Red Hat Advanced Cluster Management for Kubernetes 2.1

Security

Security

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Security

Legal Notice

Abstract

Security and governance in Red Hat Advanced Cluster Management for Kubernetes

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CHAPTER 1. SECURITY

Manage your security and role-based access control (RBAC) of Red Hat Advanced Cluster Management for Kubernetes components. Govern your cluster with defined policies and processes to identify and minimize risks. Use policies to define rules and set controls.

Prerequisite: You must configure authentication service requirements for Red Hat Advanced Cluster Management for Kubernetes to onboard workloads to Identity and Access Management (IAM). For more information see, *Understanding authentication* in OpenShift Container Platform documentation.

Review the following topics to learn more about securing your cluster:

- Role-based access control
- Certificates
- Governance and risk

1.1. ROLE-BASED ACCESS CONTROL

Red Hat Advanced Cluster Management for Kubernetes supports role-based access control (RBAC). Your role determines the actions that you can perform. RBAC is based on the authorization mechanisms in Kubernetes, similar to Red Hat OpenShift Container Platform. For more information about RBAC, see the OpenShift *RBAC* overview in the OpenShift Container Platform documentation.

Note: Action buttons are disabled from the console if the user-role access is impermissible.

View the following sections for details of supported RBAC by component:

- Overview of roles
- RBAC implementation
- Cluster lifecycle RBAC
- Application lifecycle RBAC
- Governance lifecycle RBAC
- Observability API RBAC

1.1.1. Overview of roles

Some product resources are cluster-wide and some are namespace-scoped. You must apply cluster rolebindings and namespace rolebindings to your users for consistent access controls. View the table list of the following role definitions that are supported in Red Hat Advanced Cluster Management for Kubernetes:

Table 1.1. Role definition table

Role	Definition
cluster-admin	A user with cluster-wide binding to the **cluster-admin** role is an OpenShift Container Platform super user, who has all access.

Role	Definition
open-cluster-management:cluster-manager-admin	A user with cluster-wide binding to the **cluster-manager-admin** role is a Red Hat Advanced Cluster Management for Kubernetes super user, who has all access.
open-cluster-management:managed-cluster-x (admin)	A user with cluster binding to the **managed-cluster-x** role has administrator access to **managedcluster "X"** resource.
open-cluster-management:managed-cluster-x (viewer)	A user with cluster-wide binding to the **managed-cluster-x** role has view access to **managedcluster "X"** resource.
open-cluster-management:subscription-admin	A user with the **subscription-admin** role can create Git subscriptions that deploy resources to multiple namespaces. The resources are specified in Kubernetes resource YAML files in the subscribed Git repository. **Note**: When an non-subscription-admin user creates a subscription, all resources are deployed into the subscription namespace regardless of specified namespaces in the resources. For more information, see the Application lifecycle RBAC section.
admin, edit, view	Admin, edit, and view are OpenShift Container Platform default roles. A user with a namespace-scoped binding to these roles has access to **open-cluster-management** resources in a specific namespace, while cluster-wide binding to the same roles gives access to all of the **open-cluster-management** resources cluster-wide.

Important:

- Any user can create projects from OpenShift Container Platform, which gives administrator role permissions for the namespace.
- If a user does not have role access to a cluster, the cluster name is not visible. The cluster name is displayed with the following symbol: **-**.

1.1.2. RBAC implementation

RBAC is validated at the console level and the API level. Actions in the console can be enabled or disabled based on user access role permissions. View the following sections for more information on RBAC for specific lifecyles in the product.

1.1.2.1. Cluster lifecycle RBAC

View the following cluster lifecycle RBAC operations.

To create and administer all managed clusters:

- Create a cluster role binding to the cluster role **open-cluster-management:cluster-manager-admin** by entering the following command:

```
oc create clusterrolebinding <role-binding-name> --clusterrole=open-cluster-management:cluster-manager-admin
```

  This role is a super user, which has access to all resources and actions. This role allows you to create cluster-scoped **managedcluster** resources, the namespace for the resources that manage the managed cluster, and the resources in the namespace. This role also allows access to provider connections and to bare metal assets that are used to create managed clusters.

To administer a managed cluster named **cluster-name**:

- Create a cluster role binding to the cluster role **open-cluster-management:admin:<cluster-name>** by entering the following command:

```
oc create clusterrolebinding (role-binding-name) --clusterrole=open-cluster-management:admin:<cluster-name>
```

  This role allows read and write access to the cluster-scoped **managedcluster** resource. This is needed because the **managedcluster** is a cluster-scoped resource and not a namespace-scoped resource.

- Create a namespace role binding to the cluster role **admin** by entering the following command:

```
oc create rolebinding <role-binding-name> -n <cluster-name> --clusterrole=admin
```

  This role allows read and write access to the resources in the namespace of the managed cluster.

To view a managed cluster named **cluster-name**:

- Create a cluster role binding to the cluster role **open-cluster-management:view:<cluster-name>** by entering the following command:

```
oc create clusterrolebinding <role-binding-name> --clusterrole=open-cluster-management:view:<cluster-name>
```

  This role allows read access to the cluster-scoped **managedcluster** resource. This is needed because the **managedcluster** is a cluster-scoped resource and not a namespace-scoped resource.

- Create a namespace role binding to the cluster role **view** by entering the following command:

```
oc create rolebinding <role-binding-name> -n <cluster-name> --clusterrole=view
```

  This role allows read-only access to the resources in the namespace of the managed cluster.

See ManagedClusterSets to learn about managing **ManagedClusterSet** resources.

View the following console and API RBAC tables for cluster lifecycle:

Table 1.2. Console RBAC table for Cluster lifecycle

Action	Admin	Edit	View
Clusters	read, update, delete	read, update	read
Provider connections	create, read, update, and delete	create, read, update, and delete	read
Bare metal asset	create, read, update, delete	read, update	read

Table 1.3. API RBAC table for Cluster lifecycle

API	Admin	Edit	View
manageclusters.cluster.open-cluster-management.io	create, read, update, delete	read, update	read
baremetalassets.inventory.open-cluster-management.io	create, read, update, delete	read, update	read
klusterletaddonconfigs.agent.open-cluster-management.io	create, read, update, delete	read, update	read
managedclusteractions.action.open-cluster-management.io	create, read, update, delete	read, update	read
managedclusterviews.view.open-cluster-management.io	create, read, update, delete	read, update	read
managedclusterinfos.internal.open-cluster-management.io	create, read, update, delete	read, update	read
manifestworks.work.open-cluster-management.io	create, read, update, delete	read, update	read

1.1.2.2. Application lifecycle RBAC

When you create an application, the **subscription** namespace is created and the configuration map is created in the **subscription** namespace. When you want to apply a subscription, you must be a subscription administrator. For more information on managing applications, see Creating and managing subscriptions.

To perform Application lifecycle tasks, users with the **admin** role must have access to the namespace

where the application is created and to the **managedcluster** namespace. For example, the required access to create applications in namespace "N" is a namespace-scoped binding to the **admin** role for namespace "N".

View the following console and API RBAC tables for Application lifecycle:

Table 1.4. Console RBAC table for Application lifecycle

Action	Admin	Edit	View
Application	create, read, update, delete	create, read, update, delete	read
Channel	create, read, update, delete	create, read, update, delete	read
Subscription	create, read, update, delete	create, read, update, delete	read
Placement rule	create, read, update, delete	create, read, update, delete	read

Table 1.5. API RBAC table for Application lifecycle

API	Admin	Edit	View
applications.app.k8s.io	create, read, update, delete	create, read, update, delete	read
channels.apps.open-cluster-management.io	create, read, update, delete	create, read, update, delete	read
deployables.apps.open-cluster-management.io	create, read, update, delete	create, read, update, delete	read
helmreleases.apps.open-cluster-management.io	create, read, update, delete	create, read, update, delete	read
placementrules.apps.open-cluster-management.io	create, read, update, delete	create, read, update, delete	read
subscriptions.apps.open-cluster-management.io	create, read, update, delete	create, read, update, delete	read
configmaps	create, read, update, delete	create, read, update, delete	read
secrets	create, read, update, delete	create, read, update, delete	read

API	Admin	Edit	View
namespaces	create, read, update, delete	create, read, update, delete	read

1.1.2.3. Governance lifecycle RBAC

To perform Governance lifecycle operations, users must have access to the namespace where the policy is created, along with access to the **managedcluster** namespace where the policy is applied.

View the following examples:

- To view policies in namespace "N" the following role is required:
  - A namespace-scoped binding to the **view** role for namespace "N".
- To create a policy in namespace "N" and apply it on **managedcluster** "X", the following roles are required:
  - A namespace-scoped binding to the **admin** role for namespace "N".
  - A namespace-scoped binding to the **admin** role for namespace "X".

View the following console and API RBAC tables for Governance lifecycle:

Table 1.6. Console RBAC table for Governance lifecycle

Action	Admin	Edit	View
Policies	create, read, update, delete	read, update	read
PlacementBindings	create, read, update, delete	read, update	read
PlacementRules	create, read, update, delete	read, update	read

Table 1.7. API RBAC table for Governance lifecycle

API	Admin	Edit	View
policies.policy.open-cluster-management.io	create, read, update, delete	read, update	read
placementbindings.policy.open-cluster-management.io	create, read, update, delete	read, update	read

1.1.2.4. Observability RBAC

To use the observability features, you must be assigned the **cluster-admin** or the **open-cluster-management:cluster-manager-admin** role. View the following list of observability features:

- Access managed cluster metrics.
- Search for resources.
- Use the Visual Web Terminal if you have access to the managed cluster.

To create, update, and delete the MultiClusterObservability custom resource. View the following RBAC table:

Table 1.8. API RBAC table for observability

API	Admin	Edit	View
multiclusterobservabilities.observability.open-cluster-management.io	create, read, update, and delete	-	-

To continue to learn more about securing your cluster, see Security.

1.2. CERTIFICATES

Various certificates are created and used throughout Red Hat Advanced Cluster Management for Kubernetes.

You can bring your own certificates. You must create a Kubernetes TLS Secret for your certificate. After you create your certificates, you can replace certain certificates that are created by the Red Hat Advanced Cluster Management installer.

Required access: Cluster administrator or team administrator.

Note: Replacing certificates is supported only on native Red Hat Advanced Cluster Management installations.

All certificates required by services that run on Red Hat Advanced Cluster Management are created during the installation of Red Hat Advanced Cluster Management. Certificates are created and managed by the Red Hat Advanced Cluster Management Certificate manager (**cert-manager**) service. The Red Hat Advanced Cluster Management Root Certificate Authority (CA) certificate is stored within the Kubernetes Secret **multicloud-ca-cert** in the hub cluster namespace. The certificate can be imported into your client truststores to access Red Hat Advanced Cluster Management Platform APIs.

See the following topics to replace certificates:

- Replacing the root CA certificate
- Replacing the management ingress certificates

1.2.1. List certificates

You can view a list of certificates that use **cert-manager** internally by running the following command:

```
oc get certificates.certmanager.k8s.io -n open-cluster-management
```

Note: If observability is enabled, there are additional namespaces where certificates are created.

1.2.2. Refresh a certificate

You can refresh a certificate by running the command in the Section 1.2.1, "List certificates" section. When you identify the certificate that you need to refresh, delete the secret that is associated with the certificate. For example, you can delete a secret by running the following command:

```
oc delete secret grc-0c925-grc-secrets -n open-cluster-management
```

1.2.3. Refresh certificates for Red Hat Advanced Cluster Management for Kubernetes

You can refresh all certificates that are issued by the Red Hat Advanced Cluster Management CA. During the refresh, the Kubernetes secret that is associated with each **cert-manager** certificate is deleted. The service restarts automatically to use the certifcate. Run the following command:

```
oc delete secret -n open-cluster-management $(oc get certificates.certmanager.k8s.io -n open-cluster-management -o wide | grep multicloud-ca-issuer | awk '{print $3}')
```

The Red Hat OpenShift Container Platform certificate is not included in the Red Hat Advanced Cluster Management for Kubernetes management ingress. For more information, see the Security known issues. Use the certificate policy controller to create and manage certificate policies on managed clusters. See Policy controllers to learn more about controllers. Return to the Security page for more information.

1.2.4. Replacing the root CA certificate

You can replace the root CA certificate.

1.2.4.1. Prerequisites for root CA certificate

Verify that your Red Hat Advanced Cluster Management for Kubernetes cluster is running.

Back up the existing Red Hat Advanced Cluster Management for Kubernetes certificate resource by running the following command:

```
oc get cert multicloud-ca-cert -n open-cluster-management -o yaml > multicloud-ca-cert-backup.yaml
```

1.2.4.2. Creating the root CA certificate with OpenSSL

Complete the following steps to create a root CA certificate with OpenSSL:

1. Generate your certificate authority (CA) RSA private key by running the following command:

   ```
   openssl genrsa -out ca.key 4096
   ```

2. Generate a self-signed CA certificate by using your CA key. Run the following command:

   ```
   openssl req -x509 -new -nodes -key ca.key -days 400 -out ca.crt -config req.cnf
   ```

   Your **req.cnf** file might resemble the following file:

```
[ req ]              # Main settings
default_bits = 4096       # Default key size in bits.
prompt = no               # Disables prompting for certificate values so the configuration file
values are used.
default_md = sha256       # Specifies the digest algorithm.
distinguished_name = dn   # Specifies the section that includes the distinguished name
information.
x509_extensions = v3_ca   # The extentions to add to the self signed cert

[ dn ]               # Distinguished name settings
C = US                    # Country
ST = North Carolina            # State or province
L = Raleigh               # Locality
O = Red Hat Open Shift     # Organization
OU = Red Hat Advanced Container Management        # Organizational unit
CN = www.redhat.com  # Common name.

[ v3_ca ]         # x509v3 extensions
basicConstraints=critical,CA:TRUE # Indicates whether the certificate is a CA certificate
during the certificate chain verification process.
```

1.2.4.3. Replacing root CA certificates

1. Create a new secret with the CA certificate by running the following command:

```
kubectl -n open-cluster-management create secret tls byo-ca-cert --cert ./ca.crt --key ./ca.key
```

2. Edit the CA issuer to point to the BYO certificate. Run the following commnad:

```
oc edit issuer -n open-cluster-management multicloud-ca-issuer
```

3. Replace the string **mulicloud-ca-cert** with **byo-ca-cert**. Save your deployment and quit the editor.

4. Edit the management ingress deployment to reference the Bring Your Own (BYO) CA certificate. Run the following command:

```
oc edit deployment management-ingress-435ab
```

5. Replace the **multicloud-ca-cert** string with the **byo-ca-cert**. Save your deployment and quit the editor.

6. Validate the custom CA is in use by logging in to the console and view the details of the certificate being used.

1.2.4.4. Refreshing cert-manager certificates

After the root CA is replaced, all certificates that are signed by the root CA must be refreshed and the services that use those certificates must be restarted. Cert-manager creates the default Issuer from the root CA so all of the certificates issued by **cert-manager**, and signed by the default ClusterIssuer must also be refreshed.

Delete the Kubernetes secrets associated with each **cert-manager** certificate to refresh the certificate and restart the services that use the certificate. Run the following command:

```
oc delete secret -n open-cluster-management $(oc get cert -n open-cluster-management -o wide |
grep multicloud-ca-issuer | awk '{print $3}')
```

1.2.4.5. Restoring root CA certificates

To restore the root CA certificate, update the CA issuer by completing the following steps:

1. Edit the CA issuer. Run the following command:

```
oc edit issuer -n open-cluster-management multicloud-ca-issuer
```

2. Replace the **byo-ca-cert** string with **multicloud-ca-cert** in the editor. Save the issuer and quit the editor.

3. Edit the management ingress depolyment to reference the original CA certificate. Run the following command:

```
oc edit deployment management-ingress-435ab
```

4. Replace the **byo-ca-cert** string with the **multicloud-ca-cert** string. Save your deployment and quit the editor.

5. Delete the BYO CA certificate. Run the following commnad:

```
oc delete secret -n open-cluster-management byo-ca-cert
```

Refresh all **cert-manager** certificates that use the CA. For more information, see the forementioned section, Refreshing *cert-manager* certificates.

See Certificates for more information about certificates that are created and managed by Red Hat Advanced Cluster Management for Kubernates.

1.2.5. Replacing the management ingress certificates

You can replace management ingress certificates. If you replace the default ingress certificate for OpenShift Container Platform, you need to make modifications to the management ingress. For more information see, *500 Internal error during login to the console* in the Security known issues .

1.2.5.1. Prerequisites to replace management ingress certificate

Prepare and have your **management-ingress** certificates and private keys ready. If needed, you can generate a TLS certificate by using OpenSSL. Set the common name parameter,**CN**, on the certificate to **manangement-ingress**. If you are generating the certificate, include the following settings:

- Include the following IP addresses and domain names in your certificate Subject Alternative Name (SAN) list:
  - The service name for the management ingress: **management-ingress**.
  - Include the route name for Red Hat Advanced Cluster Management for Kubernetes. Recieve the route name by running the following command:

```
oc get route -n open-cluster-management
```

You might receieve the following response:

```
multicloud-console.apps.grchub2.dev08.red-chesterfield.com
```

- Add the localhost IP address: **127.0.0.1**.
- Add the localhost entry: **localhost**.

1.2.5.1.1. Example configuration file for generating a certificate

The following example configuration file and OpenSSL commands provide an example for how to generate a TLS certificate by using OpenSSL. View the following **csr.cnf** configuration file, which defines the configuration settings for generating certificates with OpenSSL.

```
[ req ]             # Main settings
default_bits = 2048       # Default key size in bits.
prompt = no               # Disables prompting for certificate values so the configuration file values are used.
default_md = sha256       # Specifies the digest algorithm.
req_extensions = req_ext  # Specifies the configuration file section that includes any extensions.
distinguished_name = dn   # Specifies the section that includes the distinguished name information.

[ dn ]              # Distinguished name settings
C = US                    # Country
ST = North Carolina             # State or province
L = Raleigh               # Locality
O = Red Hat Open Shift     # Organization
OU = Red Hat Advanced Container Management        # Organizational unit
CN = management-ingress  # Common name.

[ req_ext ]         # Extensions
subjectAltName = @alt_names # Subject alternative names

[ alt_names ]       # Subject alternative names
DNS.1 = management-ingress
DNS.2 = multicloud-console.apps.grchub2.dev08.red-chesterfield.com
DNS.3 = localhost
DNS.4 = 127.0.0.1

[ v3_ext ]          # x509v3 extensions
authorityKeyIdentifier=keyid,issuer:always  # Specifies the public key that corresponds to the private key that is used to sign a certificate.
basicConstraints=CA:FALSE                   # Indicates whether the certificate is a CA certificate during the certificate chain verification process.
#keyUsage=keyEncipherment,dataEncipherment   # Defines the purpose of the key that is contained in the certificate.
extendedKeyUsage=serverAuth                 # Defines the purposes for which the public key can be used.
subjectAltName=@alt_names                   # Identifies the subject alternative names for the identify that is bound to the public key by the CA.
```

Note: Be sure to update the SAN labeled, **DNS.2** with the correct hostname for your management ingress.

1.2.5.1.2. OpenSSL commands for generating a certificate

The following OpenSSL commands are used with the preceding configuration file to generate the required TLS certificate.

1. Generate your certificate authority (CA) RSA private key:

```
openssl genrsa -out ca.key 4096
```

2. Generate a self-signed CA certificate by using your CA key:

```
openssl req -x509 -new -nodes -key ca.key -subj "/C=US/ST=North
Carolina/L=Raleigh/O=Red Hat OpenShift" -days 400 -out ca.crt
```

3. Generate the RSA private key for your certificate:

```
openssl genrsa -out ingress.key 4096
```

4. Generate the Certificate Signing request (CSR) by using the private key:

```
openssl req -new -key ingress.key -out ingress.csr -config csr.cnf
```

5. Generate a signed certificate by using your CA certificate and key and CSR:

```
openssl x509 -req -in ingress.csr -CA ca.crt -CAkey ca.key -CAcreateserial -out ingress.crt -
sha256 -days 300 -extensions v3_ext -extfile csr.cnf
```

6. Examine the certificate contents:

```
openssl x509  -noout -text -in ./ingress.crt
```

1.2.5.2. Replace the Bring Your Own (BYO) ingress certificate

Complete the following steps to replace your BYO ingress certificate:

1. Create the **byo-ingress-tls** secret by using your certificate and private key. Run the following command:

```
kubectl -n open-cluster-management create secret tls byo-ingress-tls-secret --cert
./ingress.crt --key ./ingress.key
```

2. Verify that the secret is created in the correct namespace.

```
kubectl get secret -n open-cluster-management | grep byo-ingress | grep tls
```

3. Create a secret containing the CA certificate by running the following command:

```
kubectl -n open-cluster-management create secret tls byo-ca-cert --cert ./ca.crt --key ./ca.key
```

4. Edit the management ingress deployment. Get the name of the deployment. Run the following commands:

```
export MANAGEMENT_INGRESS=`oc get deployment -o custom-columns=:.metadata.name
| grep management-ingress`
```

```
oc edit deployment $MANAGEMENT_INGRESS -n open-cluster-management
```

- Replace the **multicloud-ca-cert** string with **byo-ca-cert**.
- Replace the **$MANAGEMENT_INGRESS-tls-secret** string with **byo-ingress-tls-secret**.
- Save your deployment and close the editor. The management ingress automatically restarts.

5. After the management ingress pod has restarted, navigate to the Red Hat Advanced Cluster Management for Kubernetes console from your browser. Verify that the current certificate is your certificate, and that all console access and login functionality remain the same.

1.2.5.3. Restore the default self-signed certificate for management ingress

1. Edit the management ingress deployment. Replace the string **multicloud-ca-cert** with **byo-ca-cert**. Get the name of the deployment. Run the following commands:

```
export MANAGEMENT_INGRESS=`oc get deployment -o custom-columns=:.metadata.name | grep management-ingress`

oc edit deployment $MANAGEMENT_INGRESS -n open-cluster-management
```

   a. Replace the **byo-ca-cert** string with **multicloud-ca-cert**.

   b. Replace the **byo-ingress-tls-secret** string with the **$MANAGEMENT_INGRESS-tls-secret**.

   c. Save your deployment and close the editor. The management ingress automatically restarts.

2. After all pods are restarted, navigate to the Red Hat Advanced Cluster Management for Kubernetes console from your browser. Verify that the current certificate is your certificate, and that all console access and login functionality remain the same.

3. Delete the Bring Your Own (BYO) ingress secret and ingress CA certificate by running the following commands:

```
oc delete secret -n open-cluster-management byo-ingress-tls-secret
oc delete secret -n open-cluster-management byo-ca-cert
```

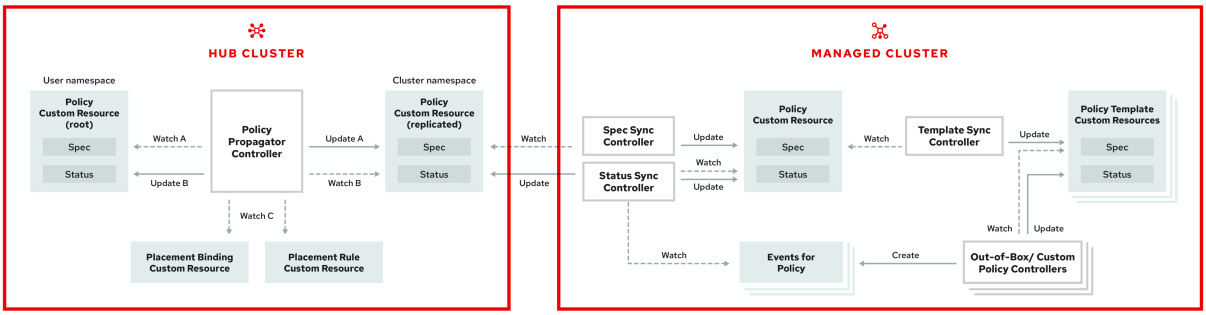
See Certificates for more information about certificates that are created and managed by Red Hat Advanced Cluster Management for Kubernates. Return to the Security page for more information on securing your cluster.

CHAPTER 2. GOVERNANCE AND RISK

Enterprises must meet internal standards for software engineering, secure engineering, resiliency, security, and regulatory compliance for workloads hosted on private, multi and hybrid clouds. Red Hat Advanced Cluster Management for Kubernetes governance provides an extensible policy framework for enterprises to introduce their own security policies.

2.1. GOVERNANCE ARCHITECTURE

Enhance the security for your cluster with the Red Hat Advanced Cluster Management for Kubernetes governance lifecycle. The product governance lifecycle is based on defined policies, processes, and procedures to manage security and compliance from a central interface page. View the following diagram of the governance architecture:



The governance architecture is composed of the following components:

- **Governance and risk dashboard**: Provides a summary of your cloud governance and risk details, which include policy and cluster violations.
  Notes:
  - When a policy is propagated to a managed cluster, the replicated policy is named **namespaceName.policyName**. When you create a policy, make sure that the length of the **namespaceName.policyName** is less than 63 characters due to the Kubernetes limit for object names.
  - When you search for a policy in the hub cluster, you might also receive the name of the replicated policy on your managed cluster. For example, if you search for **policy-dhaz-cert**, the following policy name from the hub cluster might appear: **default.policy-dhaz-cert**.
- **Policy-based governance framework:** Supports policy creation and deployment to various managed clusters based on attributes associated with clusters, such as a geographical region. See the **policy-collection** repository to view examples of the predefined policies, and instructions on deploying policies to your cluster. You can also contribute custom policy controllers and policies.
- **Policy controller**: Evaluates one or more policies on the managed cluster against your specified control and generates Kubernetes events for violations. Violations are propagated to the hub cluster. Policy controllers that are included in your installation are the following: Kubernetes configuration, Certificate, and IAM. You can also create a custom policy controller.
- **Open source community**: Supports community contributions with a foundation of the Red Hat Advanced Cluster Management policy framework. Policy controllers and third-party policies are also a part of the **open-cluster-management/policy-collection** repository. Learn how to

integrate third-party policies with Red Hat Advanced Cluster Management for Kubernetes. For more information, see Integrate third-party policy controllers.

Learn about the structure of an Red Hat Advanced Cluster Management for Kubernetes policy framework, and how to use the Red Hat Advanced Cluster Management for Kubernetes Governance and risk dashboard.

- Policy overview
- Policy controllers
- Policy samples
- Manage security policies

2.2. POLICY OVERVIEW

Use the Red Hat Advanced Cluster Management for Kubernetes security policy framework to create custom policy controllers and other policies. Kubernetes CustomResourceDefinition (CRD) instance are used to create policies. For more information about CRDs, see Extend the Kubernetes API with CustomResourceDefinitions.

Each Red Hat Advanced Cluster Management for Kubernetes policy can have at least one or more templates. For more details about the policy elements, view the following *Policy YAML table* section on this page.

The policy requires a *PlacementRule* that defines the clusters that the policy document is applied to, and a *PlacementBinding* that binds the Red Hat Advanced Cluster Management for Kubernetes policy to the placement rule.

Important:

- You must create a **placementRule** to apply your policies to the managed cluster, and bind the **placementRule** with a **PlacementBinding**.
- You can create a policy in any namespace on the hub cluster except the cluster namespace. If you create a policy in the cluster namespace, it is deleted by Red Hat Advanced Cluster Management for Kubernetes.
- Each client and provider is responsible for ensuring that their managed cloud environment meets internal enterprise security standards for software engineering, secure engineering, resiliency, security, and regulatory compliance for workloads hosted on Kubernetes clusters. Use the governance and security capability to gain visibility and remediate configurations to meet standards.

2.2.1. Policy YAML structure

When you create a policy, you must include required parameter fields and values. Depending on your policy controller, you might need to include other optional fields and values. View the following YAML structure for explained parameter fields:

```
apiVersion: policy.open-cluster-management.io/v1
kind: Policy
metadata:
  name:
  annotations:
```

```
    policy.open-cluster-management.io/standards:
    policy.open-cluster-management.io/categories:
    policy.open-cluster-management.io/controls:
spec:
  policy-templates:
    - objectDefinition:
        apiVersion:
        kind:
        metadata:
          name:
        spec:
  remediationAction:
  disabled:

---
apiVersion: apps.open-cluster-management.io/v1
kind: PlacementBinding
metadata:
  name:
placementRef:
  name:
  kind:
  apiGroup:
subjects:
- name:
  kind:
  apiGroup:

---
apiVersion: apps.open-cluster-management.io/v1
kind: PlacementRule
metadata:
  name:
spec:
  clusterConditions:
  - type:
  clusterLabels:
    matchLabels:
      cloud:
```

2.2.2. Policy YAML table

Field	Description
apiVersion	Required. Set the value to **policy.open-cluster-management.io/v1**.
kind	Required. Set the value to **Policy** to indicate the type of policy.
metadata.name	Required. The name for identifying the policy resource.

Field	Description
metadata.annotations	Optional. Used to specify a set of security details that describes the set of standards the policy is trying to validate. **Note**: You can view policy violations based on the standards and categories that you define for your policy on the *Policies* page, from the console.
annotations.policy.open-cluster-management.io/standards	The name or names of security standards the policy is related to. For example, National Institute of Standards and Technology (NIST) and Payment Card Industry (PCI).
annotations.policy.open-cluster-management.io/categories	A security control category represent specific requirements for one or more standards. For example, a System and Information Integrity category might indicate that your policy contains a data transfer protocol to protect personal information, as required by the HIPAA and PCI standards.
annotations.policy.open-cluster-management.io/controls	The name of the security control that is being checked. For example, Center of Internet Security (CIS) and certificate policy controller.
spec.policy-templates	Required. Used to create one or more policies to apply to a managed cluster.
spec.disabled	Required. Set the value to **true** or **false**. The **disabled** parameter provides the ability to enable and disable your policies.
spec.remediationAction	Optional. Specifies the remediation of your policy. The parameter values are **enforce** and **inform**. If specified, the **spec.remediationAction** value that is defined overrides the **remediationAction** parameter defined in the child policy, from the **policy-templates** section. For example, if **spec.remediationAction** value section is set to **enforce**, then the **remediationAction** in the **policy-templates** section is set to **enforce** during runtime. **Important**: Some policies might not support the enforce feature.

2.2.3. Policy sample file

```
apiVersion: policy.open-cluster-management.io/v1
kind: Policy
metadata:
```

```
  name: policy-role
  annotations:
    policy.open-cluster-management.io/standards: NIST SP 800-53
    policy.open-cluster-management.io/categories: AC Access Control
    policy.open-cluster-management.io/controls: AC-3 Access Enforcement
spec:
  remediationAction: inform
  disabled: false
  policy-templates:
    - objectDefinition:
        apiVersion: policy.open-cluster-management.io/v1
        kind: ConfigurationPolicy
        metadata:
          name: policy-role-example
        spec:
          remediationAction: inform # the policy-template spec.remediationAction is overridden by the
preceding parameter value for spec.remediationAction.
          severity: high
          namespaceSelector:
            exclude: ["kube-*"]
            include: ["default"]
          object-templates:
            - complianceType: mustonlyhave # role definition should exact match
              objectDefinition:
                apiVersion: rbac.authorization.k8s.io/v1
                kind: Role
                metadata:
                  name: sample-role
                rules:
                  - apiGroups: ["extensions", "apps"]
                    resources: ["deployments"]
                    verbs: ["get", "list", "watch", "delete","patch"]
---
apiVersion: policy.open-cluster-management.io/v1
kind: PlacementBinding
metadata:
  name: binding-policy-role
placementRef:
  name: placement-policy-role
  kind: PlacementRule
  apiGroup: apps.open-cluster-management.io
subjects:
- name: policy-role
  kind: Policy
  apiGroup: policy.open-cluster-management.io
---
apiVersion: apps.open-cluster-management.io/v1
kind: PlacementRule
metadata:
  name: placement-policy-role
spec:
  clusterConditions:
  - status: "True"
    type: ManagedClusterConditionAvailable
```

```
clusterSelector:
  matchExpressions:
    - {key: environment, operator: In, values: ["dev"]}
```

See Managing security policies to create and update a policy. You can also enable and update Red Hat Advanced Cluster Management policy controllers to validate the compliance of your policies. See Policy controllers. See Governance and risk for more policy topics.

2.3. POLICY CONTROLLERS

Policy controllers monitor and report whether your cluster is compliant with a policy. Use the Red Hat Advanced Cluster Management for Kubernetes policy framework by using the out of the box policy templates to apply predefined policy controllers, and policies. The policy controllers are Kubernetes CustomResourceDefinition (CRD) instance. For more information about CRDs, see Extend the Kubernetes API with CustomResourceDefinitions. Policy controllers remediate policy violations to make the cluster status be compliant.

You can create custom policies and policy controllers with the product policy framework. See Creating a custom policy controller for more information.

Important: Only the configuration policy controller supports the **enforce** feature. You must manually remediate policies, where the policy controller does not support the **enforce** feature.

View the following topics to learn more about the following Red Hat Advanced Cluster Management for Kubernetes policy controllers:

- Kubernetes configuration policy controller
- Certificate policy controller
- IAM policy controller

Refer to Governance and risk for more topics about managing your policies.

2.3.1. Kubernetes configuration policy controller

Configuration policy controller can be used to configure any Kubernetes resource and apply security policies across your clusters.

The configuration policy controller communicates with the local Kubernetes API server to get the list of your configurations that are in your cluster. For more information about CRDs, see Extend the Kubernetes API with CustomResourceDefinitions.

The configuration policy controller is created on the hub cluster during installation. Configuration policy controller supports the **enforce** feature and monitors the compliance of the following policies:

- Memory usage policy
- Namespace policy
- Image vulnerability policy
- Pod nginx policy
- Pod security policy

- Role policy
- Rolebinding policy
- Security content constraints (SCC) policy
- ETCD encryption policy

When the **remediationAction** for the configuration policy is set to **enforce**, the controller creates a replicate policy on the target managed clusters.

2.3.1.1. Configuration policy controller YAML structure

```
Name:         configuration-policy-example
Namespace:
Labels:
APIVersion:   policy.open-cluster-management.io/v1
Kind:         ConfigPolicy
Metadata:
  Finalizers:
    finalizer.policy.open-cluster-management.io
Spec:
  Conditions:
    Ownership:
    NamespaceSelector:
      Exclude:
      Include:
    RemediationAction:
 Status:
   CompliancyDetails:
     Configuration-Policy-Example:
       Default:
       Kube - Public:
   Compliant:          Compliant
 Events:
```

2.3.1.2. Configuration policy sample

```
apiVersion: policy.open-cluster-management.io/v1
kind: ConfigPolicy
metadata:
  name: policy-config
spec:
  namespaceSelector:
    include: ["default"]
    exclude: []
  remediationAction: inform
    severity: low
    object-templates:
    - complianceType: musthave
      objectDefinition:
        apiVersion: v1
        kind: Pod
        metadata:
          name: nginx-pod
```

```
    spec:
      containers:
      - image: nginx:1.7.9
        name: nginx
        ports:
        - containerPort: 80
```

2.3.1.3. Configuration policy YAML table

Table 2.1. Parameter table

Field	Description
apiVersion	Required. Set the value to **policy.open-cluster-management.io/v1**.
kind	Required. Set the value to **ConfigPolicy** to indicate the type of policy.
metadata.name	Required. The name of the policy.
spec	Required. Specifications of which configuration policy to monitor and how to remediate them.
spec.namespaceSelector	Required. The namespaces within the hub cluster that the policy is applied to. Enter at least one namespace for the **include** parameter, which are the namespaces you want to apply to the policy to. The **exclude** parameter specifies the namespaces you explicitly do not want to apply the policy to.
spec.remediationAction	Required. Specifies the remediation of your policy. Enter **inform**
remediationAction.severity	Required. Specifies the severity when the policy is non-compliant. Use the following parameter values: **low**, **medium**, or **high**.

Field	Description
remediationAction.complianceType	Required. Used to list expected behavior for roles and other Kubernetes object that must be evaluated or applied to the managed clusters. You must use the following verbs as parameter values: **mustonlyhave**: Indicates that an object must exist with the exact name and relevant fields. **musthave**: Indicates an object must exist with the same name as specified object-template. The other fields in the template are a subset of what exists in the object. **mustnothave**: Indicated that an object with the same name or labels cannot exist and need to be deleted, regardless of the specification or rules.

Learn about how policies are applied on your hub cluster. See Policy samples for more details. Learn how to create and customize policies, see Manage security policies.

See Policy controllers for more information about controllers.

2.3.2. Certificate policy controller

Certificate policy controller can be used to detect certificates that are close to expiring, and detect time durations (hours) that are too long or contain DNS names that fail to match specified patterns.

Configure and customize the certificate policy controller by updating the following parameters in your controller policy:

- **minimumDuration**
- **minimumCADuration**
- **maximumDuration**
- **maximumCADuration**
- **allowedSANPattern**
- **disallowedSANPattern**

Your policy might become non-compliant due to either of the following scenarios:

- When a certificate expires in less than the minimum duration of time or exceeds the maximum time.
- When DNS names fail to match the specified pattern.

The certificate policy controller is created on your managed cluster. The controller communicates with the local Kubernetes API server to get the list of secrets that contain certificates and determine all non-compliant certificates. For more information about CRDs, see Extend the Kubernetes API with CustomResourceDefinitions.

Certificate policy controller does not support the **enforce** feature.

2.3.2.1. Certificate policy controller YAML structure

View the following example of a certificate policy and review the element in the YAML table:

```
apiVersion: policy.open-cluster-management.io/v1
kind: CertificatePolicy
metadata:
  name: certificate-policy-example
  namespace:
  labels: category=system-and-information-integrity
spec:
  namespaceSelector:
    include: ["default"]
    exclude: ["kube-*"]
  remediationAction:
  severity:
  minimumDuration:
  minimumCADuration:
  maximumDuration:
  maximumCADuration:
  allowedSANPattern:
  disallowedSANPattern:
```

2.3.2.1.1. Certificate policy controller YAML table

Table 2.2. Parameter table

Field	Description
apiVersion	Required. Set the value to **policy.open-cluster-management.io/v1**.
kind	Required. Set the value to **CertificatePolicy** to indicate the type of policy.
metadata.name	Required. The name to identify the policy.
netadata.namespace	Required. The namespaces within the managed cluster where the policy is created.
metadata.labels	Optional. In a certificate policy, the **category=system-and-information-integrity** label categorizes the policy and facilitates querying the certificate policies. If there is a different value for the **category** key in your certificate policy, the value is overridden by the certificate controller.
spec	Required. Specifications of which certificates to monitor and refresh.

Field	Description
spec.namespaceSelector	Required. Managed cluster namespace to which you want to apply the policy. Enter parameter values for **Include** and **Exclude**. **Notes**: • When you create multiple certificate policies and apply them to the same managed cluster, each policy **namespaceSelector** must be assigned a different value. • If the **namespaceSelector** for the certificate policy controller does not match any namespace, the policy is considered compliant.
spec.remediationAction	Required. Specifies the remediation of your policy. Set the parameter value to **inform**. Certificate policy controller only supports **inform** feature.
spec.severity	Optional. Informs the user of the severity when the policy is non-compliant. Use the following parameter values: **low**, **medium**, or **high**.
spec.minimumDuration	Required. When a value is not specified, the default value is **100h**. This parameter specifies the smallest duration (in hours) before a certificate is considered non-compliant. The parameter value uses the time duration format from Golang. See Golang Parse Duration for more information.
spec.minimumCADuration	Optional. Set a value to identify signing certificates that might expire soon with a different value from other certificates. If the parameter value is not specified, the CA certificate expiration is the value used for the **minimumDuration**. See Golang Parse Duration for more information.
spec.maximumDuration	Optional. Set a value to identify certificates that have been created with a duration that exceeds your desired limit. The parameter uses the time duration format from Golang. See Golang Parse Duration for more information.
spec.maximumCADuration	Optional. Set a value to identify signing certificates that have been created with a duration that exceeds your defined limit. The parameter uses the time duration format from Golang. See Golang Parse Duration for more information.

Field	Description
spec.allowedSANPattern	Optional. A regular expression that must match every SAN entry that you have defined in your certificates. This parameter checks DNS names against patterns. See the Golang Regular Expression syntax for more information.
spec.disallowedSANPattern	Optional. A regular expression that must not match any SAN entries you have defined in your certificates. This parameter checks DNS names against patterns. See the Golang Regular Expression syntax for more information.

2.3.2.2. Certificate policy sample

When your certificate policy controller is created on your hub cluster, a replicated policy is created on your managed cluster. Your certificate policy on your managed cluster might resemble the following file:

```
apiVersion: policy.open-cluster-management.io/v1
kind: CertificatePolicy
metadata:
  name: certificate-policy-1
  namespace: kube-system
  label:
    category: "System-Integrity"
spec:
  namespaceSelector:
    include: ["default", "kube-*"]
    exclude: ["kube-system"]
  remediationAction: inform
  minimumDuration: 100h
  minimumCADuration: 200h
  maximumDuration: 2161h
  maximumCADuration: 43920h
  allowedSANPattern: "[[:alpha:]]"
  disallowedSANPattern: "[\\*]"
```

Learn how to manage a certificate policy, see Managing certificate policies for more details. Refer to Policy controllers for more topics.

2.3.3. IAM policy controller

Identity and Access Management (IAM) policy controller can be used to receive notifications about IAM policies that are non-compliant. The compliance check is based on the parameters that you configure in the IAM policy.

The IAM policy controller checks for compliance of the number of cluster administrators that you allow in your cluster. IAM policy controller communicates with the local Kubernetes API server. For more information, see Extend the Kubernetes API with CustomResourceDefinitions.

The IAM policy controller runs on your managed cluster.

2.3.3.1. IAM policy YAML structure

View the following example of an IAM policy and review the parameters in the YAML table:

```
apiVersion: policy.open-cluster-management.io/v1
kind: IamPolicy
metadata:
  name:
spec:
  severity:
  namespaceSelector:
    include:
    exclude:
  remediationAction:
  maxClusterRoleBindingUsers:
```

2.3.3.2. IAM policy YAMl table

View the following parameter table for descriptions:

Table 2.3. Parameter table

Field	Description
apiVersion	Required. Set the value to **policy.open-cluster-management.io/v1**.
kind	Required. Set the value to **Policy** to indicate the type of policy.
metadata.name	Required. The name for identifying the policy resource.
spec	Required. Add configuration details for your policy.
spec.namespaceSelector	Required. The namespaces within the hub cluster that the policy is applied to. Enter at least one namespace for the **include** parameter, which are the namespaces you want to apply to the policy to. The **exclude** parameter specifies the namespaces you explicitly do not want to apply the policy to. **Note**: A namespace that is specified in the object template of a policy controller overrides the namespace in the preceding parameter values.
spec.remediationAction	Required. Specifies the remediation of your policy. Enter **inform**.
spec.maxClusterRoleBindingUsers	Required. Maximum number of IAM role bindings that are available before a policy is considered non-compliant.

2.3.3.3. IAM policy sample

```
apiVersion: policy.open-cluster-management.io/v1
kind: IamPolicy # limit clusteradminrole and report violation
metadata:
  name: {{name}}-example
spec:
  severity: medium
  namespaceSelector:
    include: ["*"]
    exclude: ["kube-*", "openshift-*"]
  remediationAction: inform # will be overridden by remediationAction in parent policy
  maxClusterRoleBindingUsers: 5
```

Learn how to manage an IAM policy, see Managing IAM policies for more details. Refer to Policy controllers for more topics.

2.3.4. Integrate third-party policy controllers

Integrate third-party policies to create custom annotations within the policy templates to specify one or more compliance standards, control categories, and controls.

You can also use the third-party party policies from the policy-collection/community.

Learn to integrate the following third-party policies:

- Integrating gatekeeper constraints and constraint templates

2.3.5. Creating a custom policy controller

Learn to write, apply, view, and update your custom policy controllers. You can create a YAML file for your policy controller to deploy onto your cluster. View the following sections to create a policy controller:

2.3.5.1. Writing a policy controller

Use the policy controller framework that is in the **multicloud-operators-policy-controller** repository. Complete the following steps to create a policy controller:

1. Clone the **multicloud-operators-policy-controller** repository by running the following command:

   ```
   git clone git@github.com:open-cluster-management/multicloud-operators-policy-controller.git
   ```

2. Customize the controller policy by updating the policy schema definition. Your policy might resemble the following content:

   ```
   metadata:
     name: samplepolicies.policies.open-cluster-management.io
   spec:
     group: policy.open-cluster-management.io
     names:
       kind: SamplePolicy
   ```

```
    listKind: SamplePolicyList
    plural: samplepolicies
    singular: samplepolicy
```

3. Update the policy controller to watch for the **SamplePolicy** kind. Run the following command:

```
for file in $(find . -name "*.go" -type f); do  sed -i "" "s/SamplePolicy/g" $file; done
for file in $(find . -name "*.go" -type f); do  sed -i "" "s/samplepolicy-controller/samplepolicy-controller/g" $file; done
```

4. Recompile and run the policy controller by completing the following steps:

   a. Log in to your cluster.

   b. Select the user icon, then click **Configure client**.

   c. Copy and paste the configuration information into your command line, and press **Enter**.

   d. Run the following commands to apply your policy CRD and start the controller:

```
export GO111MODULE=on

kubectl apply -f deploy/crds/policy.open-cluster-management.io_samplepolicies_crd.yaml

operator-sdk run --local --verbose
```

   You might receive the following output that indicates that your controller runs:

```
{“level”:”info”,”ts”:1578503280.511274,”logger”:”controller-runtime.manager”,”msg”:”starting metrics server”,”path”:”/metrics”}
{“level”:”info”,”ts”:1578503281.215883,”logger”:”controller-runtime.controller”,”msg”:”Starting Controller”,”controller”:”samplepolicy-controller”}
{“level”:”info”,”ts”:1578503281.3203468,”logger”:”controller-runtime.controller”,”msg”:”Starting workers”,”controller”:”samplepolicy-controller”,”worker count”:1}
Waiting for policies to be available for processing…
```

   e. Create a policy and verify that the controller retrieves it and applies the policy onto your cluster. Run the following command:

```
kubectl apply -f deploy/crds/policy.open-cluster-management.io_samplepolicies_crd.yaml
```

   When the policy is applied, a message appears to indicate that policy is monitored and detected by your custom controller. The mesasge might resemble the following contents:

```
{"level":"info","ts":1578503685.643426,"logger":"controller_samplepolicy","msg":"Reconciling SamplePolicy","Request.Namespace":"default","Request.Name":"example-samplepolicy"}
{"level":"info","ts":1578503685.855259,"logger":"controller_samplepolicy","msg":"Reconciling SamplePolicy","Request.Namespace":"default","Request.Name":"example-samplepolicy"}
Available policies in namespaces:
namespace = kube-public; policy = example-samplepolicy
namespace = default; policy = example-samplepolicy
namespace = kube-node-lease; policy = example-samplepolicy
```

5. Check the **status** field for compliance details by running the following command:

```
kubectl describe SamplePolicy example-samplepolicy -n default
```

Your output might resemble the following contents:

```
status:
  compliancyDetails:
    example-samplepolicy:
      cluster-wide:
      - 5 violations detected in namespace `cluster-wide`, there are 0 users violations
        and 5 groups violations
      default:
      - 0 violations detected in namespace `default`, there are 0 users violations
        and 0 groups violations
      kube-node-lease:
      - 0 violations detected in namespace `kube-node-lease`, there are 0 users violations
        and 0 groups violations
      kube-public:
      - 1 violations detected in namespace `kube-public`, there are 0 users violations
        and 1 groups violations
  compliant: NonCompliant
```

6. Change the policy rules and policy logic to introduce new rules for your policy controller. Complete the following steps:

   a. Add new fields in your YAML file by updating the **SamplePolicySpec**. Your specification might resemble the following content:

```
spec:
  description: SamplePolicySpec defines the desired state of SamplePolicy
  properties:
    labelSelector:
      additionalProperties:
        type: string
      type: object
    maxClusterRoleBindingGroups:
      type: integer
    maxClusterRoleBindingUsers:
      type: integer
    maxRoleBindingGroupsPerNamespace:
      type: integer
    maxRoleBindingUsersPerNamespace:
      type: integer
```

   b. Update the **SamplePolicySpec** structure in the samplepolicy_controller.go with new fields.

   c. Update the **PeriodicallyExecSamplePolicies** function in the **samplepolicy_controller.go** file with new logic to run the policy controller. View an example of the **PeriodicallyExecSamplePolicies** field, see open-cluster-management/multicloud-operators-policy-controller.

   d. Recompile and run the policy controller. See Writing a policy controller

Your policy controller is functional.

2.3.5.2. Deploying your controller to the cluster

Deploy your custom policy controller to your cluster and integrate the policy controller with the Governance and risk dashboard. Complete the following steps:

1. Build the policy controller image by running the following command:

```
operator-sdk build <username>/multicloud-operators-policy-controller:latest
```

2. Run the following command to push the image to a repository of your choice. For example, run the following commands to push the image to Docker Hub:

```
docker login

docker push <username>/multicloud-operators-policy-controller
```

3. Configure **kubectl** to point to a cluster managed by Red Hat Advanced Cluster Management for Kubernetes.

4. Replace the operator manifest to use the built-in image name and update the namespace to watch for policies. The namespace must be the cluster namespace. Your manifest might resemble the following contents:

```
sed -i "" 's|open-cluster-management/multicloud-operators-policy-controller|ycao/multicloud-operators-policy-controller|g' deploy/operator.yaml
sed -i "" 's|value: default|value: <namespace>|g' deploy/operator.yaml
```

5. Update the RBAC role by running the following commands:

```
sed -i "" 's|samplepolicies|testpolicies|g' deploy/cluster_role.yaml
sed -i "" 's|namespace: default|namespace: <namespace>|g' deploy/cluster_role_binding.yaml
```

6. Deploy your policy controller to your cluster:

   a. Set up a service account for cluster by runnng the following command:

```
kubectl apply -f deploy/service_account.yaml -n <namespace>
```

   b. Set up RBAC for the operator by running the following commands:

```
kubectl apply -f deploy/role.yaml -n <namespace>

kubectl apply -f deploy/role_binding.yaml -n <namespace>
```

   c. Set up RBAC for your PolicyController. Run the following commands:

```
kubectl apply -f deploy/cluster_role.yaml
kubectl apply -f deploy/cluster_role_binding.yaml
```

   d. Set up a CustomResourceDefinition (CRD) by running the following command:

```
kubectl apply -f deploy/crds/policies.open-cluster-
management.io_samplepolicies_crd.yaml
```

e. Deploy the **multicloud-operator-policy-controller** by running the following command:

```
kubectl apply -f deploy/operator.yaml -n <namespace>
```

f. Verify that the controller is functional by running the following command:

```
kubectl get pod -n <namespace>
```

7. You must integrate your policy controller by creating a **policy-template** for the controller to monitor. For more information, see Creating a cluster security policy from the console .

2.3.5.2.1. Scaling your controller deployment

Policy controller deployments do not support deletetion or removal. You can scale your deployment to update which pods the deployment is applied to. Complete the following steps:

1. Log in to your managed cluster.
2. Navigate to the deployment for your custom policy controller.
3. Scale the deployment. When you scale your deployment to zero pods, the policy controler deployment is disabled.

For more information on deployments, see OpenShift Container Platform Deployments.

Your policy controller is deployed and integrated on your cluster. View the product policy controllers, see Policy controllers for more information.

2.4. POLICY SAMPLES

View policy samples to learn how to define rules, processes, and controls on the hub cluster when you create and manage policies in Red Hat Advanced Cluster Management for Kubernetes.

Note: You can copy and paste an existing policy in to the *Policy YAML*. The values for the parameter fields are automatically entered when you paste your existing policy. You can also search the contents in your policy YAML file with the search feature.

View the following policy samples to view how specfic policies are applied:

- Kubernetes configuration policy controller sample
- Image vulnerability policy sample
- Memory usage policy sample
- Namespace policy sample
- Pod nginx policy sample
- Pod security policy sample
- Role policy sample

- Rolebinding policy sample
- Security context constraints policy sample
- Certificate policy sample
- IAM policy sample
- Gatekeeper policy sample
- ETCD encryption policy sample

Refer to Governance and risk for more topics.

2.4.1. Memory usage policy

Kubernetes configuration policy controller monitors the status of the memory usage policy. Use the memory usage policy to limit or restrict your memory and compute usage. For more information, see *Limit Ranges* in the Kubernetes documentation. Learn more details about the memory usage policy structure in the following sections.

2.4.1.1. Memory usage policy YAML structure

Your memory usage policy might resemble the following YAML file:

```
apiVersion: policy.open-cluster-management.io/v1
kind: Policy
metadata:
  name: policy-limitrange
  namespace:
spec:
  complianceType:
  remediationAction:
  namespaces:
    exclude:
    include:
  object-templates:
    - complianceType:
      objectDefinition:
        apiVersion:
        kind:
        metadata:
          name:
        spec:
          limits:
          - default:
              memory:
            defaultRequest:
              memory:
            type:
        ...
```

2.4.1.2. Memory usage policy table

Field	Description
apiVersion	Required. Set the value to **policy.open-cluster-management.io/v1**.
kind	Required. Set the value to **Policy** to indicate the type of policy.
metadata.name	Required. The name for identifying the policy resource.
metadata.namespaces	Optional.
spec.namespace	Required. The namespaces within the hub cluster that the policy is applied to. Enter parameter values for **include**, which are the namespaces you want to apply to the policy to. The **exclude** parameter specifies the namespaces you explicitly do not want to apply the policy to. **Note**: A namespace that is specified in the object template of a policy controller overrides the namespace in the corresponding parent policy.
remediationAction	Optional. Specifies the remediation of your policy. The parameter values are **enforce** and **inform**. **Important**: Some policies might not support the enforce feature.
disabled	Required. Set the value to **true** or **false**. The **disabled** parameter provides the ability to enable and disable your policies.
spec.complianceType	Required. Set the value to **"musthave"**
spec.object-template	Optional. Used to list any other Kubernetes object that must be evaluated or applied to the managed clusters.

2.4.1.3. Memory usage policy sample

```
apiVersion: policy.open-cluster-management.io/v1
kind: Policy
metadata:
  name: policy-limitrange
  namespace: mcm
spec:
  complianceType: musthave
  remediationAction: inform
  namespaces:
    exclude: ["kube-*"]
    include: ["default"]
```

```
    object-templates:
      - complianceType: musthave
        objectDefinition:
          apiVersion: v1
          kind: LimitRange # limit memory usage
          metadata:
            name: mem-limit-range
          spec:
            limits:
            - default:
                memory: 512Mi
              defaultRequest:
                memory: 256Mi
              type: Container
          ...
```

See Managing memory usage policies for more information. View other configuration policies that are monitored by controller, see the Kubernetes configuration policy controller page.

2.4.2. Namespace policy

Kubernetes configuration policy controller monitors the status of your namespace policy. Apply the namespace policy to define specific rules for your namespace. Learn more details about the namespace policy structure in the following sections.

2.4.2.1. Namespace policy YAML structure

```
apiVersion: policy.open-cluster-management.io/v1
kind: Policy
metadata:
  name: policy-namespace-1
  namespace:
spec:
  complianceType:
  remediationAction:
  namespaces:
    exclude:
    include:
  object-templates:
    - complianceType:
      objectDefinition:
        kind:
        apiVersion:
        metadata:
          name:
      ...
```

2.4.2.2. Namespace policy YAML table

Field	Description
apiVersion	Required. Set the value to **policy.open-cluster-management.io/v1**.

Field	Description
kind	Required. Set the value to **Policy** to indicate the type of policy.
metadata.name	Required. The name for identifying the policy resource.
metadata.namespaces	Optional.
spec.namespace	Required. The namespaces within the hub cluster that the policy is applied to. Enter parameter values for **include**, which are the namespaces you want to apply to the policy to. The **exclude** parameter specifies the namespaces you explicitly do not want to apply the policy to. **Note**: A namespace that is specified in the object template of a policy controller overrides the namespace in the corresponding parent policy.
remediationAction	Optional. Specifies the remediation of your policy. The parameter values are **enforce** and **inform**. **Important**: Some policies might not support the enforce feature.
disabled	Required. Set the value to **true** or **false**. The **disabled** parameter provides the ability to enable and disable your policies.
spec.complianceType	Required. Set the value to **"musthave"**
spec.object-template	Optional. Used to list any other Kubernetes object that must be evaluated or applied to the managed clusters.

2.4.2.3. Namespace policy sample

Your namespace policy might resemble the following YAML file:

```
apiVersion: policy.open-cluster-management.io/v1
kind: Policy
metadata:
  name: policy-namespace-1
  namespace: open-cluster-management
spec:
  complianceType: musthave
  remediationAction: inform
  namespaces:
    exclude: ["kube-*"]
    include: ["default"]
  object-templates:
```

```
    - complianceType: musthave
      objectDefinition:
        kind: Namespace # must have namespace 'prod'
        apiVersion: v1
        metadata:
          name: prod
    ...
```

Manage your namespace policy. See Managing namespace policies for more information. See Kubernetes configuration policy controller to learn about other configuration policies.

2.4.3. Image vulnerability policy

Apply the image vulnerability policy to detect if container images have vulnerabilities by leveraging the Container Security Operator. The policy installs the Container Security Operator on your managed cluster if it is not installed.

The image vulnerability policy is checked by the Kubernetes configuration policy controller. For more information about the Security Operator, see the *Container Security Operator* from the Quay repository.

Note: Image vulnerability policy is not functional during a disconnected installation.

2.4.3.1. Image vulnerability policy YAML structure

```
apiVersion: policy.open-cluster-management.io/v1
kind: Policy
metadata:
  name: policy-imagemanifestvulnpolicy
  namespace: default
  annotations:
    policy.open-cluster-management.io/standards: NIST-CSF
    policy.open-cluster-management.io/categories: DE.CM Security Continuous Monitoring
    policy.open-cluster-management.io/controls: DE.CM-8 Vulnerability Scans
spec:
  remediationAction:
  disabled:
  policy-templates:
  - objectDefinition:
      apiVersion: policy.open-cluster-management.io/v1
      kind: ConfigurationPolicy
      metadata:
        name:
      spec:
        remediationAction:
        severity: high
        object-templates:
          - complianceType:
            objectDefinition:
              apiVersion: operators.coreos.com/v1alpha1
              kind: Subscription
              metadata:
                name: container-security-operator
                namespace:
              spec:
                channel:
```

```
            installPlanApproval:
            name:
            source:
            sourceNamespace:
  - objectDefinition:
      apiVersion: policy.open-cluster-management.io/v1
      kind: ConfigurationPolicy
      metadata:
        name:
      spec:
        remediationAction:
        severity:
        namespaceSelector:
          exclude:
          include:
        object-templates:
          - complianceType:
            objectDefinition:
              apiVersion: secscan.quay.redhat.com/v1alpha1
              kind: ImageManifestVuln # checking for a kind
---
apiVersion: policy.open-cluster-management.io/v1
kind: PlacementBinding
metadata:
  name: binding-policy-imagemanifestvulnpolicy
  namespace: default
placementRef:
  name:
  kind:
  apiGroup:
subjects:
- name:
  kind:
  apiGroup:
---
apiVersion: apps.open-cluster-management.io/v1
kind: PlacementRule
metadata:
  name: placement-policy-imagemanifestvulnpolicy
  namespace: default
spec:
  clusterConditions:
  - status:
    type:
  clusterSelector:
    matchExpressions:
      [] # selects all clusters if not specified
```

2.4.3.2. Image vulnerability policy YAML table

Field	Description
apiVersion	Required. Set the value to **policy.open-cluster-management.io/v1**.

Field	Description
kind	Required. Set the value to **Policy** to indicate the type of policy.
metadata.name	Required. The name for identifying the policy resource.
metadata.namespaces	Optional.
spec.namespace	Required. The namespaces within the hub cluster that the policy is applied to. Enter parameter values for **include**, which are the namespaces you want to apply to the policy to. The **exclude** parameter specifies the namespaces you explicitly do not want to apply the policy to. **Note**: A namespace that is specified in the object template of a policy controller overrides the namespace in the corresponding parent policy.
remediationAction	Optional. Specifies the remediation of your policy. The parameter values are **enforce** and **inform**. **Important**: Some policies might not support the enforce feature.
disabled	Required. Set the value to **true** or **false**. The **disabled** parameter provides the ability to enable and disable your policies.
spec.complianceType	Required. Set the value to **"musthave"**
spec.object-template	Optional. Used to list any other Kubernetes object that must be evaluated or applied to the managed clusters.

2.4.3.3. Image vulnerability policy sample

```
apiVersion: policy.open-cluster-management.io/v1
kind: Policy
metadata:
  name: policy-imagemanifestvulnpolicy
  namespace: default
  annotations:
    policy.open-cluster-management.io/standards: NIST-CSF
    policy.open-cluster-management.io/categories: DE.CM Security Continuous Monitoring
    policy.open-cluster-management.io/controls: DE.CM-8 Vulnerability Scans
spec:
  remediationAction: inform
  disabled: false
  policy-templates:
```

```
  - objectDefinition:
      apiVersion: policy.open-cluster-management.io/v1
      kind: ConfigurationPolicy
      metadata:
        name: policy-imagemanifestvulnpolicy-example-sub
      spec:
        remediationAction: inform # will be overridden by remediationAction in parent policy
        severity: high
        object-templates:
          - complianceType: musthave
            objectDefinition:
              apiVersion: operators.coreos.com/v1alpha1
              kind: Subscription
              metadata:
                name: container-security-operator
                namespace: openshift-operators
              spec:
                channel: quay-v3.3
                installPlanApproval: Automatic
                name: container-security-operator
                source: redhat-operators
                sourceNamespace: openshift-marketplace
  - objectDefinition:
      apiVersion: policy.open-cluster-management.io/v1
      kind: ConfigurationPolicy
      metadata:
        name: policy-imagemanifestvulnpolicy-example-imv
      spec:
        remediationAction: inform # will be overridden by remediationAction in parent policy
        severity: high
        namespaceSelector:
          exclude: ["kube-*"]
          include: ["*"]
        object-templates:
          - complianceType: mustnothave # mustnothave any ImageManifestVuln object
            objectDefinition:
              apiVersion: secscan.quay.redhat.com/v1alpha1
              kind: ImageManifestVuln # checking for a kind
---
apiVersion: policy.open-cluster-management.io/v1
kind: PlacementBinding
metadata:
  name: binding-policy-imagemanifestvulnpolicy
  namespace: default
placementRef:
  name: placement-policy-imagemanifestvulnpolicy
  kind: PlacementRule
  apiGroup: apps.open-cluster-management.io
subjects:
- name: policy-imagemanifestvulnpolicy
  kind: Policy
  apiGroup: policy.open-cluster-management.io
---
apiVersion: apps.open-cluster-management.io/v1
kind: PlacementRule
metadata:
```

```
  name: placement-policy-imagemanifestvulnpolicy
  namespace: default
spec:
  clusterConditions:
  - status: "True"
    type: ManagedClusterConditionAvailable
  clusterSelector:
    matchExpressions:
      [] # selects all clusters if not specified
```

See Managing image vulnerability policies for more information. View other configuration policies that are monitored by the configuration controller, see Kubernetes configuration policy controller .

2.4.4. Pod nginx policy

Kubernetes configuration policy controller monitors the status of you pod nginx policies. Apply the pod policy to define the container rules for your pods. A nginx pod must exist in your cluster.

2.4.4.1. Pod nginx policy YAML structure

```
apiVersion: policy.open-cluster-management.io/v1
kind: Policy
metadata:
  name: policy-pod
  namespace:
spec:
  complianceType:
  remediationAction:
  namespaces:
    exclude:
    include:
  object-templates:
    - complianceType:
      objectDefinition:
        apiVersion:
        kind: Pod # nginx pod must exist
        metadata:
          name:
        spec:
          containers:
          - image:
            name:
            ports:
            - containerPort:
      ...
```

2.4.4.2. Pod nginx policy table

Field	Description
apiVersion	Required. Set the value to **policy.open-cluster-management.io/v1**.

Field	Description
kind	Required. Set the value to **Policy** to indicate the type of policy.
metadata.name	Required. The name for identifying the policy resource.
metadata.namespaces	Optional.
spec.namespace	Required. The namespaces within the hub cluster that the policy is applied to. Enter parameter values for **include**, which are the namespaces you want to apply to the policy to. The **exclude** parameter specifies the namespaces you explicitly do not want to apply the policy to. **Note**: A namespace that is specified in the object template of a policy controller overrides the namespace in the corresponding parent policy.
remediationAction	Optional. Specifies the remediation of your policy. The parameter values are **enforce** and **inform**. **Important**: Some policies might not support the enforce feature.
disabled	Required. Set the value to **true** or **false**. The **disabled** parameter provides the ability to enable and disable your policies.
spec.complianceType	Required. Set the value to **"musthave"**
spec.object-template	Optional. Used to list any other Kubernetes object that must be evaluated or applied to the managed clusters.

2.4.4.3. Pod nginx policy sample

Your pod policy nginx policy might resemble the following YAML file:

```
apiVersion: policy.open-cluster-management.io/v1
kind: Policy
metadata:
  name: policy-pod
  namespace: open-cluster-management
spec:
  complianceType: musthave
  remediationAction: inform
  namespaces:
    exclude: ["kube-*"]
    include: ["default"]
```

```
  object-templates:
    - complianceType: musthave
      objectDefinition:
        apiVersion: v1
        kind: Pod # nginx pod must exist
        metadata:
          name: nginx-pod
        spec:
          containers:
          - image: nginx:1.7.9
            name: nginx
            ports:
            - containerPort: 80
    ...
```

Learn how to manage a pod nginx policy, see Managing pod nginx policies for more details. View other configuration policies that are monitored by the configuration controller, see Kubernetes configuration policy controller. See Manage security policies to manage other policies.

2.4.5. Pod security policy

Kubernetes configuration policy controller monitors the status of the pod security policy. Apply a pod security policy to secure pods and containers. For more information, see *Pod Security Policies* in the Kubernetes documentation. Learn more details about the pod security policy structure in the following sections.

2.4.5.1. Pod security policy YAML structure

```
apiVersion: policy.open-cluster-management.io/v1
kind: Policy
metadata:
  name: policy-podsecuritypolicy
  namespace:
spec:
  complianceType:
  remediationAction:
  namespaces:
    exclude:
    include:
  object-templates:
    - complianceType:
      objectDefinition:
        apiVersion:
        kind: PodSecurityPolicy # no privileged pods
        metadata:
          name:
          annotations:
        spec:
          privileged:
          allowPrivilegeEscalation:
          allowedCapabilities:
          volumes:
          hostNetwork:
          hostPorts:
          hostIPC:
```

```
    hostPID:
    runAsUser:
      rule:
    seLinux:
      rule:
    supplementalGroups:
      rule:
    fsGroup:
      rule:
...
```

2.4.5.2. Pod security policy table

Field	Description
apiVersion	Required. Set the value to **policy.open-cluster-management.io/v1**.
kind	Required. Set the value to **Policy** to indicate the type of policy.
metadata.name	Required. The name for identifying the policy resource.
metadata.namespaces	Optional.
spec.namespace	Required. The namespaces within the hub cluster that the policy is applied to. Enter parameter values for **include**, which are the namespaces you want to apply to the policy to. The **exclude** parameter specifies the namespaces you explicitly do not want to apply the policy to. **Note**: A namespace that is specified in the object template of a policy controller overrides the namespace in the corresponding parent policy.
remediationAction	Optional. Specifies the remediation of your policy. The parameter values are **enforce** and **inform**. **Important**: Some policies might not support the enforce feature.
disabled	Required. Set the value to **true** or **false**. The **disabled** parameter provides the ability to enable and disable your policies.
spec.complianceType	Required. Set the value to **"musthave"**
spec.object-template	Optional. Used to list any other Kubernetes object that must be evaluated or applied to the managed clusters.

2.4.5.3. Pod security policy sample

Your pod security policy might resemble the following YAML file:

```
apiVersion: policy.open-cluster-management.io/v1
kind: Policy
metadata:
  name: policy-podsecuritypolicy
  namespace: open-cluster-management
spec:
  complianceType: musthave
  remediationAction: inform
  namespaces:
    exclude: ["kube-*"]
    include: ["default"]
  object-templates:
    - complianceType: musthave
      objectDefinition:
        apiVersion: policy/v1beta1
        kind: PodSecurityPolicy # no privileged pods
        metadata:
          name: restricted-open-cluster-management
          annotations:
         seccomp.security.alpha.kubernetes.io/allowedProfileNames: '*'
        spec:
          privileged: false # no priviliedged pods
          allowPrivilegeEscalation: false
          allowedCapabilities:
          - '*'
          volumes:
          - '*'
          hostNetwork: true
          hostPorts:
          - min: 1000 # ports < 1000 are reserved
            max: 65535
          hostIPC: false
          hostPID: false
          runAsUser:
            rule: 'RunAsAny'
          seLinux:
            rule: 'RunAsAny'
          supplementalGroups:
            rule: 'RunAsAny'
          fsGroup:
            rule: 'RunAsAny'
      ...
```

See Managing pod security policies for more information. View other configuration policies that are monitored by controller, see the Kubernetes configuration policy controller page.

2.4.6. Role policy

Kubernetes configuration policy controller monitors the status of role policies. Define roles in the **object-template** to set rules and permissions for specific roles in your cluster. Learn more details about the role policy structure in the following sections.

2.4.6.1. Role policy YAML structure

```
apiVersion: policy.open-cluster-management.io/v1
kind: Policy
metadata:
  name: policy-role
  namespace:
  annotations:
    policy.open-cluster-management.io/standards: NIST-CSF
    policy.open-cluster-management.io/categories: PR.AC Identity Management Authentication and
Access Control
    policy.open-cluster-management.io/controls: PR.AC-4 Access Control
spec:
  remediationAction: inform
  disabled: false
  policy-templates:
    - objectDefinition:
        apiVersion: policy.open-cluster-management.io/v1
        kind: ConfigurationPolicy
        metadata:
          name: policy-role-example
        spec:
          remediationAction: inform # will be overridden by remediationAction in parent policy
          severity: high
          namespaceSelector:
            exclude: ["kube-*"]
            include: ["default"]
          object-templates:
            - complianceType: mustonlyhave # role definition should exact match
              objectDefinition:
                apiVersion: rbac.authorization.k8s.io/v1
                kind: Role
                metadata:
                  name: sample-role
                rules:
                  - apiGroups: ["extensions", "apps"]
                    resources: ["deployments"]
                    verbs: ["get", "list", "watch", "delete","patch"]
---
apiVersion: policy.open-cluster-management.io/v1
kind: PlacementBinding
metadata:
  name: binding-policy-role
  namespace:
placementRef:
  name: placement-policy-role
  kind: PlacementRule
  apiGroup: apps.open-cluster-management.io
subjects:
- name: policy-role
  kind: Policy
  apiGroup: policy.open-cluster-management.io
---
apiVersion: apps.open-cluster-management.io/v1
kind: PlacementRule
metadata:
```

```
  name: placement-policy-role
  namespace:
spec:
  clusterConditions:
    - type: ManagedClusterConditionAvailable
      status: "True"
  clusterSelector:
    matchExpressions:
      []

          ...
```

2.4.6.2. Role policy table

Field	Description
apiVersion	Required. Set the value to **policy.open-cluster-management.io/v1**.
kind	Required. Set the value to **Policy** to indicate the type of policy.
metadata.name	Required. The name for identifying the policy resource.
metadata.namespaces	Optional.
spec.namespace	Required. The namespaces within the hub cluster that the policy is applied to. Enter parameter values for **include**, which are the namespaces you want to apply to the policy to. The **exclude** parameter specifies the namespaces you explicitly do not want to apply the policy to. **Note**: A namespace that is specified in the object template of a policy controller overrides the namespace in the corresponding parent policy.
remediationAction	Optional. Specifies the remediation of your policy. The parameter values are **enforce** and **inform**. **Important**: Some policies might not support the enforce feature.
disabled	Required. Set the value to **true** or **false**. The **disabled** parameter provides the ability to enable and disable your policies.
spec.complianceType	Required. Set the value to **"musthave"**
spec.object-template	Optional. Used to list any other Kubernetes object that must be evaluated or applied to the managed clusters.

2.4.6.3. Role policy sample

Apply a role policy to set rules and permissions for specific roles in your cluster. For more information on roles, see Role-based access control. Your role policy might resemble the following YAML file:

```
apiVersion: policy.open-cluster-management.io/v1
kind: Policy
metadata:
  name: policy-role
  namespace: open-cluster-management
spec:
  complianceType: musthave
  remediationAction: inform
  namespaces:
    exclude: ["kube-*"]
    include: ["default"]
  role-templates:
    - apiVersion: open-cluster-management.io/v1/v1alpha1 # role must follow defined permissions
      metadata:
        namespace: "" # will be inferred
        name: operator-role-policy
      selector:
        matchLabels:
          dev: "true"
      complianceType: musthave # at this level, it means the role must exist with the rules that it must have the following
      rules:
        - complianceType: musthave # at this level, it means if the role exists the rule is a musthave
          policyRule:
            apiGroups: ["extensions", "apps"]
            resources: ["deployments"]
            verbs: ["get", "list", "watch", "create", "delete","patch"]
        - complianceType: "mustnothave" # at this level, it means if the role exists the rule is a mustnothave
          policyRule:
            apiGroups: ["core"]
            resources: ["secrets"]
            verbs: ["get", "list", "watch","delete", "create", "update", "patch"]
      ...
```

See Managing role policies for more information. View other configuration policies that are monitored by controller, see the Kubernetes configuration policy controller page. Learn more about Red Hat Advanced Cluster Management for Kubernates RBAC, see Role-based access control.

2.4.7. Rolebinding policy

Kubernetes configuration policy controller monitors the status of your rolebinding policy. Apply a rolebinding policy to bind a policy to a namespace in your managed cluster. Learn more details about the namespace policy structure in the following sections.

2.4.7.1. Rolebinding policy YAML structure

```
apiVersion: policy.open-cluster-management.io/v1
kind: Policy
metadata:
```

```
    name:
    namespace:
  spec:
    complianceType:
    remediationAction:
    namespaces:
      exclude:
      include:
    object-templates:
      - complianceType:
        objectDefinition:
          kind: RoleBinding # role binding must exist
          apiVersion: rbac.authorization.k8s.io/v1
          metadata:
            name: operate-pods-rolebinding
          subjects:
          - kind: User
            name: admin # Name is case sensitive
            apiGroup:
          roleRef:
            kind: Role #this must be Role or ClusterRole
            name: operator # this must match the name of the Role or ClusterRole you wish to bind to
            apiGroup: rbac.authorization.k8s.io
      ...
```

2.4.7.2. Rolebinding policy table

Field	Description
apiVersion	Required. Set the value to **policy.open-cluster-management.io/v1**.
kind	Required. Set the value to **Policy** to indicate the type of policy.
metadata.name	Required. The name to identify the policy resource.
metadata.namespaces	Required. The namespace within the managed cluster where the policy is created.
spec	Required. Specifications of how compliance violations are identified and fixed.
metadata.name	Required. The name for identifying the policy resource.
metadata.namespaces	Optional.
spec.complianceType	Required. Set the value to **"musthave"**

Field	Description
spec.namespace	Required. Managed cluster namespace to which you want to apply the policy. Enter parameter values for **include**, which are the namespaces you want to apply to the policy to. The **exclude** parameter specifies the namespaces you explicitly do not want to apply the policy to. **Note**: A namespace that is specified in the object template of a policy controller overrides the namespace in the corresponding parent policy.
spec.remediationAction	Required. Specifies the remediation of your policy. The parameter values are **enforce** and **inform**. **Important**: Some policies might not support the enforce feature.
spec.object-template	Required. Used to list any other Kubernetes object that must be evaluated or applied to the managed clusters.

2.4.7.3. Rolebinding policy sample

Your rolebinding policy might resemble the following YAML file:

```
apiVersion: policy.open-cluster-management.io/v1
kind: Policy
metadata:
  name: policy-rolebinding
  namespace: open-cluster-management
spec:
  complianceType: musthave
  remediationAction: inform
  namespaces:
    exclude: ["kube-*"]
    include: ["default"]
  object-templates:
    - complianceType: musthave
      objectDefinition:
        kind: RoleBinding # role binding must exist
        apiVersion: rbac.authorization.k8s.io/v1
        metadata:
          name: operate-pods-rolebinding
        subjects:
        - kind: User
          name: admin # Name is case sensitive
          apiGroup: rbac.authorization.k8s.io
        roleRef:
          kind: Role #this must be Role or ClusterRole
```

```
        name: operator # this must match the name of the Role or ClusterRole you wish to bind to
        apiGroup: rbac.authorization.k8s.io
    ...
```

Learn how to manage a rolebinding policy, see Managing rolebinding policies for more details. See Kubernetes configuration policy controller to learn about other configuration policies. See Manage security policies to manage other policies.

2.4.8. Security Context Constraints policy

Kubernetes configuration policy controller monitors the status of your Security Context Constraints (SCC) policy. Apply an Security Context Constraints (SCC) policy to control permissions for pods by defining conditions in the policy. Learn more details about SCC policies in the following sections.

2.4.8.1. SCC policy YAML structure

```
apiVersion: policy.open-cluster-management.io/v1
kind: Policy
metadata:
  name: policy-scc
  namespace: open-cluster-management-policies
spec:
  complianceType:
  remediationAction:
  namespaces:
    exclude:
    include:
  object-templates:
    - complianceType:
      objectDefinition:
        apiVersion:
        kind: SecurityContextConstraints # restricted scc
        metadata:
          annotations:
            kubernetes.io/description:
          name: sample-restricted-scc
        allowHostDirVolumePlugin:
        allowHostIPC:
        allowHostNetwork:
        allowHostPID:
        allowHostPorts:
        allowPrivilegeEscalation:
        allowPrivilegedContainer:
        allowedCapabilities:
        defaultAddCapabilities:
        fsGroup:
         type:
        groups:
        - system:
        priority:
        readOnlyRootFilesystem:
        requiredDropCapabilities:
        runAsUser:
          type:
        seLinuxContext:
```

```
    type:
supplementalGroups:
    type:
users:
volumes:
```

2.4.8.2. SCC policy table

Field	Description
apiVersion	Required. Set the value to **policy.open-cluster-management.io/v1**.
kind	Required. Set the value to **Policy** to indicate the type of policy.
metadata.name	Required. The name to identify the policy resource.
metadata.namespace	Required. The namespace within the managed cluster where the policy is created.
spec.complianceType	Required. Set the value to **"musthave"**
spec.remediationAction	Required. Specifies the remediation of your policy. The parameter values are **enforce** and **inform**. **Important**: Some policies might not support the enforce feature.
spec.namespace	Required. Managed cluster namespace to which you want to apply the policy. Enter parameter values for **include**, which are the namespaces you want to apply to the policy to. The **exclude** parameter specifies the namespaces you explicitly do not want to apply the policy to. **Note**: A namespace that is specified in the object template of a policy controller overrides the namespace in the corresponding parent policy.
spec.object-template	Required. Used to list any other Kubernetes object that must be evaluated or applied to the managed clusters.

For explanations on the contents of a SCC policy, see About Security Context Constraints from the OpenShift Container Platform documentation.

2.4.8.3. SCC policy sample

Apply an Security context constraints (SCC) policy to control permissions for pods by defining conditions in the policy. For more information see, Managing Security Context Constraints (SCC) . Your SCC policy might resemble the following YAML file:

```
  apiVersion: policy.open-cluster-management.io/v1
  kind: Policy
  metadata:
    name: policy-scc
    namespace: open-cluster-management
    annotations:
      policy.open-cluster-management.io/standards: NIST-CSF
      policy.open-cluster-management.io/categories: PR.PT Protective Technology
      policy.open-cluster-management.io/controls: PR.PT-3 Least Functionality
  spec:
    complianceType: musthave
    remediationAction: inform
    disabled: false
    namespaces:
      exclude: ["kube-*"]
      include: ["default"]
    object-templates:
      - complianceType: musthave
        objectDefinition:
          apiVersion: security.openshift.io/v1
          kind: SecurityContextConstraints # restricted scc
          metadata:
            annotations:
              kubernetes.io/description: restricted denies access to all host features and requires pods to
be run with a UID, and SELinux context that are allocated to the namespace.  This is the most
restrictive SCC and it is used by default for authenticated users.
            name: sample-restricted-scc
          allowHostDirVolumePlugin: false
          allowHostIPC: false
          allowHostNetwork: false
          allowHostPID: false
          allowHostPorts: false
          allowPrivilegeEscalation: true
          allowPrivilegedContainer: false
          allowedCapabilities: []
          defaultAddCapabilities: []
          fsGroup:
            type: MustRunAs
          groups:
          - system:authenticated
          priority: null
          readOnlyRootFilesystem: false
          requiredDropCapabilities:
          - KILL
          - MKNOD
          - SETUID
          - SETGID
          runAsUser:
            type: MustRunAsRange
          seLinuxContext:
            type: MustRunAs
          supplementalGroups:
            type: RunAsAny
          users: []
          volumes:
          - configMap
```

```
        - downwardAPI
        - emptyDir
        - persistentVolumeClaim
        - projected
        - secret
---
apiVersion: apps.open-cluster-management.io/v1
kind: PlacementBinding
metadata:
  name: binding-policy-scc
  namespace: open-cluster-management-policies
placementRef:
  name: placement-policy-scc
  kind: PlacementRule
  apiGroup: apps.open-cluster-management.io
subjects:
- name: policy-scc
  kind: Policy
  apiGroup: policy.mcm.ibm.com
---
apiVersion: apps.open-cluster-management.io/v1
kind: PlacementBinding
metadata:
  name: policy-scc-production-clusters
  namespace: open-cluster-management-policies
placementRef:
  name: production-clusters
  kind: PlacementRule
  apiGroup: apps.open-cluster-management.io
subjects:
- name: policy-scc
  kind: Policy
  apiGroup: policy.mcm.ibm.com
---
apiVersion: apps.open-cluster-management.io/v1
kind: PlacementRule
metadata:
  name: placement-policy-scc
  namespace: open-cluster-management-policies
spec:
  clusterConditions:
    - type: ManagedClusterConditionAvailable
      status: "True"
  clusterSelector:
    matchExpressions: []
```

To learn how to manage an SCC policy, see Managing Security Context Constraints policies for more details. See Kubernetes configuration policy controller to learn about other configuration policies. See Manage security policies to manage other policies.

2.4.9. ETCD encryption policy

Apply the **etcd-encryption** policy to detect, or enable encryption of sensitive data in the ETCD data-store. Kubernetes configuration policy controller monitors the status of the **etcd-encryption** policy. For more information, see *ETCD Encyrption* in the OpenShift Container Platform documentation.

Learn more details about the **etcd-encryption** policy structure in the following sections:

2.4.9.1. ETCD encryption policy YAML structure

Your **etcd-encryption** policy might resemble the following YAML file:

```
apiVersion: policy.open-cluster-management.io/v1
kind: ConfigurationPolicy
metadata:
  name: policy-etcdencryption
  namespace:
spec:
  complianceType:
  remediationAction:
  namespaces:
    exclude:
    include:
  object-templates:
    - complianceType:
      objectDefinition:
        apiVersion: config.openshift.io/v1
        kind: APIServer
        metadata:
          name: cluster
        spec:
          encryption:
            type:
        ...
```

2.4.9.2. ETCD encryption policy table

Table 2.4. Parameter table

Field	Description
apiVersion	Required. Set the value to **policy.open-cluster-management.io/v1**.
kind	Required. Set the value to **Policy** to indicate the type of policy, for example, **ConfigurationPolicy**.
metadata.name	Required. The name for identifying the policy resource.
metadata.namespaces	Optional.

Field	Description
spec.namespace	Required. The namespaces within the hub cluster that the policy is applied to. Enter parameter values for **include**, which are the namespaces you want to apply to the policy to. The **exclude** parameter specifies the namespaces you explicitly do not want to apply the policy to. **Note**: A namespace that is specified in the object template of a policy controller overrides the namespace in the corresponding parent policy.
remediationAction	Optional. Specifies the remediation of your policy. The parameter values are **enforce** and **inform**. **Important**: Some policies might not support the enforce feature.
disabled	Required. Set the value to **true** or **false**. The **disabled** parameter provides the ability to enable and disable your policies.
spec.complianceType	Required. Set the value to **"musthave"**
spec.object-template	Optional. Used to list any other Kubernetes object that must be evaluated or applied to the managed clusters. See OpenShift Container Platform documentation for more information.

2.4.9.3. Etcd encryption policy sample

```
apiVersion: policy.open-cluster-management.io/v1
kind: ConfigurationPolicy
metadata:
  name: policy-etcdencryption
  namespace: default
spec:
  complianceType: musthave
  remediationAction: inform
  namespaces:
    exclude: ["kube-*"]
    include: ["default"]
  object-templates:
    - complianceType: musthave
      objectDefinition:
        apiVersion: config.openshift.io/v1
        kind: APIServer
        metadata:
          name: cluster
        spec:
```

```
    encryption:
      type: aescbc
...
```

See Managing ETCD encryption policies for more information. View other configuration policies that are monitored by controller, see the Kubernetes configuration policy controller page.

2.4.10. Integrating gatekeeper constraints and constraint templates

Gatekeeper is a validating webhook that enforces CustomResourceDefinition (CRD) based policies that are run with the Open Policy Agent (OPA). You can install Gatekeeper to integrate a gatekeeper policy with Red Hat Advanced Cluster Management for Kubernetes. Gatekeeper policy can be used to evaluate Kubernetes resource compliance. You can leverage an OPA as the policy engine, and use Rego as the policy language.

The gatekeeper policy is created as a Kubernetes configuration policy. Gatekeeper policies include constraint templates (**ConstraintTemplates**) and constraints, audit templates, and admission templates. For more information, see the Gatekeeper.

Prerequisites:

- You must install Gatekeeper on your managed cluster to use the gatekeeper policy controller. For more information, see the **open-policy-agent/gatekeeper** repository.
- Kubernetes version 1.14 or later

Red Hat Advanced Cluster Management applies the following constraint templates in your Red Hat Advanced Cluster Management gatekeeper policy:

- ***ConstraintTemplates*** and constraints: Use the ***policy-gatekeeper-k8srequiredlabels*** policy to create a gatekeeper constraint template on the managed cluster.

```
apiVersion: policy.open-cluster-management.io/v1
kind: ConfigurationPolicy
metadata:
  name: policy-gatekeeper-k8srequiredlabels
spec:
  remediationAction: enforce # will be overridden by remediationAction in parent policy
  severity: low
  object-templates:
    - complianceType: musthave
      objectDefinition:
        apiVersion: templates.gatekeeper.sh/v1beta1
        kind: ConstraintTemplate
        metadata:
          name: k8srequiredlabels
        spec:
          crd:
            spec:
              names:
                kind: K8sRequiredLabels
              validation:
                # Schema for the `parameters` field
                openAPIV3Schema:
                  properties:
                    labels:
```

```
                type: array
                items: string
      targets:
        - target: admission.k8s.gatekeeper.sh
          rego: |
            package k8srequiredlabels
            violation[{"msg": msg, "details": {"missing_labels": missing}}] {
              provided := {label | input.review.object.metadata.labels[label]}
              required := {label | label := input.parameters.labels[_]}
              missing := required - provided
              count(missing) > 0
              msg := sprintf("you must provide labels: %v", [missing])
            }
  - complianceType: musthave
    objectDefinition:
      apiVersion: constraints.gatekeeper.sh/v1beta1
      kind: K8sRequiredLabels
      metadata:
        name: ns-must-have-gk
      spec:
        match:
          kinds:
            - apiGroups: [""]
              kinds: ["Namespace"]
          namespaces:
            - e2etestsuccess
            - e2etestfail
        parameters:
          labels: ["gatekeeper"]
```

- ***audit*** template: Use the ***policy-gatekeeper-audit*** to periodically check and evaluate existing resources against the gatekeeper policies that are enforced to detect existing miscongfigurations.

```
apiVersion: policy.open-cluster-management.io/v1
kind: ConfigurationPolicy
metadata:
  name: policy-gatekeeper-audit
spec:
  remediationAction: inform # will be overridden by remediationAction in parent policy
  severity: low
  object-templates:
    - complianceType: musthave
      objectDefinition:
        apiVersion: constraints.gatekeeper.sh/v1beta1
        kind: K8sRequiredLabels
        metadata:
          name: ns-must-have-gk
        status:
          totalViolations: 0
```

- ***admission*** template: Use the ***policy-gatekeeper-admission*** to check for misconfigurations that are created by the gatekeeper admission webhook:

```
apiVersion: policy.open-cluster-management.io/v1
```

```
kind: ConfigurationPolicy
metadata:
  name: policy-gatekeeper-admission
spec:
  remediationAction: inform # will be overridden by remediationAction in parent policy
  severity: low
  object-templates:
    - complianceType: mustnothave
      objectDefinition:
        apiVersion: v1
        kind: Event
        metadata:
          namespace: openshift-gatekeeper-system # set it to the actual namespace where
gatekeeper is running if different
          annotations:
            constraint_action: deny
            constraint_kind: K8sRequiredLabels
            constraint_name: ns-must-have-gk
            event_type: violation
```

See **policy-gatekeeper-sample.yaml** for more details.

Learn how to use Red Hat Advanced Cluster Management gatekeeper operator policy to install gatekeeper and create a Red Hat Advanced Cluster Management gatekeeper operator policy, see Gatekeeper policy integration for more details. Refer to Governance and risk for more topics on the security framework.

2.5. MANAGE SECURITY POLICIES

Use the Governance and risk dashboard to create, view, and manage your security policies and policy violations. You can create YAML files for your policies from the CLI and console.

From the *Governance and risk* page, you can customize your Summary view by filtering the violations by categories or standards, collapse the summary to see less information, and you can search for policies. You can also filter the violation table view by policies or cluster violations.

The table of policies list the following details of a policy: *Policy name*, *Namespace*, *Remediation*, *Cluster violation*, *Standards*, *Categories*, and *Controls*. You can edit, disable, inform or remove a policy by selecting the **Actions** icon.

When you select a policy in the table list, the following tabs of information are displayed from the console:

- *Details*: Select the *Details* tab to view Policy details, Placement details, and a table list of _Policy templates.
- *Status*: Select the *Status* tab to view a table list of violations. You can filter your view by *Clusters* or *Templates*. To view the compliance status of your policy, select the *Status* tab. Click the *View history* link to view a list of violation messages.
- *YAML*: Select the *YAML* tab to view, and or edit your policy with the editor. Select the YAML toggle to view or hide the editor.

Review the following topics to learn more about creating and updating your security policies:

- Managing security policies

- Managing configuration policies
- Managing image vulnerability policies
- Managing memory usage policies
- Managing namespace policies
- Managing pod nginx policies
- Managing pod security policies
- Managing role policies
- Managing rolebinding policies
- Managing Security Context Constraints policies
- Managing certificate policies
- Managing IAM policies
- Managing ETCD encryption policies

Refer to Governance and risk for more topics.

2.5.1. Managing security policies

Create a security policy to report and validate your cluster compliance based on your specified security standards, categories, and controls. To create a policy for Red Hat Advanced Cluster Management for Kubernetes, you must create a YAML file on your managed clusters.

Note: You can copy and paste an existing policy in to the *Policy YAML*. The values for the parameter fields are automatically entered when you paste your existing policy. You can also search the contents in your policy YAML file with the search feature.

2.5.1.1. Creating a security policy

You can create a security policy from the command line interface (CLI) or from the console. Cluster administrator access is required.

Important: You must define a PlacementPolicy and PlacementBinding to apply your policy to a specific cluster. Enter a value for the *Cluster binding* field to define a PlacementPolicy and PlacementBinding. View the definitions of the objects that are required for your Red Hat Advanced Cluster Management policy:

- *PlacementRule*: Defines a *cluster selector* where the policy must be deployed.
- *PlacementBinding*: Binds the placement to a PlacementPolicy.

View more descriptions of the policy YAML files in the Policy overview.

2.5.1.1.1. Creating a security policy from the command line interface

Complete the following steps to create a policy from the command line interface (CLI):

1. Create a policy by running the following command:

```
kubectl create -f policy.yaml -n <namespace>
```

2. Define the template that the policy uses. Edit your **.yaml** file by adding a **templates** field to define a template. Your policy might resemble the following YAML file:

```
apiVersion: policy.open-cluster-management.io/v1
kind: Policy
metadata:
  name: policy1
spec:
  remediationAction: "enforce" # or inform
  disabled: false # or true
  namespaces:
    include: ["default"]
    exclude: ["kube*"]
  policy-templates:
    - objectDefinition:
        apiVersion: policy.open-cluster-management.io/v1
        kind: ConfigurationPolicy
        metadata:
          namespace: kube-system # will be inferred
          name: operator
        spec:
          remediationAction: "inform"
          object-templates:
            complianceType: "musthave" # at this level, it means the role must exist and must
have the following rules
            apiVersion: rbac.authorization.k8s.io/v1
            kind: Role
            metadata:
              name: example
            objectDefinition:
              rules:
                - complianceType: "musthave" # at this level, it means if the role exists the rule is a
musthave
                  apiGroups: ["extensions", "apps"]
                  resources: ["deployments"]
                  verbs: ["get", "list", "watch", "create", "delete","patch"]
```

3. Define a **PlacementRule**. Be sure to change the **PlacementRule** to specify the clusters where the policies need to be applied, either by **clusterNames**, or **clusterLabels**. View Creating and managing placement rules. Your **PlacementRule** might resemble the following content:

```
apiVersion: apps.open-cluster-management.io/v1
kind: PlacementRule
metadata:
  name: placement1
spec:
  clusterConditions:
    - type: ManagedClusterConditionAvailable
      status: "True"
  clusterNames:
  - "cluster1"
  - "cluster2"
```

```
  clusterLabels:
    matchLabels:
      cloud: IBM
```

4. Define a **PlacementBinding** to bind your policy and your **PlacementRule**. Your **PlacementBinding** might resemble the following YAML sample:

```
apiVersion: policy.open-cluster-management.io/v1
kind: PlacementBinding
metadata:
  name: binding1
placementRef:
  name: placement1
  apiGroup: apps.open-cluster-management.io
  kind: PlacementRule
subjects:
- name: policy1
  apiGroup: policy.mcm.ibm.com
  kind: Policy
```

2.5.1.1.1.1. Viewing your security policy from the CLI

Complete the following steps to view your security policy from the CLI:

1. View details for a specific security policy by running the following command:

```
kubectl get securitypolicy <policy-name> -n <namespace> -o yaml
```

2. View a description of your security policy by running the following command:

```
kubectl describe securitypolicy <name> -n <namespace>
```

2.5.1.1.2. Creating a cluster security policy from the console

As you create your new policy from the console, a YAML file is also created in the YAML editor.

1. From the navigation menu, click **Govern risk**.
2. To create a policy, click **Create policy**.
3. Enter or select values for the following parameters:
   - Name
   - Specifications
   - Cluster selector
   - Remediation action
   - Standards
   - Categories
   - Controls

4. View the following example Red Hat Advanced Cluster Management for Kubernetes security policy definition. Copy and paste the YAML file for your policy.
   Your YAML file might resemble the following policy:

```
apiVersion: policy.open-cluster-management.io/v1
kind: Policy
metadata:
  name: policy-pod
  annotations:
    policy.open-cluster-management.io/categories:
'SystemAndCommunicationsProtections,SystemAndInformationIntegrity'
    policy.open-cluster-management.io/controls: 'control example'
    policy.open-cluster-management.io/standards: 'NIST,HIPAA'
spec:
  complianceType: musthave
  namespaces:
    exclude: ["kube*"]
    include: ["default"]
  object-templates:
  - complianceType: musthave
    objectDefinition:
      apiVersion: v1
      kind: Pod
      metadata:
        name: nginx1
      spec:
        containers:
        - name: nginx
          image: 'nginx:1.7.9'
          ports:
          - containerPort: 80
  remediationAction: enforce
  disabled: false

---
apiVersion: apps.open-cluster-management.io/v1
kind: PlacementBinding
metadata:
  name: binding-pod
placementRef:
  name: placement-pod
  kind: PlacementRule
  apiGroup: apps.open-cluster-management.io
subjects:
- name: policy-pod
  kind: Policy
  apiGroup: policy.mcm.ibm.com

---
apiVersion: apps.open-cluster-management.io/v1
kind: PlacementRule
metadata:
  name: placement-pod
spec:
  clusterConditions:
    - type: ManagedClusterConditionAvailable
```

```
      status: "True"
  clusterLabels:
    matchLabels:
      cloud: "IBM"
```

5. Click **Create Policy**.

A security policy is created from the console.

2.5.1.1.2.1. Viewing your security policy from the console

You can view any security policy and its status from the console.

1. Log in to your cluster from the console.
2. From the navigation menu, click **Governance and risk** to view a table list of your policies. **Note**: You can filter the table list of your policies by selecting the *Policies* tab or *Cluster violations* tab.
3. Select one of your policies to view more details. The *Overview* tab, *Status* tab, and *YAML* tab are displayed.

2.5.1.2. Updating security policies

Learn to update security policies by viewing the following section.

2.5.1.2.1. Disabling security policies

Your policy is enabled by default. You can disable your policy by completing the following steps:

1. Log in to your Red Hat Advanced Cluster Management for Kubernetes console.
2. From the navigation menu, click **Govern risk** to view a table list of your policies.
3. Disable your policy by clicking the **Actions** icon > **Disable policy**. The *Disable Policy* dialog box appears.
4. Click **Disable policy**.

Your policy is disabled.

2.5.1.2.2. Deleting a security policy

Delete a security policy from the CLI or the console.

- Delete a security policy from the CLI:
  a. Delete a security policy by running the following command:

```
kubectl delete policy <securitypolicy-name> -n <open-cluster-management-namespace>
```

+ After your policy is deleted, it is removed from your target cluster or clusters. Verify that your policy is removed by running the following command: **kubectl get policy <securitypolicy-name> -n <open-cluster-management-namespace>**

- Delete a security policy from the console:
  a. From the navigation menu, click **Govern risk** to view a table list of your policies.
  b. Click the **Actions** icon for the policy you want to delete in the policy violation table.
  c. Click **Remove**.
  d. From the *Remove policy* dialog box, click **Remove policy**

To manage other policies, see Managing security policies for more information. Refer to Governance and risk for more topics about policies.

2.5.2. Managing configuration policies

Learn to create, apply, view, and update your configuration policies.

2.5.2.1. Creating a configuration policy

You can create a YAML file for your configuration policy from the command line interface (CLI) or from the console. View the following sections to create a configuration policy:

2.5.2.1.1. Creating a configuration policy from the CLI

Complete the following steps to create a configuration policy from the (CLI):

1. Create a YAML file for your configuration policy. Run the following command:

```
kubectl create -f configpolicy-1.yaml
```

Your configuration policy might resemble the following policy:

```
apiVersion: policy.open-cluster-management.io/v1
kind: Policy
metadata:
  name: policy-1
  namespace: kube-system
spec:
  namespaces:
    include: ["default", "kube-*"]
    exclude: ["kube-system"]
  remediationAction: inform
  disabled: false
  complianceType: musthave
  object-templates:
  ...
```

2. Apply the policy by running the following command:

```
kubectl apply -f <policy-file-name>  --namespace=<namespace>
```

3. Verify and list the policies by running the following command:

```
kubectl get policy --namespace=<namespace>
```

Your configuration policy is created.

2.5.2.1.1.1. Viewing your configuration policy from the CLI

Complete the following steps to view your configuration policy from the CLI:

1. View details for a specific configuration policy by running the following command:

```
kubectl get policy <policy-name> -n <namespace> -o yaml
```

2. View a description of your configuration policy by running the following command:

```
kubectl describe policy <name> -n <namespace>
```

2.5.2.1.2. Creating a configuration policy from the console

As you create a configuration policy from the console, a YAML file is also created in the YAML editor. Complete the following steps to create a configuration policy from the console:

1. Log in to your cluster from the console.
2. From the navigation menu, click **Governance and risk**.
3. Click **Create policy**.
4. Specify the policy you want to create by selecting one of the configuration policies for the specification parameter. Continue to enter or select the appropriate values for the following fields:
   - Name
   - Specifications
   - Cluster selector
   - Remediation action
   - Standards
   - Categories
   - Controls
5. Click **Create**.

2.5.2.1.2.1. Viewing your configuration policy from the console

You can view any configuration policy and its status from the console.

1. Log in to your cluster from the console.
2. From the navigation menu, click **Govern risk** to view a table list of your policies.
   Note: You can filter the table list of your policies by selecting the *All policies* tab or *Cluster violations* tab.

3. Select one of your policies to view more details. The *Overview* tab, *Status* tab, and *YAML* tab are displayed.

2.5.2.2. Updating configuration policies

Learn to update configuration policies by viewing the following section.

2.5.2.2.1. Disabling configuration policies

Complete the following steps to disable your configuration policy:

1. Log in to your Red Hat Advanced Cluster Management for Kubernetes console.
2. From the navigation menu, click **Govern risk** to view a table list of your policies.
3. Disable your policy by clicking the **Actions** icon > **Disable**. The *Disable Policy* dialog box appears.
4. Click **Disable policy**.

Your policy is disabled.

2.5.2.3. Deleting a configuration policy

Delete a configuration policy from the CLI or the console.

- Delete a configuration policy from the CLI:
  a. Delete a configuration policy by running the following command:

     ```
     kubectl delete policy <policy-name> -n <mcm namespace>
     ```

     After your policy is deleted, it is removed from your target cluster or clusters.
  b. Verify that your policy is removed by running the following command:

     ```
     kubectl get policy <policy-name> -n <mcm namespace>
     ```

- Delete a configuration policy from the console:
  a. From the navigation menu, click **Govern risk** to view a table list of your policies.
  b. Click the **Actions** icon for the policy you want to delete in the policy violation table.
  c. Click **Remove**.
  d. From the *Remove policy* dialog box, click **Remove policy**.

Your policy is deleted.

View configuration policy samples, see Policy samples. See Managing security policies to manage other policies.

2.5.3. Managing image vulnerability policies

Configuration policy controller monitors the status of image vulnerability policies. Image vulnerability policies are applied to check if your containers have vulnerabilities. Learn to create, apply, view, and update your image vulnerability policy.

2.5.3.1. Creating an image vulnerability policy

You can create a YAML for your image vulnerability policy from the command line interface (CLI) or from the console. View the following sections to create an image vulnerability policy:

2.5.3.1.1. Creating an image vulnerability policy from the CLI

Complete the following steps to create an image vulnerability policy from the CLI:

1. Create a YAML file for your image vulnerability policy by running the following command:

```
kubectl create -f imagevulnpolicy-1.yaml
```

2. Apply the policy by running the following command:

```
kubectl apply -f <imagevuln-policy-file-name>  --namespace=<namespace>
```

3. List and verify the policies by running the following command:

```
kubectl get imagevulnpolicy --namespace=<namespace>
```

Your image vulnerability policy is created.

2.5.3.1.1.1. Viewing your image vulnerability policy from the CLI

Complete the following steps to view your image vulnerability policy from the CLI:

1. View details for a specific image vulnerability policy by running the following command:

```
kubectl get imagevulnpolicy <policy-name> -n <namespace> -o yaml
```

2. View a description of your image vulnerability policy by running the following command:

```
kubectl describe imagevulnpolicy <name> -n <namespace>
```

2.5.3.2. Creating an image vulnerability policy from the console

As you create an image vulnerability policy from the console, a YAML file is also created in the YAML editor. Complete the following steps to create the image vulnerability policy from the console:

1. Log in to your cluster from the console.
2. From the navigation menu, click **Governance and risk**.
3. Click **Create policy**.
4. Select **ImageManifestVulnPolicy** from the *Specifications* field. Parameter values are automatically set. You can edit your values.
5. Click **Create**.

An image vulnerability policy is created.

2.5.3.3. Viewing image vulnerability violations from the console

1. From the navigation menu, click **Govern risk** to view a table list of your policies.
2. Select **policy-imagemanifestvulnpolicy** > ***Status*** to view the cluster location of the violation. Your image vulnerability violation might resemble the following:

```
imagemanifestvulns exist and should be deleted:
[sha256.7ac7819e1523911399b798309025935a9968b277d86d50e5255465d6592c0266] in
namespace default;
[sha256.4109631e69d1d562f014dd49d5166f1c18b4093f4f311275236b94b21c0041c0] in
namespace calamari;
[sha256.573e9e0a1198da4e29eb9a8d7757f7afb7ad085b0771bc6aa03ef96dedc5b743,
sha256.a56d40244a544693ae18178a0be8af76602b89abe146a43613eaeac84a27494e,
sha256.b25126b194016e84c04a64a0ad5094a90555d70b4761d38525e4aed21d372820] in
namespace open-cluster-management-agent-addon;
[sha256.64320fbf95d968fc6b9863581a92d373bc75f563a13ae1c727af37450579f61a] in
namespace openshift-cluster-version
```

3. Navigate to your OpenShift Container Platform console by selecting the *Cluster* link.
4. From the navigation menu on the OpenShift Container Platform console, click **Administration** > **Custom Resource Definitions**
5. Select **imagemanifestvulns** > ***Instances*** **tab** to view all of the **imagemanifestvulns** instances.
6. Select an entry to view more details.

2.5.3.4. Updating image vulnerability policies

Learn to update image vulnerability policies by viewing the following section.

2.5.3.4.1. Disabling image vulnerability policies

Complete the following steps to disable your image vulnerability policy:

1. Log in to your Red Hat Advanced Cluster Management for Kubernetes console.
2. From the navigation menu, click **Govern risk** to view a table list of your policies.
3. Disable your policy by clicking the **Actions** icon > **Disable**. The *Disable Policy* dialog box appears.
4. Click **Disable policy**.

Your policy is disabled.

2.5.3.4.2. Deleting an image vulnerability policy

Delete the image vulnerability policy from the CLI or the console.

- Delete an image vulnerability policy from the CLI:
  a. Delete a certificate policy by running the following command:
     -

```
kubectl delete policy <imagevulnpolicy-name> -n <mcm namespace>
```

After your policy is deleted, it is removed from your target cluster or clusters.

b. Verify that your policy is removed by running the following command:

```
kubectl get policy <imagevulnpolicy-name> -n <mcm namespace>
```

- Delete an image vulnerability policy from the console:
  a. From the navigation menu, click **Govern risk** to view a table list of your policies.
  b. Click the **Actions** icon for the policy you want to delete in the policy violation table.
  c. Click **Remove**.
  d. From the *Remove policy* dialog box, click **Remove policy**.

Your image vulnerability policy is deleted.

View a sample of an image vulnerability policy, see *Image vulnerability policy sample* from the Image vulnerability policy page. See Kubernetes configuration policy controller to learn about other policies that are monitored by the Kubernetes configuration policy controller. See Managing security policies to manage other policies.

2.5.4. Managing memory usage policies

Apply a memory usage policy to limit or restrict your memory and compute usage. Learn to create, apply, view, and update your memory usage policy in the following sections.

2.5.4.1. Creating a memory usage policy

You can create a YAML file for your memory usage policy from the command line interface (CLI) or from the console. View the following sections to create a memory usage policy:

2.5.4.1.1. Creating a memory usage policy from the CLI

Complete the following steps to create a memory usage policy from the CLI:

1. Create a YAML file for your memory usage policy by running the following command:

```
kubectl create -f memorypolicy-1.yaml
```

2. Apply the policy by running the following command:

```
kubectl apply -f <memory-policy-file-name>  --namespace=<namespace>
```

3. List and verify the policies by running the following command:

```
kubectl get memorypolicy --namespace=<namespace>
```

Your memory usage policy is created from the CLI.

2.5.4.1.1.1. Viewing your policy from the CLI

Complete the following steps to view your memory usage policy from the CLI:

1. View details for a specific memory usage policy by running the following command:

```
kubectl get memorypolicy <policy-name> -n <namespace> -o yaml
```

2. View a description of your memory usage policy by running the following command:

```
kubectl describe memorypolicy <name> -n <namespace>
```

2.5.4.1.2. Creating an memory usage policy from the console

As you create a memory usage policy from the console, a YAML file is also created in the YAML editor. Complete the following steps to create the memory usage policy from the console:

1. Log in to your Red Hat Advanced Cluster Management for Kubernetes console.
2. From the navigation menu, click **Governance and risk**.
3. Click **Create policy**.
4. Select **Limitrange** from the *Specifications* field. Parameter values are automatically set. You can edit your values.
5. Click **Create**.

2.5.4.1.2.1. Viewing your memory usage policy from the console

You can view any memory usage policy and its status from the console.

1. Log in to your cluster from the console.
2. From the navigation menu, click **Govern risk** to view a table list of your policies.
   Note: You can filter the table list of your policies by selecting the *Policies* tab or *Cluster violations* tab.
3. Select one of your policies to view more details.
4. View the policy violations by selecting the *Status* tab.

2.5.4.2. Updating memory usage policies

Learn to update memory usage policies by viewing the following section.

2.5.4.2.1. Disabling memory usage policies

Complete the following steps to disable your memory usage policy:

1. Log in to your Red Hat Advanced Cluster Management for Kubernetes console.
2. From the navigation menu, click **Govern risk** to view a table list of your policies.
3. Disable your policy by clicking the **Actions** icon > **Disable**. The *Disable Policy* dialog box appears.
4. Click **Disable policy**.

Your policy is disabled.

2.5.4.2.2. Deleting a memory usage policy

Delete the memory usage policy from the CLI or the console.

- Delete a memory usage policy from the CLI:
  a. Delete a memory usage policy by running the following command:

     ```
     kubectl delete policy <memorypolicy-name> -n <mcm namespace>
     ```

     After your policy is deleted, it is removed from your target cluster or clusters.
  b. Verify that your policy is removed by running the following command:

     ```
     kubectl get policy <memorypolicy-name> -n <mcm namespace>
     ```

- Delete a memory usage policy from the console:
  a. From the navigation menu, click **Govern risk** to view a table list of your policies.
  b. Click the **Actions** icon for the policy you want to delete in the policy violation table.
  c. Click **Remove**.
  d. From the *Remove policy* dialog box, click **Remove policy**.

Your memory usage policy is deleted.

View a sample of a memory usage policy, see *Memory usage policy sample* from the Memory usage policy page. See Kubernetes configuration policy controller to learn about other configuration policies. See Managing security policies to manage other policies.

2.5.5. Managing namespace policies

Namespace policies are applied to define specific rules for your namespace. Learn to create, apply, view, and update your memory usage policy in the following sections.

2.5.5.1. Creating a namespace policy

You can create a YAML file for your namespace policy from the command line interface (CLI) or from the console. View the following sections to create a namespace policy:

2.5.5.1.1. Creating a namespace policy from the CLI

Complete the following steps to create a namespace policy from the CLI:

1. Create a YAML file for your namespace policy by running the following command:

   ```
   kubectl create -f namespacepolicy-1.yaml
   ```

2. Apply the policy by running the following command:

   ```
   kubectl apply -f <namespace-policy-file-name>  --namespace=<namespace>
   ```

3. List and verify the policies by running the following command:

```
kubectl get namespacepolicy --namespace=<namespace>
```

Your namespace policy is created from the CLI.

2.5.5.1.1.1. Viewing your namespace policy from the CLI

Complete the following steps to view your namespace policy from the CLI:

1. View details for a specific namespace policy by running the following command:

```
kubectl get namespacepolicy <policy-name> -n <namespace> -o yaml
```

2. View a description of your namespace policy by running the following command:

```
kubectl describe namespacepolicy <name> -n <namespace>
```

2.5.5.1.2. Creating a namespace policy from the console

As you create a namespace policy from the console, a YAML file is also created in the YAML editor. Complete the following steps to create a namespace policy from the console:

1. Log in to your Red Hat Advanced Cluster Management for Kubernetes console.
2. From the navigation menu, click **Governance and risk**.
3. Click **Create policy**.
4. Select **Namespace** from the *Specifications* field. Parameter values are automatically set. You can edit your values.
5. Click **Create**.

2.5.5.1.2.1. Viewing your namespace policy from the console

You can view any namespace policy and its status from the console.

1. Log in to your cluster from the console.
2. From the navigation menu, click **Governance and risk** to view a table list of your policies. **Note:** You can filter the table list of your policies by selecting the *Policies* tab or *Cluster violations* tab.
3. Select one of your policies to view more details.
4. View the policy violations by selecting the *Status* tab.

2.5.5.2. Updating namespace policies

Learn to update namespace policies by viewing the following section.

2.5.5.2.1. Disabling namespace policies

Complete the following steps to disable your namespace policy:

1. Log in to your Red Hat Advanced Cluster Management for Kubernetes console.
2. From the navigation menu, click **Govern risk** to view a table list of your policies.
3. Disable your policy by clicking the **Actions** icon > **Disable**. The *Disable Policy* dialog box appears.
4. Click **Disable policy**.

Your policy is disabled.

2.5.5.2.2. Deleting a namespace policy

Delete a namespace policy from the CLI or the console.

- Delete a namespace policy from the CLI:
  a. Delete a namespace policy by running the following command:

     ```
     kubectl delete policy <memorypolicy-name> -n <mcm namespace>
     ```

     After your policy is deleted, it is removed from your target cluster or clusters.
  b. Verify that your policy is removed by running the following command:

     ```
     kubectl get policy <memorypolicy-name> -n <mcm namespace>
     ```

- Delete a namespace policy from the console:
  a. From the navigation menu, click **Govern risk** to view a table list of your policies.
  b. Click the **Actions** icon for the policy you want to delete in the policy violation table.
  c. Click **Remove**.
  d. From the *Remove policy* dialog box, click **Remove policy**.

Your namespace policy is deleted.

View a sample of a namespace policy, see *Namespace policy sample* on the Namespace policy page. See Kubernetes configuration policy controller to learn about other configuration policies. See Managing security policies to manage other policies.

2.5.6. Managing pod nginx policies

Kubernetes configuration policy controller monitors the status of you pod nginx policies. Pod nginx policies are applied to to define the container rules for your pods. Learn to create, apply, view, and update your pod nginx policy.

2.5.6.1. Creating a pod nginx policy

You can create a YAML for your pod nginx policy from the command line interface (CLI) or from the console. View the following sections to create a pod nginx policy:

2.5.6.1.1. Creating a pod nginx policy from the CLI

Complete the following steps to create a pod nginx policy from the CLI:

1. Create a YAML file for your pod nginx policy by running the following command:

```
kubectl create -f podnginxpolicy-1.yaml
```

2. Apply the policy by running the following command:

```
kubectl apply -f <podnginx-policy-file-name>  --namespace=<namespace>
```

3. List and verify the policies by running the following command:

```
kubectl get podnginxpolicy --namespace=<namespace>
```

Your image pod nginx policy is created from the CLI.

2.5.6.1.1.1. Viewing your nginx policy from the CLI

Complete the following steps to view your pod nginx policy from the CLI:

1. View details for a specific pod nginx policy by running the following command:

```
kubectl get podnginxpolicy <policy-name> -n <namespace> -o yaml
```

2. View a description of your pod nginx policy by running the following command:

```
kubectl describe podnginxpolicy <name> -n <namespace>
```

2.5.6.2. Creating an pod nginx policy from the console

As you create a pod nginx policy from the console, a YAML file is also created in the YAML editor. Complete the following steps to create the pod nginx policy from the console:

1. Log in to your Red Hat Advanced Cluster Management for Kubernetes console.
2. From the navigation menu, click **Govern risk**.
3. Click **Create policy**.
4. Select **Pod** from the *Specifications* field. Parameter values are automatically set. You can edit your values.
5. Click **Create**.

Viewing your pod nginx policy from the console
You can view any pod nginx policy and its status from the console.

1. Log in to your cluster from the console.
2. From the navigation menu, click **Govern risk** to view a table list of your policies.
   Note: You can filter the table list of your policies by selecting the *Policies* tab or *Cluster violations* tab.

3. Select one of your policies to view more details.
4. View the policy violations by selecting the *Status* tab.

2.5.6.3. Updating pod nginx policies

Learn to update pod nginx policies by viewing the following section.

2.5.6.3.1. Disabling pod nginx policies

Complete the following steps to disable your pod nginx policy:

1. Log in to your Red Hat Advanced Cluster Management for Kubernetes console.
2. From the navigation menu, click **Govern risk** to view a table list of your policies.
3. Disable your policy by clicking the **Actions** icon > **Disable**. The *Disable Policy* dialog box appears.
4. Click **Disable policy**.

Your policy is disabled.

2.5.6.3.2. Deleting a pod nginx policy

Delete the pod nginx policy from the CLI or the console.

- Delete a pod nginx policy from the CLI:
  a. Delete a pod nginx policy by running the following command:

     ```
     kubectl delete policy <podnginxpolicy-name> -n <namespace>
     ```

     After your policy is deleted, it is removed from your target cluster or clusters.

  b. Verify that your policy is removed by running the following command:

     ```
     kubectl get policy <podnginxpolicy-name> -n <namespace>
     ```

- Delete a pod nginx policy from the console:
  a. From the navigation menu, click **Govern risk** to view a table list of your policies.
  b. Click the **Actions** icon for the policy you want to delete in the policy violation table.
  c. Click **Remove**.
  d. From the *Remove policy* dialog box, click **Remove policy**.

Your pod nginx policy is deleted.

View a sample of a pod nginx policy, see *Pod nginx policy sample* from the Pod nginx policy page. See Kubernetes configuration policy controller to learn about other configuration policies. See Managing security policies to manage other policies.

2.5.7. Managing pod security policies

Apply a pod security policy to secure pods and containers. Learn to create, apply, view, and update your pod security policy in the following sections.

2.5.7.1. Creating a pod security policy

You can create a YAML file for your pod security policy from the command line interface (CLI) or from the console. View the following sections to create a pod security policy:

2.5.7.1.1. Creating a pod security policy from the CLI

Complete the following steps to create a pod security from the CLI:

1. Create a YAML file for your pod security policy by running the following command:

```
kubectl create -f podsecuritypolicy-1.yaml
```

2. Apply the policy by running the following command:

```
kubectl apply -f <podsecurity-policy-file-name>  --namespace=<namespace>
```

3. List and verify the policies by running the following command:

```
kubectl get podsecuritypolicy --namespace=<namespace>
```

Your pod security policy is created from the CLI.

2.5.7.1.1.1. Viewing your pod security policy from the CLI

Complete the following steps to view your pod security policy from the CLI:

1. View details for a specific pod security policy by running the following command:

```
kubectl get podsecuritypolicy <policy-name> -n <namespace> -o yaml
```

2. View a description of your pod security policy by running the following command:

```
kubectl describe podsecuritypolicy <name> -n <namespace>
```

2.5.7.1.2. Creating a pod security policy from the console

As you create a pod security policy from the console, a YAML file is also created in the YAML editor. Complete the following steps to create the pod security policy from the console:

1. Log in to your Red Hat Advanced Cluster Management for Kubernetes console.
2. From the navigation menu, click **Govern risk**.
3. Click **Create policy**.
4. Select **Podsecuritypolicy** from the *Specifications* field. Parameter values are automatically set. You can edit your values.
5. Click **Create**.

2.5.7.1.2.1. Viewing your pod security policy from the console

You can view any pod security policy and its status from the console.

1. Log in to your cluster from the console.
2. From the navigation menu, click **Govern risk** to view a table list of your policies.
   Note: You can filter the table list of your policies by selecting the *Policies* tab or *Cluster violations* tab.
3. Select one of your policies to view more details.
4. View the policy violations by selecting the *Status* tab.

2.5.7.2. Updating pod security policies

Learn to update pod security policies by viewing the following section.

2.5.7.2.1. Disabling pod security policies

Complete the following steps to disable your pod security policy:

1. Log in to your Red Hat Advanced Cluster Management for Kubernetes console.
2. From the navigation menu, click **Govern risk** to view a table list of your policies.
3. Disable your policy by clicking the **Actions** icon > **Disable**. The *Disable Policy* dialog box appears.
4. Click **Disable policy**.

Your policy is disabled.

2.5.7.2.2. Deleting a pod security policy

Delete the pod security policy from the CLI or the console.

- Delete a pod security policy from the CLI:
  a. Delete a pod security policy by running the following command:

     ```
     kubectl delete policy <podsecurity-policy-name> -n <mcm namespace>
     ```

     After your policy is deleted, it is removed from your target cluster or clusters.
  b. Verify that your policy is removed by running the following command:

     ```
     kubectl get policy <podsecurity-policy-name> -n <mcm namespace>
     ```

- Delete a pod security policy from the console:
  a. From the navigation menu, click **Govern risk** to view a table list of your policies.
  b. Click the **Actions** icon for the policy you want to delete in the policy violation table.
  c. Click **Remove**.

d. From the *Remove policy* dialog box, click **Remove policy**.

Your pod security policy is deleted.

View a sample of a pod security policy, see *Pod security policy sample* on the Pod security policy page. See Kubernetes configuration policy controller to learn about other configuration policies. See Managing security policies to manage other policies.

2.5.8. Managing role policies

Kubernetes configuration policy controller monitors the status of role policies. Apply a role policy to set rules and permissions for specific roles in your cluster. Learn to create, apply, view, and update your role policy in the following sections.

2.5.8.1. Creating a role policy

You can create a YAML file for your role policy from the command line interface (CLI) or from the console. View the following sections to create a role policy:

2.5.8.1.1. Creating a role policy from the CLI

Complete the following steps to create a role from the CLI:

1. Create a YAML file for your role policy by running the following command:

```
kubectl create -f rolepolicy-1.yaml
```

2. Apply the policy by running the following command:

```
kubectl apply -f <role-policy-file-name>  --namespace=<namespace>
```

3. List and verify the policies by running the following command:

```
kubectl get rolepolicy --namespace=<namespace>
```

Your role policy is created from the CLI.

2.5.8.1.1.1. Viewing your role policy from the CLI

Complete the following steps to view your role policy from the CLI:

1. View details for a specific role policy by running the following command:

```
kubectl get rolepolicy <policy-name> -n <namespace> -o yaml
```

2. View a description of your role policy by running the following command:

```
kubectl describe rolepolicy <name> -n <namespace>
```

2.5.8.1.2. Creating a role policy from the console

As you create a role policy from the console, a YAML file is also created in the YAML editor. Complete the following steps to create the role policy from the console:

1. Log in to your Red Hat Advanced Cluster Management for Kubernetes console.
2. From the navigation menu, click **Govern risk**.
3. Click **Create policy**.
4. Select **Role** from the *Specifications* field. Parameter values are automatically set. You can edit your values.
5. Click **Create**.

2.5.8.1.2.1. Viewing your role policy from the console

You can view any role policy and its status from the console.

1. Log in to your cluster from the console.
2. From the navigation menu, click **Govern risk** to view a table list of your policies.
   Note: You can filter the table list of your policies by selecting the *Policies* tab or *Cluster violations* tab.
3. Select one of your policies to view more details.
4. View the policy violations by selecting the *Status* tab.

2.5.8.2. Updating role policies

Learn to update role policies by viewing the following section.

2.5.8.2.1. Disabling role policies

Complete the following steps to disable your role policy:

1. Log in to your Red Hat Advanced Cluster Management for Kubernetes console.
2. From the navigation menu, click **Govern risk** to view a table list of your policies.
3. Disable your policy by clicking the **Actions** icon > **Disable**. The *Disable Policy* dialog box appears.
4. Click **Disable policy**.

Your policy is disabled.

2.5.8.2.2. Deleting a role policy

Delete the role policy from the CLI or the console.

- Delete a role policy from the CLI:
  a. Delete a role policy by running the following command:

     ```
     kubectl delete policy <podsecurity-policy-name> -n <mcm namespace>
     ```

     After your policy is deleted, it is removed from your target cluster or clusters.
  b. Verify that your policy is removed by running the following command:

```
kubectl get policy <podsecurity-policy-name> -n <mcm namespace>
```

- Delete a role policy from the console:
  a. From the navigation menu, click **Govern risk** to view a table list of your policies.
  b. Click the **Actions** icon for the policy you want to delete in the policy violation table.
  c. Click **Remove**.
  d. From the *Remove policy* dialog box, click **Remove policy**.

Your role policy is deleted.

View a sample of a role policy, see *Role policy sample* on the Role policy page. See Kubernetes configuration policy controller to learn about other configuration policies. See Managing security policies to manage other policies.

2.5.9. Managing rolebinding policies

Learn to create, apply, view, and update your rolebinding policies.

2.5.9.1. Creating a rolebinding policy

You can create a YAML file for your rolebinding policy from the command line interface (CLI) or from the console. View the following sections to create a rolebinding policy:

2.5.9.1.1. Creating a rolebinding policy from the CLI

Complete the following steps to create a rolebinding policy from the CLI:

1. Create a YAML file for your rolebinding policy. Run the following command:

```
kubectl create -f rolebindingpolicy.yaml
```

2. Apply the policy by running the following command:

```
kubectl apply -f <rolebinding-policy-file-name>  --namespace=<namespace>
```

3. Verify and list the policies by running the following command:

```
kubectl get rolebindingpolicy --namespace=<namespace>
```

Your rolebinding policy is created.

2.5.9.1.1.1. Viewing your rolebinding policy from the CLI

Complete the following steps to view your rolebinding policy from the CLI:

1. View details for a specific rolebinding policy by running the following command:

```
kubectl get rolebindingpolicy <policy-name> -n <namespace> -o yaml
```

2. View a description of your rolebinding policy by running the following command:

```
kubectl describe rolebindingpolicy <name> -n <namespace>
```

2.5.9.1.2. Creating a rolebinding policy from the console

As you create a rolebinding policy from the console, a YAML file is also created in the YAML editor. Complete the following steps to create a rolebinding policy from the console:

1. Log in to your cluster from the console.
2. From the navigation menu, click **Governance and risk**.
3. Click **Create policy**.
4. Enter or select the appropriate values for the following fields:
   - Name
   - Specifications
   - Cluster selector
   - Remediation action
   - Standards
   - Categories
   - Controls
   - Disabled
5. Click **Create**.

A rolebinding policy is created.

2.5.9.1.2.1. Viewing your rolebinding policy from the console

You can view any rolebinding policy and its status from the console.

1. Log in to your cluster from the console.
2. From the navigation menu, click **Governance and risk** to view a table list of your policies. **Note:** You can filter the table list of your policies by selecting the *Policies* tab or *Cluster violations* tab.
3. Select one of your policies to view more details.
4. View the rolebinding policy violations by selecting the *Status* tab.

2.5.9.2. Updating rolebinding policies

Learn to update rolebinding policies by viewing the following section.

2.5.9.2.1. Disabling rolebinding policies

Complete the following steps to disable your rolebinding policy:

1. Log in to your Red Hat Advanced Cluster Management for Kubernetes console.
2. From the navigation menu, click **Govern risk** to view a table list of your policies.
3. Disable your policy by clicking the **Actions** icon > **Disable**. The *Disable Policy* dialog box appears.
4. Click **Disable policy**.

Your policy is disabled.

2.5.9.2.2. Deleting a rolebinding policy

Delete the rolebinding policy from the CLI or the console.

- Delete a rolebinding policy from the CLI:
  a. Delete a rolebinding policy by running the following command:

     ```
     kubectl delete policy <podsecurity-policy-name> -n <namespace>
     ```

     After your policy is deleted, it is removed from your target cluster or clusters.
  b. Verify that your policy is removed by running the following command:

     ```
     kubectl get policy <podsecurity-policy-name> -n <namespace>
     ```

- Delete a rolebinding policy from the console:
  a. From the navigation menu, click **Govern risk** to view a table list of your policies.
  b. Click the **Actions** icon for the policy you want to delete in the policy violation table.
  c. Click **Remove**.
  d. From the *Remove policy* dialog box, click **Remove policy**.

Your rolebinding policy is deleted.

View a sample of a rolebinding policy, see *Rolebinding policy sample* on the Rolebinding policy page. See Kubernetes configuration policy controller to learn about other configuration policies. See Managing security policies to manage other policies.

2.5.10. Managing Security Context Constraints policies

Learn to create, apply, view, and update your Security Context Constraints (SCC) policies.

2.5.10.1. Creating an SCC policy

You can create a YAML file for your SCC policy from the command line interface (CLI) or from the console. View the following sections to create an SCC policy:

2.5.10.1.1. Creating an SCC policy from the CLI

See Creating Security Context Constraints in the OpenShift Container Platform documentation for more details.

2.5.10.1.1.1. Viewing your SCC policy from the CLI

See Examining an SCC in the OpenShift Container Platform documentation for more details.

2.5.10.1.2. Creating an SCC policy from the console

As you create an SCC policy from the console, a YAML file is also created in the YAML editor. Complete the following steps to create an SCC policy from the console:

1. Log in to your cluster from the console.
2. From the navigation menu, click **Governance and risk**.
3. Click **Create policy**.
4. Enter or select the appropriate values for the following fields:
   - Name
   - Specifications
   - Cluster selector
   - Remediation action
   - Standards
   - Categories
   - Controls
   - Disabled
5. Click **Create**.

An SCC policy is created.

2.5.10.1.2.1. Viewing your SCC policy from the console

You can view any SCC policy and its status from the console.

1. Log in to your cluster from the console.
2. From the navigation menu, click **Governance and risk** to view a table list of your policies. **Note:** You can filter the table list of your policies by selecting the *Policies* tab or *Cluster violations* tab.
3. Select one of your policies to view more details.
4. View the SCC policy violations by selecting the *Status* tab.

2.5.10.2. Updating SCC policies

Learn to update SCC policies by viewing the following sections.

2.5.10.2.1. Disabling SCC policies

Complete the following steps to disable your SCC policy:

1. Log in to your Red Hat Advanced Cluster Management for Kubernetes console.
2. From the navigation menu, click **Govern risk** to view a table list of your policies.
3. Disable your policy by clicking the **Actions** icon > **Disable**. The *Disable Policy* dialog box appears.
4. Click **Disable policy**.

Your policy is disabled.

2.5.10.2.2. Deleting an SCC policy

Delete the SCC policy from the CLI or the console.

See Deleting an SCC in the OpenShift Container Platform documentation to learn more about deleting an SCC policy from the CLI.

- Delete an SCC policy from the console:
  a. From the navigation menu, click **Govern risk** to view a table list of your policies.
  b. Click the **Actions** icon for the policy you want to delete in the policy violation table.
  c. Click **Remove**.
  d. From the *Remove policy* dialog box, click **Remove policy**.

Your SCC policy is deleted.

To view a sample of an SCC policy, see the *Security context constraint policy sample* section of Security Context Constraints policy. See Kubernetes configuration policy controller to learn about other configuration policies. See Managing security policies to manage other policies.

2.5.11. Managing certificate policies

Learn to create, apply, view, and update your certificate policies.

2.5.11.1. Creating a certificate policy

You can create a YAML file for your certificate policy from the command line interface (CLI) or from the console. View the following sections to create a certificate policy:

2.5.11.1.1. Creating a certificate policy from the CLI

Complete the following steps to create a certificate policy from the CLI:

1. Create a YAML file for your certificate policy. Run the following command:

```
kubectl create -f policy-1.yaml
```

2. Apply the policy by running the following command:

```
kubectl apply -f <certificate-policy-file-name>  --namespace=<namespace>
```

3. Verify and list the policies by running the following command:

```
kubectl get certificatepolicy --namespace=<namespace>
```

Your certificate policy is created.

2.5.11.1.1.1. Viewing your certificate policy from the CLI

Complete the following steps to view your certificate policy from the CLI:

1. View details for a specific certificate policy by running the following command:

```
kubectl get certificatepolicy <policy-name> -n <namespace> -o yaml
```

2. View a description of your certificate policy by running the following command:

```
kubectl describe certificatepolicy <name> -n <namespace>
```

2.5.11.1.2. Creating a certificate policy from the console

As you create a certificate policy from the console, a YAML file is also created in the YAML editor. Complete the following steps to create a certificate policy from the console:

1. Log in to your cluster from the console.
2. From the navigation menu, click **Governance and risk**.
3. Click **Create policy**.
4. Select *CertificatePolicy* for the *Specifications* parameter. Values for the remaining parameters are automatically set when you select the policy. You can edit your values.
5. Click **Create**.

A certificate policy is created.

2.5.11.1.2.1. Viewing your certificate policy from the console

You can view any certificate policy and its status from the console.

1. Log in to your cluster from the console.
2. From the navigation menu, click **Govern risk** to view a table list of your policies.
   Note: You can filter the table list of your policies by selecting the *Policies* tab or *Cluster violations* tab.
3. Select one of your policies to view more details. The *Details* tab, *Status* tab, and *YAML* tab are displayed.
4. To view the compliance status of your policy, select the *Status* tab. Click the *View history* link to view a list of violation messages.

2.5.11.2. Updating certificate policies

2.5.11.2.1. Bringing your own certificates

You can monitor your own certificates with the certificate policy controller. You must complete one of the following requirements to monitor your own certificates:

- Create a Kubernetes TLS Secret for your certificate.
- Add the label **certificate_key_name** into your Kubernetes secret to monitor your certificates.

Create a Kubernetes TLS secret to monitor your own certificates by running the following command:

```
kubectl -n <namespace> create secret tls <secret name> --cert=<path to certificate>/<certificate name> --key=<path to key>/<key name>
```

2.5.11.2.2. Adding a label into your Kubernetes secret

Update the **metadata** parameter in your TLS Secret by adding the **certificate_key_name** label. Run the following command to add the **certificate_key_name** label:

```
kubectl label secret my-certificate -n default certificate_key_name=cert
```

Your updated TLS Secret might resemble the following content:

```
apiVersion: policy.open-cluster-management.io/v1
kind: Secret
metadata:
  name: my-certificate
  namespace: default
  labels:
    certificate_key_name: cert
type: Opaque
data:
  cert: <Certificate Data>
  key: <Private Key Data>
```

Note: When you add the label from the console, you must manually add the label into the TLS Secret YAML file.

2.5.11.2.3. Disabling certificate policies

When you create a certificate policy, it is enabled by default. Complete the following steps to disable a certificate policy from the CLI or the console:

- Disable a certificate policy from the console:
  a. Log in to your Red Hat Advanced Cluster Management for Kubernetes console.
  b. From the navigation menu, click **Govern risk** to view a table list of your policies.
  c. Disable your policy by clicking the **Actions** icon > **Disable**. The *Disable Policy* dialog box appears.
  d. Click **Disable policy**.

Your policy is disabled.

2.5.11.2.4. Deleting a certificate policy

Delete the certificate policy from the CLI or the console.

- Delete a certificate policy from the CLI:
  a. Delete a certificate policy by running the following command:

```
kubectl delete policy <cert-policy-name> -n <namespace>
```

+ After your policy is deleted, it is removed from your target cluster or clusters.

  a. Verify that your policy is removed by running the following command:

```
kubectl get policy <policy-name> -n <mcm namespace>
```

- Delete a certificate policy from the console:
  a. From the navigation menu, click **Govern risk** to view a table list of your policies.
  b. Click the **Actions** icon for the policy you want to delete in the policy violation table.
  c. Click **Remove**.
  d. From the *Remove policy* dialog box, click **Remove policy**.

Your certificate policy is deleted.

View a sample of a certificate policy, see *Certificate policy sample* on the Certificate policy controller page. For more information about other policy controllers, see Policy controllers. See Managing security policies to manage other policies.

2.5.12. Managing IAM policies

Apply an IAM policy to check the number of cluster administrators that you allow in your managed cluster. Learn to create, apply, view, and update your IAM policies in the following sections.

2.5.12.1. Creating an IAM policy

You can create a YAML file for your IAM policy from the command line interface (CLI) or from the console.

2.5.12.1.1. Creating an IAM policy from the CLI

Complete the following steps to create an IAM policy from the CLI:

1. Create a YAML file with the IAM policy definition. Run the following command:

```
kubectl create -f iam-policy-1.yaml
```

Your IAM policy might resemble the following YAML file:

```
apiVersion: policy.open-cluster-management.io/v1
```

```
kind: IamPolicy
metadata:
  name: iam-grc-policy
  label:
    category: "System-Integrity"
spec:
  namespaceSelector:
    include: ["default","kube-*"]
    exclude: ["kube-system"]
  remediationAction: inform
  disabled: false
  maxClusterRoleBindingUsers: 5
```

2. Apply the policy by running the following command:

```
kubectl apply -f <iam-policy-file-name>  --namespace=<mcm_namespace>
```

3. Verify and list the policy by running the following command:

```
kubectl get <iam-policy-file-name> --namespace=<mcm_namespace>
```

Your IAM policy is created.

2.5.12.1.1.1. Viewing your IAM policy from the CLI

Complete the following steps to view your IAM policy:

1. View details for specific IAM policy by running the following command:

```
kubectl get iampolicy <policy-name> -n <namespace> -o yaml
```

2. View a description of your IAM policy by running the following command:

```
kubectl describe iampolicy <name> -n <namespace>
```

2.5.12.1.2. Creating an IAM policy from the console

As you create your IAM policy from the console, a YAML file is also created in the YAML editor. Complete the following steps to create an IAM policy from the console:

1. Log in to your cluster from the console.
2. From the navigation menu, click **Govern risk**.
3. Click **Create policy**.
4. Select **IamPolicy** from the *Specifications* field. Values for the remaining parameters are set automatically when you select the policy. You can edit your values.
5. Click **Create**.

An IAM policy is created.

2.5.12.1.2.1. Viewing your IAM policy from the console

You can view any IAM policy and its status from the console.

1. Log in to your cluster from the console.
2. From the navigation menu, click **Govern risk** to view a table list of your policies.
   Note: You can filter the table list of your policies by selecting the *Policies* tab or *Cluster violations* tab.
3. Select one of your policies to view more details.
4. View the IAM policy violations by selecting the *Status* tab.

2.5.12.2. Updating IAM policies

Learn to update IAM policies by viewing the following section.

2.5.12.2.1. Disabling IAM policies

Complete the following steps to disable your IAM policy:

1. Log in to your Red Hat Advanced Cluster Management for Kubernetes console.
2. From the navigation menu, click **Govern risk** to view a table list of your policies.
3. Disable your policy by clicking the **Actions** icon > **Disable**. The *Disable Policy* dialog box appears.
4. Click **Disable policy**.

Your policy is disabled.

2.5.12.2.2. Deleting an IAM policy

Delete a configuration policy from the CLI or the console.

- Delete an IAM policy from the CLI:
  a. Delete an IAM policy by running the following command:

     ```
     kubectl delete policy <iam-policy-name> -n <mcm namespace>
     ```

     After your policy is deleted, it is removed from your target cluster or clusters.
  b. Verify that your policy is removed by running the following command:

     ```
     kubectl get policy <iam-policy-name> -n <mcm namespace>
     ```

- Delete an IAM policy from the console:
  a. From the navigation menu, click **Govern risk** to view a table list of your policies.
  b. Click the **Actions** icon for the policy you want to delete in the policy violation table.
  c. Click **Remove**.
  d. From the *Remove policy* dialog box, click **Remove policy**.

Your policy is deleted.

View the *IAM policy sample* from the IAM policy controller page. See Managing security policies for more topics.

2.5.13. Managing ETCD encryption policies

Apply an encryption policy to detect, or enable encryption of sensitive data in the ETCD data-store. Learn to create, apply, view, and update your encrytpion policy in the following sections.

2.5.13.1. Creating an encryption policy

You can create a YAML file for your encryption policy from the command line interface (CLI) or from the console. View the following sections to create a encryption policy:

2.5.13.1.1. Creating an encryption policy from the CLI

Complete the following steps to create an encrytpion policy from the CLI:

1. Create a YAML file for your encryption policy by running the following command:

```
kubectl create -f etcd-encryption-policy-1.yaml
```

2. Apply the policy by running the following command:

```
kubectl apply -f <etcd-encryption-policy-file-name>  --namespace=<namespace>
```

3. List and verify the policies by running the following command:

```
kubectl get etcd-encryption-policy --namespace=<namespace>
```

Your encryption policy is created from the CLI.

2.5.13.1.1.1. Viewing your encryption policy from the CLI

Complete the following steps to view your encryption policy from the CLI:

1. View details for a specific encryption policy by running the following command:

```
kubectl get etcd-encryption-policy <policy-name> -n <namespace> -o yaml
```

2. View a description of your encryption policy by running the following command:

```
kubectl describe etcd-encryption-policy <name> -n <namespace>
```

2.5.13.1.2. Creating an encryption policy from the console

As you create a encryption policy from the console, a YAML file is also created in the YAML editor. Complete the following steps to create the encryption policy from the console:

1. Log in to your Red Hat Advanced Cluster Management for Kubernetes console.

2. From the navigation menu, click **Govern risk**.

3. Click **Create policy**.
4. Select **EtcdEncryption** from the *Specifications* field. Values for the remaining parameters are set automatically when you select the policy. You can edit your values.
5. Click **Create**.

2.5.13.1.2.1. Viewing your encryption policy from the console

You can view any encryption policy and its status from the console.

1. Log in to your cluster from the console.
2. From the navigation menu, click **Govern risk** to view a table list of your policies.
   Note: You can filter the table list of your policies by selecting the All policies tab or Cluster violations tab.
3. Select one of your policies to view more details. The *Overview* tab, *Status* tab, and *YAML* tab are displayed.

2.5.13.2. Updating encryption policies

Learn to update encryption policies by viewing the following section.

2.5.13.2.1. Disabling encryption policies

Complete the following steps to disable your encryption policy:

1. Log in to your Red Hat Advanced Cluster Management for Kubernetes console.
2. From the navigation menu, click **Govern risk** to view a table list of your policies.
3. Disable your policy by clicking the **Actions** icon > **Disable**. The *Disable Policy* dialog box appears.
4. Click **Disable policy**.

Your policy is disabled.

2.5.13.2.2. Deleting an encryption policy

Delete the encryption policy from the CLI or the console.

- Delete an encryption policy from the CLI:
  a. Delete an encryption policy by running the following command:

  ```
  kubectl delete policy <podsecurity-policy-name> -n <mcm namespace>
  ```

  + After your policy is deleted, it is removed from your target cluster or clusters.

  a. Verify that your policy is removed by running the following command:

  ```
  kubectl get policy <podsecurity-policy-name> -n <mcm namespace>
  ```

- Delete a encryption policy from the console:

a. From the navigation menu, click **Govern risk** to view a table list of your policies.

b. Click the **Actions** icon for the policy you want to delete in the policy violation table.

c. Click **Remove**.

d. From the *Remove policy* dialog box, click **Remove policy**.

Your encryption policy is deleted.

View a sample of an encryption policy, see *ETCD encryption policy sample* on the ETCD encryption policy page. See Kubernetes configuration policy controller to learn about other configuration policies. See Managing security policies to manage other policies.

2.5.14. Gatekeeper policy integration

Learn to create, apply, view, and update your gatekeeper policies.

Required access: Cluster administrator

Prerequisite: You must install Gatekeeper. For more information see **open-policy-agent/gatekeeper** repository.

2.5.14.1. Creating a gatekeeper policy

You can create a YAML file for your gatekeeper policy from the command line interface (CLI). Use the Red Hat Advanced Cluster Management for Kubernetes configuration policy to propagate the gatekeeper policy from the hub cluster to the managed cluster. View the following sections to create a gatekeeper policy for the admission and auditing scenarios:

2.5.14.1.1. Creating a gatekeeper policy for admission

Use the Red Hat Advanced Cluster Management configuration policy to create a gatekeeper policy that looks for events that are generated by the gatekeeper admission webhook.

Note: Gatekeeper must be deployed with **emit-admission-events** set to **true**.

1. Create a YAML file for your gatekeeper policy. Run the following command:

```
kubectl create -f policy-gatekeeper-admission.yaml
```

Your gatekeeper policy might resemble the following policy:

```
apiVersion: policy.open-cluster-management.io/v1
kind: Policy
metadata:
  name: policy-gatekeeper
  namespace: default
  annotations:
    policy.open-cluster-management.io/standards:
    policy.open-cluster-management.io/categories:
    policy.open-cluster-management.io/controls:
spec:
  disabled: false
  policy-templates:
```

```
- objectDefinition:
    apiVersion: policy.open-cluster-management.io/v1
    kind: ConfigurationPolicy
    metadata:
      name: policy-gatekeeper-k8srequiredlabels
    spec:
      remediationAction: enforce # will be overridden by remediationAction in parent policy
      severity: low
      object-templates:
        - complianceType: musthave
          objectDefinition:
            apiVersion: templates.gatekeeper.sh/v1beta1
            kind: ConstraintTemplate
            metadata:
              name: k8srequiredlabels
            spec:
              crd:
                spec:
                  names:
                    kind: K8sRequiredLabels
                  validation:
                    # Schema for the `parameters` field
                    openAPIV3Schema:
                      properties:
                        labels:
                          type: array
                          items: string
              targets:
                - target: admission.k8s.gatekeeper.sh
                  rego: |
                    package k8srequiredlabels
                    violation[{"msg": msg, "details": {"missing_labels": missing}}] {
                      provided := {label | input.review.object.metadata.labels[label]}
                      required := {label | label := input.parameters.labels[_]}
                      missing := required - provided
                      count(missing) > 0
                      msg := sprintf("you must provide labels: %v", [missing])
                    }
        - complianceType: musthave
          objectDefinition:
            apiVersion: constraints.gatekeeper.sh/v1beta1
            kind: K8sRequiredLabels
            metadata:
              name: ns-must-have-gk
            spec:
              match:
                kinds:
                  - apiGroups: [""]
                    kinds: ["Namespace"]
              parameters:
                labels: ["gatekeeper"]
- objectDefinition:
    apiVersion: policy.open-cluster-management.io/v1
    kind: ConfigurationPolicy
    metadata:
      name: policy-gatekeeper-admission
```

```
spec:
  remediationAction: inform # will be overridden by remediationAction in parent policy
  severity: low
  object-templates:
    - complianceType: mustnothave
      objectDefinition:
        apiVersion: v1
        kind: Event
        metadata:
          namespace: gatekeeper-system
          annotations:
            constraint_action: deny
            constraint_kind: K8sRequiredLabels
            constraint_name: ns-must-have-gk
            event_type: violation
```

2.5.14.1.2. Creating a gatekeeper policy for audit

Use the product configuration policy to create a gatekeeper policy that periodically checks and evaluates existing resources against the gatekeeper policies. Red Hat Advanced Cluster Management configuration policy checks for the violations in the status field of the gatekeeper constraint.

1. Create a YAML file for your gatekeeper policy. Run the following command:

```
kubectl create -f policy-gatekeeper-audit.yaml
```

Your gatekeeper policy might resemble the following policy:

```
apiVersion: policy.open-cluster-management.io/v1
kind: Policy
metadata:
  name: policy-gatekeeper
  namespace: default
  annotations:
    policy.open-cluster-management.io/standards:
    policy.open-cluster-management.io/categories:
    policy.open-cluster-management.io/controls:
spec:
  disabled: false
  policy-templates:
    - objectDefinition:
        apiVersion: policy.open-cluster-management.io/v1
        kind: ConfigurationPolicy
        metadata:
          name: policy-gatekeeper-audit
        spec:
          remediationAction: inform # will be overridden by remediationAction in parent policy
          severity: low
          object-templates:
            - complianceType: musthave
              objectDefinition:
                apiVersion: constraints.gatekeeper.sh/v1beta1
                kind: K8sRequiredLabels
                metadata:
                  name: ns-must-have-gk
```

```
status:
  totalViolations: 0
  violations: []
```

For more information about integrating third-party policies with the product, see Integrate third-party policy controllers.