Installing Red Hat Advanced Cluster Security for Kubernetes 3.71

Installing

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Abstract

This document describes how to install Red Hat Advanced Cluster Security for Kubernetes by using the Operator, Helm charts, or the roxctl CLI.
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   4.2.5.1.1. Environment variables
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CHAPTER 1. PREREQUISITES FOR INSTALLING RED HAT ADVANCED CLUSTER SECURITY FOR KUBERNETES

1.1. GENERAL REQUIREMENTS

To install Red Hat Advanced Cluster Security for Kubernetes, you must have:

- OpenShift Container Platform version 4.5 or later for an OpenShift Container Platform installation.

WARNING

You must not install Red Hat Advanced Cluster Security for Kubernetes on:

- Amazon Elastic File System (Amazon EFS). Use the Amazon Elastic Block Store (Amazon EBS) with the default gp2 volume type instead.

- Older CPUs that do not have the Streaming SIMD Extensions (SSE) 4.2 instruction set. For example, Intel processors older than Sandy Bridge and AMD processors older than Bulldozer. (These processors were released in 2011.)

- Cluster nodes with a supported operating system. See the Red Hat Advanced Cluster Security for Kubernetes Support Policy for additional information.

  - Operating system: Amazon Linux, CentOS, Container-Optimized OS from Google, Red Hat Enterprise Linux CoreOS (RHCOS), Debian, Red Hat Enterprise Linux (RHEL), or Ubuntu.

  - Processor and memory: 2 CPU cores and at least 3GiB of RAM.

NOTE

For deploying Central, use a machine type with 4 or more cores and apply scheduling policies to launch Central on such nodes.

- Persistent storage by using persistent volume claim (PVC).

IMPORTANT


- Use Solid-State Drives (SSDs) for best performance. However, you can use another storage type if you do not have SSDs available.
- Helm command-line interface (CLI) v3.2 or newer, if you are installing or configuring Red Hat Advanced Cluster Security for Kubernetes using Helm charts. Use the `helm version` command to verify the version of Helm you have installed.

- The OpenShift Container Platform CLI (`oc`).

- You must have the required permissions to configure deployments in the Central cluster.

- You must have access to the Red Hat Container Registry. See Red Hat Container Registry Authentication for information about downloading images from `registry.redhat.io`.

**NOTE**

If you are not a Red Hat customer and purchased the StackRox Kubernetes Security Platform before the acquisition, you can use StackRox’s container registry at `stackrox.io`. Contact support@stackrox.com to enable access to the registry.

### 1.2. PREREQUISITES FOR INSTALLING CENTRAL

A single containerized service called Central handles data persistence, API interactions, and user interface (Portal) access.

Central requires persistent storage:

- You can provide storage with a persistent volume claim (PVC).

**NOTE**

You can use a hostPath volume for storage only if all your hosts (or a group of hosts) mount a shared file system, such as an NFS share or a storage appliance. Otherwise, your data is only saved on a single node. Red Hat does not recommend using a hostPath volume.

- Use Solid-State Drives (SSD) for best performance. However, you can use another storage type if you do not have SSDs available.

- If you use a web proxy or firewall, you must configure bypass rules to allow traffic for the `definitions.stackrox.io` and `collector-modules.stackrox.io` domains and enable Red Hat Advanced Cluster Security for Kubernetes to trust your web proxy or firewall. Otherwise, updates for vulnerability definitions and kernel support packages will fail.

Red Hat Advanced Cluster Security for Kubernetes requires access to:

- `definitions.stackrox.io` for downloading updated vulnerability definitions. Vulnerability definition updates allow Red Hat Advanced Cluster Security for Kubernetes to maintain up-to-date vulnerability data when new vulnerabilities are discovered or additional data sources are added.

- `collector-modules.stackrox.io` to download updated kernel support packages. Updated Kernel support packages ensure that Red Hat Advanced Cluster Security for Kubernetes can monitor the latest operating systems and collect data about the network traffic and processes running inside the containers. Without these updates, Red Hat Advanced Cluster Security for Kubernetes might fail to monitor containers if you add new nodes in your cluster or if you update your nodes’ operating system.
NOTE

For security reasons, you should deploy Central in a cluster with limited administrative access.

Memory and storage requirements
The following table lists the minimum memory and storage values required to install and run Central.

<table>
<thead>
<tr>
<th>Central</th>
<th>CPU</th>
<th>Memory</th>
<th>Storage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Request</td>
<td>1.5 cores</td>
<td>4 GiB</td>
<td>100 GiB</td>
</tr>
<tr>
<td>Limit</td>
<td>4 cores</td>
<td>8 GiB</td>
<td>100 GiB</td>
</tr>
</tbody>
</table>

Sizing guidelines
Use the following compute resources and storage values depending upon the number of nodes in your cluster.

<table>
<thead>
<tr>
<th>Nodes</th>
<th>Deployments</th>
<th>CPU</th>
<th>Memory</th>
<th>Storage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 100</td>
<td>Up to 1000</td>
<td>2 cores</td>
<td>4 GiB</td>
<td>100 GiB</td>
</tr>
<tr>
<td>Up to 500</td>
<td>Up to 2000</td>
<td>4 cores</td>
<td>8 GiB</td>
<td>100 GiB</td>
</tr>
<tr>
<td>More than 500</td>
<td>More than 2000</td>
<td>8 cores</td>
<td>12 - 16 GiB</td>
<td>100 - 200 GiB</td>
</tr>
</tbody>
</table>

1.3. PREREQUISITES FOR INSTALLING SCANNER

Red Hat Advanced Cluster Security for Kubernetes includes an image vulnerability scanner called Scanner. This service scans images that are not already scanned by scanners integrated into image registries.

Memory and storage requirements

<table>
<thead>
<tr>
<th>Scanner</th>
<th>CPU</th>
<th>Memory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Request</td>
<td>1.2 cores</td>
<td>2700 MiB</td>
</tr>
<tr>
<td>Limit</td>
<td>5 cores</td>
<td>8000 MiB</td>
</tr>
</tbody>
</table>

1.4. PREREQUISITES FOR INSTALLING SENSOR

Sensor monitors your Kubernetes and OpenShift Container Platform clusters. These services currently deploy in a single deployment, which handles interactions with the Kubernetes API and coordinates with Collector.

Memory and storage requirements
### 1.5. PREREQUISITES FOR INSTALLING ADMISSION CONTROLLER

The Admission controller prevents users from creating workloads that violate policies you configure.

**Memory and storage requirements**

By default, the admission control service runs 3 replicas. The following table lists the request and limits for each replica.

<table>
<thead>
<tr>
<th>Admission controller</th>
<th>CPU</th>
<th>Memory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Request</td>
<td>.05 cores</td>
<td>100 MiB</td>
</tr>
<tr>
<td>Limit</td>
<td>.5 cores</td>
<td>500 MiB</td>
</tr>
</tbody>
</table>

### 1.6. PREREQUISITES FOR INSTALLING COLLECTOR

Collector monitors runtime activity on each node in your secured clusters. It connects to Sensor to report this information.

**CAUTION**

To install Collector on systems that have Unified Extensible Firmware Interface (UEFI) and that have Secure Boot enabled, you must use eBPF probes because kernel modules are unsigned, and the UEFI firmware cannot load unsigned packages. Collector identifies Secure Boot status at the start and switches to eBPF probes if required.

**Memory and storage requirements**

<table>
<thead>
<tr>
<th>Collector</th>
<th>CPU</th>
<th>Memory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Request</td>
<td>.05 cores</td>
<td>320 MiB</td>
</tr>
<tr>
<td>Limit</td>
<td>.75 cores</td>
<td>1 GiB</td>
</tr>
</tbody>
</table>

**NOTE**

Collector uses a mutable image tag (<version>-latest), so you get support for newer Linux kernel versions more easily. There is no change in code, pre-existing kernel modules, or eBPF programs for image updates. Updates only add a single image layer with support for new kernel versions published after the initial release.
CHAPTER 2. INSTALLATION PLATFORMS AND METHODS

Red Hat Advanced Cluster Security for Kubernetes is supported on various platforms. This topic provides information for each platform and links to installation documentation.

2.1. INSTALLATION METHODS FOR DIFFERENT PLATFORMS

You can perform different types of installations on different platforms.

**NOTE**

Not all installation options are supported for all platforms, as shown in the following tables. Red Hat recommends that you do not use the `roxctl` install method unless you have a specific installation need that requires using this method.

### Table 2.1. Self-managed platforms

<table>
<thead>
<tr>
<th>Platform</th>
<th>Supported installation methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red Hat OpenShift Container Platform (OCP) 4.x</td>
<td>- <strong>Operator</strong> (recommended)</td>
</tr>
<tr>
<td></td>
<td>- <strong>Helm</strong></td>
</tr>
<tr>
<td></td>
<td>- <strong>roxctl</strong></td>
</tr>
<tr>
<td>Red Hat OpenShift Container Platform (OCP) 3.11.z</td>
<td>- <strong>Helm</strong> (recommended)</td>
</tr>
<tr>
<td></td>
<td>- <strong>roxctl</strong></td>
</tr>
<tr>
<td>Red Hat OpenShift Kubernetes Engine (OKE) 4.x</td>
<td>- <strong>Operator</strong> (recommended)</td>
</tr>
<tr>
<td></td>
<td>- <strong>Helm</strong></td>
</tr>
<tr>
<td></td>
<td>- <strong>roxctl</strong></td>
</tr>
</tbody>
</table>

### Table 2.2. Managed services platforms

<table>
<thead>
<tr>
<th>Platform</th>
<th>Supported installation methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red Hat OpenShift Dedicated (OSD)</td>
<td>- <strong>Operator</strong> (recommended)</td>
</tr>
<tr>
<td></td>
<td>- <strong>Helm</strong></td>
</tr>
<tr>
<td></td>
<td>- <strong>roxctl</strong></td>
</tr>
<tr>
<td>Platform</td>
<td>Supported installation methods</td>
</tr>
<tr>
<td>------------------------------------------------------------</td>
<td>--------------------------------</td>
</tr>
<tr>
<td>Azure Red Hat OpenShift (ARO)</td>
<td>● Operator (recommended)</td>
</tr>
<tr>
<td></td>
<td>● Helm</td>
</tr>
<tr>
<td></td>
<td>● roxctl</td>
</tr>
<tr>
<td>Red Hat OpenShift Service on AWS (ROSA)</td>
<td>● Operator (recommended)</td>
</tr>
<tr>
<td></td>
<td>● Helm</td>
</tr>
<tr>
<td></td>
<td>● roxctl</td>
</tr>
<tr>
<td>Amazon Elastic Kubernetes Service (Amazon EKS)</td>
<td>● Helm (recommended)</td>
</tr>
<tr>
<td></td>
<td>● roxctl</td>
</tr>
<tr>
<td>Google Kubernetes Engine (Google GKE)</td>
<td>● Helm (recommended)</td>
</tr>
<tr>
<td></td>
<td>● roxctl</td>
</tr>
<tr>
<td>Microsoft Azure Kubernetes Service (Microsoft AKS)</td>
<td>● Helm (recommended)</td>
</tr>
<tr>
<td></td>
<td>● roxctl</td>
</tr>
</tbody>
</table>
CHAPTER 3. INSTALLING BY USING AN OPERATOR

Red Hat Advanced Cluster Security for Kubernetes (RHACS) installs a set of services on your OpenShift Container Platform or Kubernetes cluster. This section describes the installation procedure for installing Red Hat Advanced Cluster Security for Kubernetes on your OpenShift Container Platform or Kubernetes cluster by using an Operator.

Before you install:


The Red Hat Advanced Cluster Security for Kubernetes Operator includes the following two custom resources:

1. **Central** - The central resource is a logical grouping of the following services:
   - **Central**: Central is the Red Hat Advanced Cluster Security for Kubernetes application management interface and services. It handles data persistence, API interactions, and user interface (RHACS Portal) access. You can use the same Central instance to secure multiple OpenShift Container Platform or Kubernetes clusters.
   - **Scanner**: Scanner is a Red Hat-developed and certified vulnerability scanner for scanning container images and their associated database. It analyzes all image layers to check known vulnerabilities from the Common Vulnerabilities and Exposures (CVEs) list. Scanner also identifies vulnerabilities in packages installed by package managers and in dependencies for multiple programming languages.

2. **SecuredCluster** - The secured cluster resource is a logical grouping of the following services:
   - **Sensor**: Sensor is the service responsible for analyzing and monitoring the cluster. It handles interactions with the OpenShift Container Platform or Kubernetes API server for policy detection and enforcement, and it coordinates with Collector.
   - **Collector**: Collector analyzes and monitors container activity on cluster nodes. It collects information about container runtime and network activity. It then sends the collected data to Sensor.
   - **Admission Control**: The admission controller prevents users from creating workloads that violate security policies in Red Hat Advanced Cluster Security for Kubernetes.

The following steps represent a high-level workflow for installing Red Hat Advanced Cluster Security for Kubernetes by using an Operator:

1. **Install the Red Hat Advanced Cluster Security for Kubernetes Operator** from OperatorHub in the cluster where you want to install Central.
2. **Configure and deploy the Central custom resource**.
3. **Generate and apply an init bundle**. The init bundle contains the secrets that provide linking between Central and the secured clusters.
4. **Install the Red Hat Advanced Cluster Security for Kubernetes Operator** in all clusters that you want to monitor.
5. Configure and deploy the SecuredCluster custom resource in each individual cluster that you want to monitor.

### 3.1. INSTALLING THE RED HAT ADVANCED CLUSTER SECURITY FOR KUBERNETES OPERATOR

Using the OperatorHub provided with OpenShift Container Platform is the easiest way to install Red Hat Advanced Cluster Security for Kubernetes.

**Prerequisites**

- You have access to an OpenShift Container Platform cluster using an account with Operator installation permissions.
- You must be using OpenShift Container Platform 4.6 or later.

**Procedure**

1. Navigate in the web console to the Operators → OperatorHub page.


4. Read the information about the Operator and click Install.

5. On the Install Operator page:
   - Keep the default value for Installation mode as All namespaces on the cluster.
   - Choose a specific namespace in which to install the Operator for the Installed namespace field. Red Hat recommends installing the Red Hat Advanced Cluster Security for Kubernetes Operator in the rhacs-operator namespace.
   - Select automatic or manual updates for Update approval.
     - If you choose automatic updates, when a new version of the Operator is available, Operator Lifecycle Manager (OLM) automatically upgrades the running instance of your Operator.
     - If you choose manual updates, when a newer version of the Operator is available, OLM creates an update request. As a cluster administrator, you must then manually approve that update request to update the Operator to the new version.

6. Click Install.

**Verification**

- After the installation completes, navigate to Operators → Installed Operators to verify that the Red Hat Advanced Cluster Security for Kubernetes Operator is listed with the status of Succeeded.

**Next Step**
3.2. INSTALLING CENTRAL

The main component of Red Hat Advanced Cluster Security for Kubernetes is called Central. You can install Central on OpenShift Container Platform by using the Central custom resource. You deploy Central only once, and you can monitor multiple separate clusters by using the same Central installation.

IMPORTANT

When you install Red Hat Advanced Cluster Security for Kubernetes for the first time, you must first install the Central custom resource because the SecuredCluster custom resource installation is dependent on certificates that Central generates.

Prerequisites

- You must be using OpenShift Container Platform 4.6 or later.

Procedure


2. Select the Red Hat Advanced Cluster Security for Kubernetes Operator from the list of installed Operators.

3. If you have installed the Operator in the recommended namespace, OpenShift Container Platform lists the project as rhacs-operator. Select Project: rhacs-operator → Create project.

WARNING

- If you have installed the Operator in a different namespace, OpenShift Container Platform shows the name of that namespace rather than rhacs-operator.

- You must install the Red Hat Advanced Cluster Security for Kubernetes Central custom resource in its own project and not in the rhacs-operator and openshift-operator projects, or in the project in which you have installed the Red Hat Advanced Cluster Security for Kubernetes Operator.

4. Enter the new project name (for example, stackrox), and click Create. Red Hat recommends that you use stackrox as the project name.

5. Under the Provided APIs section, select Central. Click Create Central.

6. Enter a name for your Central custom resource and add any labels you want to apply. Otherwise, accept the default values for the available options.

7. Click Create.
NOTE

If you are using the cluster-wide proxy, Red Hat Advanced Cluster Security for Kubernetes uses that proxy configuration to connect to the external services.

Next Steps

1. Verify Central installation.
2. Optional: Configure Central options.
3. Generate an init bundle.

Additional resources

- Configuring the cluster-wide proxy

3.3. VERIFYING CENTRAL INSTALLATION

After Central finishes installing, log in to the RHACS portal to verify the successful installation of Central.

Procedure

2. Select the Red Hat Advanced Cluster Security for Kubernetes Operator from the list of installed Operators.
3. Select the Central tab.
4. From the Centrals list, select stackrox-central-services to view its details.
5. To get the password for the admin user, you can either:
   a. Click the link under Admin Password Secret Reference.
   b. Use the OpenShift Container Platform CLI to enter the command listed under Admin Credentials Info:
      
         ```
         $ oc -n stackrox get secret central-htpasswd -o go-template='{{index .data "password" | base64decode}}'
         ```
       
5. Find the link to the RHACS portal by using the OpenShift Container Platform CLI command:

         ```
         $ oc -n stackrox get route central -o jsonpath="{.status.ingress[0].host}"
         ```

   Alternatively, you can use the Red Hat Advanced Cluster Security for Kubernetes web console to find the link to the RHACS portal by performing the following commands:

   a. Navigate to Networking → Routes.
   b. Find the central Route and click on the RHACS portal link under the Location column.
7. Log in to the RHACS portal using the username admin and the password that you retrieved in a previous step. Until Red Hat Advanced Cluster Security for Kubernetes is completely configured (for example, you have the Central resource and at least one SecuredCluster resource installed and configured), no data is available in the dashboard. The SecuredCluster resource can be installed and configured on the same cluster as the Central resource. Clusters with the SecuredCluster resource are similar to managed clusters in Red Hat Advanced Cluster Management (RHACM).

Next Steps

1. Optional: Configure central settings.

2. Generate an init bundle containing the cluster secrets that allows communication between the Central and SecuredCluster resources. You need to download this bundle, use it to generate resources on the clusters you want to secure, and securely store it.

3.4. CENTRAL CONFIGURATION OPTIONS

When you create a Central instance, the Operator lists the following configuration options for the Central custom resource.

3.4.1. Central settings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>central.adminPasswordSecret</td>
<td>Specify a secret that contains the administrator password in the password data item. If omitted, the operator autogenerates a password and stores it in the password item in the central-htpasswd secret.</td>
</tr>
<tr>
<td>central.defaultTLSSecret</td>
<td>By default, Central only serves an internal TLS certificate, which means that you need to handle TLS termination at the ingress or load balancer level. If you want to terminate TLS in Central and serve a custom server certificate, you can specify a secret containing the certificate and private key.</td>
</tr>
<tr>
<td>central.adminPasswordGenerationDisabled</td>
<td>Set this parameter to true to disable the automatic administrator password generation. Use this only after you perform the first-time setup of alternative authentication methods. Do not use this for initial installation. Otherwise, you must reinstall the custom resource to log back in.</td>
</tr>
<tr>
<td>central.tolerations</td>
<td>If the node selector selects tainted nodes, use this parameter to specify a taint tolerance key, value, and effect for Central. This parameter is mainly used for infrastructure nodes.</td>
</tr>
<tr>
<td>central.exposure.loadBalancer.enabled</td>
<td>Set this to true to expose Central through a load balancer.</td>
</tr>
<tr>
<td>central.exposure.loadBalancer.port</td>
<td>Use this parameter to specify a custom port for your load balancer.</td>
</tr>
<tr>
<td>central.exposure.loadBalancer.ip</td>
<td>Use this parameter to specify a static IP address reserved for your load balancer.</td>
</tr>
</tbody>
</table>
### Parameter Description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>central.exposure.route.enabled</code></td>
<td>Set this to <code>true</code> to expose Central through an OpenShift route. The default value is <code>false</code>.</td>
</tr>
<tr>
<td><code>central.exposure.nodePort.enabled</code></td>
<td>Set this to <code>true</code> to expose Central through a node port. The default value is <code>false</code>.</td>
</tr>
<tr>
<td><code>central.exposure.nodePort.port</code></td>
<td>Use this to specify an explicit node port.</td>
</tr>
<tr>
<td><code>central.nodeSelector</code></td>
<td>If you want this component to only run on specific nodes, you can configure a node selector by using this parameter.</td>
</tr>
<tr>
<td><code>central.persistence.hostPath.path</code></td>
<td>Specify a host path to store persistent data in a directory on the host. Red Hat does not recommend using this. If you need to use host path, you must use it with a node selector.</td>
</tr>
<tr>
<td><code>central.persistence.persistentVolumeClaim.claimName</code></td>
<td>The name of the PVC to manage persistent data. If no PVC with the given name exists, it will be created. The default value is <code>stackrox-db</code> if not set. To prevent data losses the PVC is not removed automatically with Central’s deletion.</td>
</tr>
<tr>
<td><code>central.persistence.persistentVolumeClaim.size</code></td>
<td>The size of the persistent volume when created through the claim. This is automatically generated by default.</td>
</tr>
<tr>
<td><code>central.persistence.persistentVolumeClaim.storageClassName</code></td>
<td>The name of the storage class to use for the PVC. If your cluster is not configured with a default storage class, you must provide a value for this parameter.</td>
</tr>
<tr>
<td><code>central.resources.limits</code></td>
<td>Use this parameter to override the default resource limits for the Central.</td>
</tr>
<tr>
<td><code>central.resources.requests</code></td>
<td>Use this parameter to override the default resource requests for the Central.</td>
</tr>
<tr>
<td><code>central.imagePullSecrets</code></td>
<td>Use this parameter to specify the image pull secrets for the Central image.</td>
</tr>
</tbody>
</table>

### 3.4.2. Scanner settings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>scanner.analyzer.nodeSelector</code></td>
<td>If you want this scanner to only run on specific nodes, you can configure a node selector by using this parameter.</td>
</tr>
<tr>
<td>Parameter</td>
<td>Description</td>
</tr>
<tr>
<td>------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><code>scanner.analyzer.tolerations</code></td>
<td>If the node selector selects tainted nodes, use this parameter to specify a taint toleration key, value, and effect for Scanner. This parameter is mainly used for infrastructure nodes.</td>
</tr>
<tr>
<td><code>scanner.analyzer.resources.limits</code></td>
<td>Use this parameter to override the default resource limits for the scanner.</td>
</tr>
<tr>
<td><code>scanner.analyzer.resources.requests</code></td>
<td>Use this parameter to override the default resource requests for the scanner.</td>
</tr>
<tr>
<td><code>scanner.analyzer.scaling.autoScaling</code></td>
<td>When enabled, the number of analyzer replicas is managed dynamically based on the load, within the limits specified.</td>
</tr>
<tr>
<td><code>scanner.analyzer.scaling.maxReplicas</code></td>
<td>Specifies the maximum replicas to be used the analyzer autoscaling configuration</td>
</tr>
<tr>
<td><code>scanner.analyzer.scaling.minReplicas</code></td>
<td>Specifies the minimum replicas to be used the analyzer autoscaling configuration</td>
</tr>
<tr>
<td><code>scanner.analyzer.scaling.replicas</code></td>
<td>When autoscaling is disabled, the number of replicas will always be configured to match this value.</td>
</tr>
<tr>
<td><code>scanner.db.nodeSelector</code></td>
<td>If you want this component to only run on specific nodes, you can configure a node selector by using this parameter.</td>
</tr>
<tr>
<td><code>scanner.db.tolerations</code></td>
<td>If the node selector selects tainted nodes, use this parameter to specify a taint toleration key, value, and effect for Scanner DB. This parameter is mainly used for infrastructure nodes.</td>
</tr>
<tr>
<td><code>scanner.db.resources.limits</code></td>
<td>Use this parameter to override the default resource limits for the scanner.</td>
</tr>
<tr>
<td><code>scanner.db.resources.requests</code></td>
<td>Use this parameter to override the default resource requests for the scanner.</td>
</tr>
<tr>
<td><code>scanner.scannerComponent</code></td>
<td>If you do not want to deploy Scanner, you can disable it by using this parameter. If you disable Scanner, all other settings in this section have no effect. Red Hat does not recommend disabling Red Hat Advanced Cluster Security for Kubernetes Scanner.</td>
</tr>
</tbody>
</table>

### 3.4.3. General and miscellaneous settings
### 3.5. GENERATING AN INIT BUNDLE

Before you install the `SecuredCluster` resource on a cluster, you must create an init bundle. The cluster that has `SecuredCluster` installed and configured then uses this bundle to authenticate with Central.

You can create an init bundle by using the RHACS portal (recommended) or by using the `roxctl` CLI.

#### 3.5.1. Generating an init bundle by using the RHACS portal

You can create an init bundle containing secrets by using the RHACS portal.

**Procedure**

1. Find the address of the RHACS portal based on your exposure method:
   
   a. For a route:
      
      ```bash
      $ oc get route central -n stackrox
      ```
   
   b. For a load balancer:
      
      ```bash
      $ oc get service central-loadbalancer -n stackrox
      ```
   
   c. For port forward:
      
      i. Run the following command:
         
         ```bash
         $ oc port-forward svc/central 18443:443 -n stackrox
         ```
      

2. On the RHACS portal, navigate to **Platform Configuration → Integrations**.

3. Navigate to the **Authentication Tokens** section and click on **Cluster Init Bundle**.

4. Click **Generate bundle**.

5. Enter a name for the cluster init bundle and click **Generate**.

6. Click **Download Kubernetes Secret File** to download the generated bundle.
IMPORTANT

Store this bundle securely because it contains secrets. You can use the same bundle to create multiple secured clusters.

Next Step

1. Use the OpenShift Container Platform CLI to create resources using the init bundle.

2. Install Red Hat Advanced Cluster Security for Kubernetes in all clusters that you want to monitor.

3.5.2. Generating an init bundle by using the roxctl CLI

You can create an init bundle with secrets by using the roxctl CLI.

Prerequisites

You have configured the `ROX_API_TOKEN` and the `ROX_CENTRAL_ADDRESS` environment variables.

- Set the `ROX_API_TOKEN` and the `ROX_CENTRAL_ADDRESS` environment variables:

  ```
  $ export ROX_API_TOKEN=<api_token>
  $ export ROX_CENTRAL_ADDRESS=<address>:<port_number>
  ```

Procedure

- Run the following command to generate a cluster init bundle containing secrets:

  ```
  $ roxctl -e "$ROX_CENTRAL_ADDRESS" \
  central init-bundles generate <cluster_init_bundle_name> \
  --output-secrets cluster_init_bundle.yaml
  ```

IMPORTANT

Make sure that you store this bundle securely because it contains secrets. You can use the same bundle to set up multiple secured clusters.

3.5.3. Additional resources

- Installing the roxctl CLI

- Using the roxctl CLI

3.6. CREATING RESOURCES BY USING THE INIT BUNDLE

Before you install secured clusters, you must use the init bundle to create the required resources on the cluster that will allow the services on the secured clusters to communicate with Central.

Prerequisites
You must have generated an init bundle containing secrets.

**Procedure**

- Using the OpenShift Container Platform CLI, run the following command to create the resources:

  ```bash
  $ oc create -f <init_bundle>.yaml \ 1
  -n <stackrox> 2
  
  1. Specify the file name of the init bundle containing the secrets.
  2. Specify the name of the project where you installed Central.
  
**Next Step**

- Install Red Hat Advanced Cluster Security for Kubernetes in all clusters that you want to monitor.

### 3.7. INSTALLING SECURED CLUSTER SERVICES

You can install secured cluster services on your clusters by using the **SecuredCluster** custom resource. You must install the secured cluster services on every cluster in your environment that you want to monitor.

**CAUTION**

To install Collector on systems that have Unified Extensible Firmware Interface (UEFI) and that have Secure Boot enabled, you must use eBPF probes because kernel modules are unsigned, and the UEFI firmware cannot load unsigned packages. Collector identifies Secure Boot status at the start and switches to eBPF probes if required.

**Prerequisites**

- You must be using OpenShift Container Platform 4.6 or later.
- You must have generated an init bundle and already created the required resources by using the init bundle.

**Procedure**

1. On the OpenShift Container Platform web console, navigate to the **Operators → Installed Operators** page.

2. Select the Red Hat Advanced Cluster Security for Kubernetes Operator from the list of installed operators.

3. By default, OpenShift Container Platform lists the project as **rhacs-operator**. Select **Project: rhacs-operator → Create project**.
4. Enter the new project name as stackrox or some other name, and click Create.

5. Under the Provided APIs section, select Secured Cluster.

6. Choose Create SecuredCluster.

7. Enter a name for your SecuredCluster custom resource.

8. For Central Endpoint, enter the address and port number of your Central instance. For example, if Central is available at https://central.example.com, then specify the central endpoint as central.example.com:443. The default value of central.stackrox.svc:443 only works when you install secured cluster services and Central in the same cluster.

9. Accept the default values or configure custom values for the available options.

10. Click Create.

Next step

1. Optional: Configure additional secured cluster settings.


3.8. SECURED CLUSTER CONFIGURATION OPTIONS

When you create a Central instance, the Operator lists the following configuration options for the Central custom resource.

3.8.1. Required Configuration Settings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>centralEndpoint</td>
<td>The endpoint of Central instance to connect to, including the port number. If using a non-gRPC capable load balancer, use the WebSocket protocol by prefixing the endpoint address with wss://. If you do not specify a value for this parameter, Sensor attempts to connect to a Central instance running in the same namespace.</td>
</tr>
<tr>
<td>clusterName</td>
<td>The unique name of this cluster, which shows up in the RHACS portal. After the name is set by using this parameter, you cannot change it again. To change the name, you must delete and recreate the object.</td>
</tr>
</tbody>
</table>
### 3.8.2. Admission controller settings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>admissionControl.listenOnCreates</td>
<td>Specify <strong>true</strong> to enable preventive policy enforcement for object creations. The default value is <strong>false</strong>.</td>
</tr>
<tr>
<td>admissionControl.listenOnEvents</td>
<td>Specify <strong>true</strong> to enable monitoring and enforcement for Kubernetes events, such as <strong>port-forward</strong> and <strong>exec</strong> events. It is used to control access to resources through the Kubernetes API. The default value is <strong>true</strong>.</td>
</tr>
<tr>
<td>admissionControl.listenOnUpdates</td>
<td>Specify <strong>true</strong> to enable preventive policy enforcement for object updates. It will not have any effect unless <strong>Listen On Creates</strong> is set to <strong>true</strong> as well. The default value is <strong>false</strong>.</td>
</tr>
<tr>
<td>admissionControl.nodeSelector</td>
<td>If you want this component to only run on specific nodes, you can configure a node selector using this parameter.</td>
</tr>
<tr>
<td>admissionControl.tolerations</td>
<td>If the node selector selects tainted nodes, use this parameter to specify a taint tolerance key, value, and effect for Admission Control. This parameter is mainly used for infrastructure nodes.</td>
</tr>
<tr>
<td>admissionControl.resources.limits</td>
<td>Use this parameter to override the default resource limits for the admission controller.</td>
</tr>
<tr>
<td>admissionControl.resources.requests</td>
<td>Use this parameter to override the default resource requests for the admission controller.</td>
</tr>
<tr>
<td>admissionControl.bypass</td>
<td>Use one of the following values to configure the bypassing of admission controller enforcement:</td>
</tr>
<tr>
<td></td>
<td>- <strong>BreakGlassAnnotation</strong> to enable bypassing the admission controller via the admission.stackrox.io/break-glass annotation.</td>
</tr>
<tr>
<td></td>
<td>- <strong>Disabled</strong> to disable the ability to bypass admission controller enforcement for the secured cluster.</td>
</tr>
<tr>
<td></td>
<td>The default value is <strong>BreakGlassAnnotation</strong>.</td>
</tr>
<tr>
<td>admissionControl.contactImageScanners</td>
<td>Use one of the following values to specify if the admission controller must connect to the image scanner:</td>
</tr>
<tr>
<td></td>
<td>- <strong>ScanIfMissing</strong> if the scan results for the image are missing.</td>
</tr>
<tr>
<td></td>
<td>- <strong>DoNotScanInline</strong> to skip scanning the image when processing the admission request.</td>
</tr>
<tr>
<td></td>
<td>The default value is <strong>DoNotScanInline</strong>.</td>
</tr>
<tr>
<td>admissionControl.timeoutSeconds</td>
<td>Use this parameter to specify the maximum number of seconds Red Hat Advanced Cluster Security for Kubernetes must wait for an admission review before marking it as fail open.</td>
</tr>
</tbody>
</table>
### 3.8.3. Scanner configuration

Use Scanner configuration settings to modify the local cluster scanner for the OpenShift Container Registry (OCR).

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>scanner.analyzer.no deSelector</code></td>
<td>Specify a node selector label as <code>label-key: label-value</code> to force Scanner to only schedule on nodes with the specified label.</td>
</tr>
<tr>
<td><code>scanner.analyzer.resources.requests.memory</code></td>
<td>The memory request for the Scanner container. Use this parameter to override the default value.</td>
</tr>
<tr>
<td><code>scanner.analyzer.resources.requests.cpu</code></td>
<td>The CPU request for the Scanner container. Use this parameter to override the default value.</td>
</tr>
<tr>
<td><code>scanner.analyzer.resources.limits.memory</code></td>
<td>The memory limit for the Scanner container. Use this parameter to override the default value.</td>
</tr>
<tr>
<td><code>scanner.analyzer.resources.limits.cpu</code></td>
<td>The CPU limit for the Scanner container. Use this parameter to override the default value.</td>
</tr>
<tr>
<td><code>scanner.scaling.autoscaling</code></td>
<td>If you set this option to <strong>Disabled</strong>, Red Hat Advanced Cluster Security for Kubernetes disables autoscaling on the Scanner deployment. The default value is <strong>Enabled</strong>.</td>
</tr>
<tr>
<td><code>scanner.scaling.min Replicas</code></td>
<td>The minimum number of replicas for autoscaling. The default value is 2.</td>
</tr>
<tr>
<td><code>scanner.scaling.max Replicas</code></td>
<td>The maximum number of replicas for autoscaling. The default value is 5.</td>
</tr>
<tr>
<td><code>scanner.scaling.replicas</code></td>
<td>The default number of replicas. The default value is 3.</td>
</tr>
<tr>
<td><code>scanner.Tolerations</code></td>
<td>If the node selector selects tainted nodes, use this parameter to specify a taint toleration key, value, and effect for Scanner.</td>
</tr>
<tr>
<td><code>scanner.db.nodeSelector</code></td>
<td>Specify a node selector label as <code>label-key: label-value</code> to force Scanner DB to only schedule on nodes with the specified label.</td>
</tr>
<tr>
<td><code>scanner.db.resources.requests.memory</code></td>
<td>The memory request for the Scanner DB container. Use this parameter to override the default value.</td>
</tr>
<tr>
<td><code>scanner.db.resources.requests.cpu</code></td>
<td>The CPU request for the Scanner DB container. Use this parameter to override the default value.</td>
</tr>
</tbody>
</table>
### 3.8.4. Image configuration

Use image configuration settings when you are using a custom registry.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>imagePullSecrets.name</code></td>
<td>Additional image pull secrets to be taken into account for pulling images.</td>
</tr>
</tbody>
</table>

### 3.8.5. Per node settings

Per node settings define the configuration settings for components that run on each node in a cluster to secure the cluster. These components are Collector and Compliance.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>perNode.collector.collection</code></td>
<td>The method for system-level data collection. The default value is <strong>EBPF</strong>. Red Hat recommends using <strong>EBPF</strong> for data collection. If you select <strong>NoCollection</strong>, Collector does not report any information about the network activity and the process executions. Available options are <strong>NoCollection</strong>, <strong>EBPF</strong>, and <strong>KernelModule</strong>.</td>
</tr>
<tr>
<td><code>perNode.collector.imageFlavor</code></td>
<td>The image type to use for Collector. You can specify it as <strong>Regular</strong> or <strong>Slim</strong>. <strong>Regular</strong> images are bigger in size, but contain kernel modules for most kernels. If you use the <strong>Slim</strong> image type, you must ensure that your Central instance is connected to the internet, or regularly receives Collector support package updates. The default value is <strong>Slim</strong>.</td>
</tr>
<tr>
<td><code>perNode.collector.resources.limits</code></td>
<td>Use this parameter to override the default resource limits for Collector.</td>
</tr>
<tr>
<td><code>perNode.collector.resources.requests</code></td>
<td>Use this parameter to override the default resource requests for Collector.</td>
</tr>
</tbody>
</table>
**Parameter** | **Description**
---|---
`perNode.compliance.resources.requests` | Use this parameter to override the default resource requests for Compliance.
`perNode.compliance.resources.limits` | Use this parameter to override the default resource limits for Compliance.

### 3.8.6. Taint Tolerations settings

| Parameter | Description |
---|---|
`taintToleration` | To ensure comprehensive monitoring of your cluster activity, Red Hat Advanced Cluster Security for Kubernetes runs services on every node in the cluster, including tainted nodes by default. If you do not want this behavior, specify `AvoidTaints` for this parameter. |

### 3.8.7. Sensor configuration

This configuration defines the settings of the Sensor components, which runs on one node in a cluster.

| Parameter | Description |
---|---|
`sensor.nodeSelector` | If you want Sensor to only run on specific nodes, you can configure a node selector. |
`sensor.tolerations` | If the node selector selects tainted nodes, use this parameter to specify a taint toleration key, value, and effect for Sensor. This parameter is mainly used for infrastructure nodes. |
`sensor.resources.limits` | Use this parameter to override the default resource limits for Sensor. |
`sensor.resources.requests` | Use this parameter to override the default resource requests for Sensor. |

### 3.8.8. General and miscellaneous settings

| Parameter | Description |
---|---|
`tls.additionalCAs` | Additional trusted CA certificates for the secured cluster. These certificates are used when integrating with services using a private certificate authority. |
`misc.createSCCs` | Set this to `true` to create SCCs for Central. It may cause issues in some environments. |
3.9. VERIFYING INSTALLATION

After you complete the installation, run a few vulnerable applications and navigate to the RHACS portal to evaluate the results of security assessments and policy violations.

**NOTE**

The sample applications listed in the following section contain critical vulnerabilities and they are specifically designed to verify the build and deploy-time assessment features of Red Hat Advanced Cluster Security for Kubernetes.

To verify installation:

1. Find the address of the RHACS portal based on your exposure method:
   a. For a route:
      
      $ oc get route central -n stackrox
   b. For a load balancer:
      
      $ oc get service central-loadbalancer -n stackrox
   c. For port forward:
      i. Run the following command:
         
         $ oc port-forward svc/central 18443:443 -n stackrox

2. Using the OpenShift Container Platform CLI, create a new project:

   $ oc new-project test

3. Start some applications with critical vulnerabilities:

   $ oc run shell --labels=app=shellshock,team=test-team --image=vulnerables/cve-2014-6271 -n test

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>customize.annotations</td>
<td>Allows specifying custom annotations for the Central deployment.</td>
</tr>
<tr>
<td>customize.envVars</td>
<td>Advanced settings to configure environment variables.</td>
</tr>
<tr>
<td>egress.connectivityPolicy</td>
<td>Configures whether Red Hat Advanced Cluster Security for Kubernetes should run in online or offline mode. In offline mode, automatic updates of vulnerability definitions and kernel modules are disabled.</td>
</tr>
</tbody>
</table>
Red Hat Advanced Cluster Security for Kubernetes automatically scans these deployments for security risk and policy violations as soon as they are submitted to the cluster. Navigate to the RHACS portal to view the violations. You can log in to the RHACS portal by using the default username `admin` and the generated password.

### 3.10. ADDING A NEW CLUSTER TO RHACS

To add more clusters to Red Hat Advanced Cluster Security for Kubernetes, you must install the Red Hat Advanced Cluster Security for Kubernetes Operator in every cluster that you want to add.

The following steps represent the high-level flow for adding additional clusters to Red Hat Advanced Cluster Security for Kubernetes:

2. Use an existing init bundle or **generate a new init bundle**.
3. **Create resources in your cluster by using the init bundle**.
4. **Install secured cluster services** on your cluster.

```bash
$ oc run samba --labels=app=rce --image=vulnerables/cve-2017-7494 -n test
```

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CHAPTER 4. INSTALLING USING HELM CHARTS

4.1. INSTALLING QUICKLY USING HELM CHARTS

Red Hat Advanced Cluster Security for Kubernetes installs a set of services on your OpenShift Container Platform cluster. This topic describes the installation procedure for installing Red Hat Advanced Cluster Security for Kubernetes on your OpenShift Container Platform cluster without any customizations.

The following steps represent the high-level installation flow for quickly installing Red Hat Advanced Cluster Security for Kubernetes:

1. Add the Red Hat Advanced Cluster Security for Kubernetes Helm chart repository.

2. Install the central-services Helm chart to install the centralized components (Central and Scanner).

3. Generate an init bundle.

4. Install the secured-cluster-services Helm chart to install the per-cluster and per-node components (Sensor, Admission Controller, and Collector).

Before you install:


4.1.1. Adding the Helm chart repository

Procedure

- Add Red Hat Advanced Cluster Security for Kubernetes charts repository.

```
$ helm repo add rhacs https://mirror.openshift.com/pub/rhacs/charts/
```

The Helm repository for Red Hat Advanced Cluster Security for Kubernetes includes two Helm charts for installing different components.

- Central services Helm chart (central-services) for installing the centralized components (Central and Scanner).

  **NOTE**

  You deploy centralized components only once and you can monitor multiple separate clusters by using the same installation.

- Secured Cluster Services Helm chart (secured-cluster-services) for installing the per-cluster (Sensor and Admission controller) and per-node (Collector) components.
NOTE

Deploy the per-cluster components into each cluster that you want to monitor and deploy the per-node components in all nodes that you want to monitor.

Verification

- Run the following command to verify the added chart repository:

  $ helm search repo -l rhacs/

4.1.2. Installing the central-services Helm chart without customization

Use the following instructions to install the `central-services` Helm chart to deploy the centralized components (Central and Scanner).

Procedure

- Run the following command to install Central services and expose Central using a route:

  $ helm install -n stackrox
  --create-namespace stackrox-central-services rhacs/central-services
  --set imagePullSecrets.allowNone=true
  --set central.exposure.route.enabled=true

- Or, run the following command to install Central services and expose Central using a load balancer:

  $ helm install -n stackrox
  --create-namespace stackrox-central-services rhacs/central-services
  --set imagePullSecrets.allowNone=true
  --set central.exposure.loadBalancer.enabled=true

- Or, run the following command to install Central services and expose Central using port forward:

  $ helm install -n stackrox
  --create-namespace stackrox-central-services rhacs/central-services
  --set imagePullSecrets.allowNone=true

IMPORTANT

If you are installing Red Hat Advanced Cluster Security for Kubernetes in a cluster that requires a proxy to connect to external services, you must specify your proxy configuration by using the `proxyConfig` parameter. For example:

```
env:
proxyConfig:
  url: http://proxy.name:port
  username: username
  password: password
  excludes:
    - some.domain
```
The output of the installation command includes:

- An automatically generated administrator password.
- Instructions on storing all the configuration values.
- Any warnings that Helm generates.

4.1.3. Generating an init bundle

Before you install the **SecuredCluster** resource on a cluster, you must create an init bundle. The cluster that has **SecuredCluster** installed and configured then uses this bundle to authenticate with Central.

4.1.3.1. Generating an init bundle by using the roxctl CLI

You can create an init bundle with secrets by using the **roxctl CLI**.

**Prerequisites**

You have configured the **ROX_API_TOKEN** and the **ROX_CENTRAL_ADDRESS** environment variables.

- Set the **ROX_API_TOKEN** and the **ROX_CENTRAL_ADDRESS** environment variables:

  ```
  $ export ROX_API_TOKEN=<api_token>
  $ export ROX_CENTRAL_ADDRESS=<address>:<port_number>
  ```

**Procedure**

- Run the following command to generate a cluster init bundle containing secrets:

  ```
  $ roxctl -e "$ROX_CENTRAL_ADDRESS" \
  central init-bundles generate <cluster_init_bundle_name> \
  --output cluster_init_bundle.yaml
  ```

  ```
  $ roxctl -e "$ROX_CENTRAL_ADDRESS" \
  central init-bundles generate <cluster_init_bundle_name> \
  --output-secrets cluster_init_bundle.yaml
  ```

**IMPORTANT**

Make sure that you store this bundle securely because it contains secrets. You can use the same bundle to set up multiple secured clusters.

**Additional resources**

- Installing the **roxctl CLI**
- Generating an init bundle by using the RHACS portal

4.1.4. Installing the secured-cluster-services Helm chart without customization
Use the following instructions to install the `secured-cluster-services` Helm chart to deploy the per-cluster and per-node components (Sensor, Admission Controller, and Collector).

**CAUTION**

To install Collector on systems that have Unified Extensible Firmware Interface (UEFI) and that have Secure Boot enabled, you must use eBPF probes because kernel modules are unsigned, and the UEFI firmware cannot load unsigned packages. Collector identifies Secure Boot status at the start and switches to eBPF probes if required.

**Prerequisites**

- You must have the address and the port number that you are exposing the Central service on.

**Procedure**

- Run the following command on other Kubernetes based clusters:

  ```
  $ helm install -n stackrox --create-namespace \
  stackrox-secured-cluster-services rhacs/secured-cluster-services \
  -f <path_to_cluster_init_bundle.yaml> \ 
  --set clusterName=<name_of_the_secured_cluster> \ 
  --set centralEndpoint=<endpoint_of_central_service>
  ```

  1. Use the `-f` option to specify the path for the init bundle.
  2. Specify the address and port number for Central.

- Run the following command on OpenShift Container Platform clusters:

  ```
  $ helm install -n stackrox --create-namespace \
  stackrox-secured-cluster-services rhacs/secured-cluster-services \
  -f <path_to_cluster_init_bundle.yaml> \ 
  --set clusterName=<name_of_the_secured_cluster> \ 
  --set centralEndpoint=<endpoint_of_central_service> \ 
  --set scanner.disable=false
  ```

  1. Use the `-f` option to specify the path for the init bundle.
  2. Specify the address and port number for Central.

**4.1.5. Verifying installation**

After you complete the installation, run a few vulnerable applications and navigate to the RHACS portal to evaluate the results of security assessments and policy violations.

**NOTE**

The sample applications listed in the following section contain critical vulnerabilities and they are specifically designed to verify the build and deploy-time assessment features of Red Hat Advanced Cluster Security for Kubernetes.
To verify installation:

1. Find the address of the RHACS portal based on your exposure method:
   a. For a route:
      ```
      $ oc get route central -n stackrox
      ```
   b. For a load balancer:
      ```
      $ oc get service central-loadbalancer -n stackrox
      ```
   c. For port forward:
      i. Run the following command:
      ```
      $ oc port-forward svc/central 18443:443 -n stackrox
      ```

2. Using the OpenShift Container Platform CLI, create a new project:
   ```
   $ oc new-project test
   ```

3. Start some applications with critical vulnerabilities:
   ```
   $ oc run shell --labels=app=shellshock,team=test-team --image=vulnerables/cve-2014-6271 -n test
   $ oc run samba --labels=app=rce --image=vulnerables/cve-2017-7494 -n test
   ```

Red Hat Advanced Cluster Security for Kubernetes automatically scans these deployments for security risk and policy violations as soon as they are submitted to the cluster. Navigate to the RHACS portal to view the violations. You can log in to the RHACS portal by using the default username admin and the generated password.

### 4.1.6. Additional resources

- Installing with customizations using Helm charts

### 4.2. INSTALLING WITH CUSTOMIZATIONS USING HELM CHARTS

High-level installation flow:

1. Add Red Hat Advanced Cluster Security for Kubernetes Helm chart repository.
2. Configure the **central-services** Helm chart.
3. Install the **central-services** Helm chart to install the centralized components (Central and Scanner).
4. Generate an init bundle.
5. Configure the **secured-cluster-services** Helm chart.
6. Install the **secured-cluster-services** Helm chart to install the **per-cluster** and **per-node** components (Sensor, Admission Controller, and Collector).

Before you install:

- Understand [Red Hat Advanced Cluster Security for Kubernetes architecture](#).
- Review the [prerequisites for installing Red Hat Advanced Cluster Security for Kubernetes](#).

### 4.2.1. Adding the Helm chart repository

**Procedure**

- Add Red Hat Advanced Cluster Security for Kubernetes charts repository.

```bash
$ helm repo add rhacs https://mirror.openshift.com/pub/rhacs/charts/
```

The Helm repository for Red Hat Advanced Cluster Security for Kubernetes includes two Helm charts for installing different components.

- Central services Helm chart (**central-services**) for installing the centralized components (Central and Scanner).
  
  **NOTE**
  
  You deploy centralized components only once and you can monitor multiple separate clusters by using the same installation.

- Secured Cluster Services Helm chart (**secured-cluster-services**) for installing the per-cluster (Sensor and Admission controller) and per-node (Collector) components.
  
  **NOTE**
  
  Deploy the per-cluster components into each cluster that you want to monitor and deploy the per-node components in all nodes that you want to monitor.

**Verification**

- Run the following command to verify the added chart repository:

  ```bash
  $ helm search repo -l rhacs/
  ```

### 4.2.2. Configuring the central-services Helm chart

This section describes Helm chart configuration parameters that you can use with the `helm install` and `helm upgrade` commands. You can specify these parameters by using the **--set** option or by creating YAML configuration files.

Create the following files for configuring the Helm chart for installing Red Hat Advanced Cluster Security for Kubernetes:
• Public configuration file values-public.yaml: Use this file to save all non-sensitive configuration options.

• Private configuration file values-private.yaml: Use this file to save all sensitive configuration options. Make sure that you store this file securely.

4.2.2.1. Private configuration file

This section lists the configurable parameters of the values-private.yaml file. There are no default values for these parameters.

4.2.2.1.1. Image pull secrets

The credentials required for pulling images from your registry.

**NOTE**

• If you are using the stackrox.io registry, you must specify the `imagePullSecrets.username` and `imagePullSecrets.password` parameters.

• If you are using a custom registry, you must also specify the `image.registry` parameter.

• If you do not use a username and password to log in to your custom registry, you must specify one of the following parameters:
  • `imagePullSecrets.allowNone`
  • `imagePullSecrets.useExisting`
  • `imagePullSecrets.useFromDefaultServiceAccount`

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>imagePullSecrets.username</code></td>
<td>The username for your registry.</td>
</tr>
<tr>
<td><code>imagePullSecrets.password</code></td>
<td>The password (for the selected username) of your registry.</td>
</tr>
<tr>
<td><code>imagePullSecrets.allowNone</code></td>
<td>Use <code>true</code> if you are using a custom registry and it allows pulling images without credentials.</td>
</tr>
<tr>
<td><code>imagePullSecrets.useExisting</code></td>
<td>A comma-separated list of secrets as values. For example, <code>secret1, secret2, secretN</code>. Use this option if you have already created pre-existing image pull secrets with the given name in the target namespace.</td>
</tr>
<tr>
<td><code>imagePullSecrets.useFromDefaultServiceAccount</code></td>
<td>Use <code>true</code> if you have already configured the default service account in the target namespace with sufficiently scoped image pull secrets.</td>
</tr>
</tbody>
</table>
4.2.2.1.2. Proxy configuration

If you are installing Red Hat Advanced Cluster Security for Kubernetes in a cluster that requires a proxy to connect to external services, you must specify your proxy configuration by using the `proxyConfig` parameter. For example:

```
env:
  proxyConfig:
    url: http://proxy.name:port
    username: username
    password: password
    excludes:
      - some.domain
```

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>env.proxyConfig</code></td>
<td>Your proxy configuration.</td>
</tr>
</tbody>
</table>

4.2.2.1.3. Central

Configurable parameters for Central.

For a new installation, you can skip the following parameters:

- `central.jwtSigner.key`
- `central.serviceTLS.cert`
- `central.serviceTLS.key`
- `central.adminPassword.value`
- `central.adminPassword.htpasswd`

- When you do not specify values for these parameters the Helm chart autogenerates values for them.
- If you want to modify these values you can use the `helm upgrade` command and specify the values using the `--set` option.

**IMPORTANT**

For setting the administrator password, you can only use either `central.adminPassword.value` or `central.adminPassword.htpasswd`, but not both.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>central.jwtSigner.key</code></td>
<td>A private key which Red Hat Advanced Cluster Security for Kubernetes should use for signing JSON web tokens (JWTs) for authentication.</td>
</tr>
<tr>
<td>Parameter</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>central.serviceTLS.cert</td>
<td>An internal certificate that the Central service should use for deploying Central.</td>
</tr>
<tr>
<td>central.serviceTLS.key</td>
<td>The private key of the internal certificate that the Central service should use.</td>
</tr>
<tr>
<td>central.defaultTLS.cert</td>
<td>The user-facing certificate that Central should use. Red Hat Advanced Cluster Security for Kubernetes uses this certificate for RHACS portal.</td>
</tr>
<tr>
<td></td>
<td>• For a new installation, you must provide a certificate, otherwise, Red Hat Advanced Cluster Security for Kubernetes installs Central by using a self-signed certificate.</td>
</tr>
<tr>
<td></td>
<td>• If you are upgrading, Red Hat Advanced Cluster Security for Kubernetes uses the existing certificate and its key.</td>
</tr>
<tr>
<td>central.defaultTLS.key</td>
<td>The private key of the user-facing certificate that Central should use.</td>
</tr>
<tr>
<td></td>
<td>• For a new installation, you must provide the private key, otherwise, Red Hat Advanced Cluster Security for Kubernetes installs Central by using a self-signed certificate.</td>
</tr>
<tr>
<td></td>
<td>• If you are upgrading, Red Hat Advanced Cluster Security for Kubernetes uses the existing certificate and its key.</td>
</tr>
<tr>
<td>central.adminPassword.value</td>
<td>Administrator password for logging into Red Hat Advanced Cluster Security for Kubernetes.</td>
</tr>
<tr>
<td>central.adminPassword.htpasswd</td>
<td>Administrator password for logging into Red Hat Advanced Cluster Security for Kubernetes. This password is stored in hashed format using bcrypt.</td>
</tr>
</tbody>
</table>

**NOTE**

If you are using `central.adminPassword.htpasswd` parameter, you must use a bcrypt encoded password hash. You can run the command `htpasswd -nB admin` to generate a password hash. For example,

```
htpasswd: |
admin:<bcrypt-hash>
```

### 4.2.2.1.4. Scanner

Configurable parameters for Scanner.
For a new installation, you can skip the following parameters and the Helm chart autogenerates values for them. Otherwise, if you are upgrading to a new version, specify the values for the following parameters:

- `scanner.dbPassword.value`
- `scanner.serviceTLS.cert`
- `scanner.serviceTLS.key`
- `scanner.dbServiceTLS.cert`
- `scanner.dbServiceTLS.key`

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>scanner.dbPassword.value</code></td>
<td>The password to use for authentication with Scanner database. Do not modify this parameter because Red Hat Advanced Cluster Security for Kubernetes automatically creates and uses its value internally.</td>
</tr>
<tr>
<td><code>scanner.serviceTLS.cert</code></td>
<td>An internal certificate that the Scanner service should use for deploying Scanner.</td>
</tr>
<tr>
<td><code>scanner.serviceTLS.key</code></td>
<td>The private key of the internal certificate that the Scanner service should use.</td>
</tr>
<tr>
<td><code>scanner.dbServiceTLS.cert</code></td>
<td>An internal certificate that the Scanner-db service should use for deploying Scanner database.</td>
</tr>
<tr>
<td><code>scanner.dbServiceTLS.key</code></td>
<td>The private key of the internal certificate that the Scanner-db service should use.</td>
</tr>
</tbody>
</table>

4.2.2.2. Public configuration file

This section lists the configurable parameters of the `values-public.yaml` file.

4.2.2.2.1. Image pull secrets

Image pull secrets are the credentials required for pulling images from your registry.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>imagePullSecrets.allowNone</code></td>
<td>Use <code>true</code> if you are using a custom registry and it allows pulling images without credentials.</td>
</tr>
<tr>
<td><code>imagePullSecrets.useExisting</code></td>
<td>A comma-separated list of secrets as values. For example, <code>secret1, secret2</code>. Use this option if you have already created pre-existing image pull secrets with the given name in the target namespace.</td>
</tr>
</tbody>
</table>
4.2.2.2.2. Image

Image declares the configuration to set up the main registry, which the Helm chart uses to resolve images for the `central.image`, `scanner.image`, and `scanner.dbImage` parameters.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>image.registry</td>
<td>Address of your image registry. Either use a hostname, such as <code>registry.redhat.io</code>, or a remote registry hostname, such as <code>us.gcr.io/stackrox-mirror</code>.</td>
</tr>
</tbody>
</table>

4.2.2.2.3. Environment variables

Red Hat Advanced Cluster Security for Kubernetes automatically detects your cluster environment and sets values for `env.openshift`, `env.istio`, and `env.platform`. Only set these values to override the automatic cluster environment detection.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>env.openshift</td>
<td>Use <code>true</code> for installing on an OpenShift Container Platform cluster and overriding automatic cluster environment detection.</td>
</tr>
<tr>
<td>env.istio</td>
<td>Use <code>true</code> for installing on an Istio enabled cluster and overriding automatic cluster environment detection.</td>
</tr>
<tr>
<td>env.platform</td>
<td>The platform on which you are installing Red Hat Advanced Cluster Security for Kubernetes. Set its value to <code>default</code> or <code>gke</code> to specify cluster platform and override automatic cluster environment detection.</td>
</tr>
<tr>
<td>env.offlineMode</td>
<td>Use <code>true</code> to use Red Hat Advanced Cluster Security for Kubernetes in offline mode.</td>
</tr>
</tbody>
</table>

4.2.2.2.4. Additional trusted certificate authorities

The Red Hat Advanced Cluster Security for Kubernetes automatically references the system root certificates to trust. When Central or Scanner must reach out to services that use certificates issued by an authority in your organization or a globally trusted partner organization, you can add trust for these services by specifying the root certificate authority to trust by using the following parameter:
### 4.2.2.2.5. Central

Configurable parameters for Central.

- You must specify a persistent storage option as either `hostPath` or `persistentVolumeClaim`.
- For exposing Central deployment for external access. You must specify one parameter, either `central.exposure.loadBalancer`, `central.exposure.nodePort`, or `central.exposure.route`. When you do not specify any value for these parameters, you must manually expose Central or access it by using port-forwarding.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>additionalCAs.&lt;certificate_name&gt;</code></td>
<td>Specify the PEM encoded certificate of the root certificate authority to trust.</td>
</tr>
<tr>
<td><code>central.disableTelemetry</code></td>
<td>Use <code>true</code> to disable online telemetry data collection.</td>
</tr>
<tr>
<td><code>central.endpointsConfig</code></td>
<td>The endpoint configuration options for Central.</td>
</tr>
<tr>
<td><code>central.nodeSelector</code></td>
<td>If the node selector selects tainted nodes, use this parameter to specify a taint toleration key, value, and effect for Central. This parameter is mainly used for infrastructure nodes.</td>
</tr>
<tr>
<td><code>central.tolerations</code></td>
<td>If the node selector selects tainted nodes, use this parameter to specify a taint toleration key, value, and effect for Central. This parameter is mainly used for infrastructure nodes.</td>
</tr>
<tr>
<td><code>central.exposeMonitoring</code></td>
<td>Specify <code>true</code> to expose Prometheus metrics endpoint for Central on port number <code>9090</code>.</td>
</tr>
<tr>
<td><code>central.image.registry</code></td>
<td>A custom registry that overrides the global <code>image.registry</code> parameter for the Central image.</td>
</tr>
<tr>
<td><code>central.image.name</code></td>
<td>The custom image name that overrides the default Central image name (main).</td>
</tr>
<tr>
<td><code>central.image.tag</code></td>
<td>The custom image tag that overrides the default tag for Central image. If you specify your own image tag during a new installation, you must manually increment this tag when you upgrade to a new version by running the <code>helm upgrade</code> command. If you mirror Central images in your own registry, do not modify the original image tags.</td>
</tr>
<tr>
<td>Parameter</td>
<td>Description</td>
</tr>
<tr>
<td>----------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>central.image.fullRef</td>
<td>Full reference including registry address, image name, and image tag for the Central image. Setting a value for this parameter overrides the <code>central.image.registry</code>, <code>central.image.name</code>, and <code>central.image.tag</code> parameters.</td>
</tr>
<tr>
<td>central.resources.requests.memory</td>
<td>The memory request for Central to override the default value.</td>
</tr>
<tr>
<td>central.resources.requests.cpu</td>
<td>The CPU request for Central to override the default value.</td>
</tr>
<tr>
<td>central.resources.limits.memory</td>
<td>The memory limit for Central to override the default value.</td>
</tr>
<tr>
<td>central.resources.limits.cpu</td>
<td>The CPU limit for Central to override the default value.</td>
</tr>
<tr>
<td>central.persistence.hostPath</td>
<td>The path on the node where Red Hat Advanced Cluster Security for Kubernetes should create a database volume. Red Hat does not recommend using this option.</td>
</tr>
<tr>
<td>central.persistence.persistentVolumeClaim.claimName</td>
<td>The name of the persistent volume claim (PVC) you are using.</td>
</tr>
<tr>
<td>central.persistence.persistentVolumeClaim.createClaim</td>
<td>Use <code>true</code> to create a new persistent volume claim, or <code>false</code> to use an existing claim.</td>
</tr>
<tr>
<td>central.persistence.persistentVolumeClaim.size</td>
<td>The size (in GiB) of the persistent volume managed by the specified claim.</td>
</tr>
<tr>
<td>central.exposure.loadBalancer.enabled</td>
<td>Use <code>true</code> to expose Central by using a load balancer.</td>
</tr>
<tr>
<td>central.exposure.loadBalancer.port</td>
<td>The port number on which to expose Central. The default port number is 443.</td>
</tr>
<tr>
<td>central.exposure.nodePort.enabled</td>
<td>Use <code>true</code> to expose Central by using the node port service.</td>
</tr>
<tr>
<td>central.exposure.nodePort.port</td>
<td>The port number on which to expose Central. When you skip this parameter, OpenShift Container Platform automatically assigns a port number. Red Hat recommends that you do not specify a port number if you are exposing Red Hat Advanced Cluster Security for Kubernetes by using a node port.</td>
</tr>
</tbody>
</table>
Use `true` to expose Central by using a route. This parameter is only available for OpenShift Container Platform clusters.

### 4.2.2.2.6. Scanner

Configurable parameters for Scanner.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>central.exposure.route.enabled</code></td>
<td>Use <code>true</code> to expose Central by using a route. This parameter is only available for OpenShift Container Platform clusters.</td>
</tr>
<tr>
<td><code>scanner.disable</code></td>
<td>Use <code>true</code> to install Red Hat Advanced Cluster Security for Kubernetes without Scanner. When you use it with the <code>helm upgrade</code> command, Helm removes existing Scanner deployment.</td>
</tr>
<tr>
<td><code>scanner.replicas</code></td>
<td>The number of replicas to create for the Scanner deployment. When you use it with the <code>scanner.autoscaling</code> parameter, this value sets the initial number of replicas.</td>
</tr>
<tr>
<td><code>scanner.logLevel</code></td>
<td>Configure the log level for Scanner. Red Hat recommends that you not change the log level's default value (<code>INFO</code>).</td>
</tr>
<tr>
<td><code>scanner.nodeSelector</code></td>
<td>Specify a node selector label as <code>label-key: label-value</code> to force Scanner to only schedule on nodes with the specified label.</td>
</tr>
<tr>
<td><code>scanner.tolerations</code></td>
<td>If the node selector selects tainted nodes, use this parameter to specify a taint toleration key, value, and effect for Scanner. This parameter is mainly used for infrastructure nodes.</td>
</tr>
<tr>
<td><code>scanner.autoscaling.disable</code></td>
<td>Use <code>true</code> to disable autoscaling for Scanner deployment. When you disable autoscaling, the <code>minReplicas</code> and <code>maxReplicas</code> parameters do not have any effect.</td>
</tr>
<tr>
<td><code>scanner.autoscaling.minReplicas</code></td>
<td>The minimum number of replicas for autoscaling.</td>
</tr>
<tr>
<td><code>scanner.autoscaling.maxReplicas</code></td>
<td>The maximum number of replicas for autoscaling.</td>
</tr>
<tr>
<td><code>scanner.resources.requests.memory</code></td>
<td>The memory request for Scanner to override the default value.</td>
</tr>
<tr>
<td><code>scanner.resources.requests.cpu</code></td>
<td>The CPU request for Scanner to override the default value.</td>
</tr>
<tr>
<td>Parameter</td>
<td>Description</td>
</tr>
<tr>
<td>-----------</td>
<td>-------------</td>
</tr>
<tr>
<td><code>scanner.resources.limits.memory</code></td>
<td>The memory limit for Scanner to override the default value.</td>
</tr>
<tr>
<td><code>scanner.resources.limits.cpu</code></td>
<td>The CPU limit for Scanner to override the default value.</td>
</tr>
<tr>
<td><code>scanner.dbResources.requests.memory</code></td>
<td>The memory request for Scanner database deployment to override the default values.</td>
</tr>
<tr>
<td><code>scanner.dbResources.requests.cpu</code></td>
<td>The CPU request for Scanner database deployment to override the default values.</td>
</tr>
<tr>
<td><code>scanner.dbResources.limits.memory</code></td>
<td>The memory limit for Scanner database deployment to override the default values.</td>
</tr>
<tr>
<td><code>scanner.dbResources.limits.cpu</code></td>
<td>The CPU limit for Scanner database deployment to override the default values.</td>
</tr>
<tr>
<td><code>scanner.image.registry</code></td>
<td>A custom registry for the Scanner image.</td>
</tr>
<tr>
<td><code>scanner.image.name</code></td>
<td>The custom image name that overrides the default Scanner image name (<code>scanner</code>).</td>
</tr>
<tr>
<td><code>scanner.dbImage.registry</code></td>
<td>A custom registry for the Scanner DB image.</td>
</tr>
<tr>
<td><code>scanner.dbImage.name</code></td>
<td>The custom image name that overrides the default Scanner DB image name (<code>scanner-db</code>).</td>
</tr>
<tr>
<td><code>scanner.dbNodeSelector</code></td>
<td>Specify a node selector label as <code>label-key: label-value</code> to force Scanner DB to only schedule on nodes with the specified label.</td>
</tr>
<tr>
<td><code>scanner.dbTolerations</code></td>
<td>If the node selector selects tainted nodes, use this parameter to specify a taint toleration key, value, and effect for Scanner DB. This parameter is mainly used for infrastructure nodes.</td>
</tr>
</tbody>
</table>

### 4.2.2.2.7. Customization

Use these parameters to specify additional attributes for all objects that Red Hat Advanced Cluster Security for Kubernetes creates.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>customize.labels</code></td>
<td>A custom label to attach to all objects.</td>
</tr>
<tr>
<td>Parameter</td>
<td>Description</td>
</tr>
<tr>
<td>------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>customize.annotations</td>
<td>A custom annotation to attach to all objects.</td>
</tr>
<tr>
<td>customize.podLabels</td>
<td>A custom label to attach to all deployments.</td>
</tr>
<tr>
<td>customize.podAnnotations</td>
<td>A custom annotation to attach to all deployments.</td>
</tr>
<tr>
<td>customize.envVars</td>
<td>A custom environment variable for all containers in all objects.</td>
</tr>
<tr>
<td>customize.central.labels</td>
<td>A custom label to attach to all objects that Central creates.</td>
</tr>
<tr>
<td>customize.central.annotations</td>
<td>A custom annotation to attach to all objects that Central creates.</td>
</tr>
<tr>
<td>customize.central.podLabels</td>
<td>A custom label to attach to all Central deployments.</td>
</tr>
<tr>
<td>customize.central.podAnnotations</td>
<td>A custom annotation to attach to all Central deployments.</td>
</tr>
<tr>
<td>customize.central.envVars</td>
<td>A custom environment variable for all Central containers.</td>
</tr>
<tr>
<td>customize.scanner.labels</td>
<td>A custom label to attach to all objects that Scanner creates.</td>
</tr>
<tr>
<td>customize.scanner.annotations</td>
<td>A custom annotation to attach to all objects that Scanner creates.</td>
</tr>
<tr>
<td>customize.scanner.podLabels</td>
<td>A custom label to attach to all Scanner deployments.</td>
</tr>
<tr>
<td>customize.scanner.podAnnotations</td>
<td>A custom annotation to attach to all Scanner deployments.</td>
</tr>
<tr>
<td>customize.scanner.envVars</td>
<td>A custom environment variable for all Scanner containers.</td>
</tr>
<tr>
<td>customize.scanner-db.labels</td>
<td>A custom label to attach to all objects that Scanner DB creates.</td>
</tr>
<tr>
<td>customize.scanner-db.annotations</td>
<td>A custom annotation to attach to all objects that Scanner DB creates.</td>
</tr>
<tr>
<td>customize.scanner-db.podLabels</td>
<td>A custom label to attach to all Scanner DB deployments.</td>
</tr>
<tr>
<td>Parameter</td>
<td>Description</td>
</tr>
<tr>
<td>------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>customize.scanner-db.podAnnotations</td>
<td>A custom annotation to attach to all Scanner DB deployments.</td>
</tr>
<tr>
<td>customize.scanner-db.envVars</td>
<td>A custom environment variable for all Scanner DB containers.</td>
</tr>
</tbody>
</table>

You can also use:

- the `customize.other.service/*.labels` and the `customize.other.service/*.annotations` parameters, to specify labels and annotations for all objects.

- or, provide a specific service name, for example, `customize.other.service/central-loadbalancer.labels` and `customize.other.service/central-loadbalancer.annotations` as parameters and set their value.

### 4.2.2.2.8. Advanced customization

**IMPORTANT**

The parameters specified in this section are for information only. Red Hat does not support Red Hat Advanced Cluster Security for Kubernetes instances with modified namespace and release names.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>allowNonstandardNamespace</td>
<td>Use <code>true</code> to deploy Red Hat Advanced Cluster Security for Kubernetes into a namespace other than the default namespace <code>stackrox</code>.</td>
</tr>
<tr>
<td>allowNonstandardReleaseName</td>
<td>Use <code>true</code> to deploy Red Hat Advanced Cluster Security for Kubernetes with a release name other than the default <code>stackrox-central-services</code>.</td>
</tr>
</tbody>
</table>

### 4.2.3. Installing the central-services Helm chart

After you configure the `values-public.yaml` and `values-private.yaml` files, install the `central-services` Helm chart to deploy the centralized components (Central and Scanner).

**Procedure**

- Run the following command:

  ```bash
  $ helm install -n stackrox --create-namespace \
  stackrox-central-services rhacs/central-services \
  -f <path_to_values_public.yaml> -f <path_to_values_private.yaml>
  ```

  1. Use the `-f` option to specify the paths for your YAML configuration files.
4.2.3.1. Changing configuration options after deploying the central-services Helm chart

You can make changes to any configuration options after you have deployed the central-services Helm chart.

Procedure

1. Update the `values-public.yaml` and `values-private.yaml` configuration files with new values.

2. Run the `helm upgrade` command and specify the configuration files using the `-f` option:

   ```bash
   $ helm upgrade -n stackrox \
   stackrox-central-services rhacs/central-services \
   -f <path_to_values_public.yaml> \
   -f <path_to_values_private.yaml>
   ```

   **NOTE**

   You can also specify configuration values using the `--set` or `--set-file` parameters. However, these options are not saved, and it requires you to manually specify all the options again whenever you make changes.

4.2.4. Generating an init bundle

Before you install the SecuredCluster resource on a cluster, you must create an init bundle. The cluster that has SecuredCluster installed and configured then uses this bundle to authenticate with Central.

You can create an init bundle by using the roxctl CLI or from the RHACS portal.

4.2.4.1. Generating an init bundle by using the roxctl CLI

You can create an init bundle with secrets by using the roxctl CLI.

Prerequisites

You have configured the ROX_API_TOKEN and the ROX_CENTRAL_ADDRESS environment variables.

- Set the ROX_API_TOKEN and the ROX_CENTRAL_ADDRESS environment variables:

  ```bash
  $ export ROX_API_TOKEN=<api_token>
  $ export ROX_CENTRAL_ADDRESS=<address>:<port_number>
  ```

Procedure

- Run the following command to generate a cluster init bundle containing secrets:

  ```bash
  $ roxctl -e "$ROX_CENTRAL_ADDRESS" \
  central init-bundles generate <cluster_init_bundle_name> \
  --output cluster_init_bundle.yaml
  ```
$ roxctl -e "$ROX_CENTRAL_ADDRESS" \
    central init-bundles generate <cluster_init_bundle_name> \
    --output-secrets cluster_init_bundle.yaml

IMPORTANT
Make sure that you store this bundle securely because it contains secrets. You can use
the same bundle to set up multiple secured clusters.

Additional resources
- Installing the roxctl CLI

4.2.4.2. Generating an init bundle by using the RHACS portal
You can create an init bundle containing secrets by using the RHACS portal.

Procedure
1. Find the address of the RHACS portal based on your exposure method:
   a. For a route:
      $ oc get route central -n stackrox
   b. For a load balancer:
      $ oc get service central-loadbalancer -n stackrox
   c. For port forward:
      i. Run the following command:
      $ oc port-forward svc/central 18443:443 -n stackrox
2. On the RHACS portal, navigate to Platform Configuration → Integrations.
3. Navigate to the Authentication Tokens section and click on Cluster Init Bundle.
4. Click Generate bundle.
5. Enter a name for the cluster init bundle and click Generate.
6. Click Download Helm Values File to download the generated bundle.
7. Click Download Kubernetes Secret File to download the generated bundle.

IMPORTANT
Store this bundle securely because it contains secrets. You can use the same bundle to
create multiple secured clusters.
Next Step

1. Use the OpenShift Container Platform CLI to create resources using the init bundle.

2. Install Red Hat Advanced Cluster Security for Kubernetes in all clusters that you want to monitor.

4.2.5. Configuring the secured-cluster-services Helm chart

This section describes Helm chart configuration parameters that you can use with the `helm install` and `helm upgrade` commands. You can specify these parameters by using the `--set` option or by creating YAML configuration files.

Create the following files for configuring the Helm chart for installing Red Hat Advanced Cluster Security for Kubernetes:

- Public configuration file `values-public.yaml`: Use this file to save all non-sensitive configuration options.
- Private configuration file `values-private.yaml`: Use this file to save all sensitive configuration options. Make sure that you store this file securely.

**IMPORTANT**

While using the `secured-cluster-services` Helm chart, do not modify the `values.yaml` file that is part of the chart.

4.2.5.1. Configuration parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>clusterName</strong></td>
<td>Name of your cluster.</td>
</tr>
<tr>
<td><strong>centralEndpoint</strong></td>
<td>Address of the Central endpoint, including the port number. If you are using a non-gRPC capable load balancer, use the WebSocket protocol by prefixing the endpoint address with <code>wss://</code>.</td>
</tr>
<tr>
<td><strong>sensor.endpoint</strong></td>
<td>Address of the Sensor endpoint including port number.</td>
</tr>
<tr>
<td><strong>sensor.imagePullPolicy</strong></td>
<td>Image pull policy for the Sensor container.</td>
</tr>
<tr>
<td><strong>sensor.serviceTLS.cert</strong></td>
<td>The internal service-to-service TLS certificate that Sensor uses.</td>
</tr>
<tr>
<td><strong>sensor.serviceTLS.key</strong></td>
<td>The internal service-to-service TLS certificate key that Sensor uses.</td>
</tr>
<tr>
<td><strong>sensor.resources.requests.memory</strong></td>
<td>The memory request for the Sensor container. Use this parameter to override the default value.</td>
</tr>
<tr>
<td>Parameter</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><code>sensor.resources.requests.cpu</code></td>
<td>The CPU request for the Sensor container. Use this parameter to override the default value.</td>
</tr>
<tr>
<td><code>sensor.resources.limits.memory</code></td>
<td>The memory limit for the Sensor container. Use this parameter to override the default value.</td>
</tr>
<tr>
<td><code>sensor.resources.limits.cpu</code></td>
<td>The CPU limit for the Sensor container. Use this parameter to override the default value.</td>
</tr>
<tr>
<td><code>sensor.nodeSelector</code></td>
<td>Specifying a node selector label as <code>label-key: label-value</code> to force Sensor to only schedule on nodes with the specified label.</td>
</tr>
<tr>
<td><code>sensor.tolerations</code></td>
<td>If the node selector selects tainted nodes, use this parameter to specify a taint toleration key, value, and effect for Sensor. This parameter is mainly used for infrastructure nodes.</td>
</tr>
<tr>
<td><code>image.main.name</code></td>
<td>The name of the main image.</td>
</tr>
<tr>
<td><code>image.collector.name</code></td>
<td>The name of the Collector image.</td>
</tr>
<tr>
<td><code>image.main.registry</code></td>
<td>Address of the registry you are using for the main image.</td>
</tr>
<tr>
<td><code>image.collector.registry</code></td>
<td>Address of the registry you are using for the Collector image.</td>
</tr>
<tr>
<td><code>image.main.pullPolicy</code></td>
<td>Image pull policy for main images.</td>
</tr>
<tr>
<td><code>image.collector.pullPolicy</code></td>
<td>Image pull policy for the Collector images.</td>
</tr>
<tr>
<td><code>image.main.tag</code></td>
<td>Tag of main image to use.</td>
</tr>
<tr>
<td><code>image.collector.tag</code></td>
<td>Tag of collector image to use.</td>
</tr>
<tr>
<td><code>collector.collectionMethod</code></td>
<td>Either EBPF, KERNEL_MODULE, or NO_COLLECTION.</td>
</tr>
<tr>
<td><code>collector.imagePullPolicy</code></td>
<td>Image pull policy for the Collector container.</td>
</tr>
<tr>
<td><code>collector.complianceImagePullPolicy</code></td>
<td>Image pull policy for the Compliance container.</td>
</tr>
<tr>
<td>Parameter</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>collector.disableTaintTolerations</td>
<td>If you specify <strong>false</strong>, tolerations are applied to Collector, and the collector pods can schedule onto all nodes with taints. If you specify it as <strong>true</strong>, no tolerations are applied, and the collector pods are not scheduled onto nodes with taints.</td>
</tr>
<tr>
<td>collector.resources.requests.memory</td>
<td>The memory request for the Collector container. Use this parameter to override the default value.</td>
</tr>
<tr>
<td>collector.resources.requests.cpu</td>
<td>The CPU request for the Collector container. Use this parameter to override the default value.</td>
</tr>
<tr>
<td>collector.resources.limits.memory</td>
<td>The memory limit for the Collector container. Use this parameter to override the default value.</td>
</tr>
<tr>
<td>collector.resources.limits.cpu</td>
<td>The CPU limit for the Collector container. Use this parameter to override the default value.</td>
</tr>
<tr>
<td>collector.complianceResources.requests.memory</td>
<td>The memory request for the Compliance container. Use this parameter to override the default value.</td>
</tr>
<tr>
<td>collector.complianceResources.requests.cpu</td>
<td>The CPU request for the Compliance container. Use this parameter to override the default value.</td>
</tr>
<tr>
<td>collector.complianceResources.limits.memory</td>
<td>The memory limit for the Compliance container. Use this parameter to override the default value.</td>
</tr>
<tr>
<td>collector.complianceResources.limits.cpu</td>
<td>The CPU limit for the Compliance container. Use this parameter to override the default value.</td>
</tr>
<tr>
<td>collector.serviceTLS.cert</td>
<td>The internal service-to-service TLS certificate that Collector uses.</td>
</tr>
<tr>
<td>collector.serviceTLS.key</td>
<td>The internal service-to-service TLS certificate key that Collector uses.</td>
</tr>
<tr>
<td>admissionControl.listenOnCreates</td>
<td>This setting controls whether Kubernetes is configured to contact Red Hat Advanced Cluster Security for Kubernetes with <strong>AdmissionReview</strong> requests for workload creation events.</td>
</tr>
<tr>
<td>Parameter</td>
<td>Description</td>
</tr>
<tr>
<td>------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>admissionControl.listenOnUpdates</td>
<td>When you set this parameter as <code>false</code>, Red Hat Advanced Cluster Security for Kubernetes creates the <code>ValidatingWebhookConfiguration</code> in a way that causes the Kubernetes API server not to send object update events. Since the volume of object updates is usually higher than the object creates, leaving this as <code>false</code> limits the load on the admission control service and decreases the chances of a malfunctioning admission control service.</td>
</tr>
<tr>
<td>admissionControl.listenOnEvents</td>
<td>This setting controls whether the cluster is configured to contact Red Hat Advanced Cluster Security for Kubernetes with <code>AdmissionReview</code> requests for Kubernetes <code>exec</code> and <code>portforward</code> events. Red Hat Advanced Cluster Security for Kubernetes does not support this feature on OpenShift Container Platform 3.11.</td>
</tr>
<tr>
<td>admissionControl.dynamic.enforceOnCreate</td>
<td>This setting controls whether Red Hat Advanced Cluster Security for Kubernetes evaluates policies; if it is disabled, all <code>AdmissionReview</code> requests are automatically accepted.</td>
</tr>
<tr>
<td>admissionControl.dynamic.enforceOnUpdate</td>
<td>This setting controls the behavior of the admission control service. You must specify <code>listenOnUpdates</code> as <code>true</code> for this to work.</td>
</tr>
<tr>
<td>admissionControl.dynamic.scanInline</td>
<td>If you set this option to <code>true</code>, the admission control service requests an image scan before making an admission decision. Since image scans take several seconds, enable this option only if you can ensure that all images used in your cluster are scanned before deployment (for example, by a CI integration during image build). This option corresponds to the <code>Contact image scanners</code> option in the RHACS Portal.</td>
</tr>
<tr>
<td>admissionControl.dynamic.disableBypass</td>
<td>Set it to <code>true</code> to disable bypassing the Admission Controller.</td>
</tr>
<tr>
<td>admissionControl.dynamic.timeout</td>
<td>The maximum time, in seconds, Red Hat Advanced Cluster Security for Kubernetes should wait while evaluating admission review requests. Use this to set request timeouts when you enable image scanning. If the image scan runs longer than the specified time, Red Hat Advanced Cluster Security for Kubernetes accepts the request.</td>
</tr>
<tr>
<td>Parameter</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><code>admissionControl.resources.requests.memory</code></td>
<td>The memory request for the Admission Control container. Use this parameter to override the default value.</td>
</tr>
<tr>
<td><code>admissionControl.resources.requests.cpu</code></td>
<td>The CPU request for the Admission Control container. Use this parameter to override the default value.</td>
</tr>
<tr>
<td><code>admissionControl.resources.limits.memory</code></td>
<td>The memory limit for the Admission Control container. Use this parameter to override the default value.</td>
</tr>
<tr>
<td><code>admissionControl.resources.limits.cpu</code></td>
<td>The CPU limit for the Admission Control container. Use this parameter to override the default value.</td>
</tr>
<tr>
<td><code>admissionControl.nodeSelector</code></td>
<td>Specify a node selector label as <code>label-key: label-value</code> to force Admission Control to only schedule on nodes with the specified label.</td>
</tr>
<tr>
<td><code>admissionControl.tolerations</code></td>
<td>If the node selector selects tainted nodes, use this parameter to specify a taint toleration key, value, and effect for Admission Control. This parameter is mainly used for infrastructure nodes.</td>
</tr>
<tr>
<td><code>admissionControl.serviceTLS.cert</code></td>
<td>The internal service-to-service TLS certificate that Admission Control uses.</td>
</tr>
<tr>
<td><code>admissionControl.serviceTLS.key</code></td>
<td>The internal service-to-service TLS certificate key that Admission Control uses.</td>
</tr>
<tr>
<td><code>registryOverride</code></td>
<td>Use this parameter to override the default <code>docker.io</code> registry. Specify the name of your registry if you are using some other registry.</td>
</tr>
<tr>
<td><code>collector.disableTaintTolerations</code></td>
<td>If you specify <code>false</code>, tolerations are applied to Collector, and the Collector pods can schedule onto all nodes with taints. If you specify it as <code>true</code>, no tolerations are applied, and the Collector pods are not scheduled onto nodes with taints.</td>
</tr>
<tr>
<td><code>createUpgraderServiceAccount</code></td>
<td>Specify <code>true</code> to create the <code>sensor-upgrader</code> account. By default, Red Hat Advanced Cluster Security for Kubernetes creates a service account called <code>sensor-upgrader</code> in each secured cluster. This account is highly privileged but is only used during upgrades. If you do not create this account, you must complete future upgrades manually if the Sensor does not have enough permissions.</td>
</tr>
<tr>
<td>Parameter</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>createSecrets</td>
<td>Specify <strong>false</strong> to skip the orchestrator secret creation for the Sensor, Collector, and Admission Controller.</td>
</tr>
<tr>
<td>collector.slimMode</td>
<td>Specify <strong>true</strong> if you want to use a slim Collector image for deploying Collector. Using slim Collector images requires Central to provide the matching eBPF probe or kernel module. If you are running Red Hat Advanced Cluster Security for Kubernetes in offline mode, you must download a kernel support package from stackrox.io and upload it to Central for slim Collectors to function. Otherwise, you must ensure that Central can access the online probe repository hosted at <a href="https://collector-modules.stackrox.io/">https://collector-modules.stackrox.io/</a>.</td>
</tr>
<tr>
<td>sensor.resources</td>
<td>Resource specification for Sensor.</td>
</tr>
<tr>
<td>admissionControl.resources</td>
<td>Resource specification for Admission Controller.</td>
</tr>
<tr>
<td>collector.resources</td>
<td>Resource specification for Collector.</td>
</tr>
<tr>
<td>collector.complianceResources</td>
<td>Resource specification for Collector’s Compliance container.</td>
</tr>
<tr>
<td>exposeMonitoring</td>
<td>If you set this option to <strong>true</strong>, Red Hat Advanced Cluster Security for Kubernetes exposes Prometheus metrics endpoints on port number 9090 for the Sensor, Collector, and the Admission Controller.</td>
</tr>
<tr>
<td>auditLogs.disableCollection</td>
<td>If you set this option to <strong>true</strong>, Red Hat Advanced Cluster Security for Kubernetes disables the audit log detection features used to detect access and modifications to configuration maps and secrets.</td>
</tr>
<tr>
<td>scanner.disable</td>
<td>If you set this option to <strong>false</strong>, Red Hat Advanced Cluster Security for Kubernetes deploys a lightweight scanner and Scanner DB in the secured cluster to allow scanning images on OpenShift Container Registry. Enabling Scanner is only supported on OpenShift. Defaults to <strong>true</strong></td>
</tr>
<tr>
<td>scanner.dbTolerations</td>
<td>If the node selector selects tainted nodes, use this parameter to specify a taint toleration key, value, and effect for Scanner DB.</td>
</tr>
<tr>
<td>scanner.replicas</td>
<td>Resource specification for Collector’s Compliance container.</td>
</tr>
<tr>
<td>Parameter</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>scanner.logLevel</td>
<td>Setting this parameter allows you to modify the scanner log level. Use this option only for troubleshooting purposes.</td>
</tr>
<tr>
<td>scanner.autoscaling.disable</td>
<td>If you set this option to true, Red Hat Advanced Cluster Security for Kubernetes disables autoscaling on the Scanner deployment.</td>
</tr>
<tr>
<td>scanner.autoscaling.minReplicas</td>
<td>The minimum number of replicas for autoscaling. Defaults to 2.</td>
</tr>
<tr>
<td>scanner.autoscaling.maxReplicas</td>
<td>The maximum number of replicas for autoscaling. Defaults to 5.</td>
</tr>
<tr>
<td>scanner.nodeSelector</td>
<td>Specify a node selector label as label-key: label-value to force Scanner to only schedule on nodes with the specified label.</td>
</tr>
<tr>
<td>scanner.tolerations</td>
<td>If the node selector selects tainted nodes, use this parameter to specify a taint toleration key, value, and effect for Scanner.</td>
</tr>
<tr>
<td>scanner.dbNodeSelector</td>
<td>Specify a node selector label as label-key: label-value to force Scanner DB to only schedule on nodes with the specified label.</td>
</tr>
<tr>
<td>scanner.dbTolerations</td>
<td>If the node selector selects tainted nodes, use this parameter to specify a taint toleration key, value, and effect for Scanner DB.</td>
</tr>
<tr>
<td>scanner.resources.requests.memory</td>
<td>The memory request for the Scanner container. Use this parameter to override the default value.</td>
</tr>
<tr>
<td>scanner.resources.requests.cpu</td>
<td>The CPU request for the Scanner container. Use this parameter to override the default value.</td>
</tr>
<tr>
<td>scanner.resources.limits.memory</td>
<td>The memory limit for the Scanner container. Use this parameter to override the default value.</td>
</tr>
<tr>
<td>scanner.resources.limits.cpu</td>
<td>The CPU limit for the Scanner container. Use this parameter to override the default value.</td>
</tr>
<tr>
<td>scanner.dbResources.requests.memory</td>
<td>The memory request for the Scanner DB container. Use this parameter to override the default value.</td>
</tr>
<tr>
<td>scanner.dbResources.requests.cpu</td>
<td>The CPU request for the Scanner DB container. Use this parameter to override the default value.</td>
</tr>
</tbody>
</table>
## 4.2.5.1.1. Environment variables

You can specify environment variables for Sensor and Admission Controller in the following format:

```yaml
customize:
  envVars:
    ENV_VAR1: "value1"
    ENV_VAR2: "value2"
```

The `customize` setting allows you to specify custom Kubernetes metadata (labels and annotations) for all objects created by this Helm chart and additional pod labels, pod annotations, and container environment variables for workloads.

The configuration is hierarchical, in the sense that metadata defined at a more generic scope (for example, for all objects) can be overridden by metadata defined at a narrower scope (for example, only for the Sensor deployment).

### 4.2.6. Installing the secured-cluster-services Helm chart

After you configure the `values-public.yaml` and `values-private.yaml` files, install the `secured-cluster-services` Helm chart to deploy the per-cluster and per-node components (Sensor, Admission Controller, and Collector).

**CAUTION**

To install Collector on systems that have Unified Extensible Firmware Interface (UEFI) and that have Secure Boot enabled, you must use eBPF probes because kernel modules are unsigned, and the UEFI firmware cannot load unsigned packages. Collector identifies Secure Boot status at the start and switches to eBPF probes if required.

**Procedure**

- Run the following command:

```bash
$ helm install -n stackrox --create-namespace \
stackrox-secured-cluster-services rhacs/secured-cluster-services \
-f <name_of_cluster_init_bundle.yaml> \n-f <path_to_values_public.yaml> -f <path_to_values_private.yaml>
```

1. Use the `-f` option to specify the paths for your YAML configuration files.
NOTE
To deploy secured-cluster-services Helm chart by using a continuous integration (CI) system, pass the init bundle YAML file as an environment variable to the helm install command:

$ helm install ... -f <(echo "$INIT_BUNDLE_YAML_SECRET")

If you are using base64 encoded variables, use the helm install ... -f <(echo "$INIT_BUNDLE_YAML_SECRET" | base64 --decode) command instead.

4.2.6.1. Changing configuration options after deploying the secured-cluster-services Helm chart

You can make changes to any configuration options after you have deployed the secured-cluster-services Helm chart.

Procedure

1. Update the values-public.yaml and values-private.yaml configuration files with new values.

2. Run the helm upgrade command and specify the configuration files using the -f option:

$ helm upgrade -n stackrox \[stackrox-secured-cluster-services rhacs/secured-cluster-services \--reuse-values \-f <path_to_values_public.yaml> \-f <path_to_values_private.yaml>

You must specify the --reuse-values parameter, otherwise the Helm upgrade command resets all previously configured settings.

NOTE
You can also specify configuration values using the --set or --set-file parameters. However, these options are not saved, and it requires you to manually specify all the options again whenever you make changes.

4.2.7. Verifying installation

After you complete the installation, run a few vulnerable applications and navigate to the RHACS portal to evaluate the results of security assessments and policy violations.

NOTE
The sample applications listed in the following section contain critical vulnerabilities and they are specifically designed to verify the build and deploy-time assessment features of Red Hat Advanced Cluster Security for Kubernetes.

To verify installation:

1. Find the address of the RHACS portal based on your exposure method:
a. For a route:

   $ oc get route central -n stackrox

b. For a load balancer:

   $ oc get service central-loadbalancer -n stackrox
c. For port forward:

   i. Run the following command:

      $ oc port-forward svc/central 18443:443 -n stackrox


2. Using the OpenShift Container Platform CLI, create a new project:

   $ oc new-project test

3. Start some applications with critical vulnerabilities:

   $ oc run shell --labels=app=shellshock,team=test-team
         --image=vulnerables/cve-2014-6271 -n test
   $ oc run samba --labels=app=rce
         --image=vulnerables/cve-2017-7494 -n test

Red Hat Advanced Cluster Security for Kubernetes automatically scans these deployments for security risk and policy violations as soon as they are submitted to the cluster. Navigate to the RHACS portal to view the violations. You can log in to the RHACS portal by using the default username admin and the generated password.
CHAPTER 5. INSTALLING BY USING THE ROXCTL CLI

Red Hat Advanced Cluster Security for Kubernetes installs a set of services on your OpenShift Container Platform cluster. This topic describes the installation procedure for installing Red Hat Advanced Cluster Security for Kubernetes on your OpenShift Container Platform cluster by using the `roxctl` CLI.

**WARNING**

For production environments, Red Hat recommends installing Red Hat Advanced Cluster Security for Kubernetes by using Helm charts. Do not use the `roxctl` install method unless you have a specific installation need that requires using this method.

High-level installation flow:

1. Install the `roxctl` CLI.
2. Use the `roxctl` CLI interactive installer to install the centralized components (Central and Scanner).
3. Install Sensor to monitor your cluster.

Before you install:


5.1. INSTALLING THE ROXCTL CLI

To install Red Hat Advanced Cluster Security for Kubernetes you must install the `roxctl` CLI by downloading the binary. You can install `roxctl` on Linux, Windows, or macOS.

5.2. INSTALLING THE ROXCTL CLI ON LINUX

You can install the `roxctl` CLI binary on Linux by using the following procedure.

**Procedure**

1. Download the latest version of the `roxctl` CLI:
   ```sh
   $ curl -O https://mirror.openshift.com/pub/rhacs/assets/3.71.0/bin/Linux/roxctl
   $ chmod +x roxctl
   
   Red Hat Advanced Cluster Security for Kubernetes 3.71 Installing
   ```
2. Make the `roxctl` binary executable:
   ```sh
   $ chmod +x roxctl
   
   To check your PATH, execute the following command:
   ```
$ echo $PATH

Verification

- Verify the `roxctl` version you have installed:

  $ roxctl version

### 5.2.1. Installing the roxctl CLI on macOS

You can install the `roxctl` CLI binary on macOS by using the following procedure.

**Procedure**

1. Download the latest version of the `roxctl` CLI:

   $ curl -O https://mirror.openshift.com/pub/rhacs/assets/3.71.0/bin/Darwin/roxctl

2. Remove all extended attributes from the binary:

   $ xattr -c roxctl

3. Make the `roxctl` binary executable:

   $ chmod +x roxctl

4. Place the `roxctl` binary in a directory that is on your PATH:

   To check your PATH, execute the following command:

   $ echo $PATH

Verification

- Verify the `roxctl` version you have installed:

  $ roxctl version

### 5.2.2. Installing the roxctl CLI on Windows

You can install the `roxctl` CLI binary on Windows by using the following procedure.

**Procedure**

- Download the latest version of the `roxctl` CLI:

  $ curl -O https://mirror.openshift.com/pub/rhacs/assets/3.71.0/bin/Windows/roxctl.exe

Verification

- Verify the `roxctl` version you have installed:
5.3. INSTALLING CENTRAL

The main component of Red Hat Advanced Cluster Security for Kubernetes is called Central. You can install Central on OpenShift Container Platform by using the interactive installer. You deploy Central only once and you can monitor multiple separate clusters by using the same installation.

5.3.1. Using the interactive installer

Use the interactive installer to generate the required secrets, deployment configurations, and deployment scripts for your environment.

Procedure

1. Run the interactive install command:

   ```
   $ roxctl version
   $ roxctl central generate interactive
   ```

2. Press **Enter** to accept the default value for a prompt or enter custom values as required.

   - **Enter path to the backup bundle from which to restore keys and certificates (optional):**
   - **Enter PEM cert bundle file (optional):**
   - **Enter administrator password (default: autogenerated):**
   - **Enter orchestrator (k8s, openshift):** openshift
   - **Enter the directory to output the deployment bundle to (default: "central-bundle"):**
   - **Enter the OpenShift major version (3 or 4) to deploy on (default: "0"):** 4
   - **Enter Istio version when deploying into an Istio-enabled cluster (leave empty when not running Istio) (optional):**
   - **Enter the method of exposing Central (route, lb, np, none) (default: "none"):** route
   - **Enter main image to use (default: "stackrox.io/main:3.0.61.1"):**
   - **Enter whether to run StackRox in offline mode, which avoids reaching out to the Internet (default: "false"):**
   - **Enter whether to enable telemetry (default: "true"):**
   - **Enter the deployment tool to use (kubectl, helm, helm-values) (default: "kubectl"):**
   - **Enter Scanner DB image to use (default: "stackrox.io/scanner-db:2.15.2"):**
   - **Enter Scanner image to use (default: "stackrox.io/scanner:2.15.2"):**
   - **Enter Central volume type (hostpath, pvc):** pvc
   - **Enter external volume name (default: "stackrox-db"):**
   - **Enter external volume size in Gi (default: "100"):**
   - **Enter storage class name (optional if you have a default StorageClass configured):**

   **1** If you want to add a custom TLS certificate, provide the file path for the PEM-encoded certificate. When you specify a custom certificate the interactive installer also prompts you to provide a PEM private key for the custom certificate you are using.

   **2** To use the RHACS portal, you must expose Central by using a route, a load balancer or a node port.

   **3** If you plan to install Red Hat Advanced Cluster Security for Kubernetes on OpenShift Container Platform with a hostPath volume, you must modify the SELinux policy.
WARNING

On OpenShift Container Platform, for using a hostPath volume, you must modify the SELinux policy to allow access to the directory, which the host and the container share. It is because SELinux blocks directory sharing by default. To modify the SELinux policy, run the following command:

$ sudo chcon -Rt svirt_sandbox_file_t <full_volume_path>

However, Red Hat does not recommend modifying the SELinux policy, instead use PVC when installing on OpenShift Container Platform.

On completion, the installer creates a folder named central-bundle, which contains the necessary YAML manifests and scripts to deploy Central. In addition, it shows on-screen instructions for the scripts you need to run to deploy additional trusted certificate authorities, Central and Scanner, and the authentication instructions for logging into the RHACS portal along with the autogenerated password if you did not provide one when answering the prompts.

5.3.2. Running the Central installation scripts

After you run the interactive installer, you can run the setup.sh script to install Central.

Procedure

1. Run the setup.sh script to configure image registry access:

   $ ./central-bundle/central/scripts/setup.sh

2. Create the necessary resources:

   $ oc create -R -f central-bundle/central

3. Check the deployment progress:

   $ oc get pod -n stackrox -w

4. After Central is running, find the RHACS portal IP address and open it in your browser. Depending on the exposure method you selected when answering the prompts, use one of the following methods to get the IP address.

<table>
<thead>
<tr>
<th>Exposure method</th>
<th>Command</th>
<th>Address</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Route</td>
<td>oc -n stackrox get route central</td>
<td>The address under the HOST/PORT column in the output</td>
<td><a href="https://central-stackrox.example.route">https://central-stackrox.example.route</a></td>
</tr>
</tbody>
</table>
### 5.4. INSTALLING SCANNER

You can configure Red Hat Advanced Cluster Security for Kubernetes to obtain image data from a variety of open-source and commercial image scanners.

However, Red Hat Advanced Cluster Security for Kubernetes also provides an image vulnerability scanner component, called Scanner. It enriches deployments with image vulnerability information.

Red Hat recommends deploying Scanner so that it can scan all images, including the images from public registries, for vulnerabilities. You can deploy the Scanner in the same cluster with Central.

#### Prerequisites
- You must configure your image registry to allow Scanner to download and scan images. Usually, image registry integrations are created automatically by Red Hat Advanced Cluster Security for Kubernetes.

#### Procedure

1. Run the following command to configure image registry access:

   ```
   $ ./central-bundle/scanner/scripts/setup.sh
   ```

2. After the script finishes, run the following command to create the scanner service:

   ```
   $ oc create -R -f central-bundle/scanner
   ```
5.5. INSTALLING SENSOR

To monitor a cluster, you must deploy Sensor. You must deploy Sensor into each cluster that you want to monitor. The following steps describe adding Sensor by using the RHACS portal.

**Procedure**

1. On the RHACS portal, navigate to Platform Configuration → Clusters.
2. Select + New Cluster.
3. Specify a name for the cluster.
4. Provide appropriate values for the fields based on where you are deploying the Sensor.
   - If you are deploying Sensor in the same cluster, accept the default values for all the fields.
   - If you are deploying into a different cluster, replace `central.stackrox.svc:443` with a load balancer, node port, or other address, including the port number, that is accessible from the other cluster.
   - If you are using a non-gRPC capable load balancer, such as HAProxy, AWS Application Load Balancer (ALB), or AWS Elastic Load Balancing (ELB), use the WebSocket Secure (wss) protocol. To use wss:
     - Prefix the address with `wss://`.
     - Add the port number after the address, for example, `wss://stackrox-central.example.com:443`.
5. Click Next to continue with the Sensor setup.
6. Click Download YAML File and Keys to download the cluster bundle (zip archive).

**IMPORTANT**
The cluster bundle zip archive includes unique configurations and keys for each cluster. Do not reuse the same files in another cluster.

7. From a system that has access to the monitored cluster, unzip and run the `sensor` script from the cluster bundle:
   ```bash
   $ unzip -d sensor sensor-<cluster_name>.zip
   $ ./sensor/sensor.sh
   ```
   If you get a warning that you do not have the required permissions to deploy Sensor, follow the on-screen instructions, or contact your cluster administrator for assistance.

After Sensor is deployed, it contacts Central and provides cluster information.

**Verification**
1. Return to the RHACS portal and check if the deployment is successful. If it is successful, a green checkmark appears under section #2. If you do not see a green checkmark, use the following command to check for problems:

- On OpenShift Container Platform:
  
  $ oc get pod -n stackrox -w

- On Kubernetes:
  
  $ kubectl get pod -n stackrox -w

2. Click **Finish** to close the window.

After installation, Sensor starts reporting security information to Red Hat Advanced Cluster Security for Kubernetes and the RHACS portal dashboard begins showing deployments, images, and policy violations from the cluster on which you have installed the Sensor.

### 5.6. VERIFYING INSTALLATION

After you complete the installation, run a few vulnerable applications and navigate to the RHACS portal to evaluate the results of security assessments and policy violations.

**NOTE**

The sample applications listed in the following section contain critical vulnerabilities and they are specifically designed to verify the build and deploy-time assessment features of Red Hat Advanced Cluster Security for Kubernetes.

To verify installation:

1. Find the address of the RHACS portal based on your exposure method:

   a. For a route:

      $ oc get route central -n stackrox

   b. For a load balancer:

      $ oc get service central-loadbalancer -n stackrox

   c. For port forward:

      i. Run the following command:

         $ oc port-forward svc/central 18443:443 -n stackrox

      ii. Navigate to **https://localhost:18443/**.

2. Using the OpenShift Container Platform CLI, create a new project:

   $ oc new-project test
3. Start some applications with critical vulnerabilities:

   $ oc run shell --labels=app=shellshock,team=test-team \ 
     --image=vulnerables/cve-2014-6271 -n test
   $ oc run samba --labels=app=rce \ 
     --image=vulnerables/cve-2017-7494 -n test

Red Hat Advanced Cluster Security for Kubernetes automatically scans these deployments for security risk and policy violations as soon as they are submitted to the cluster. Navigate to the RHACS portal to view the violations. You can log in to the RHACS portal by using the default username `admin` and the generated password.

5.7. ADDITIONAL RESOURCES

- Installing Red Hat Advanced Cluster Security for Kubernetes with customizations using Helm charts
CHAPTER 6. UNINSTALLING RED HAT ADVANCED CLUSTER SECURITY FOR KUBERNETES

When you install Red Hat Advanced Cluster Security for Kubernetes, it creates:

- A namespace called `rhacs-operator` where the Operator is installed, if you chose the Operator method of installation
- A namespace called `stackrox`, or another namespace where you created the Central and SecuredCluster custom resources
- `PodSecurityPolicy` and Kubernetes role-based access control (RBAC) objects for all components
- Additional labels on namespaces, for use in generated network policies
- An application custom resource definition (CRD), if it does not exist

Uninstalling Red Hat Advanced Cluster Security for Kubernetes involves deleting all of these items.

6.1. DELETING NAMESPACE

You can delete the namespace that Red Hat Advanced Cluster Security for Kubernetes creates by using the OpenShift Container Platform or Kubernetes command-line interface.

Procedure

- Delete the `stackrox` namespace:
  - On OpenShift Container Platform:
    ```
    $ oc delete namespace stackrox
    ```
  - On Kubernetes:
    ```
    $ kubectl delete namespace stackrox
    ```

**NOTE**

If you installed RHACS in a different namespace, use the name of that namespace in the `delete` command.

6.2. DELETING GLOBAL RESOURCES

You can delete the global resources that Red Hat Advanced Cluster Security for Kubernetes creates, by using the OpenShift Container Platform or Kubernetes command-line interface.

Procedure

- Delete global resources:
  - On OpenShift Container Platform:
6.3. DELETING LABELS AND ANNOTATIONS

You can delete the labels and annotations that Red Hat Advanced Cluster Security for Kubernetes creates, by using the OpenShift Container Platform or Kubernetes command-line interface.

Procedure

- Delete labels and annotations:
  - On OpenShift Container Platform:
    ```
    $ for namespace in $(oc get ns | tail -n +2 | awk '{print $1}'); do
      oc label namespace $namespace namespace.metadata.stackrox.io/id-;
      oc label namespace $namespace namespace.metadata.stackrox.io/name-;
      oc annotate namespace $namespace modified-by.stackrox.io/namespace-label-patcher-;
    done
    ```
  - On Kubernetes:
    ```
    $ for namespace in $(kubectl get ns | tail -n +2 | awk '{print $1}'); do
      kubectl label namespace $namespace namespace.metadata.stackrox.io/id-;
      kubectl label namespace $namespace namespace.metadata.stackrox.io/name-;
      kubectl annotate namespace $namespace modified-by.stackrox.io/namespace-label-patcher-;
    done
    ```