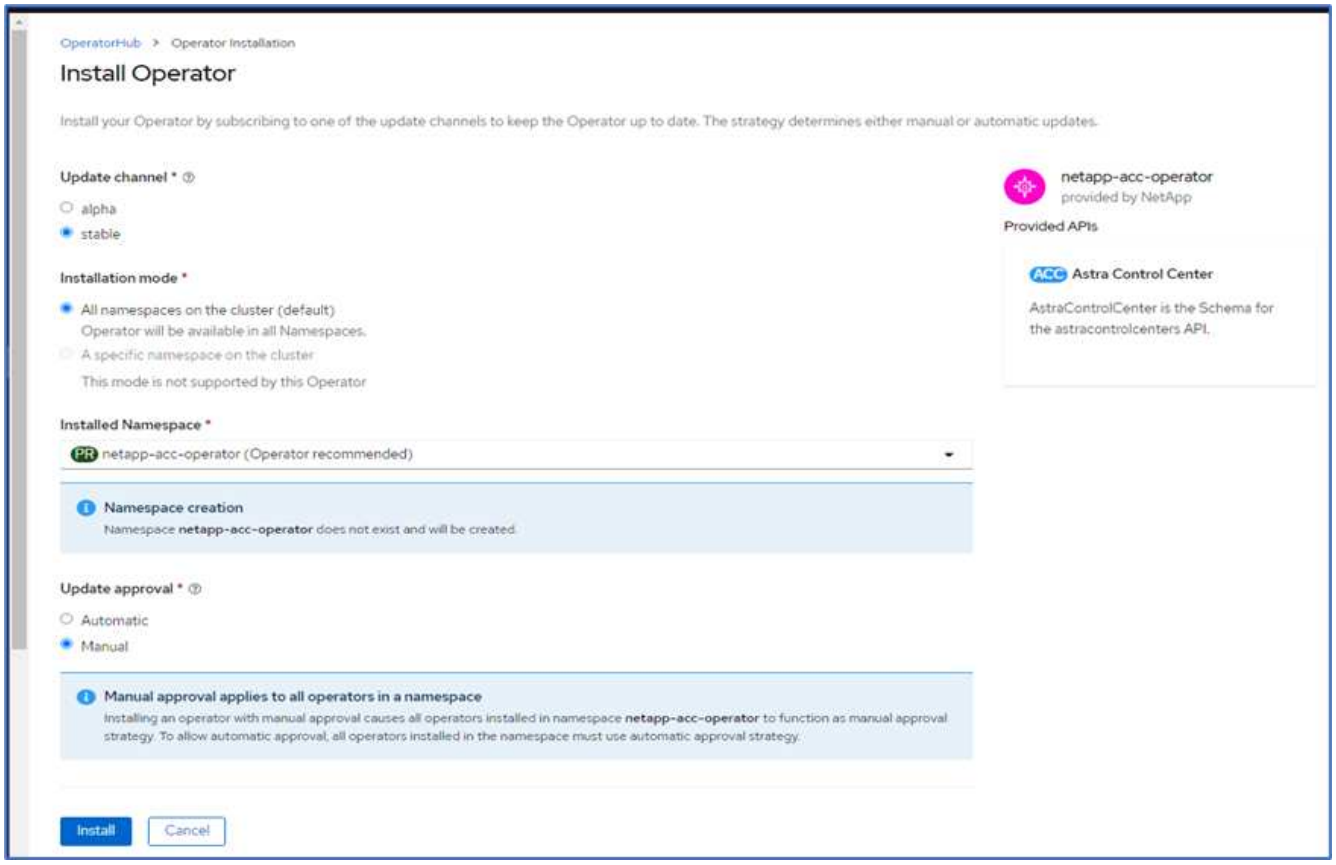


> `netapp-acc-operator` is a certified Red Hat OpenShift Operator and is listed under the OperatorHub catalogue.

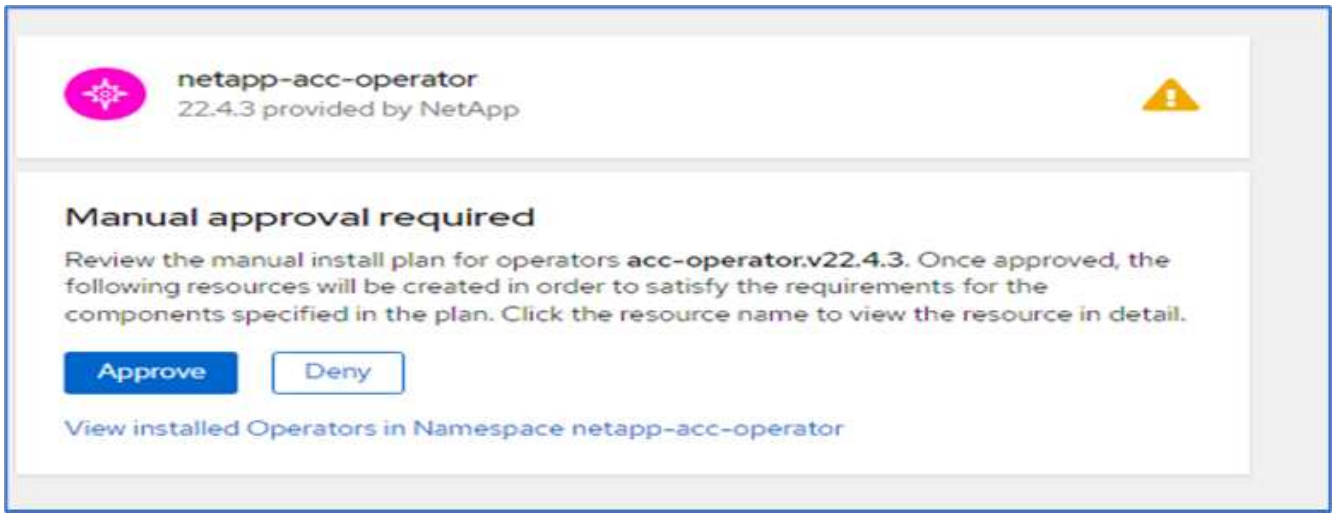
9. Select `netapp-acc-operator` and click Install.



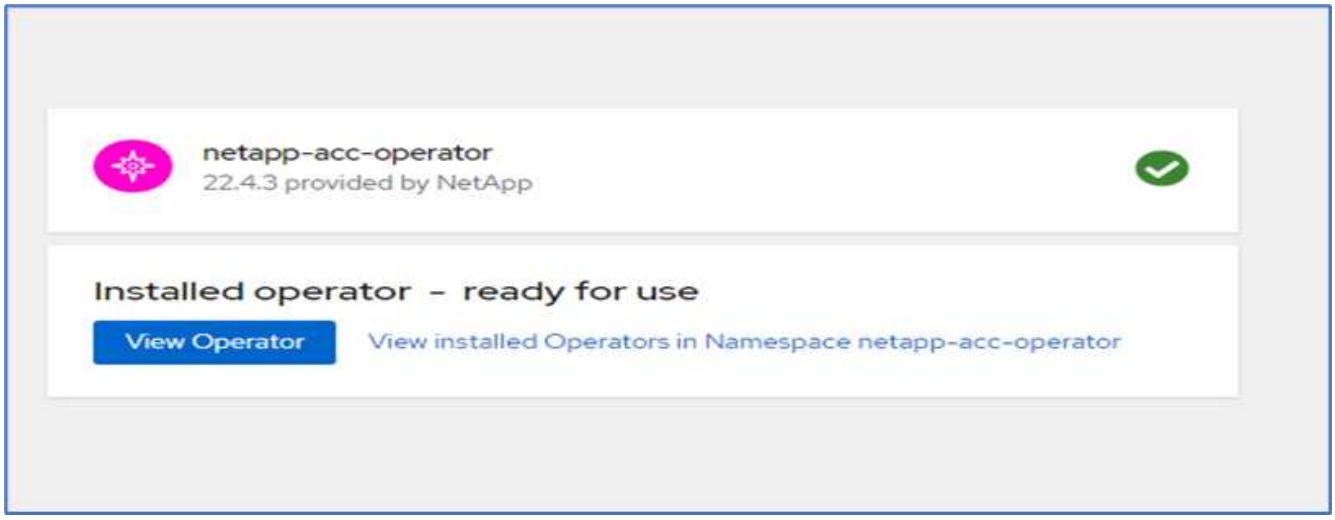
10. Select the appropriate options and click Install.



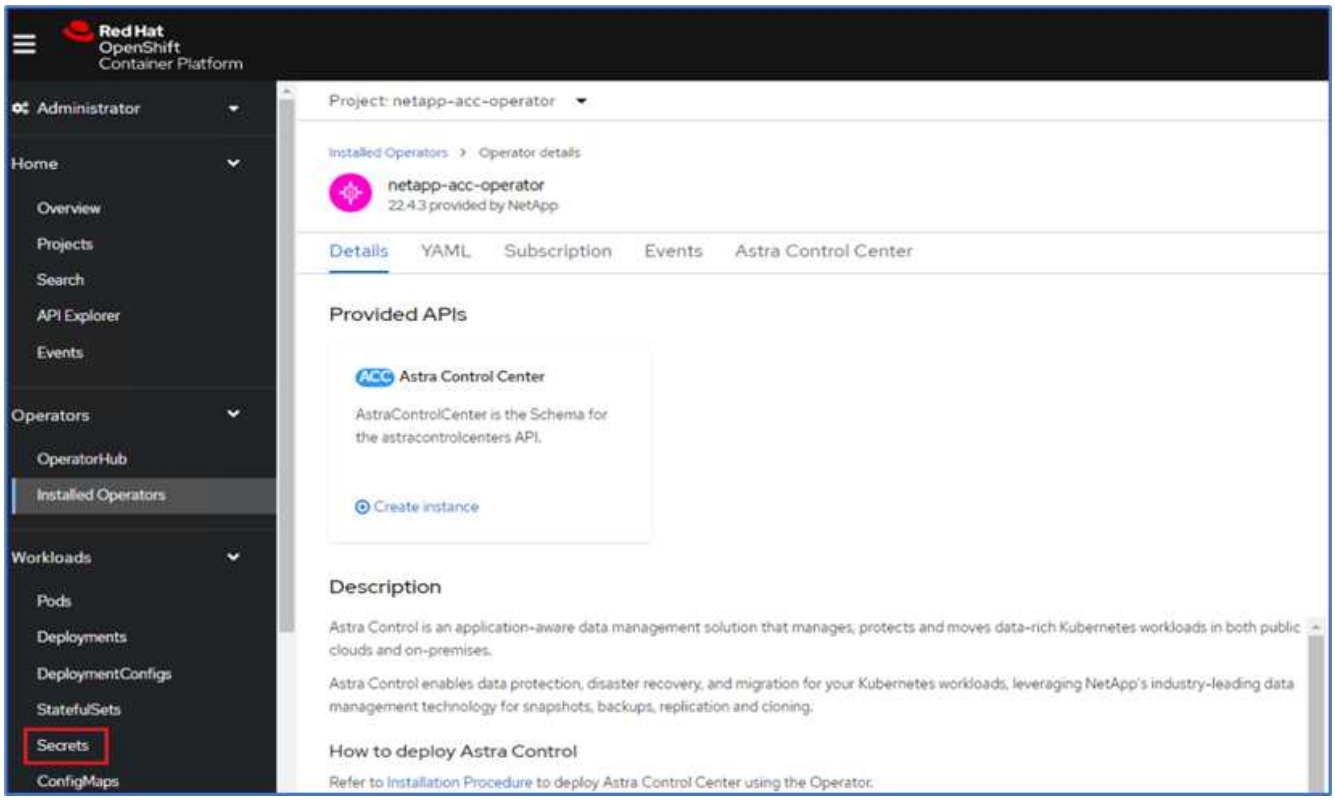
11. Approve the installation and wait for the operator to be installed.



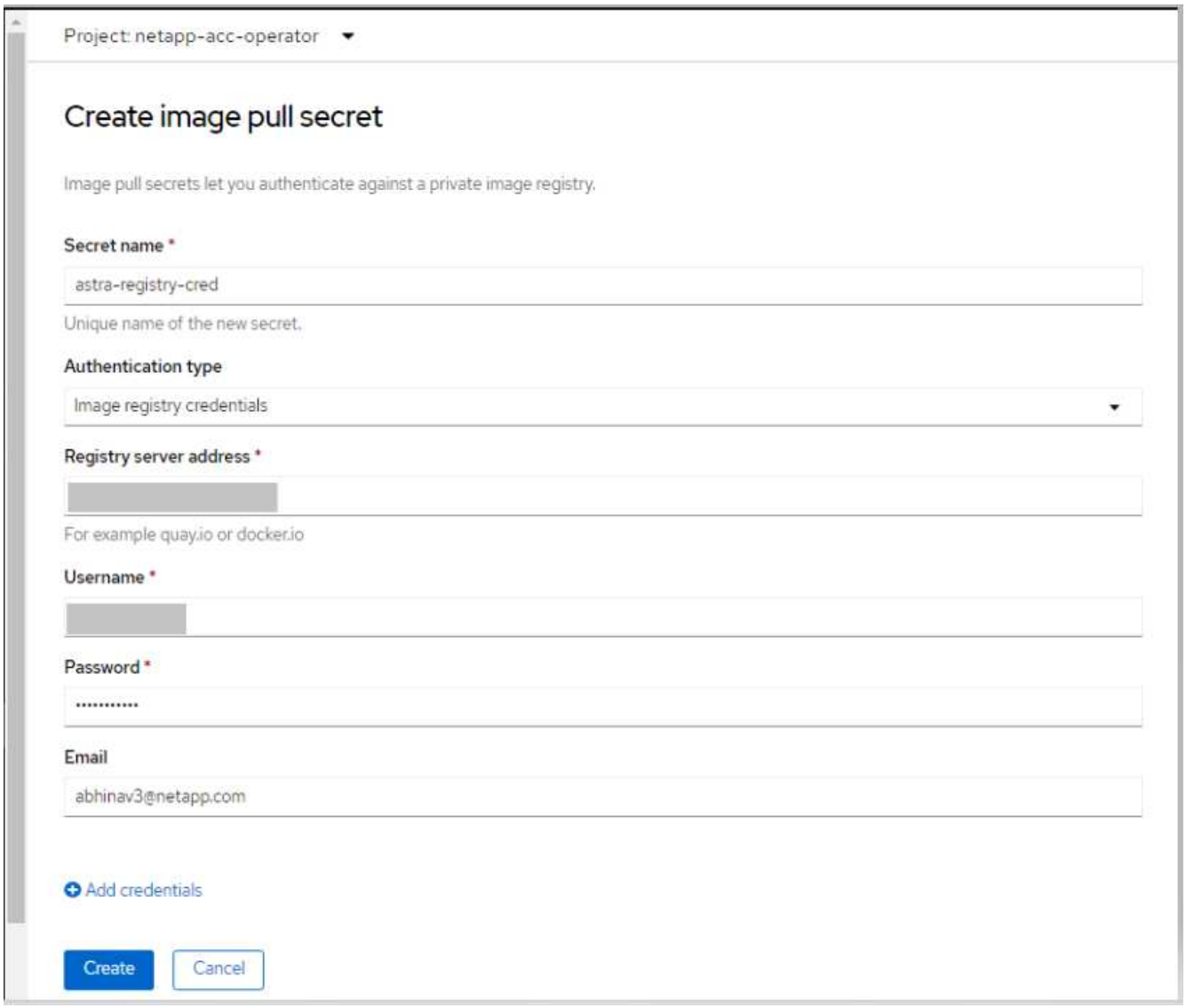
12. At this stage, the operator is installed successfully and ready for use. Click View Operator to start the installation of Astra Control Center.



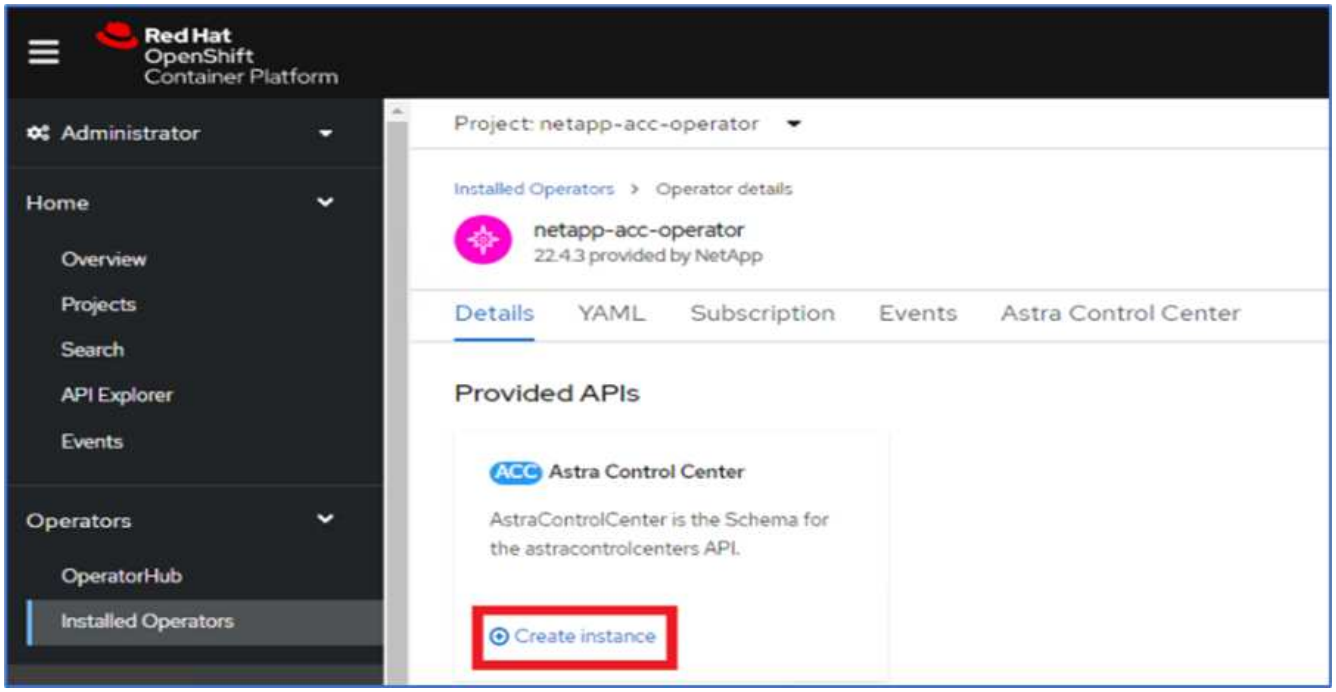
13. Before installing Astra Control Center, create the pull secret to download Astra images from the Docker registry that you pushed earlier.



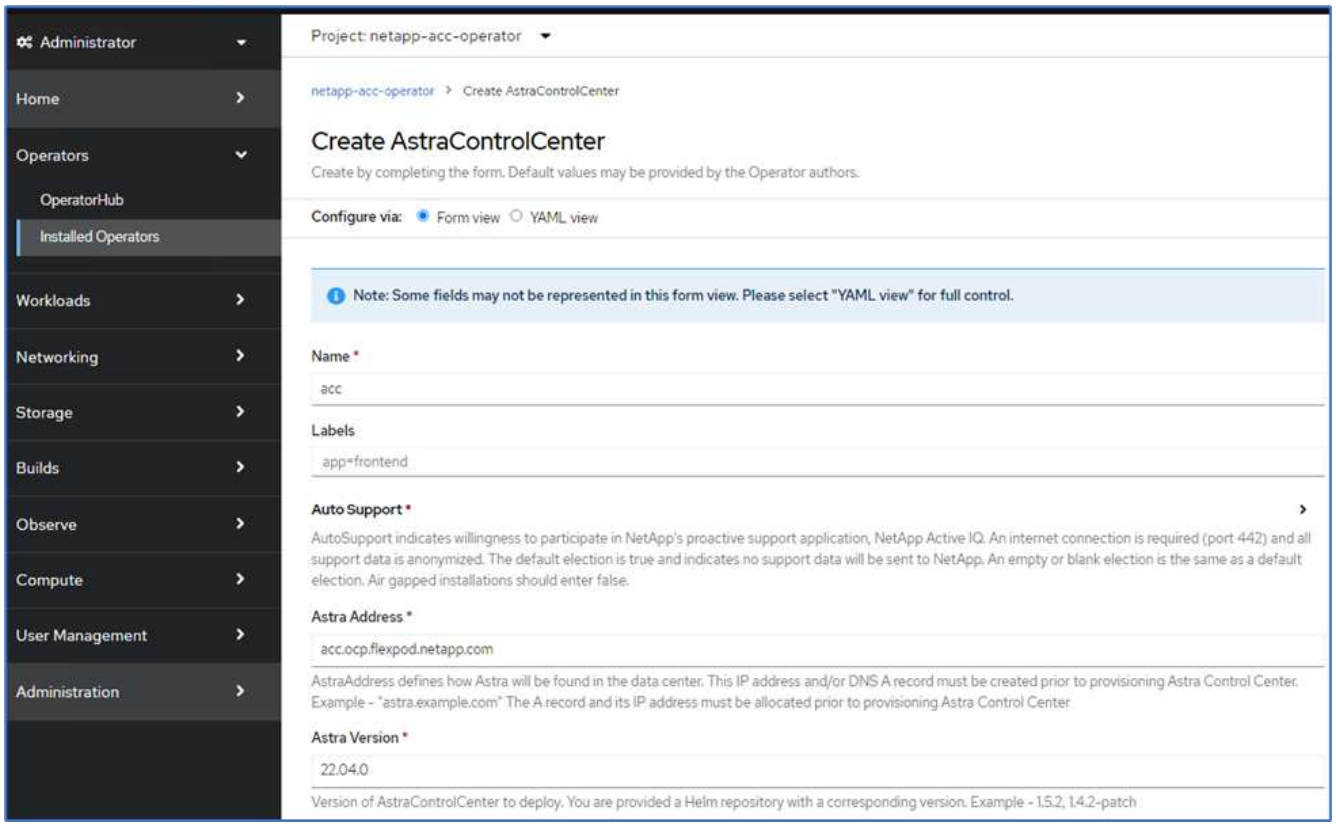
14. To pull the Astra Control Center images from your Docker private repo, create a secret in the `netapp-acc-operator` namespace. This secret name is provided in the Astra Control Center YAML manifest in a later step.



15. From the side menu, select Operators > Installed Operators and click Create Instance under the provided APIs section.



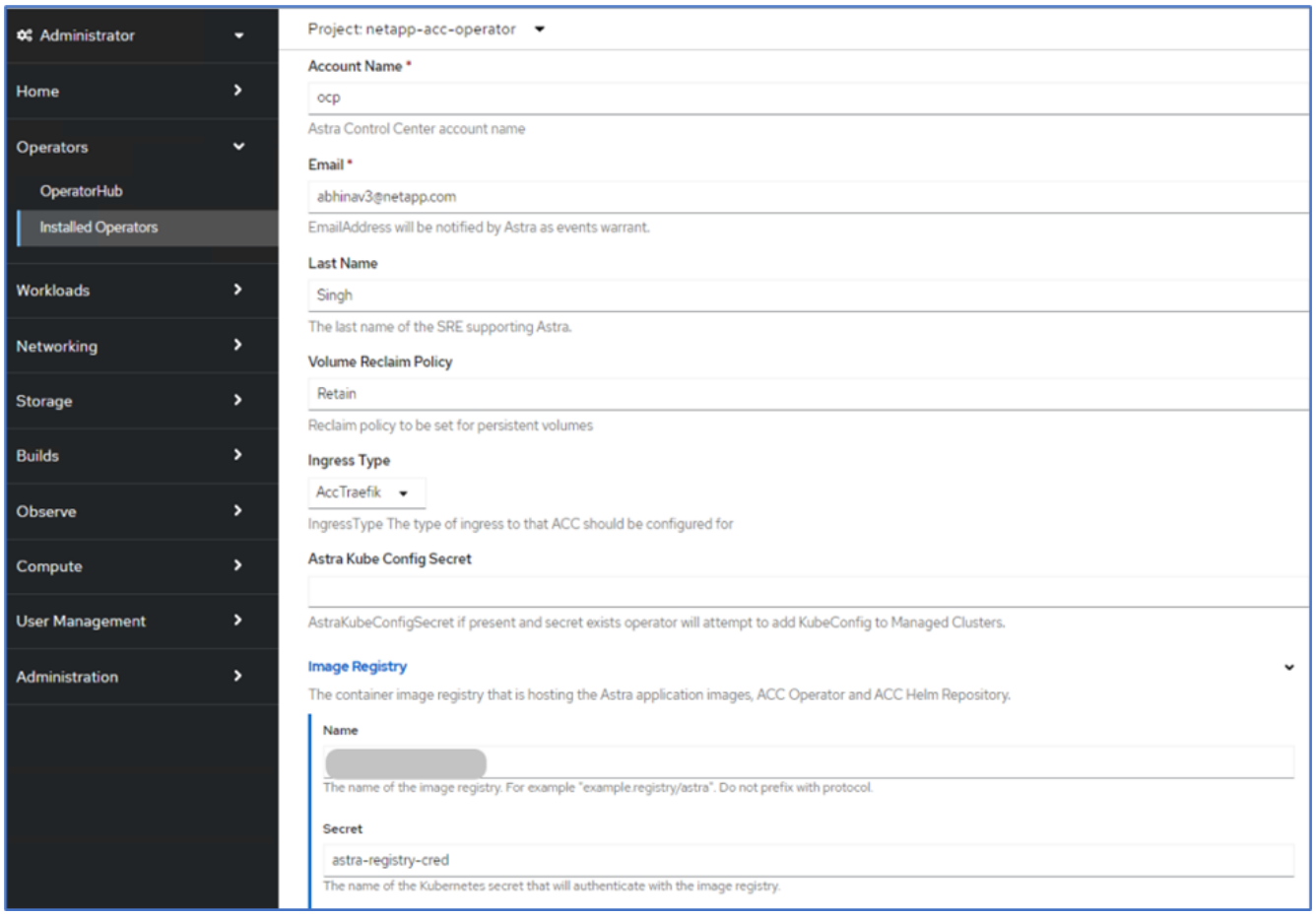
16. Complete the Create AstraControlCenter form. Provide the name, Astra address, and Astra version.



Under Astra Address, provide the FQDN address for Astra Control Center. This address is used to access the Astra Control Center Web console. The FQDN should also resolve to a reachable IP network and should be configured in the DNS.

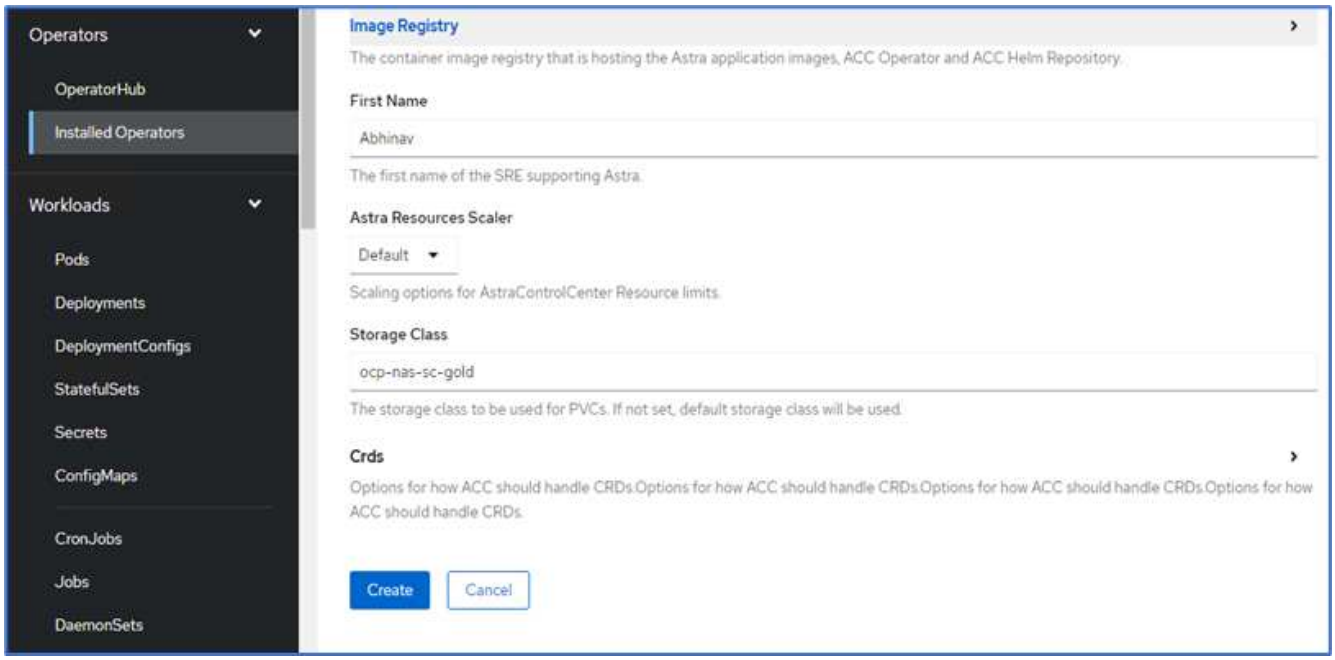
17. Enter an account name, email address, administrator last name, and retain the default volume reclaim policy. If you are using a load balancer, set the Ingress Type to `AccTraefik`. Otherwise, select Generic for

`Ingress.Controller`. Under Image Registry, enter the container image registry path and secret.

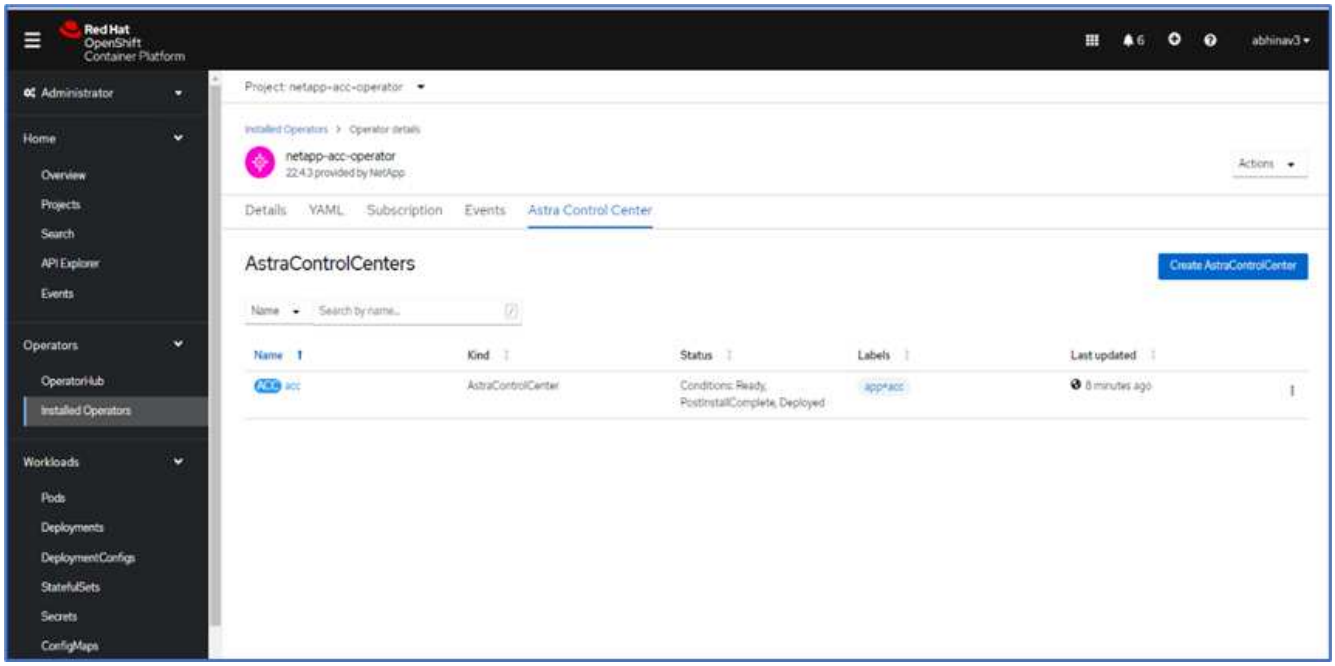


In this solution, the Metallb load balancer is used. Therefore, the ingress type is AccTraefik. This exposes the Astra Control Center traefik gateway as a Kubernetes service of type LoadBalancer.

18. Enter the admin first name, configure the resource scaling, and provide the storage class. Click Create.



The status of the Astra Control Center instance should change from Deploying to Ready.



19. Verify that all system components have been installed successfully and that all pods are running.

```
root@abhinav-ansible# oc get pods -n netapp-acc-operator
NAME                                               READY   STATUS
RESTARTS   AGE
acc-helm-repo-77745b49b5-7zg2v                     1/1     Running   0
10m
acc-operator-controller-manager-5c656c44c6-tqnmn   2/2     Running   0
13m
activity-589c6d59f4-x2sfs                          1/1     Running   0
```

```
6m4s
api-token-authentication-4q5lj                    1/1     Running   0
5m26s
api-token-authentication-pzptd                    1/1     Running   0
5m27s
api-token-authentication-tbtg6                    1/1     Running   0
5m27s
asup-669df8d49-qps54                              1/1     Running   0
5m26s
authentication-5867c5f56f-dnpp2                   1/1     Running   0
3m54s
bucketservice-85495bc475-5zcc5                    1/1     Running   0
5m55s
cert-manager-67f486bbc6-txhh6                     1/1     Running   0
9m5s
cert-manager-cainjector-75959db744-4l5p5          1/1     Running   0
9m6s
cert-manager-webhook-765556b869-g6wdf             1/1     Running   0
9m6s
cloud-extension-5d595f85f-txrfl                   1/1     Running   0
5m27s
cloud-insights-service-674649567b-5s4wd           1/1     Running   0
5m49s
composite-compute-6b58d48c69-46vhc                1/1     Running   0
6m11s
composite-volume-6d447fd959-chnrt                 1/1     Running   0
5m27s
credentials-66668f8ddd-8qc5b                      1/1     Running   0
7m20s
entitlement-fd6fc5c58-wxnmh                       1/1     Running   0
6m20s
features-756bbb7c7c-rgcrm                         1/1     Running   0
5m26s
fluent-bit-ds-278pg                               1/1     Running   0
3m35s
fluent-bit-ds-5pqc6                               1/1     Running   0
3m35s
fluent-bit-ds-8l7cq                               1/1     Running   0
3m35s
fluent-bit-ds-9qbft                               1/1     Running   0
3m35s
fluent-bit-ds-nj475                               1/1     Running   0
3m35s
fluent-bit-ds-x9pd8                               1/1     Running   0
3m35s
graphql-server-698d6f4bf-kftwc                    1/1     Running   0
```

```
3m20s
identity-5d4f4c87c9-wjz6c                          1/1     Running   0
6m27s
influxdb2-0                                        1/1     Running   0
9m33s
krakend-657d44bf54-8cb56                           1/1     Running   0
3m21s
license-594bbdc-rghdg                              1/1     Running   0
6m28s
login-ui-6c65fbbbd4-jg8wz                          1/1     Running   0
3m17s
loki-0                                             1/1     Running   0
9m30s
metrics-facade-75575f69d7-hnlk6                    1/1     Running   0
6m10s
monitoring-operator-65dff79cfb-z78vk               2/2     Running   0
3m47s
nats-0                                             1/1     Running   0
10m
nats-1                                             1/1     Running   0
9m43s
nats-2                                             1/1     Running   0
9m23s
nautilus-7bb469f857-4hlc6                          1/1     Running   0
6m3s
nautilus-7bb469f857-vz94m                          1/1     Running   0
4m42s
openapi-8586db4bcd-gwwvf                           1/1     Running   0
5m41s
packages-6bdb949cfb-nrq8l                          1/1     Running   0
6m35s
polaris-consul-consul-server-0                     1/1     Running   0
9m22s
polaris-consul-consul-server-1                     1/1     Running   0
9m22s
polaris-consul-consul-server-2                     1/1     Running   0
9m22s
polaris-mongodb-0                                  2/2     Running   0
9m22s
polaris-mongodb-1                                  2/2     Running   0
8m58s
polaris-mongodb-2                                  2/2     Running   0
8m34s
polaris-ui-5df7687dbd-trcnf                        1/1     Running   0
3m18s
polaris-vault-0                                    1/1     Running   0
```

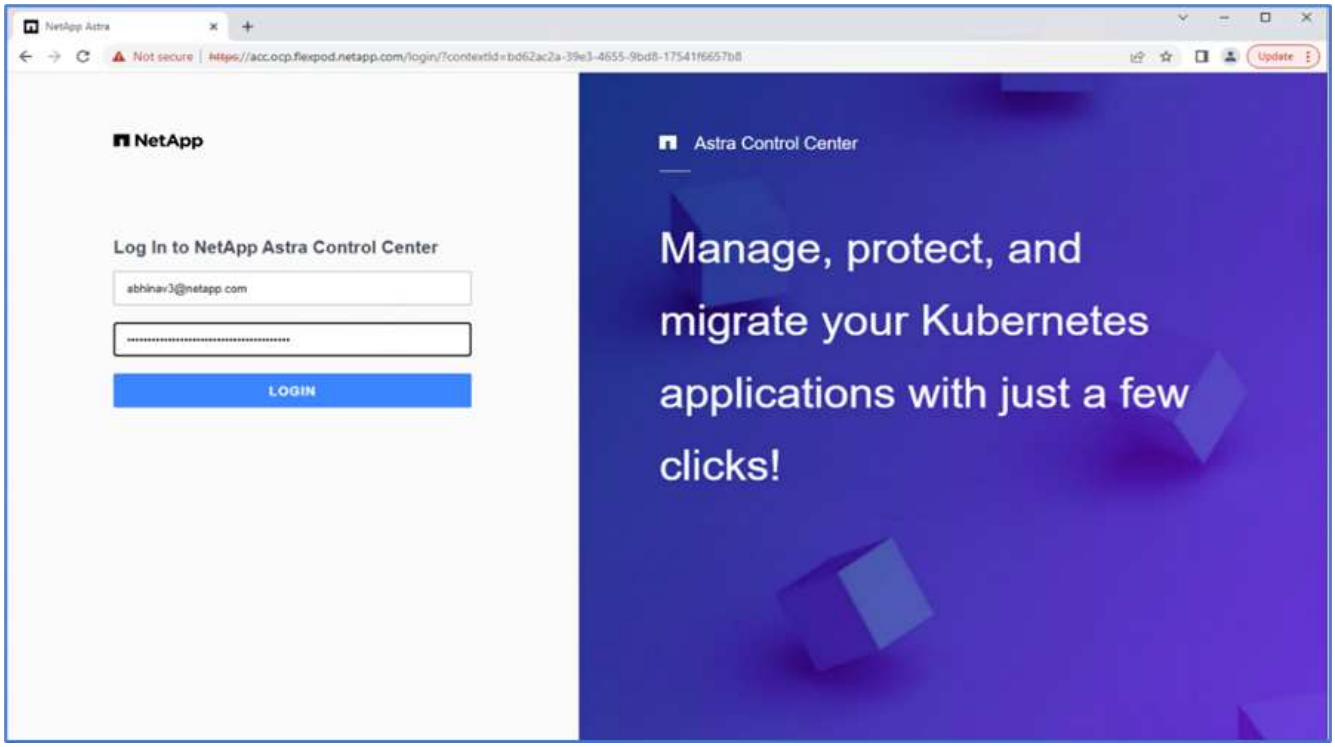
```
9m18s
polaris-vault-1                                   1/1     Running   0
9m18s
polaris-vault-2                                   1/1     Running   0
9m18s
public-metrics-7b96476f64-j88bw                   1/1     Running   0
5m48s
storage-backend-metrics-5fd6d7cd9c-vcb4j          1/1     Running   0
5m59s
storage-provider-bb85ff965-m7qrq                  1/1     Running   0
5m25s
telegraf-ds-4zqgz                                 1/1     Running   0
3m36s
telegraf-ds-cp9x4                                 1/1     Running   0
3m36s
telegraf-ds-h4n59                                 1/1     Running   0
3m36s
telegraf-ds-jnp2q                                 1/1     Running   0
3m36s
telegraf-ds-pdz5j                                 1/1     Running   0
3m36s
telegraf-ds-znqtp                                 1/1     Running   0
3m36s
telegraf-rs-rt64j                                 1/1     Running   0
3m36s
telemetry-service-7dd9c74bfc-sfkzt                1/1     Running   0
6m19s
tenancy-d878b7fb6-wf8x9                           1/1     Running   0
6m37s
traefik-6548496576-5v2g6                          1/1     Running   0
98s
traefik-6548496576-g82pq                          1/1     Running   0
3m8s
traefik-6548496576-psn49                          1/1     Running   0
38s
traefik-6548496576-qrkfd                          1/1     Running   0
2m53s
traefik-6548496576-srs6r                          1/1     Running   0
98s
trident-svc-679856c67-78kbt                       1/1     Running   0
5m27s
vault-controller-747d664964-xmn6c                 1/1     Running   0
7m37s
```

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

20. When all pods are running, run the following command to retrieve the one-time password. In the YAML version of the output, check the `status.deploymentState` field for the deployed value, and then copy the `status.uuid` value. The password is `ACC-` followed by the UUID value. (ACC-[UUID]).

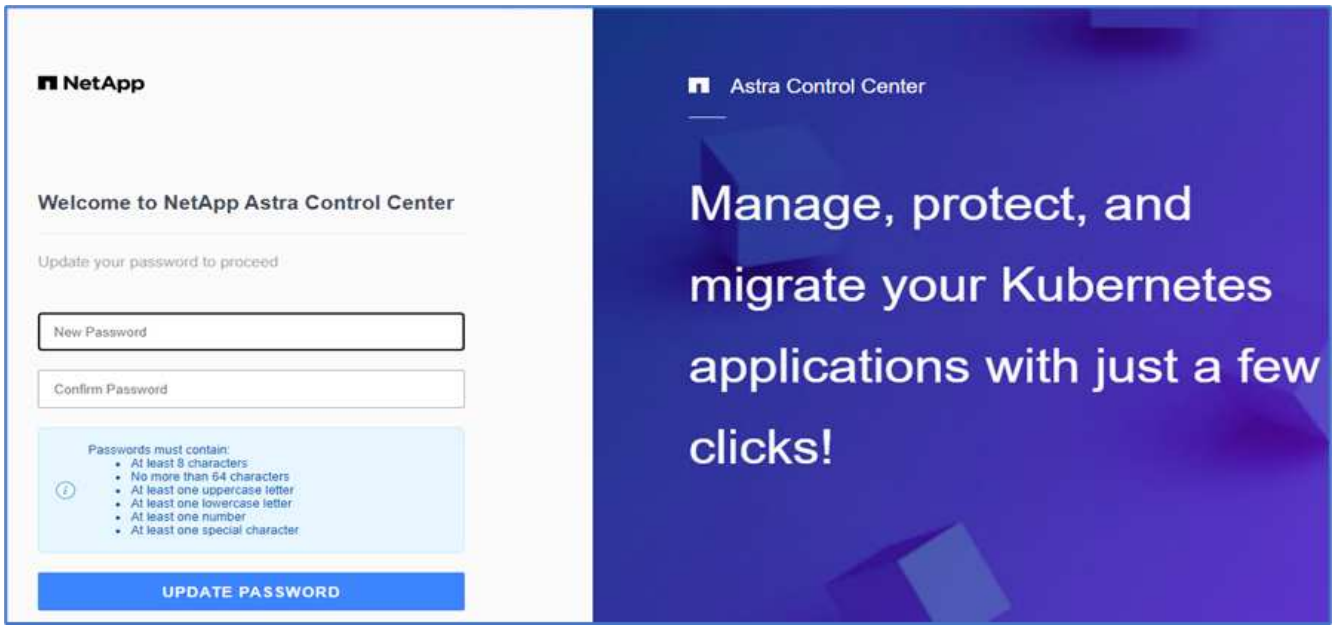
```
root@abhinav-ansible# oc get acc -o yaml -n netapp-acc-operator
```

21. In a browser, navigate to the URL by using the FQDN that you had provided.
22. Log in using the default user name, which is the email address provided during the installation and the one-time password ACC-[UUID].



If you enter an incorrect password three times, then the administrator account is locked for 15 minutes.

23. Change the password and proceed.

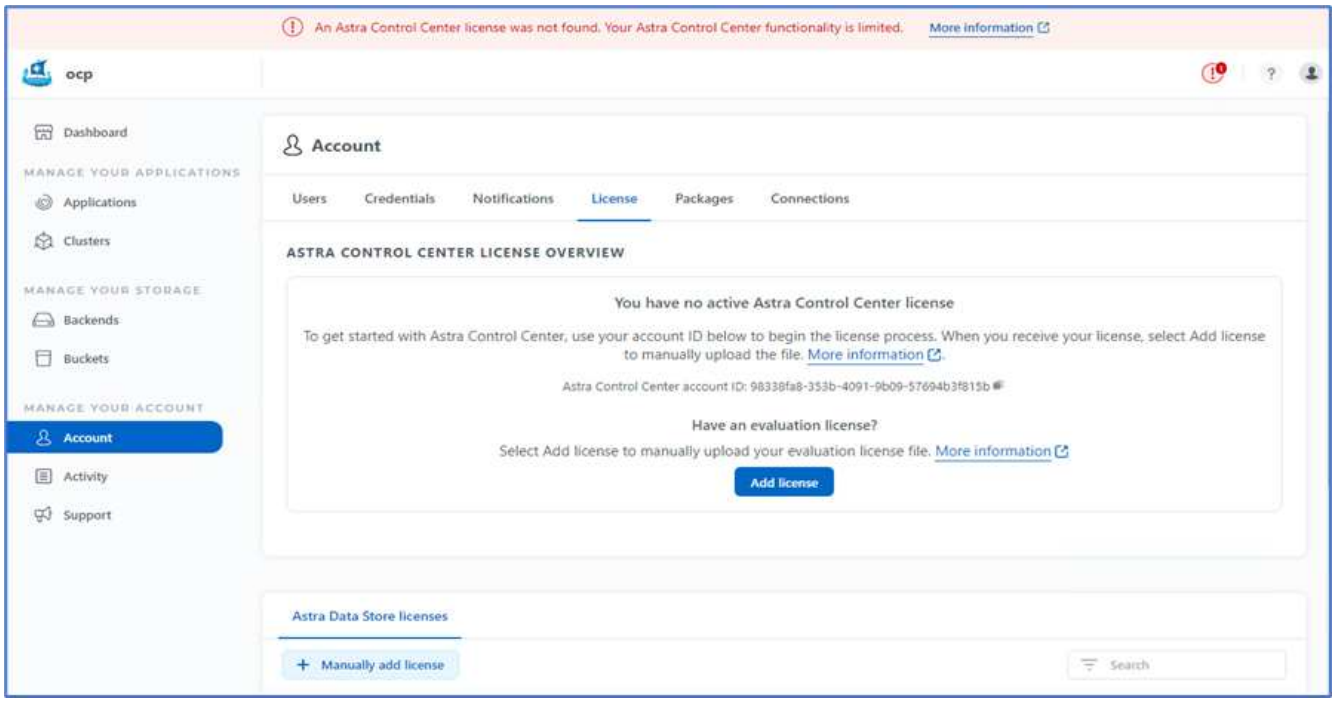


For more information about the Astra Control Center installation, see the Astra Control Center Installation overview page.

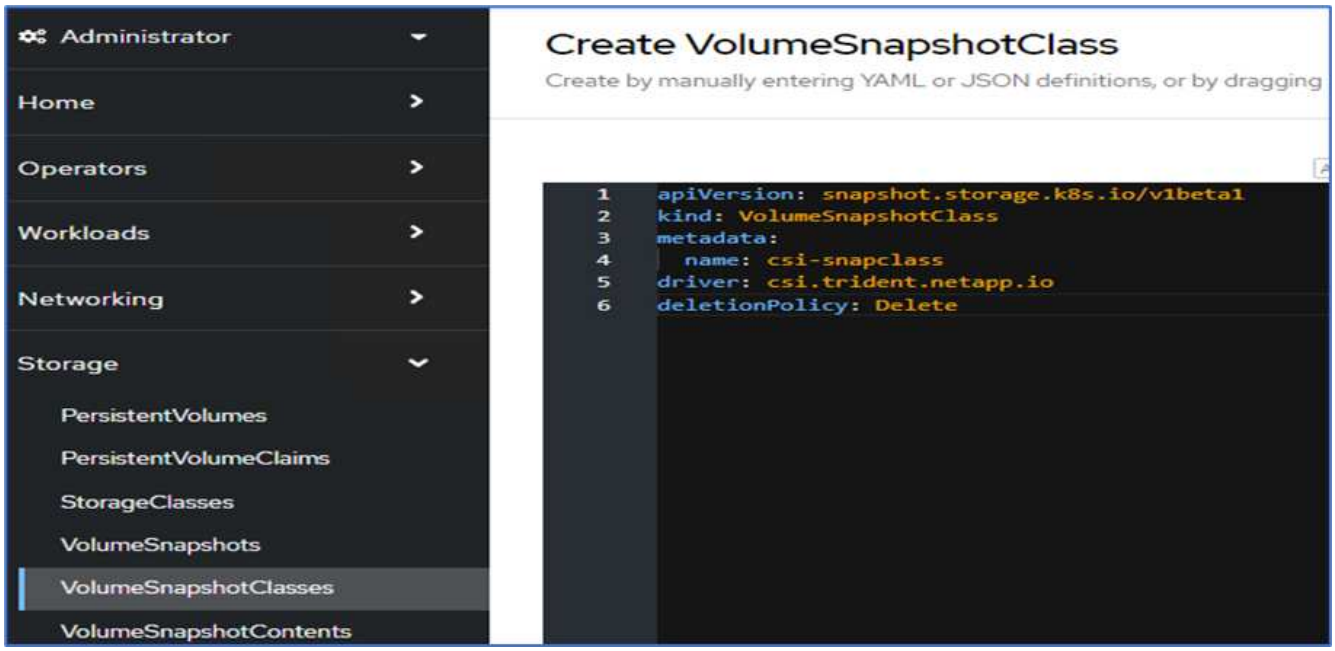
Set up Astra Control Center

After you install Astra Control Center, log into the UI, upload the license, add clusters, manage storage, and add buckets.

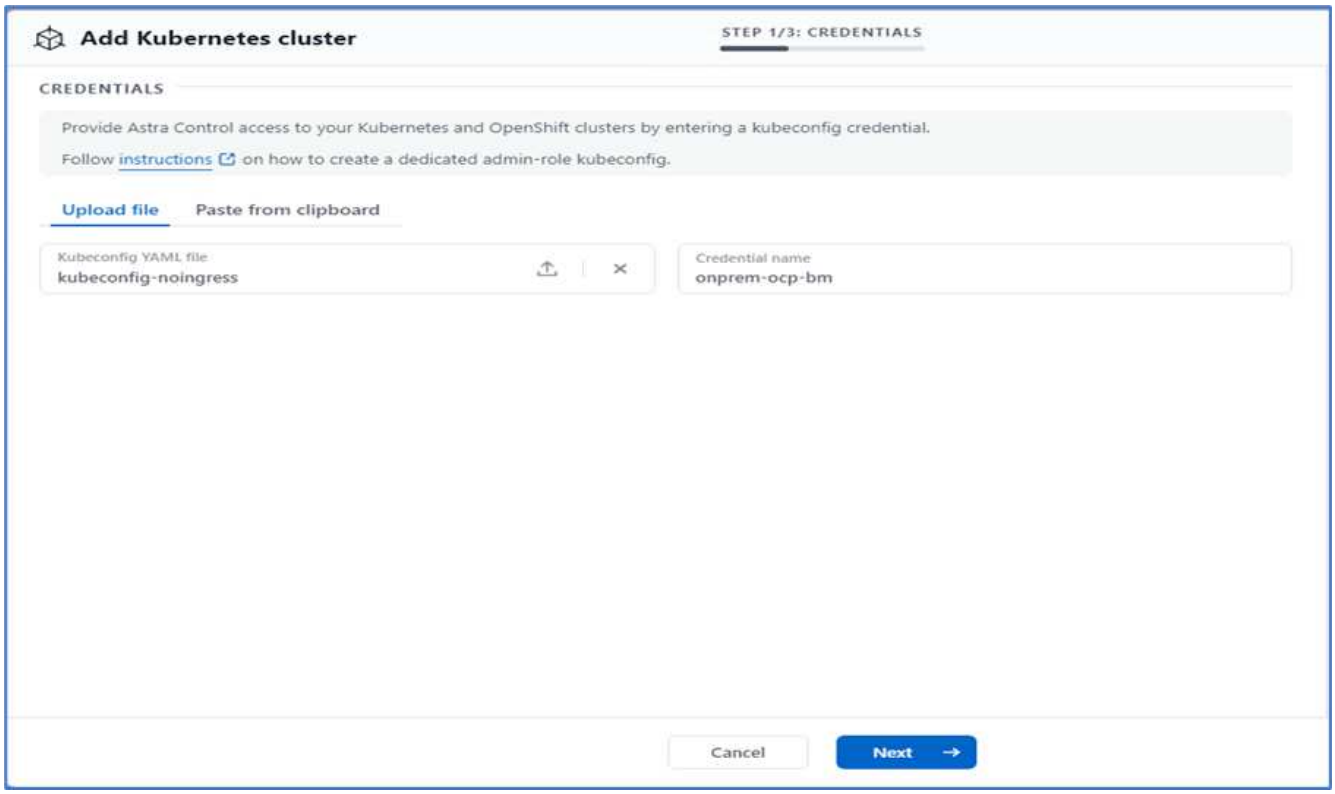
1. On the home page under Account, go to the License tab and select Add License to upload the Astra license.



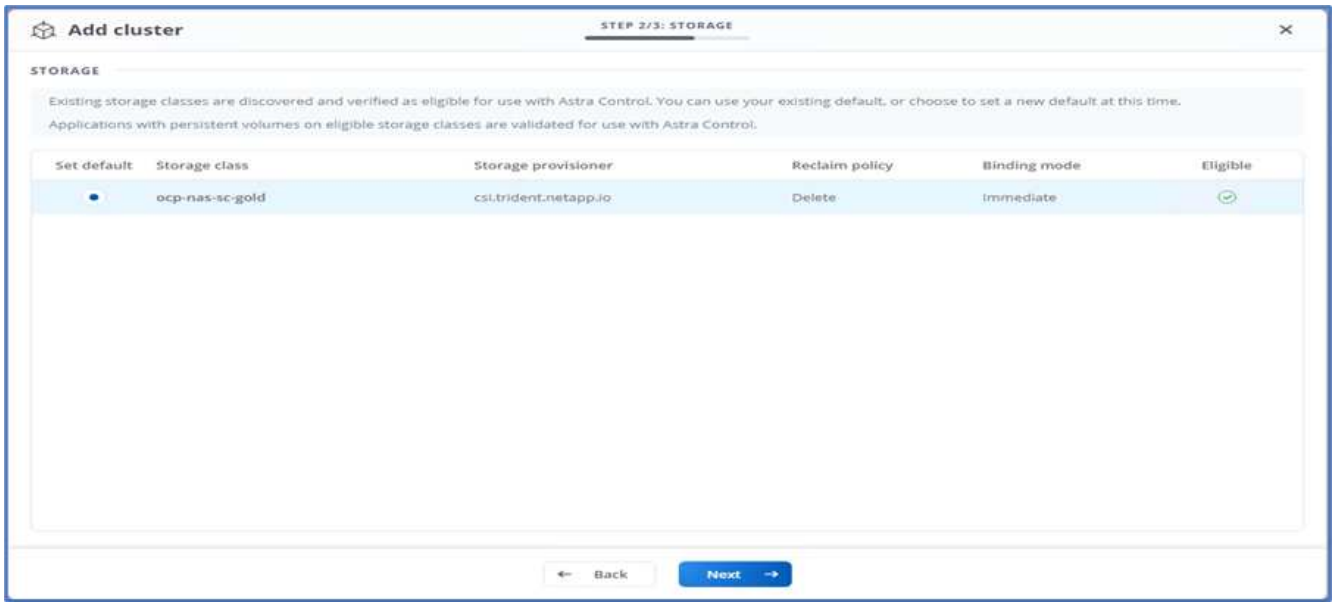
2. Before adding the OpenShift cluster, create an Astra Trident Volume snapshot class from the OpenShift web console. The Volume snapshot class is configured with the `csi.trident.netapp.io` driver.



3. To add the Kubernetes cluster, go to Clusters on the home page and click Add Kubernetes Cluster. Then upload the `kubeconfig` file for the cluster and provide a credential name. Click Next.



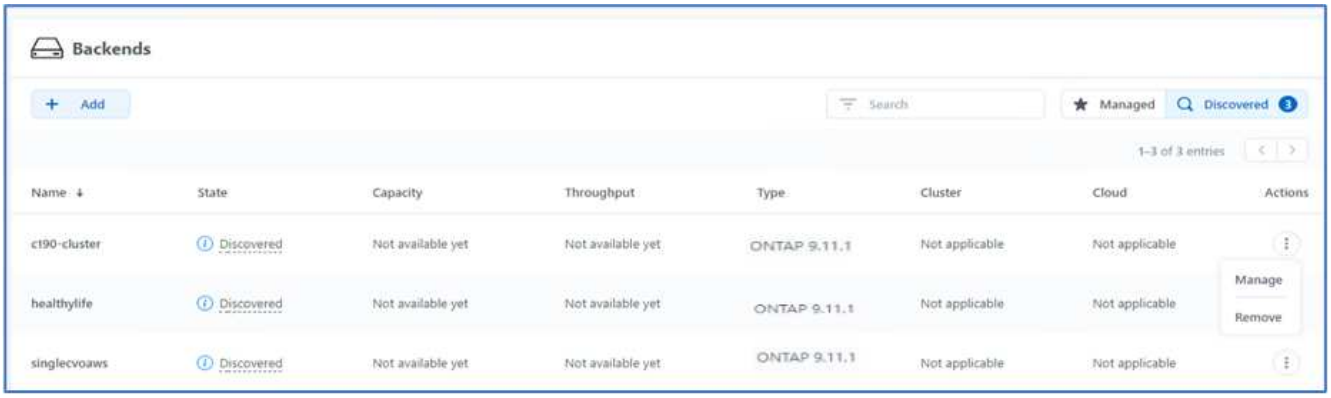
4. The existing storage classes are discovered automatically. Select the default storage class, click Next, and then click Add cluster.



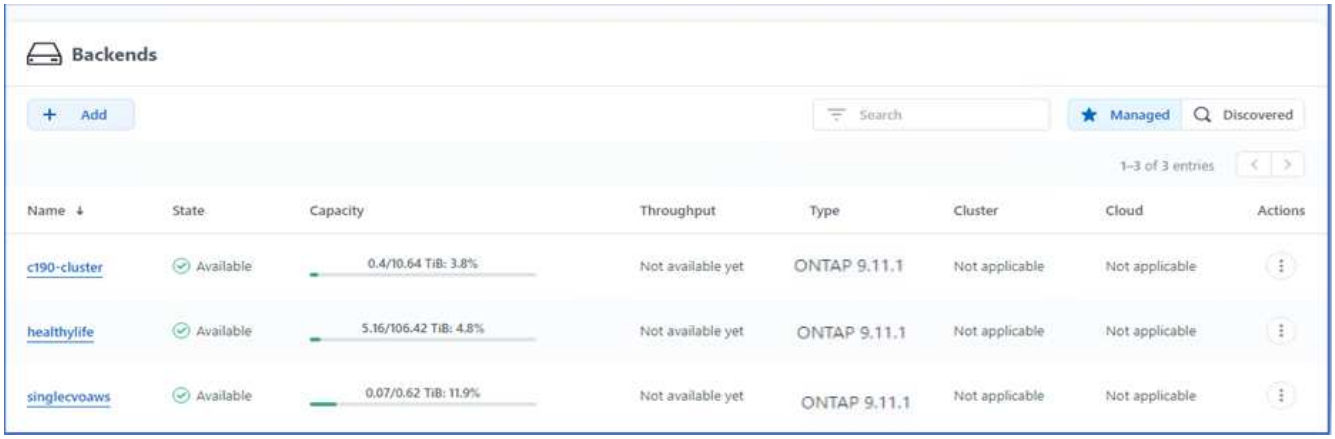
5. The cluster is added in few minutes. To add additional OpenShift Container Platform clusters, repeat steps 1–4.

> To add an additional OpenShift operational environment as a managed compute resource, make sure that the Astra Trident VolumeSnapshotClass objects are defined.

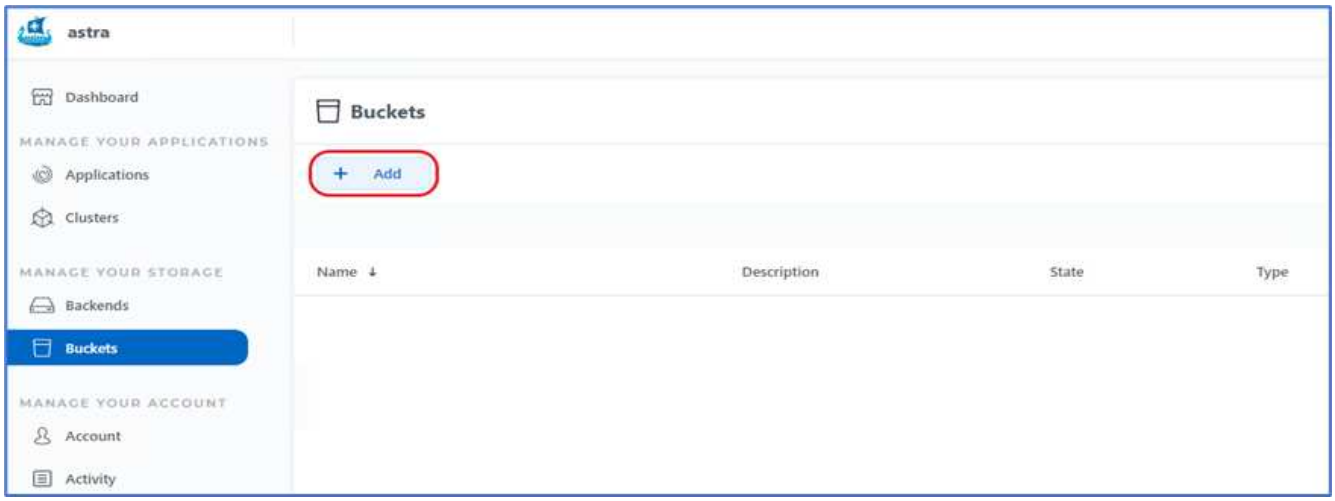
6. To manage the storage, go to Backends, click the three dots under Actions against the backend that you would like to manage. Click Manage.



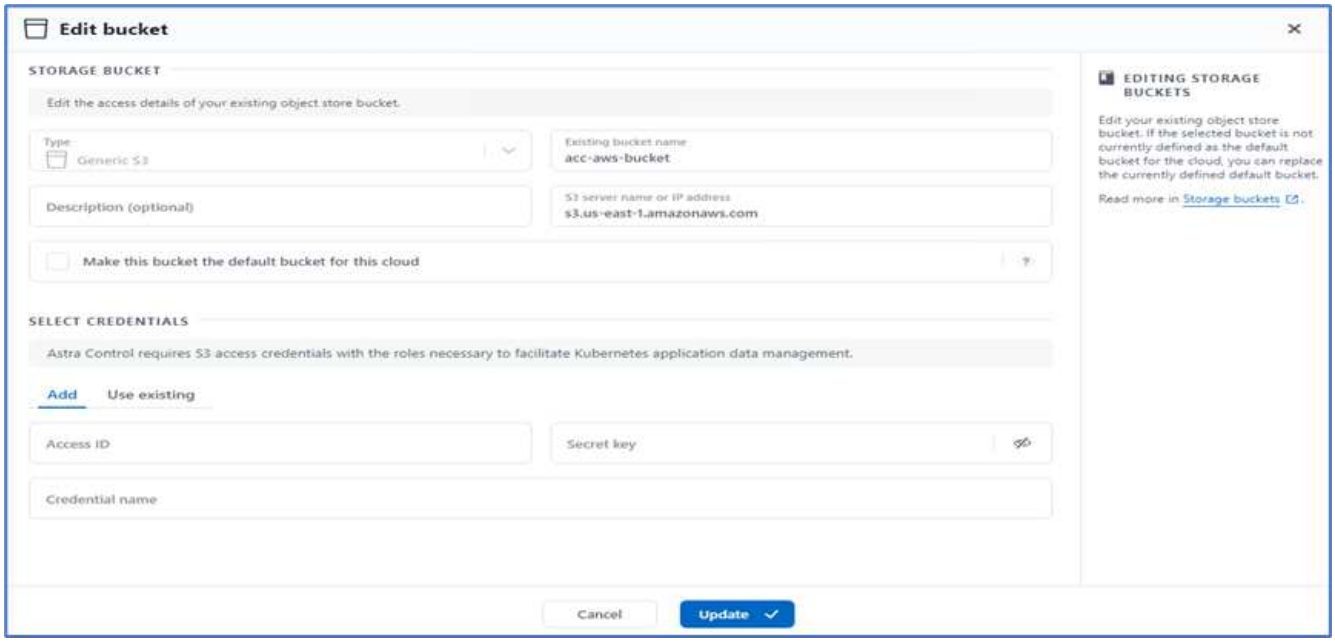
7. Provide the ONTAP credentials and click Next. Review the information and click Managed. The backends should look like the following example.



8. To add a bucket to Astra Control, select Buckets and click Add.

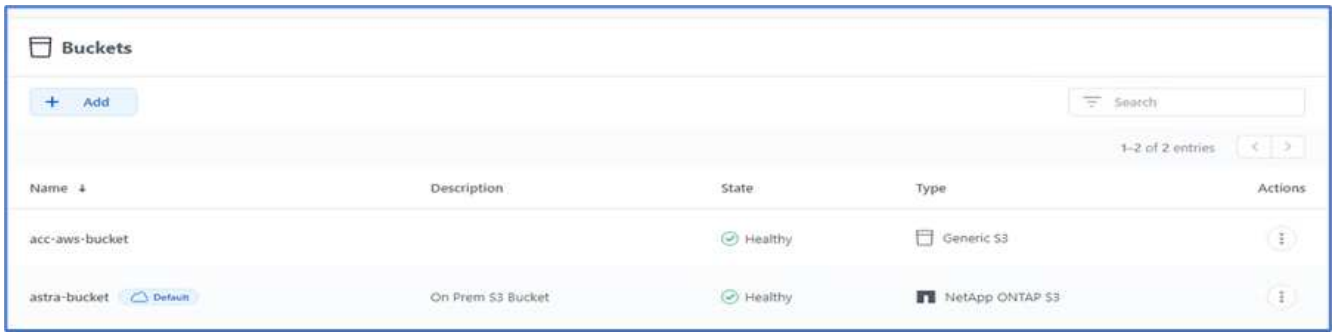


9. Select the bucket type and provide the bucket name, S3 server name, or IP address and S3 credential. Click Update.



In this solution, AWS S3 and ONTAP S3 buckets are both used. You can also use StorageGRID.

The Bucket state should be Healthy.



As a part of Kubernetes cluster registration with Astra Control Center for application-aware data management, Astra Control automatically creates role bindings and a NetApp monitoring namespace to collect metrics and logs from the application pods and worker nodes. Make one of the supported ONTAP-based storage classes the default.

After you add a cluster to Astra Control management, you can install apps on the cluster (outside of Astra Control) and then go to the Apps page in Astra Control to manage the apps and their resources. For more information about managing apps with Astra, see the App management requirements.

Next: Solution validation overview.

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