



# Requirements

## Kubernetes clusters

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# Requirements

## Requirements for Kubernetes clusters in AWS

You can add managed Amazon Elastic Kubernetes Service (EKS) clusters or self-managed Kubernetes clusters on AWS to Cloud Manager. Before you can add the clusters to Cloud Manager, you need to ensure that the following requirements are met.

This topic uses *Kubernetes cluster* where configuration is the same for EKS and self-managed Kubernetes clusters. The cluster type is specified where configuration differs.

### Requirements

#### Astra Trident

The Kubernetes cluster must have NetApp Astra Trident installed. One of the four most recent versions of Astra Trident is required. [Go to the Astra Trident docs for installation steps.](#)

#### Cloud Volumes ONTAP

Cloud Volumes ONTAP for AWS must be set up as backend storage for the cluster. [Go to the Astra Trident docs for configuration steps.](#)

#### Cloud Manager Connector

A Connector must be running in AWS with the required permissions. [Learn more below.](#)

#### Network connectivity

Network connectivity is required between the Kubernetes cluster and the Connector and between the Kubernetes cluster and Cloud Volumes ONTAP. [Learn more below.](#)

#### RBAC authorization

The Cloud Manager Connector role must be authorized on each Kubernetes cluster. [Learn more below.](#)

### Prepare a Connector

A Cloud Manager Connector is required in AWS to discover and manage Kubernetes clusters. You'll need to create a new Connector or use an existing Connector that has the required permissions.

#### Create a new Connector

Follow the steps in one of the links below.

- [Create a Connector from Cloud Manager](#) (recommended)
- [Create a Connector from the AWS Marketplace](#)
- [Install the Connector on an existing Linux host in AWS](#)

#### Add the required permissions to an existing Connector

Starting in the 3.9.13 release, any *newly* created Connectors include three new AWS permissions that enable discovery and management of Kubernetes clusters. If you created a Connector prior to this release, then you'll need to modify the existing policy for the Connector's IAM role to provide the permissions.

## Steps

1. Go the AWS console and open the EC2 service.
2. Select the Connector instance, click **Security**, and click the name of the IAM role to view the role in the IAM service.

The screenshot shows the AWS Management Console interface. On the left, the 'Instances' menu is expanded. The main panel displays a list of EC2 instances. The 'Cloud-Manager-Connector' instance is selected. Below the list, the 'Instance: i-03adf85b99abdfbfa (Cloud-Manager-Connector)' details are shown. The 'Security' tab is active, displaying the 'IAM Role' as 'Cloud-Manager-Operator-P5mGGXw'. A hand cursor is pointing at the role name.

Name	Instan...	Instance state
occmAnatoly	i-0984...	Running
<b>Cloud-Manager-Connector</b>	<b>i-03ad...</b>	<b>Running</b>
tomercM231152prod	i-07cd...	Running
tomercvo	i-0a05...	Running

**Instance: i-03adf85b99abdfbfa (Cloud-Manager-Connector)**

**Security**

**Security details**

IAM Role

[Cloud-Manager-Operator-P5mGGXw](#)

3. In the **Permissions** tab, expand the policy and click **Edit policy**.



4. Click **JSON** and add the following permissions under the first set of actions:

```
"eks:ListClusters",  
"eks:DescribeCluster",  
"iam:GetInstanceProfile"
```

[View the full JSON format for the policy.](#)

5. Click **Review policy** and then click **Save changes**.

## Review networking requirements

You need to provide network connectivity between the Kubernetes cluster and the Connector and between the Kubernetes cluster and the Cloud Volumes ONTAP system that provides backend storage to the cluster.

- Each Kubernetes cluster must have an inbound connection from the Connector
- The Connector must have an outbound connection to each Kubernetes cluster over port 443

The simplest way to provide this connectivity is to deploy the Connector and Cloud Volumes ONTAP in the same VPC as the Kubernetes cluster. Otherwise, you need to set up a VPC peering connection between the different VPCs.

Here's an example that shows each component in the same VPC.



And here's another example that shows an EKS cluster running in a different VPC. In this example, VPC peering provides a connection between the VPC for the EKS cluster and the VPC for the Connector and Cloud Volumes ONTAP.



## Set up RBAC authorization

You need to authorize the Connector role on each Kubernetes cluster so the Connector can discover and manage a cluster.

### Steps

1. Create a cluster role and role binding.
  - a. Create a YAML file that includes the following text.

```

apiVersion: rbac.authorization.k8s.io/v1
kind: ClusterRole
metadata:
  name: cloudmanager-access-clusterrole
rules:
  - apiGroups:
      - ''
    resources:
      - secrets
      - namespaces
      - persistentvolumeclaims
      - persistentvolumes
    verbs:
      - get
      - list
      - create
  - apiGroups:
      - storage.k8s.io
    resources:
      - storageclasses
    verbs:
      - get
      - list
  - apiGroups:
      - trident.netapp.io
    resources:
      - tridentbackends
      - tridentorchestrators
    verbs:
      - get
      - list
---
apiVersion: rbac.authorization.k8s.io/v1
kind: ClusterRoleBinding
metadata:
  name: k8s-access-binding
subjects:
  - kind: Group
    name: cloudmanager-access-group
    apiGroup: rbac.authorization.k8s.io
roleRef:
  kind: ClusterRole
  name: cloudmanager-access-clusterrole
  apiGroup: rbac.authorization.k8s.io

```

- b. Apply the configuration to a cluster.

```
kubectl apply -f <file-name>
```

2. Create an identity mapping to the permissions group.

#### Use eksctl

Use eksctl to create an IAM identity mapping between a cluster and the IAM role for the Cloud Manager Connector.

[Go to the eksctl documentation for full instructions.](#)

An example is provided below.

```
eksctl create iamidentitymapping --cluster <eksCluster> --region  
<us-east-2> --arn <ARN of the Connector IAM role> --group  
cloudmanager-access-group --username  
system:node:{{EC2PrivateDNSName}}
```

#### Edit aws-auth

Directly edit the aws-auth ConfigMap to add RBAC access to the IAM role for the Cloud Manager Connector.

[Go to the AWS EKS documentation for full instructions.](#)

An example is provided below.

```
apiVersion: v1  
data:  
  mapRoles: |  
    - groups:  
      - cloudmanager-access-group  
      rolearn: <ARN of the Connector IAM role>  
      username: system:node:{{EC2PrivateDNSName}}  
kind: ConfigMap  
metadata:  
  creationTimestamp: "2021-09-30T21:09:18Z"  
  name: aws-auth  
  namespace: kube-system  
  resourceVersion: "1021"  
  selfLink: /api/v1/namespaces/kube-system/configmaps/aws-auth  
  uid: dcc31de5-3838-11e8-af26-02e00430057c
```



# Requirements for Kubernetes clusters in Azure

You can add and manage managed Azure Kubernetes clusters (AKS) and self-managed Kubernetes clusters in Azure using Cloud Manager. Before you can add the clusters to Cloud Manager, ensure the following requirements are met.

This topic uses *Kubernetes cluster* where configuration is the same for AKS and self-managed Kubernetes clusters. The cluster type is specified where configuration differs.

## Requirements

### Astra Trident

The Kubernetes cluster must have NetApp Astra Trident deployed. Install one of the four most recent versions of Astra Trident using Helm. [Go to the Astra Trident docs for installation steps using Helm.](#)

### Cloud Volumes ONTAP

Cloud Volumes ONTAP must be set up as backend storage for the cluster. [Go to the Astra Trident docs for configuration steps.](#)

### Cloud Manager Connector

A Connector must be running in Azure with the required permissions. [Learn more below.](#)

### Network connectivity

Network connectivity is required between the Kubernetes cluster and the Connector and between the Kubernetes cluster and Cloud Volumes ONTAP. [Learn more below.](#)

### RBAC authorization

Cloud Manager supports RBAC-enabled clusters with and without Active Directory. The Cloud Manager Connector role must be authorized on each Azure cluster. [Learn more below.](#)

## Prepare a Connector

A Cloud Manager Connector in Azure is required to discover and manage Kubernetes clusters. You'll need to create a new Connector or use an existing Connector that has the required permissions.

### Create a new Connector

Follow the steps in one of the links below.

- [Create a Connector from Cloud Manager](#) (recommended)
- [Create a Connector from the Azure Marketplace](#)
- [Install the Connector on an existing Linux host](#)

### Add the required permissions to an existing Connector (to discover a managed AKS cluster)

If you want to discover a managed AKS cluster, you might need to modify the custom role for the Connector to provide the permissions.

### Steps

1. Identify the role assigned to the Connector virtual machine:

- a. In the Azure portal, open the Virtual machines service.
  - b. Select the Connector virtual machine.
  - c. Under Settings, select **Identity**.
  - d. Click **Azure role assignments**.
  - e. Make note of the custom role assigned to the Connector virtual machine.
2. Update the custom role:
- a. In the Azure portal, open your Azure subscription.
  - b. Click **Access control (IAM) > Roles**.
  - c. Click the ellipsis (...) for the custom role and then click **Edit**.
  - d. Click JSON and add the following permissions:

```
"Microsoft.ContainerService/managedClusters/listClusterUserCredential  
/action"  
"Microsoft.ContainerService/managedClusters/read"
```

- e. Click **Review + update** and then click **Update**.

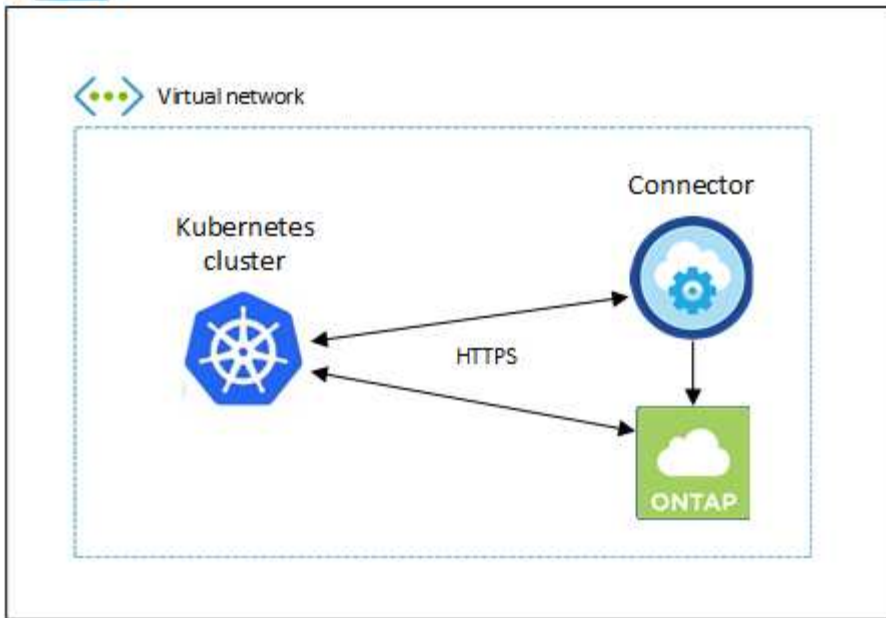
## Review networking requirements

You need to provide network connectivity between the Kubernetes cluster and the Connector and between the Kubernetes cluster and the Cloud Volumes ONTAP system that provides backend storage to the cluster.

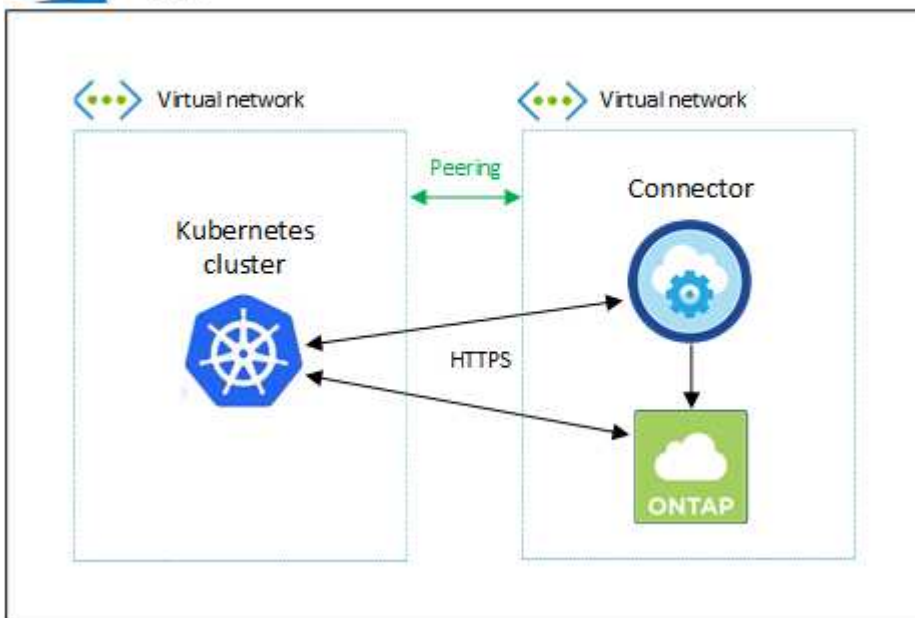
- Each Kubernetes cluster must have an inbound connection from the Connector
- The Connector must have an outbound connection to each Kubernetes cluster over port 443

The simplest way to provide this connectivity is to deploy the Connector and Cloud Volumes ONTAP in the same VNet as the Kubernetes cluster. Otherwise, you need to set up a peering connection between the different VNets.

Here's an example that shows each component in the same VNet.



And here's another example that shows a Kubernetes cluster running in a different VNet. In this example, peering provides a connection between the VNet for the Kubernetes cluster and the VNet for the Connector and Cloud Volumes ONTAP.



## Set up RBAC authorization

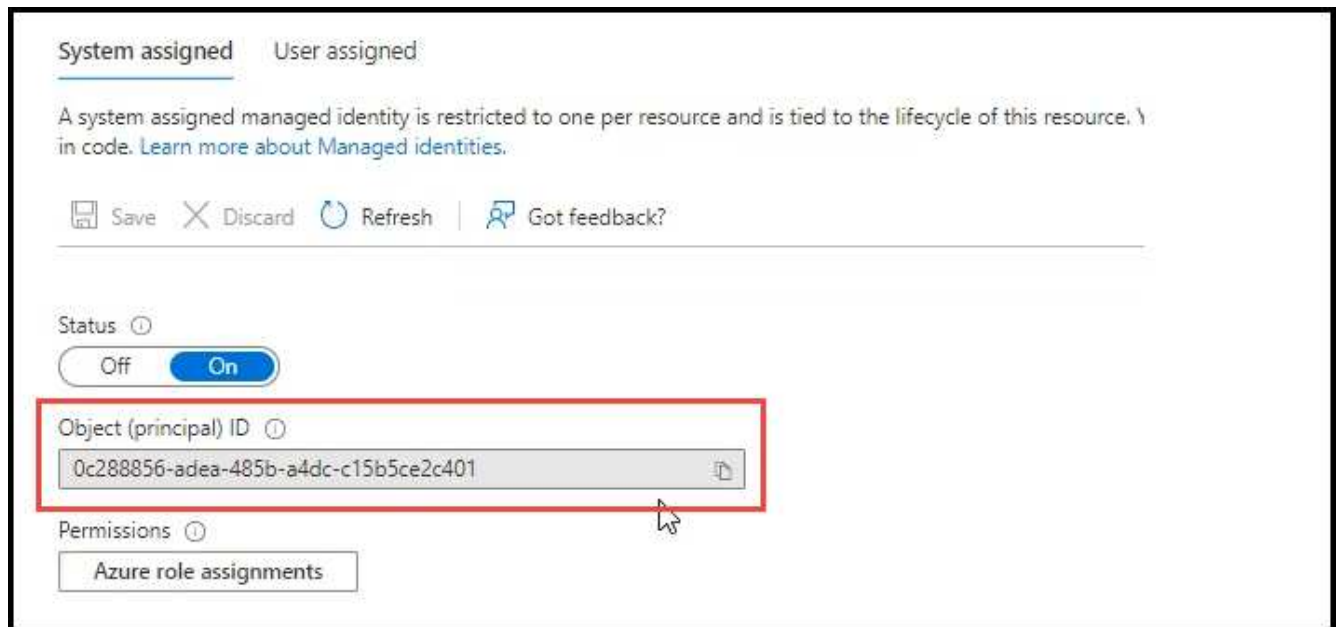
RBAC validation occurs only on Kubernetes clusters with Active Directory (AD) enabled. Kubernetes clusters without AD will pass validation automatically.

You need authorize the Connector role on each Kubernetes cluster so the Connector can discover and manage a cluster.

## Before you begin

Your RBAC subjects: name: configuration varies slightly based on your Kubernetes cluster type.

- If you are deploying a **managed AKS cluster**, you need the Object ID for the system-assigned managed identity for the Connector. This ID is available in Azure management portal.



- If you are deploying a **self-managed Kubernetes cluster**, you need the username of any authorized user.

## Steps

Create a cluster role and role binding.

1. Create a YAML file that includes the following text. Replace the `subjects: kind: variable` with your username and `subjects: user:` with either the Object ID for the system-assigned managed identity or username of any authorized user as described above.

```

apiVersion: rbac.authorization.k8s.io/v1
kind: ClusterRole
metadata:
  name: cloudmanager-access-clusterrole
rules:
  - apiGroups:
      - ''
    resources:
      - secrets
      - namespaces
      - persistentvolumeclaims
      - persistentvolumes
    verbs:
      - get
      - list
      - create
  - apiGroups:
      - storage.k8s.io
    resources:
      - storageclasses
    verbs:
      - get
      - list
  - apiGroups:
      - trident.netapp.io
    resources:
      - tridentbackends
      - tridentorchestrators
    verbs:
      - get
      - list
---
apiVersion: rbac.authorization.k8s.io/v1
kind: ClusterRoleBinding
metadata:
  name: k8s-access-binding
subjects:
  - kind: User
    name: Object (principal) ID (for AKS) or username (for self-
managed)
    apiGroup: rbac.authorization.k8s.io
roleRef:
  kind: ClusterRole
  name: cloudmanager-access-clusterrole
  apiGroup: rbac.authorization.k8s.io

```

2. Apply the configuration to a cluster.

```
kubectl apply -f <file-name>
```

## Requirements for Kubernetes clusters in Google Cloud

You can add and manage managed Google Kubernetes Engine (GKE) clusters and self-managed Kubernetes clusters in Google using Cloud Manager. Before you can add the clusters to Cloud Manager, ensure the following requirements are met.

This topic uses *Kubernetes cluster* where configuration is the same for GKE and self-managed Kubernetes clusters. The cluster type is specified where configuration differs.

### Requirements

#### Astra Trident

The Kubernetes cluster must have NetApp Astra Trident deployed. Install one of the four most recent versions of Astra Trident using Helm. [Go to the Astra Trident docs for installation steps using Helm.](#)

#### Cloud Volumes ONTAP

Cloud Volumes ONTAP must be in Cloud Manager under the same tenancy account, workspace, and Connector as the Kubernetes cluster. [Go to the Astra Trident docs for configuration steps.](#)

#### Cloud Manager Connector

A Connector must be running in Google with the required permissions. [Learn more below.](#)

#### Network connectivity

Network connectivity is required between the Kubernetes cluster and the Connector and between the Kubernetes cluster and Cloud Volumes ONTAP. [Learn more below.](#)

#### RBAC authorization

Cloud Manager supports RBAC-enabled clusters with and without Active Directory. The Cloud Manager Connector role must be authorized on each GKE cluster. [Learn more below.](#)

### Prepare a Connector

A Cloud Manager Connector in Google is required to discover and manage Kubernetes clusters. You'll need to create a new Connector or use an existing Connector that has the required permissions.

#### Create a new Connector

Follow the steps in one of the links below.

- [Create a Connector from Cloud Manager](#) (recommended)
- [Install the Connector on an existing Linux host](#)

#### Add the required permissions to an existing Connector (to discover a managed GKE cluster)

If you want to discover a managed GKE cluster, you might need to modify the custom role for the Connector to

provide the permissions.

### Steps

1. In [Cloud Console](#), go to the **Roles** page.
2. Using the drop-down list at the top of the page, select the project or organization that contains the role that you want to edit.
3. Click a custom role.
4. Click **Edit Role** to update the role's permissions.
5. Click **Add Permissions** to add the following new permissions to the role.

```
container.clusters.get  
container.clusters.list
```

6. Click **Update** to save the edited role.

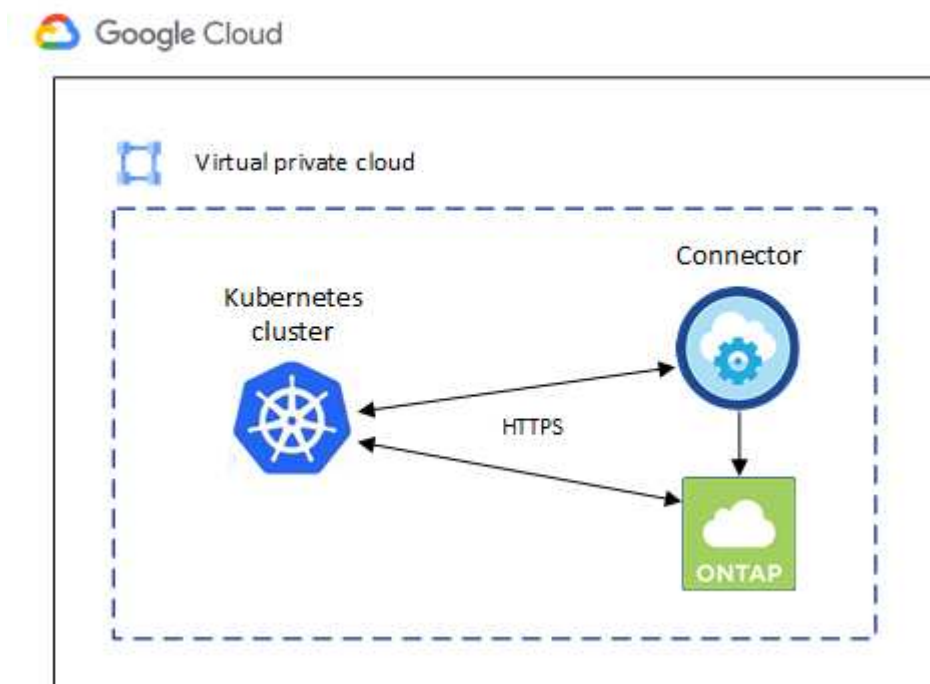
## Review networking requirements

You need to provide network connectivity between the Kubernetes cluster and the Connector and between the Kubernetes cluster and the Cloud Volumes ONTAP system that provides backend storage to the cluster.

- Each Kubernetes cluster must have an inbound connection from the Connector
- The Connector must have an outbound connection to each Kubernetes cluster over port 443

The simplest way to provide this connectivity is to deploy the Connector and Cloud Volumes ONTAP in the same VPC as the Kubernetes cluster. Otherwise, you need to set up a peering connection between the different VPC.

Here's an example that shows each component in the same VPC.



## Set up RBAC authorization

RBAC validation occurs only on Kubernetes clusters with Active Directory (AD) enabled. Kubernetes clusters without AD will pass validation automatically.

You need authorize the Connector role on each Kubernetes cluster so the Connector can discover and manage a cluster.

### Before you begin

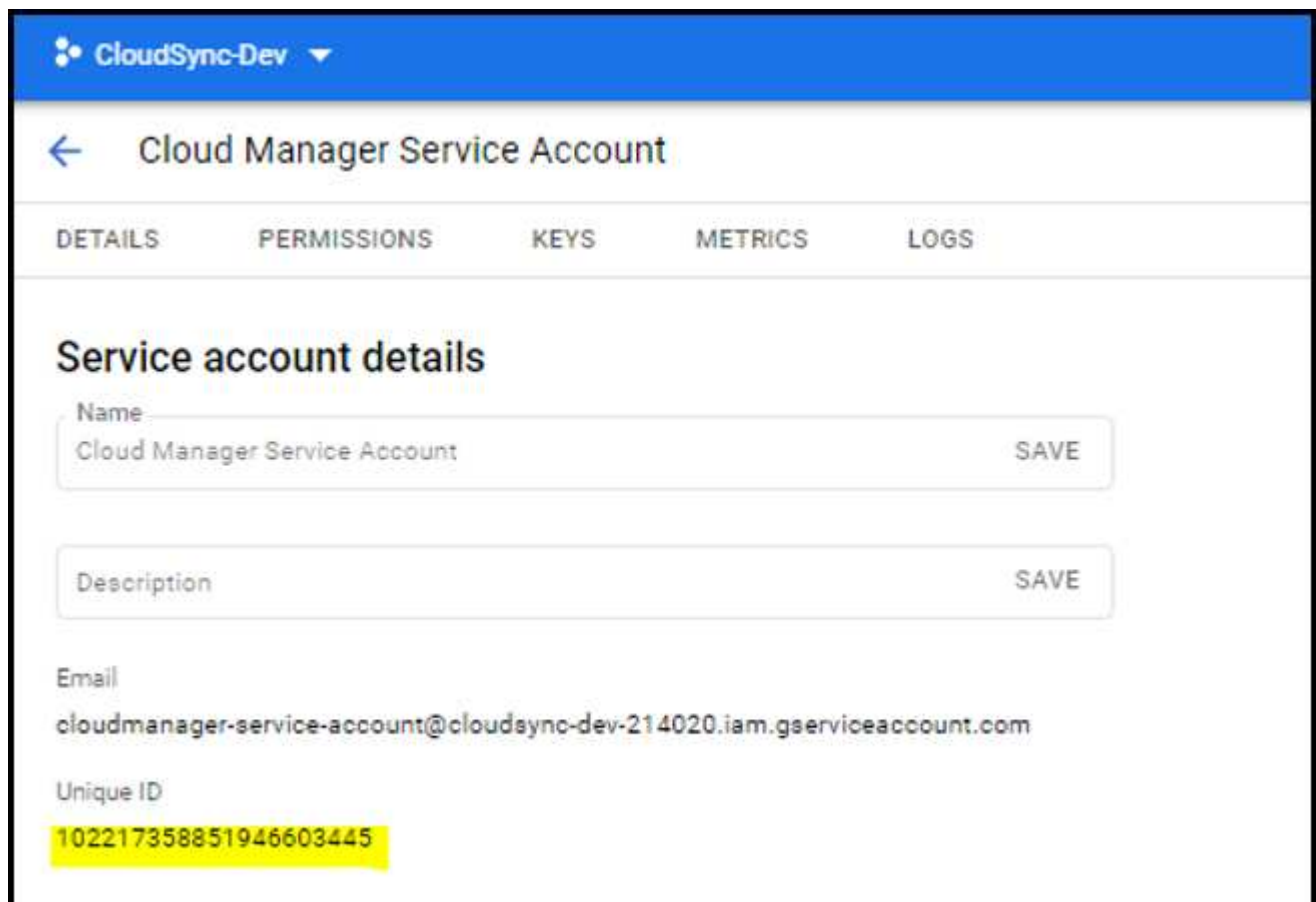
To configure `subjects: name:` in the YAML file, you need to know the Cloud Manager Unique ID.

You can find the unique ID one of two ways:

- Using the command:

```
gcloud iam service-accounts list
gcloud iam service-accounts describe <service-account-email>
```

- In the Service Account Details on the [Cloud Console](#).



### Steps

Create a cluster role and role binding.

1. Create a YAML file that includes the following text. Replace the `subjects: kind: variable` with your



username and subjects: user: with the unique ID for the authorized service account.

```

apiVersion: rbac.authorization.k8s.io/v1
kind: ClusterRole
metadata:
  name: cloudmanager-access-clusterrole
rules:
  - apiGroups:
      - ''
    resources:
      - secrets
      - namespaces
      - persistentvolumeclaims
      - persistentvolumes
    verbs:
      - get
      - list
      - create
  - apiGroups:
      - storage.k8s.io
    resources:
      - storageclasses
    verbs:
      - get
      - list
  - apiGroups:
      - trident.netapp.io
    resources:
      - tridentbackends
      - tridentorchestrators
    verbs:
      - get
      - list
---
apiVersion: rbac.authorization.k8s.io/v1
kind: ClusterRoleBinding
metadata:
  name: k8s-access-binding
subjects:
  - kind: User
    name: "uniqueID"
    apiGroup: rbac.authorization.k8s.io
roleRef:
  kind: ClusterRole
  name: cloudmanager-access-clusterrole
  apiGroup: rbac.authorization.k8s.io

```

2. Apply the configuration to a cluster.

```
kubectl apply -f <file-name>
```

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