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

One of the four most recent versions of Astra Trident is required. You can install Astra Trident directly from Cloud Manager. You should review the prerequisites prior to installing Astra Trident.

To upgrade Astra Trident, upgrade with the operator.

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

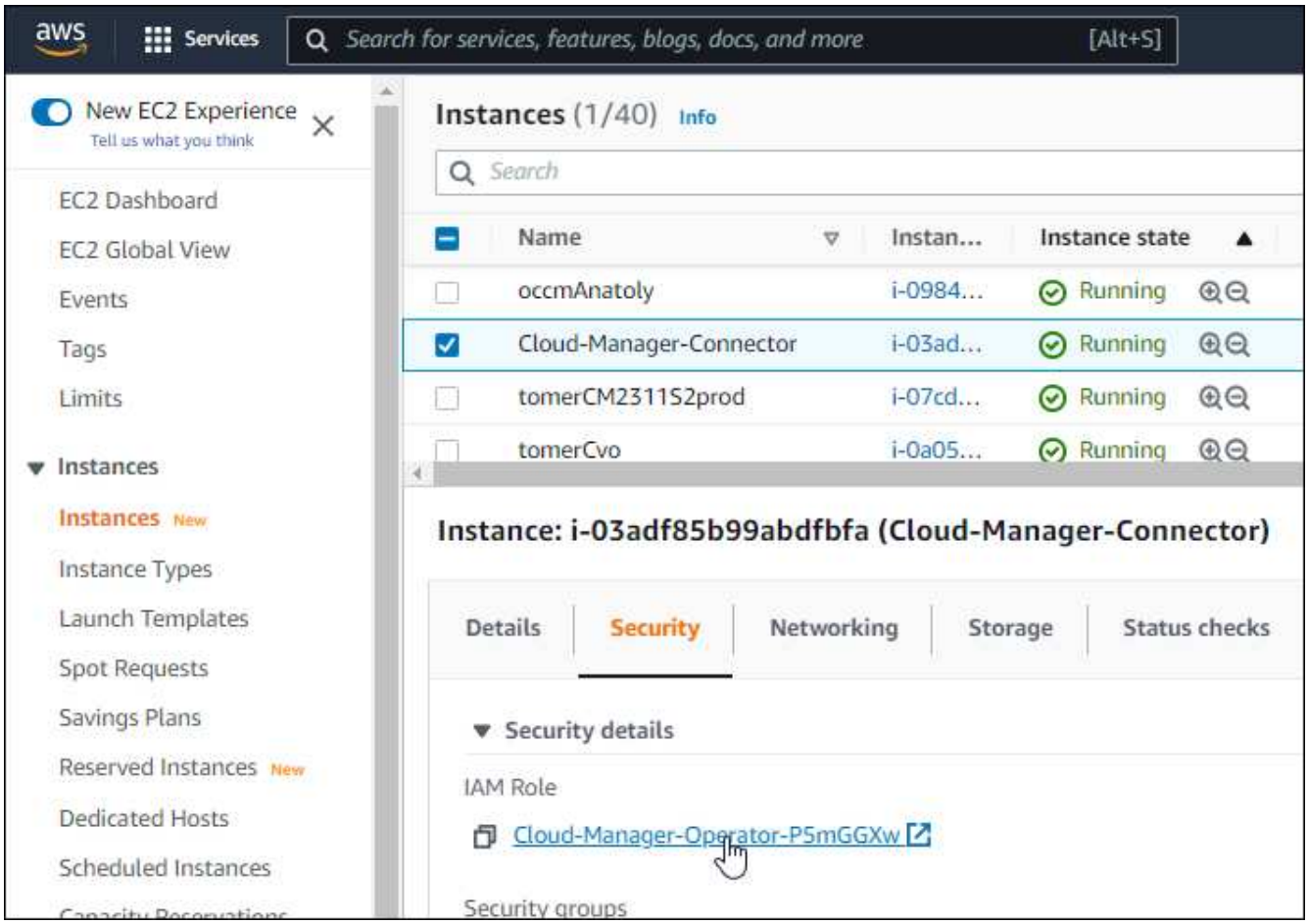
Add the required permissions to an existing Connector

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

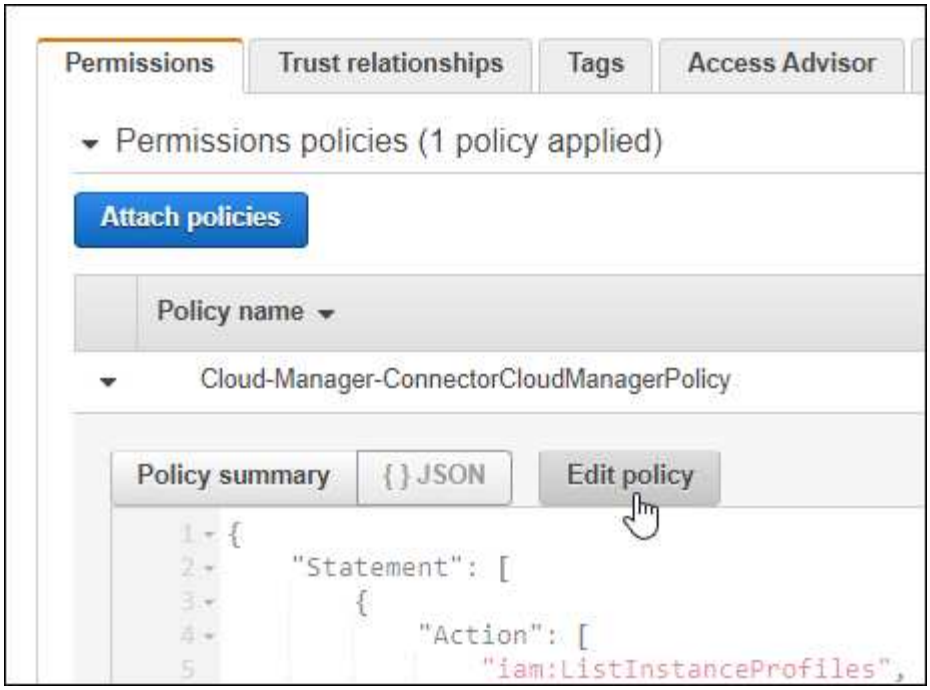
need to modify the existing policy for the Connector's IAM role to provide the permissions.

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.



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:

   - ec2:DescribeRegions
   - eks:ListClusters
   - eks:DescribeCluster
   - iam:GetInstanceProfile

   View the full JSON format for the policy

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

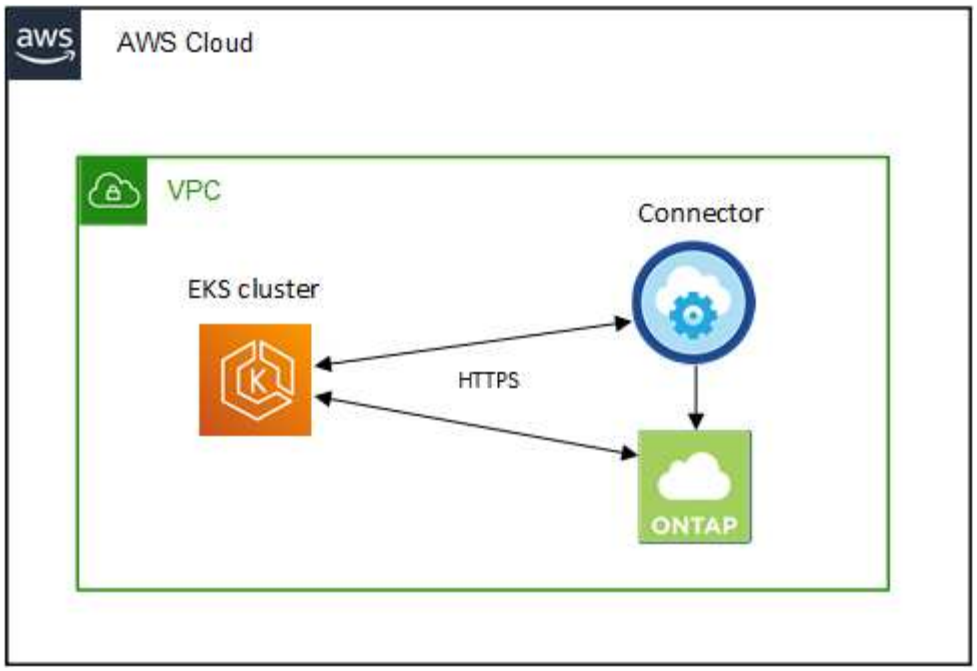
Review networking requirements

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.

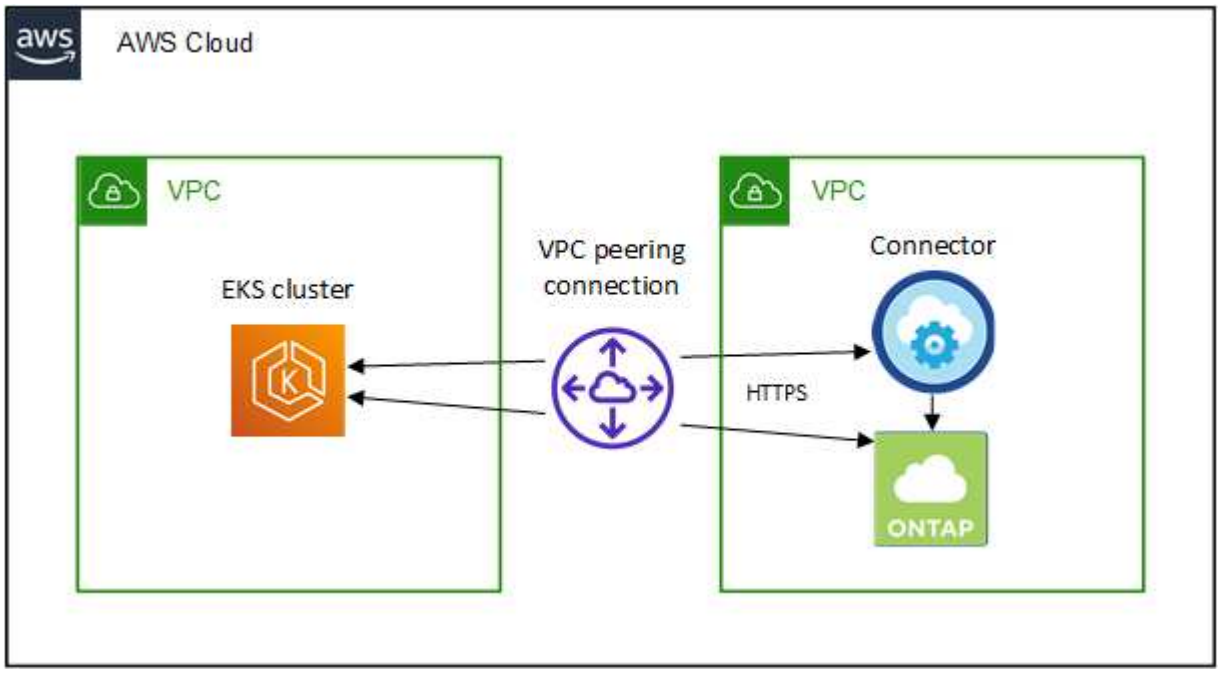
- Each Kubernetes cluster must have an inbound connection from the Connector
- The Connector must have an outbound connection to each Kubernetes cluster over port 443

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.

Different authorization is required to enable different functionality.

Backup and restore

Backup and restore requires only basic authorization.

Add storage classes

Expanded authorization is required to add storage classes using Cloud Manager.

Install Astra trident

You need to provide full authorization for Cloud Manager to install Astra Trident.

When installing Astra Trident, Cloud Manager installs the Astra Trident backend and Kubernetes secret that contains the credentials Astra Trident needs to communicate with the storage cluster.

Steps

1. Create a cluster role and role binding.
    a. Create a YAML file that includes the following text based on your authorization requirements.

Backup/restore

Add basic authorization to enable backup and restore for Kubernetes clusters.

```
apiVersion: rbac.authorization.k8s.io/v1
kind: ClusterRole
metadata:
    name: cloudmanager-access-clusterrole
rules:
    - apiGroups:
        - ''
      resources:
        - namespaces
      verbs:
        - list
    - apiGroups:
        - ''
      resources:
        - persistentvolumes
      verbs:
        - list
    - apiGroups:
        - ''
      resources:
        - pods
        - pods/exec
      verbs:
        - get
        - list
    - apiGroups:
        - ''
      resources:
        - persistentvolumeclaims
      verbs:
        - list
        - create
    - apiGroups:
        - storage.k8s.io
      resources:
        - storageclasses
      verbs:
        - list
    - apiGroups:
        - trident.netapp.io
      resources:
        - tridentbackends
```

```
      verbs:
          - list
    - apiGroups:
          - trident.netapp.io
      resources:
          - tridentorchestrators
      verbs:
          - get
---
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
```

Storage classes

Add expanded authorization to add storage classes using Cloud Manager.

```
apiVersion: rbac.authorization.k8s.io/v1
kind: ClusterRole
metadata:
    name: cloudmanager-access-clusterrole
rules:
    - apiGroups:
          - ''
      resources:
          - secrets
          - namespaces
          - persistentvolumeclaims
          - persistentvolumes
          - pods
          - pods/exec
      verbs:
          - get
          - list
          - create
          - delete
    - apiGroups:
```

```
          - storage.k8s.io
      resources:
          - storageclasses
      verbs:
          - get
          - create
          - list
          - delete
          - patch
    - apiGroups:
          - trident.netapp.io
      resources:
          - tridentbackends
          - tridentorchestrators
          - tridentbackendconfigs
      verbs:
          - get
          - list
          - create
          - delete
---
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
```

Install Trident

Use the command line to provide full authorization and enable Cloud Manager to install Astra Trident.

```
eksctl create iamidentitymapping --cluster < > --region < > --arn
< > --group "system:masters" --username
system:node:{{EC2PrivateDNSName}}
```

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
```