



# **Administer Cloud Manager**

## Cloud Manager

NetApp  
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# Table of Contents

- Administer Cloud Manager ..... 1
  - Manage Connectors ..... 1
  - Manage cloud provider credentials ..... 16
  - Adding NetApp Support Site accounts to Cloud Manager ..... 39
  - Managing your account ..... 39
  - Monitoring operations in your account ..... 48
  - Managing an HTTPS certificate for secure access ..... 50
  - Removing Cloud Volumes ONTAP working environments ..... 52
  - Configuring a Connector to use a proxy server ..... 52
  - Reference ..... 54

# Administer Cloud Manager

## Manage Connectors

### Finding the system ID for a Connector

To help you get started, your NetApp representative might ask you for the system ID for a Connector. The ID is typically used for licensing and troubleshooting purposes.

#### Steps

1. In the upper right of the Cloud Manager console, click the Help icon.
2. Click **Support > Connector**.

The system ID appears at the top.

#### Example



## Managing existing Connectors

After you create one or more Connectors, you can manage them by switching between Connectors, connecting to the local user interface running on a Connector, and more.

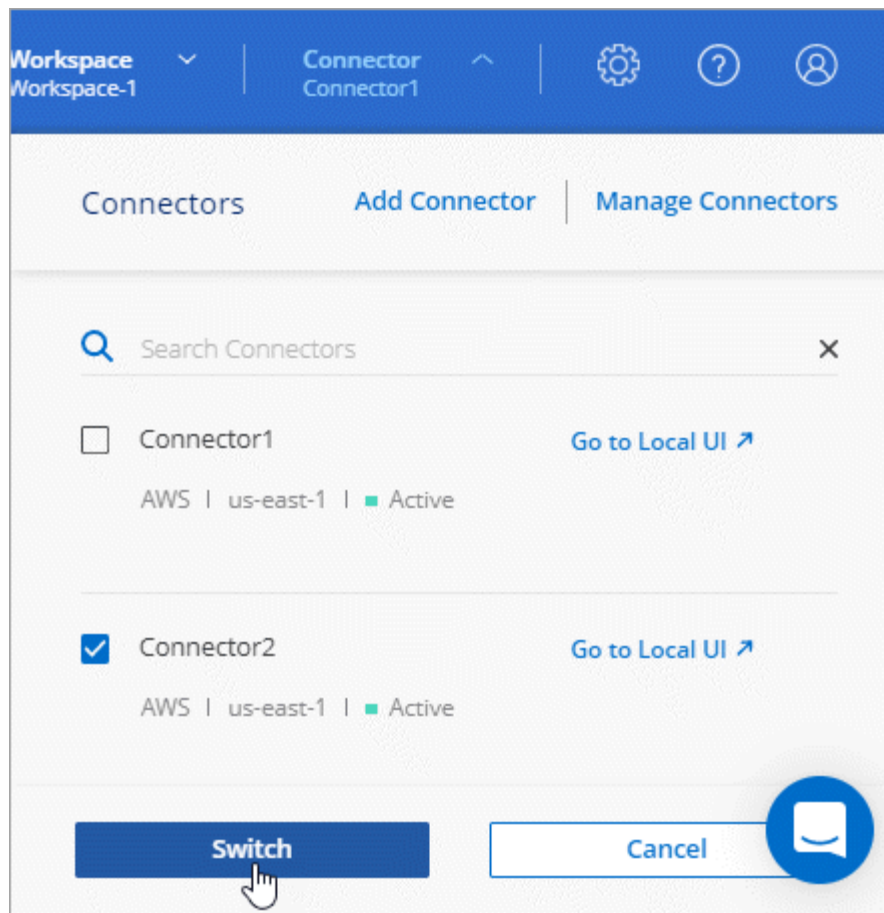
### Switching between Connectors

If you have multiple Connectors, you can switch between them to see the Working Environments that are associated with a specific Connector.

For example, let's say that you're working in a multi-cloud environment. You might have one Connector in AWS and another in Google Cloud. You'd need to switch between those Connectors to manage the Cloud Volumes ONTAP systems running in those clouds.

#### Step

1. Click the **Connector** drop-down, select another Connector, and then click **Switch**.



Cloud Manager refreshes and shows the Working Environments associated with the selected Connector.

## Accessing the local UI

While you should perform almost all tasks from the SaaS user interface, a local user interface is still available on the Connector. This interface is needed for a few tasks that need to be performed from the Connector itself:

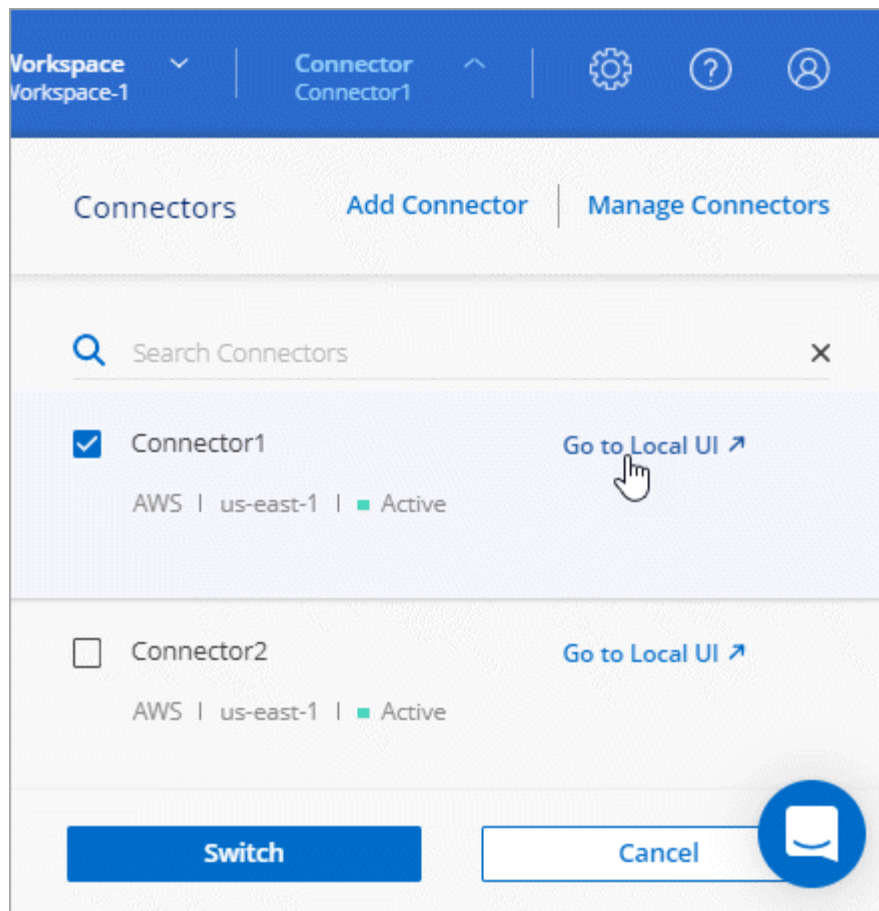
- [Setting a proxy server](#)
- Installing a patch (you'll typically work with NetApp personnel to install a patch)
- Downloading AutoSupport messages (usually directed by NetApp personnel when you have issues)

## Steps

1. [Log in to the Cloud Manager SaaS interface](#) from a machine that has a network connection to the Connector instance.

If the Connector doesn't have a public IP address, you'll need a VPN connection or you'll need to connect from a jump host that's in the same network as the Connector.

2. Click the **Connector** drop-down and then click **Go to Local UI**.



The Cloud Manager interface running on the Connector loads in a new browser tab.

## Editing a Connector's URIs

Add and remove the URIs for a Connector.

### Steps

1. Click the **Connector** drop-down from the Cloud Manager header.
2. Click **Manage Connectors**.
3. Click the action menu for a Connector and click **Edit URIs**.
4. Add and remove URIs and then click **Apply**.

## Removing Connectors from Cloud Manager

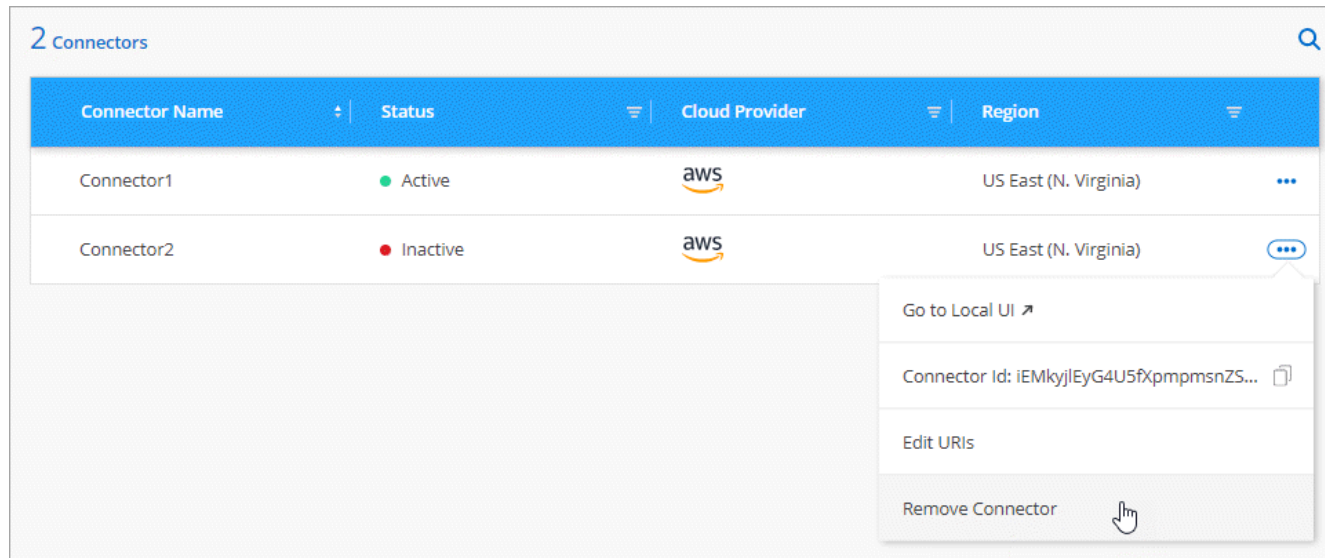
If a Connector is inactive, you can remove it from the list of Connectors in Cloud Manager. You might do this if you deleted the Connector virtual machine or if you uninstalled the Connector software.

Note the following about removing a Connector:

- This action doesn't delete the virtual machine.
- This action can't be reverted—once you remove a Connector from Cloud Manager, you can't add it back to Cloud Manager.

### Steps

1. Click the **Connector** drop-down from the Cloud Manager header.
2. Click **Manage Connectors**.
3. Click the action menu for an inactive Connector and click **Remove Connector**.



4. Enter the name of the Connector to confirm and then click Remove.

## Result

Cloud Manager removes the Connector from its records.

## Uninstalling the Connector software

The Connector includes an uninstallation script that you can use to uninstall the software to troubleshoot issues or to permanently remove the software from the host.

## Step

1. From the Linux host, run the uninstallation script:

```
/opt/application/netapp/cloudmanager/bin/uninstall.sh [silent]
```

*silent* runs the script without prompting you for confirmation.

## What about software upgrades?

The Connector automatically updates its software to the latest version, as long as it has [outbound internet access](#) to obtain the software update.

## More ways to create Connectors

### Connector host requirements

The Connector software must run on a host that meets specific operating system requirements, RAM requirements, port requirements, and so on.

## **A dedicated host is required**

The Connector is not supported on a host that is shared with other applications. The host must be a dedicated host.

## **CPU**

4 cores or 4 vCPUs

## **RAM**

14 GB

## **AWS EC2 instance type**

An instance type that meets the CPU and RAM requirements above. We recommend t3.xlarge and use that instance type when you deploy the Connector directly from Cloud Manager.

## **Azure VM size**

An instance type that meets the CPU and RAM requirements above. We recommend DS3 v2 and use that VM size when you deploy the Connector directly from Cloud Manager.

## **GCP machine type**

An instance type that meets the CPU and RAM requirements above. We recommend n1-standard-4 and use that machine type when you deploy the Connector directly from Cloud Manager.

## **Supported operating systems**

- CentOS 7.6
- CentOS 7.7
- CentOS 7.8
- CentOS 7.9
- Red Hat Enterprise Linux 7.6
- Red Hat Enterprise Linux 7.7
- Red Hat Enterprise Linux 7.8
- Red Hat Enterprise Linux 7.9

The Red Hat Enterprise Linux system must be registered with Red Hat Subscription Management. If it is not registered, the system cannot access repositories to update required 3rd party software during Connector installation.

The Connector is supported on English-language versions of these operating systems.

## **Hypervisor**

A bare metal or hosted hypervisor that is certified to run CentOS or Red Hat Enterprise Linux  
[Red Hat Solution: Which hypervisors are certified to run Red Hat Enterprise Linux?](#)

## **Disk space in /opt**

100 GB of space must be available

## **Disk space in /var**

20 GB of space must be available

## Outbound internet access

Outbound internet access is required to install the Connector and for the Connector to manage resources and processes within your public cloud environment. For a list of endpoints, see [Networking requirements for the Connector](#).

## Creating a Connector from the AWS Marketplace

It's best to create a Connector directly from Cloud Manager, but you can launch a Connector from the AWS Marketplace, if you'd rather not specify AWS access keys. After you create and set up the Connector, Cloud Manager will automatically use it when you create new working environments.

### Steps

1. Create an IAM policy and role for the EC2 instance:
  - a. Download the Cloud Manager IAM policy from the following location:  
[NetApp Cloud Manager: AWS, Azure, and GCP Policies](#)
  - b. From the IAM console, create your own policy by copying and pasting the text from the Cloud Manager IAM policy.
  - c. Create an IAM role with the role type Amazon EC2 and attach the policy that you created in the previous step to the role.
2. Now go to the [Cloud Manager page on the AWS Marketplace](#) to deploy Cloud Manager from an AMI.

The IAM user must have AWS Marketplace permissions to subscribe and unsubscribe.

3. On the Marketplace page, click **Continue to Subscribe** and then click **Continue to Configuration**.



**a**

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## Cloud Manager - Manual Installation without access keys

By: [NetApp, Inc.](#) Latest Version: 3.8.4

Read below for instructions on how to deploy Cloud Volumes ONTAP.

Linux/Unix ★★★★★ 6 AWS reviews

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[Save to List](#)

Typical Total Price  
**\$0.226/hr**  
Total pricing per instance for services hosted on t3.xlarge in US East (N. Virginia). [View Details](#)

Overview Pricing Usage Support Review

### Product Overview

Do NOT subscribe on this page unless instructed by NetApp or redirected here from the NetApp website.

This listing lets you manually launch a Cloud Manager instance without providing your AWS credentials. After launching the Cloud Manager software in AWS, you can access it by entering the instance's IP address in a web browser. If you subscribe here, you still need to subscribe on the listing below for PAYGO charges.

#### Highlights

- See Product Overview for instructions on how to deploy NetApp Cloud Manager.

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## Cloud Manager - Manual Installation without access keys

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### Subscribe to this software

You're subscribed to this software. Please see the terms and pricing details below or click the button above to configure your software.

#### Terms and Conditions

NetApp, Inc. Offer

You have subscribed to this software and agreed that your use of this software is subject to the pricing terms and the seller's [End User License Agreement \(EULA\)](#). You agreed that AWS may share information about this transaction (including your payment terms) with the respective seller, reseller or underlying provider, as applicable, in accordance with the [AWS Privacy Notice](#). Your use of AWS services remains subject to the [AWS Customer Agreement](#) or other agreement with AWS governing your use of such services.

4. Change any of the default options and click **Continue to Launch**.
5. Under **Choose Action**, select **Launch through EC2** and then click **Launch**.

These steps describe how to launch the instance from the EC2 Console because the console enables you to attach an IAM role to the Cloud Manager instance. This isn't possible using the **Launch from Website** action.

6. Follow the prompts to configure and deploy the instance:
  - **Choose Instance Type:** Depending on region availability, choose one of the supported instance types (t3.xlarge is recommended).

[Review the instance requirements.](#)

- **Configure Instance:** Select a VPC and subnet, choose the IAM role that you created in step 1, enable termination protection (recommended), and choose any other configuration options that meet your requirements.

<b>Number of instances</b> ⓘ	<input type="text" value="1"/>	<a href="#">Launch into Auto Scaling Group</a> ⓘ
<b>Purchasing option</b> ⓘ	<input type="checkbox"/> Request Spot instances	
<b>Network</b> ⓘ	<input type="text" value="vpc-a76d91c2   VPC4QA (default)"/>	<a href="#">Create new VPC</a>
<b>Subnet</b> ⓘ	<input type="text" value="subnet-39536c13   QASubnet1   us-east-1b"/> 155 IP Addresses available	<a href="#">Create new subnet</a>
<b>Auto-assign Public IP</b> ⓘ	<input type="text" value="Enable"/>	
<b>Placement group</b> ⓘ	<input type="checkbox"/> Add instance to placement group	
<b>Capacity Reservation</b> ⓘ	<input type="text" value="Open"/>	<a href="#">Create new Capacity Reservation</a>
<b>IAM role</b> ⓘ	<input type="text" value="Cloud_Manager"/>	<a href="#">Create new IAM role</a>
<b>CPU options</b> ⓘ	<input type="checkbox"/> Specify CPU options	
<b>Shutdown behavior</b> ⓘ	<input type="text" value="Stop"/>	
<b>Enable termination protection</b> ⓘ	<input checked="" type="checkbox"/> Protect against accidental termination	
<b>Monitoring</b> ⓘ	<input type="checkbox"/> Enable CloudWatch detailed monitoring <a href="#">Additional charges apply.</a>	

- **Add Storage:** Keep the default storage options.
- **Add Tags:** Enter tags for the instance, if desired.
- **Configure Security Group:** Specify the required connection methods for the Connector instance: SSH, HTTP, and HTTPS.
- **Review:** Review your selections and click **Launch**.

AWS launches the software with the specified settings. The Connector instance and software should be running in approximately five minutes.

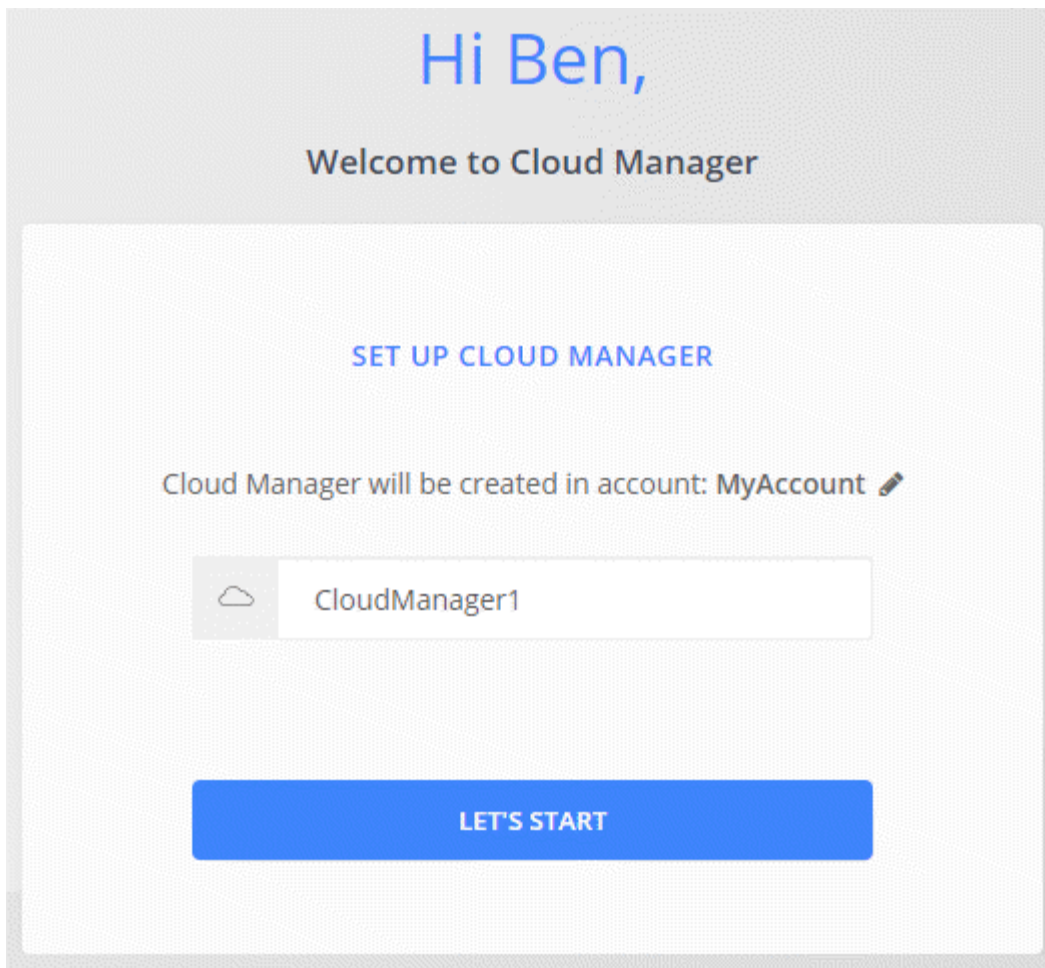
7. Open a web browser from a host that has a connection to the Connector instance and enter the following URL:

`http://ipaddress:80`

8. After you log in, set up the Connector:
  - a. Specify the Cloud Central account to associate with the Connector.

[Learn about Cloud Central accounts.](#)

- b. Enter a name for the system.



## Result

The Connector is now installed and set up with your Cloud Central account. Cloud Manager will automatically use this Connector when you create new working environments. But if you have more than one Connector, you'll need to [switch between them](#).

## Creating a Connector from the Azure Marketplace

It's best to create a Connector directly from Cloud Manager, but you can launch a Connector from the Azure Marketplace, if you prefer. After you create and set up the Connector, Cloud Manager will automatically use it when you create new working environments.

### Creating a Connector in Azure

Deploy the Connector in Azure using the image in the Azure Marketplace and then log in to the Connector to specify your Cloud Central account.

### Steps

1. [Go to the Azure Marketplace page for Cloud Manager](#).
2. Click **Get it now** and then click **Continue**.
3. From the Azure portal, click **Create** and follow the steps to configure the virtual machine.

Note the following as you configure the VM:

- Cloud Manager can perform optimally with either HDD or SSD disks.
- Choose a VM size that meets CPU and RAM requirements. We recommend DS3 v2.

[Review the VM requirements.](#)

- For the network security group, the Connector requires inbound connections using SSH, HTTP, and HTTPS.

[Learn more about security group rules for the Connector.](#)

- Under **Management**, enable **System assigned managed identity** for the Connector by selecting **On**.

This setting is important because a managed identity allows the Connector virtual machine to identify itself to Azure Active Directory without providing any credentials. [Learn more about managed identities for Azure resources.](#)

4. On the **Review + create** page, review your selections and click **Create** to start the deployment.

Azure deploys the virtual machine with the specified settings. The virtual machine and Connector software should be running in approximately five minutes.

5. Open a web browser from a host that has a connection to the Connector virtual machine and enter the following URL:

`http://ipaddress:80`

6. After you log in, set up the Connector:

- a. Specify the Cloud Central account to associate with the Connector.

[Learn about Cloud Central accounts.](#)

- b. Enter a name for the system.



## Result

The Connector is now installed and set up. You must grant Azure permissions before users can deploy Cloud Volumes ONTAP in Azure.

## Granting Azure permissions

When you deployed the Connector in Azure, you should have enabled a [system-assigned managed identity](#). You must now grant the required Azure permissions by creating a custom role and then by assigning the role to the Connector virtual machine for one or more subscriptions.

## Steps

1. Create a custom role using the Cloud Manager policy:
  - a. Download the [Cloud Manager Azure policy](#).
  - b. Modify the JSON file by adding Azure subscription IDs to the assignable scope.

You should add the ID for each Azure subscription from which users will create Cloud Volumes ONTAP systems.

## Example

```
"AssignableScopes": [  
  "/subscriptions/d333af45-0d07-4154-943d-c25fbzzzzzzz",  
  "/subscriptions/54b91999-b3e6-4599-908e-416e0zzzzzzz",  
  "/subscriptions/398e471c-3b42-4ae7-9b59-ce5bbzzzzzzz"
```

- c. Use the JSON file to create a custom role in Azure.

The following example shows how to create a custom role using the Azure CLI 2.0:

```
az role definition create --role-definition
C:\Policy_for_cloud_Manager_Azure_3.9.8.json
```

You should now have a custom role called Cloud Manager Operator that you can assign to the Connector virtual machine.

2. Assign the role to the Connector virtual machine for one or more subscriptions:
  - a. Open the **Subscriptions** service and then select the subscription in which you want to deploy Cloud Volumes ONTAP systems.
  - b. Click **Access control (IAM)**.
  - c. Click **Add > Add role assignment** and then add the permissions:
    - Select the **Cloud Manager Operator** role.



Cloud Manager Operator is the default name provided in the [Cloud Manager policy](#). If you chose a different name for the role, then select that name instead.

- Assign access to a **Virtual Machine**.
  - Select the subscription in which the Connector virtual machine was created.
  - Select the Connector virtual machine.
  - Click **Save**.
- d. If you want to deploy Cloud Volumes ONTAP from additional subscriptions, switch to that subscription and then repeat these steps.

## Result

The Connector now has the permissions that it needs to manage resources and processes within your public cloud environment. Cloud Manager will automatically use this Connector when you create new working environments. But if you have more than one Connector, you'll need to [switch between them](#).

## Installing the Connector software on an existing Linux host

The most common way to create a Connector is directly from Cloud Manager or from a cloud provider's marketplace. But you have the option to download and install the Connector software on an existing Linux host in your network or in the cloud.



If you want to create a Cloud Volumes ONTAP system in Google Cloud, then you must have a Connector running in Google Cloud, as well. You can't use a Connector that's running in another location.

## Requirements

- The host must meet [requirements for the Connector](#).
- A Red Hat Enterprise Linux system must be registered with Red Hat Subscription Management. If it is not registered, the system cannot access repositories to update required 3rd party software during installation.
- The Connector installer accesses several URLs during the installation process. You must ensure that outbound internet access is allowed to these endpoints:

- <http://dev.mysql.com/get/mysql-community-release-el7-5.noarch.rpm>
- <https://dl.fedoraproject.org/pub/epel/epel-release-latest-7.noarch.rpm>
- <https://s3.amazonaws.com/aws-cli/awscli-bundle.zip>

The host might try to update operating system packages during installation. The host can contact different mirroring sites for these OS packages.

### About this task

- Root privileges are not required to install the Connector.
- The installation installs the AWS command line tools (awscli) to enable recovery procedures from NetApp support.

If you receive a message that installing the awscli failed, you can safely ignore the message. The Connector can operate successfully without the tools.

- The installer that is available on the NetApp Support Site might be an earlier version. After installation, the Connector automatically updates itself if a new version is available.

### Steps

1. Download the Cloud Manager software from the [NetApp Support Site](#), and then copy it to the Linux host.

For help with connecting and copying the file to an EC2 instance in AWS, see [AWS Documentation: Connecting to Your Linux Instance Using SSH](#).

2. Assign permissions to run the script.

### Example

```
chmod +x OnCommandCloudManager-V3.8.9.sh
```

3. Run the installation script:

```
./OnCommandCloudManager-V3.8.9.sh [silent] [proxy=ipaddress]
[proxyport=port] [proxyuser=user_name] [proxypwd=password]
```

*silent* runs the installation without prompting you for information.

*proxy* is required if the host is behind a proxy server.

*proxyport* is the port for the proxy server.

*proxyuser* is the user name for the proxy server, if basic authentication is required.

*proxypwd* is the password for the user name that you specified.

4. Unless you specified the silent parameter, type **Y** to continue the script, and then enter the HTTP and HTTPS ports when prompted.

Cloud Manager is now installed. At the end of the installation, the Cloud Manager service (occm) restarts

twice if you specified a proxy server.

5. Open a web browser and enter the following URL:

`https://ipaddress:port`

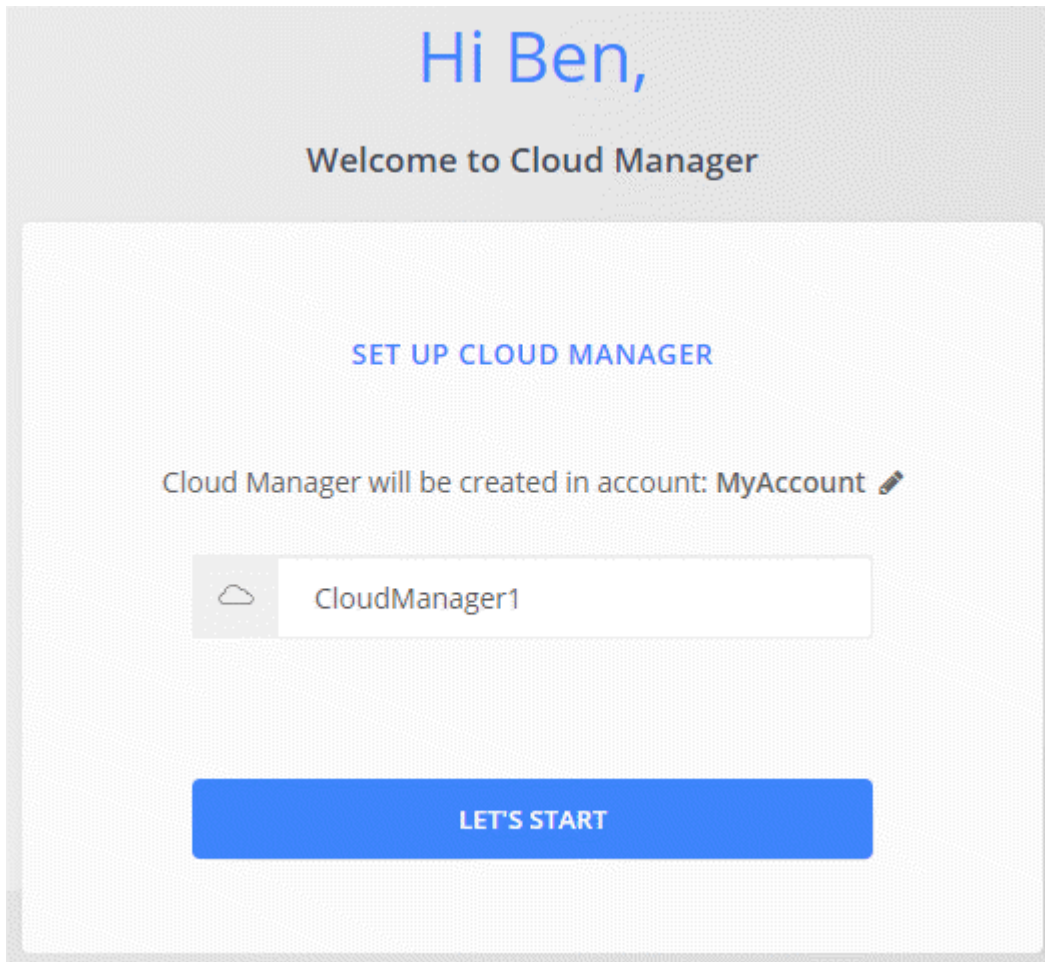
*ipaddress* can be localhost, a private IP address, or a public IP address, depending on the configuration of the host. For example, if the Connector is in the public cloud without a public IP address, you must enter a private IP address from a host that has a connection to the Connector host.

*port* is required if you changed the default HTTP (80) or HTTPS (443) ports. For example, if the HTTPS port was changed to 8443, you would enter `https://ipaddress:8443`

6. Sign up at NetApp Cloud Central or log in.
7. After you log in, set up Cloud Manager:
  - a. Specify the Cloud Central account to associate with the Connector.

[Learn about Cloud Central accounts.](#)

- b. Enter a name for the system.



## Result

The Connector is now installed and set up with your Cloud Central account. Cloud Manager will automatically use this Connector when you create new working environments.



## After you finish

Set up permissions so Cloud Manager can manage resources and processes within your public cloud environment:

- AWS: [Set up an AWS account and then add it to Cloud Manager](#).
- Azure: [Set up an Azure account and then add it to Cloud Manager](#).
- GCP: Set up a service account that has the permissions that Cloud Manager needs to create and manage Cloud Volumes ONTAP systems in projects.
  1. [Create a role in GCP](#) that includes the permissions defined in the [Cloud Manager policy for GCP](#).
  2. [Create a GCP service account and apply the custom role that you just created](#).
  3. [Associate this service account with the Connector VM](#).
  4. If you want to deploy Cloud Volumes ONTAP in other projects, [grant access by adding the service account with the Cloud Manager role to that project](#). You'll need to repeat this step for each project.

## Default configuration for the Connector

If you need to troubleshoot the Connector, it might help to understand how it's configured.

- If you deployed the Connector from Cloud Manager (or directly from a cloud provider's marketplace), note the following:
  - In AWS, the user name for the EC2 Linux instance is ec2-user.
  - The operating system for the image is as follows:
    - AWS: Red Hat Enterprise Linux 7.6 (HVM)
    - Azure: CentOS 7.6
    - GCP: CentOS 7.9

The operating system does not include a GUI. You must use a terminal to access the system.

- The Connector installation folder resides in the following location:

`/opt/application/netapp/cloudmanager`

- Log files are contained in the following folders:

- `/opt/application/netapp/cloudmanager/log`

The logs in this folder provide details about the Connector and docker images.

- `/opt/application/netapp/cloudmanager/docker_occm/data/log`

The logs in this folder provide details about cloud services and the Cloud Manager service that runs on the Connector.

- The Cloud Manager service is named occm.
- The occm service is dependent on the MySQL service.

If the MySQL service is down, then the occm service is down too.

- Cloud Manager installs the following packages on the Linux host, if they are not already installed:

- 7Zip
  - AWSCLI
  - Docker
  - Java
  - Kubectl
  - MySQL
  - Tridentctl
  - Pull
  - Wget
- The Connector uses the following ports on the Linux host:
    - 80 for HTTP access
    - 443 for HTTPS access
    - 3306 for the Cloud Manager database
    - 8080 for the Cloud Manager API proxy
    - 8666 for the Service Manager API
    - 8777 for the Health-Checker Container Service API

## Manage cloud provider credentials

### AWS

#### AWS credentials and permissions

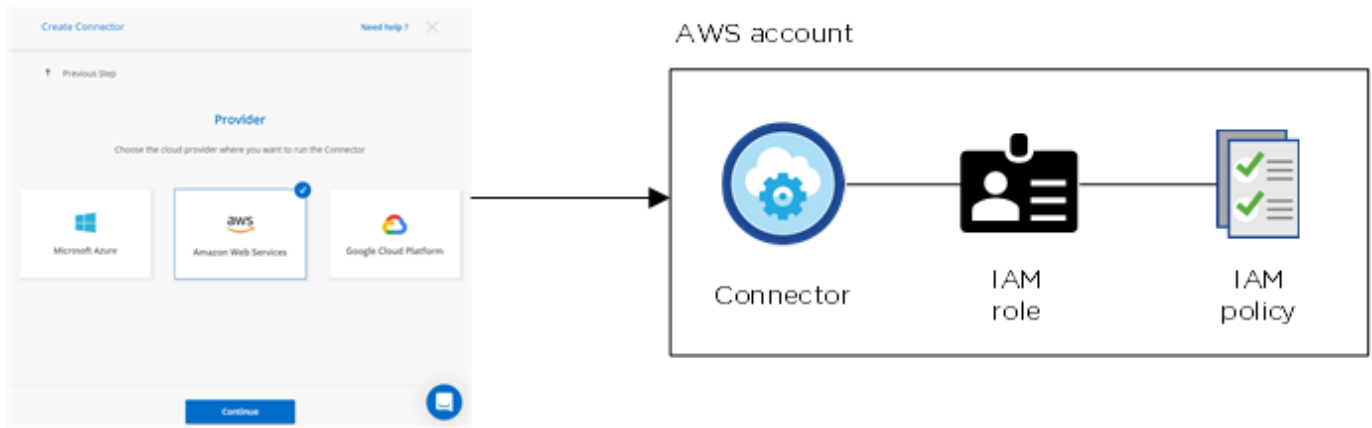
Cloud Manager enables you to choose the AWS credentials to use when deploying Cloud Volumes ONTAP. You can deploy all of your Cloud Volumes ONTAP systems using the initial AWS credentials, or you can add additional credentials.

#### Initial AWS credentials

When you deploy a Connector from Cloud Manager, you need to use an AWS account that has permissions to launch the Connector instance. The required permissions are listed in the [Connector deployment policy for AWS](#).

When Cloud Manager launches the Connector instance in AWS, it creates an IAM role and an instance profile for the instance. It also attaches a policy that provides Cloud Manager with permissions to manage resources and processes within that AWS account. [Review how Cloud Manager uses the permissions](#).

## Cloud Manager

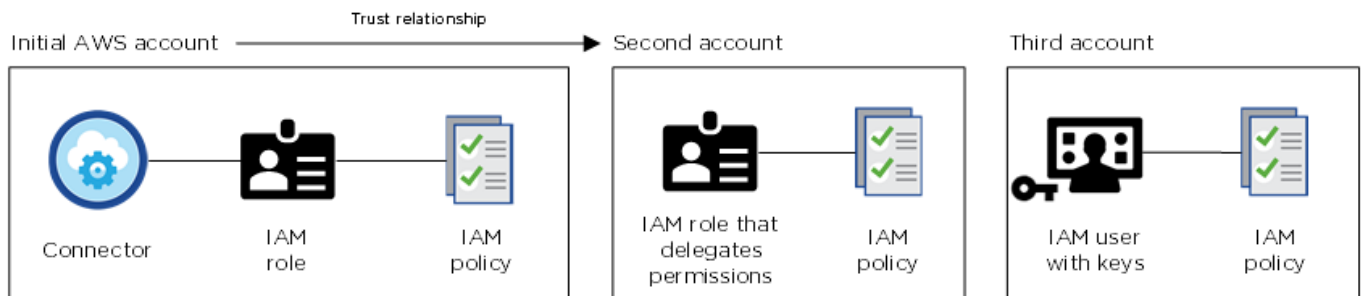


Cloud Manager selects these AWS credentials by default when you create a new working environment for Cloud Volumes ONTAP:

Details & Credentials			
Instance Profile		QA Subscription	<a href="#">Edit Credentials</a>
Credentials	Account ID	Marketplace Subscription	

### Additional AWS credentials

If you want to launch Cloud Volumes ONTAP in different AWS accounts, then you can either [provide AWS keys for an IAM user or the ARN of a role in a trusted account](#). The following image shows two additional accounts, one providing permissions through an IAM role in a trusted account and another through the AWS keys of an IAM user:



You would then [add the account credentials to Cloud Manager](#) by specifying the Amazon Resource Name (ARN) of the IAM role, or the AWS keys for the IAM user.

After you add another set of credentials, you can switch to them when creating a new working environment:

## Edit Account & Add Subscription

### Credentials

Keys | Account ID: [REDACTED]

Instance Profile | Account ID: [REDACTED]

QA Subscription

### Associate Subscription to Credentials

To create a pay-as-you-go Cloud Volumes ONTAP system, you need to select AWS credentials that are associated with a subscription to Cloud Volumes ONTAP from the AWS Marketplace.

[+ Add Subscription](#)

Apply

Cancel

### What about Marketplace deployments and on-prem deployments?

The sections above describe the recommended deployment method for the Connector, which is from Cloud Manager. You can also deploy a Connector in AWS from the [AWS Marketplace](#) and you can [install the Connector on-premises](#).

If you use the Marketplace, permissions are provided in the same way. You just need to manually create and set up the IAM role, and then provide permissions for any additional accounts.

For on-premises deployments, you can't set up an IAM role for the Cloud Manager system, but you can provide permissions just like you would for additional AWS accounts.

### How can I securely rotate my AWS credentials?

As described above, Cloud Manager enables you to provide AWS credentials in a few ways: an IAM role associated with the Connector instance, by assuming an IAM role in a trusted account, or by providing AWS

access keys.

With the first two options, Cloud Manager uses the AWS Security Token Service to obtain temporary credentials that rotate constantly. This process is the best practice—it's automatic and it's secure.

If you provide Cloud Manager with AWS access keys, you should rotate the keys by updating them in Cloud Manager at a regular interval. This is a completely manual process.

## Managing AWS credentials and subscriptions for Cloud Manager

When you create a Cloud Volumes ONTAP system, you need to select the AWS credentials and subscription to use with that system. If you manage multiple AWS subscriptions, you can assign each one of them to different AWS credentials from the Credentials page.

Before you add AWS credentials to Cloud Manager, you need to provide the required permissions to that account. The permissions enable Cloud Manager to manage resources and processes within that AWS account. How you provide the permissions depends on whether you want to provide Cloud Manager with AWS keys or the ARN of a role in a trusted account.



When you deployed a Connector from Cloud Manager, Cloud Manager automatically added AWS credentials for the account in which you deployed the Connector. This initial account is not added if you manually installed the Connector software on an existing system. [Learn about AWS credentials and permissions.](#)

## Choices

- [Granting permissions by providing AWS keys](#)
- [Granting permissions by assuming IAM roles in other accounts](#)

### How can I securely rotate my AWS credentials?

Cloud Manager enables you to provide AWS credentials in a few ways: an IAM role associated with the Connector instance, by assuming an IAM role in a trusted account, or by providing AWS access keys. [Learn more about AWS credentials and permissions.](#)

With the first two options, Cloud Manager uses the AWS Security Token Service to obtain temporary credentials that rotate constantly. This process is the best practice, it's automatic and it's secure.

If you provide Cloud Manager with AWS access keys, you should rotate the keys by updating them in Cloud Manager at a regular interval. This is a completely manual process.

## Granting permissions by providing AWS keys

If you want to provide Cloud Manager with AWS keys for an IAM user, then you need to grant the required permissions to that user. The Cloud Manager IAM policy defines the AWS actions and resources that Cloud Manager is allowed to use.

## Steps

1. Download the Cloud Manager IAM policy from the [Cloud Manager Policies page](#).
2. From the IAM console, create your own policy by copying and pasting the text from the Cloud Manager

IAM policy.

[AWS Documentation: Creating IAM Policies](#)

3. Attach the policy to an IAM role or an IAM user.

- [AWS Documentation: Creating IAM Roles](#)
- [AWS Documentation: Adding and Removing IAM Policies](#)

## Result

The account now has the required permissions. [You can now add it to Cloud Manager.](#)

## Granting permissions by assuming IAM roles in other accounts

You can set up a trust relationship between the source AWS account in which you deployed the Connector instance and other AWS accounts by using IAM roles. You would then provide Cloud Manager with the ARN of the IAM roles from the trusted accounts.

## Steps

1. Go to the target account where you want to deploy Cloud Volumes ONTAP and create an IAM role by selecting **Another AWS account**.

Be sure to do the following:

- Enter the ID of the account where the Connector instance resides.
- Attach the Cloud Manager IAM policy, which is available from the [Cloud Manager Policies page](#).

2. Go to the source account where the Connector instance resides and select the IAM role that is attached to the instance.

- a. Click **Attach policies** and then click **Create policy**.
- b. Create a policy that includes the "sts:AssumeRole" action and the ARN of the role that you created in the target account.

## Example

```
{
  "Version": "2012-10-17",
  "Statement": {
    "Effect": "Allow",
    "Action": "sts:AssumeRole",
    "Resource": "arn:aws:iam::ACCOUNT-B-ID:role/ACCOUNT-B-ROLENAME"
  }
}
```

## Result

The account now has the required permissions. [You can now add it to Cloud Manager.](#)

## Adding AWS credentials to Cloud Manager

After you provide an AWS account with the required permissions, you can add the credentials for that account to Cloud Manager. This enables you to launch Cloud Volumes ONTAP systems in that account.

### Before you get started

If you just created these credentials in your cloud provider, it might take a few minutes until they are available for use. Wait a few minutes before you add the credentials to Cloud Manager.

### Steps

1. In the upper right of the Cloud Manager console, click the Settings icon, and select **Credentials**.



2. Click **Add Credentials** and select **AWS**.
3. Provide AWS keys or the ARN of a trusted IAM role.
4. Confirm that the policy requirements have been met and click **Continue**.
5. Choose the subscription that you want to associate with the credentials, or click **Add Subscription** if you don't have one yet.

To pay for Cloud Volumes ONTAP at an hourly rate (PAYGO) or with an annual contract, AWS credentials must be associated with a subscription to Cloud Volumes ONTAP from the AWS Marketplace.

6. Click **Add**.

### Result

You can now switch to a different set of credentials from the Details and Credentials page when creating a new working environment:

## Edit Account & Add Subscription

### Credentials

Keys | Account ID:

Instance Profile | Account ID:

QA Subscription

### Associate Subscription to Credentials

To create a pay-as-you-go Cloud Volumes ONTAP system, you need to select AWS credentials that are associated with a subscription to Cloud Volumes ONTAP from the AWS Marketplace.

[+ Add Subscription](#)

Apply

Cancel

### Associating an AWS subscription to credentials

After you add your AWS credentials to Cloud Manager, you can associate an AWS Marketplace subscription with those credentials. The subscription enables you to pay for Cloud Volumes ONTAP at an hourly rate (PAYGO) or using an annual contract, and to use other NetApp cloud services.

There are two scenarios in which you might associate an AWS Marketplace subscription after you've already added the credentials to Cloud Manager:

- You didn't associate a subscription when you initially added the credentials to Cloud Manager.
- You want to replace an existing AWS Marketplace subscription with a new subscription.

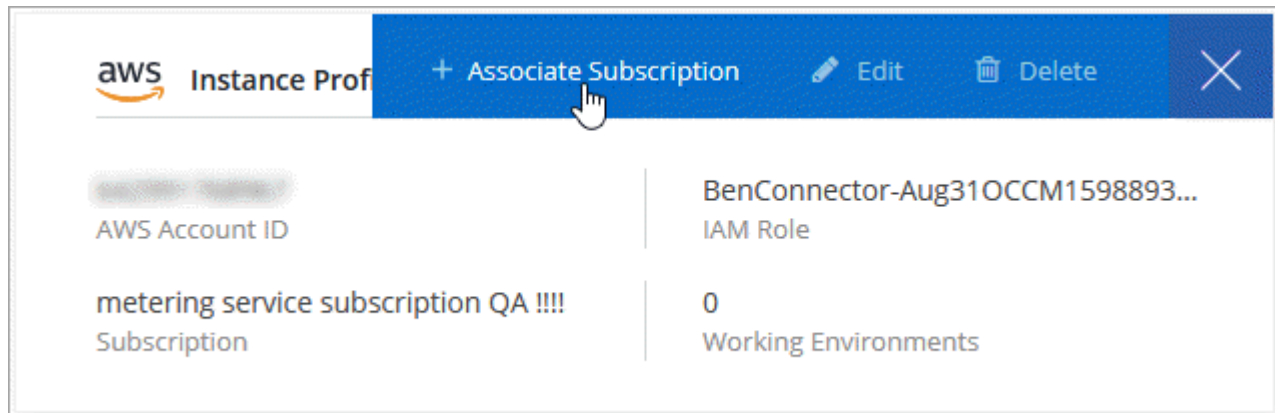
### What you'll need

You need to create a Connector before you can change Cloud Manager settings. [Learn how.](#)

### Steps



1. In the upper right of the Cloud Manager console, click the Settings icon, and select **Credentials**.
2. Hover over a set of credentials and click the action menu.
3. From the menu, click **Associate Subscription**.



4. Select a subscription from the down-down list or click **Add Subscription** and follow the steps to create a new subscription.

► [https://docs.netapp.com/us-en/occm//media/video\\_subscribing\\_aws.mp4](https://docs.netapp.com/us-en/occm//media/video_subscribing_aws.mp4) (video)

## Azure

### Azure credentials and permissions

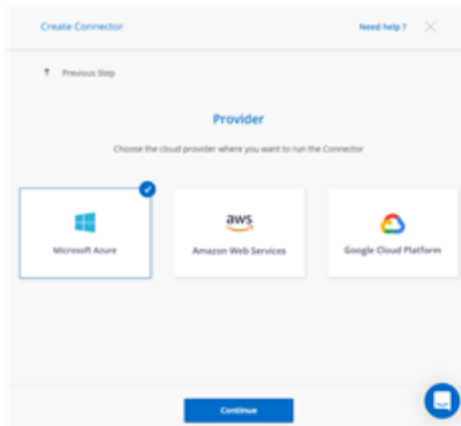
Cloud Manager enables you to choose the Azure credentials to use when deploying Cloud Volumes ONTAP. You can deploy all of your Cloud Volumes ONTAP systems using the initial Azure credentials, or you can add additional credentials.

#### Initial Azure credentials

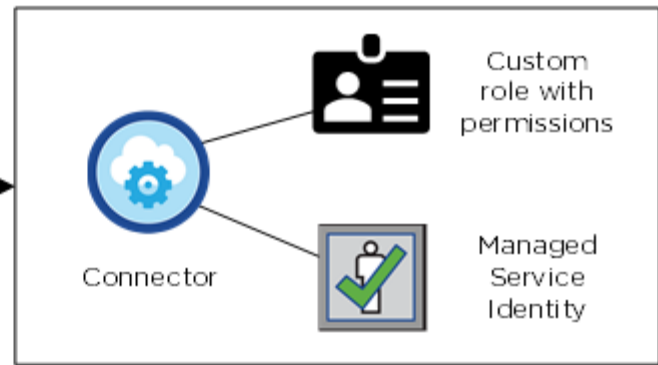
When you deploy a Connector from Cloud Manager, you need to use an Azure account that has permissions to deploy the Connector virtual machine. The required permissions are listed in the [Connector deployment policy for Azure](#).

When Cloud Manager deploys the Connector virtual machine in Azure, it enables a [system-assigned managed identity](#) on virtual machine, creates a custom role, and assigns it to the virtual machine. The role provides Cloud Manager with permissions to manage resources and processes within that Azure subscription. [Review how Cloud Manager uses the permissions](#).

## Cloud Manager



## Azure account



Cloud Manager selects these Azure credentials by default when you create a new working environment for Cloud Volumes ONTAP:

Details & Credentials			
Managed Service Ide...	OCCM QA1	<span>ⓘ</span> No subscription is associated	<a href="#">Edit Credentials</a>
Credential Name	Azure Subscription	Marketplace Subscription	

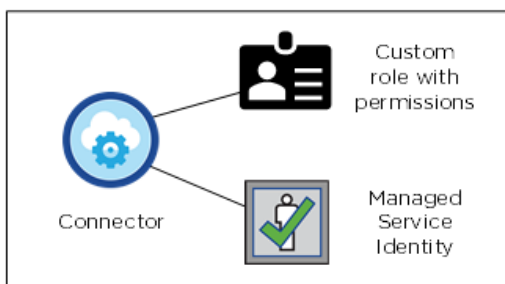
### Additional Azure subscriptions for a managed identity

The managed identity is associated with the subscription in which you launched the Connector. If you want to select a different Azure subscription, then you need to [associate the managed identity with those subscriptions](#).

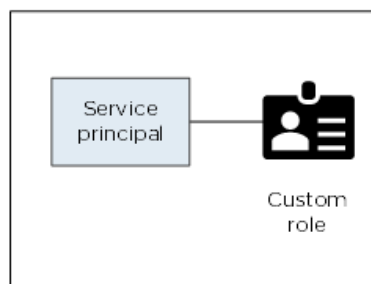
### Additional Azure credentials

If you want to deploy Cloud Volumes ONTAP using different Azure credentials, then you must grant the required permissions by [creating and setting up a service principal in Azure Active Directory](#) for each Azure account. The following image shows two additional accounts, each set up with a service principal and custom role that provides permissions:

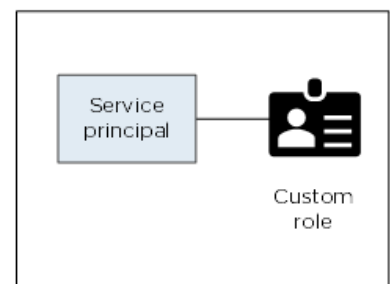
Initial Azure account



Second account



Third account



You would then [add the account credentials to Cloud Manager](#) by providing details about the AD service principal.

After you add another set of credentials, you can switch to them when creating a new working environment:

## Edit Account & Add Subscription

### Credentials

cloud-manager-app | Application ID: 57c42424-88a0-480a.

Managed Service Identity

OCCM QA1 (Default)

### What about Marketplace deployments and on-prem deployments?

The sections above describe the recommended deployment method for the Connector, which is from NetApp Cloud Central. You can also deploy a Connector in Azure from the [Azure Marketplace](#), and you can [install the Connector on-premises](#).

If you use the Marketplace, permissions are provided in the same way. You just need to manually create and set up the managed identity for the Connector, and then provide permissions for any additional accounts.

For on-premises deployments, you can't set up a managed identity for the Connector, but you can provide permissions just like you would for additional accounts by using a service principal.

### Managing Azure credentials and subscriptions for Cloud Manager

When you create a Cloud Volumes ONTAP system, you need to select the Azure credentials and Marketplace subscription to use with that system. If you manage multiple Azure Marketplace subscriptions, you can assign each one of them to different Azure credentials from the Credentials page.

There are two ways to manage Azure credentials in Cloud Manager. First, if you want to deploy Cloud Volumes ONTAP in different Azure accounts, then you need to provide the required permissions and add the credentials to Cloud Manager. The second way is to associate additional subscriptions with the Azure managed identity.



When you deploy a Connector from Cloud Manager, Cloud Manager automatically adds the Azure account in which you deployed the Connector. An initial account is not added if you manually installed the Connector software on an existing system. [Learn about Azure accounts and permissions](#).

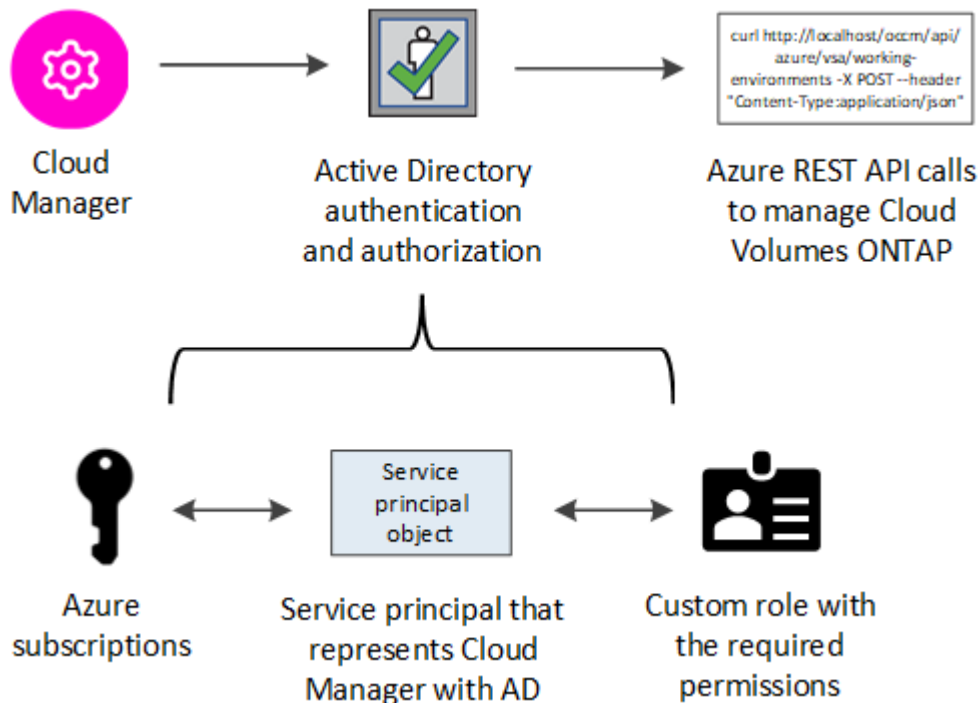
### Granting Azure permissions using a service principal

Cloud Manager needs permissions to perform actions in Azure. You can grant the required permissions to an Azure account by creating and setting up a service principal in Azure Active Directory and by obtaining the

Azure credentials that Cloud Manager needs.

### About this task

The following image depicts how Cloud Manager obtains permissions to perform operations in Azure. A service principal object, which is tied to one or more Azure subscriptions, represents Cloud Manager in Azure Active Directory and is assigned to a custom role that allows the required permissions.



### Steps

1. [Create an Azure Active Directory application.](#)
2. [Assign the application to a role.](#)
3. [Add Windows Azure Service Management API permissions.](#)
4. [Get the application ID and directory ID.](#)
5. [Create a client secret.](#)

### Creating an Azure Active Directory application

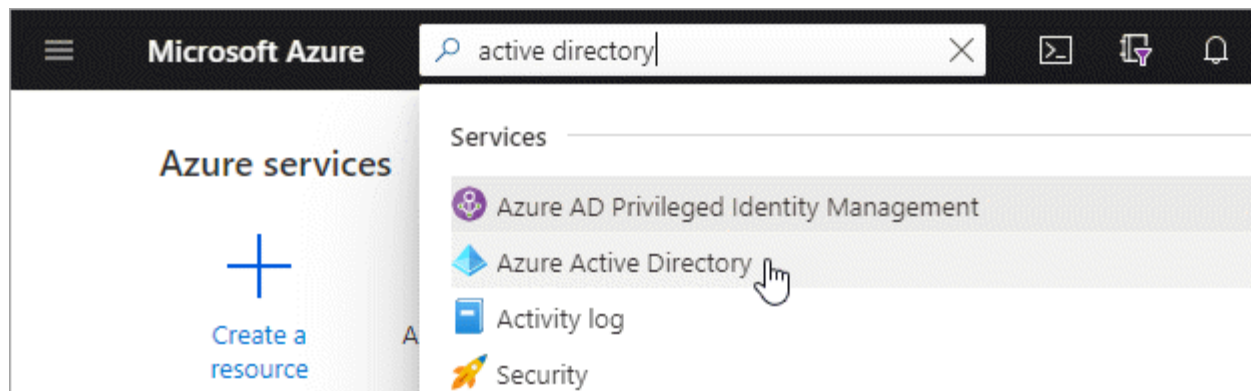
Create an Azure Active Directory (AD) application and service principal that Cloud Manager can use for role-based access control.

### Before you begin

You must have the right permissions in Azure to create an Active Directory application and to assign the application to a role. For details, refer to [Microsoft Azure Documentation: Required permissions](#).

### Steps

1. From the Azure portal, open the **Azure Active Directory** service.



2. In the menu, click **App registrations**.
3. Click **New registration**.
4. Specify details about the application:
  - **Name**: Enter a name for the application.
  - **Account type**: Select an account type (any will work with Cloud Manager).
  - **Redirect URI**: You can leave this field blank.
5. Click **Register**.

## Result

You've created the AD application and service principal.

## Assigning the application to a role

You must bind the service principal to one or more Azure subscriptions and assign it the custom "OnCommand Cloud Manager Operator" role so Cloud Manager has permissions in Azure.

## Steps

1. Create a custom role:
  - a. Download the [Cloud Manager Azure policy](#).
  - b. Modify the JSON file by adding Azure subscription IDs to the assignable scope.

You should add the ID for each Azure subscription from which users will create Cloud Volumes ONTAP systems.

## Example

```
"AssignableScopes": [  
  "/subscriptions/d333af45-0d07-4154-943d-c25fbzzzzzzz",  
  "/subscriptions/54b91999-b3e6-4599-908e-416e0zzzzzzz",  
  "/subscriptions/398e471c-3b42-4ae7-9b59-ce5bbzzzzzzz"
```

- c. Use the JSON file to create a custom role in Azure.

The following example shows how to create a custom role using the Azure CLI 2.0:

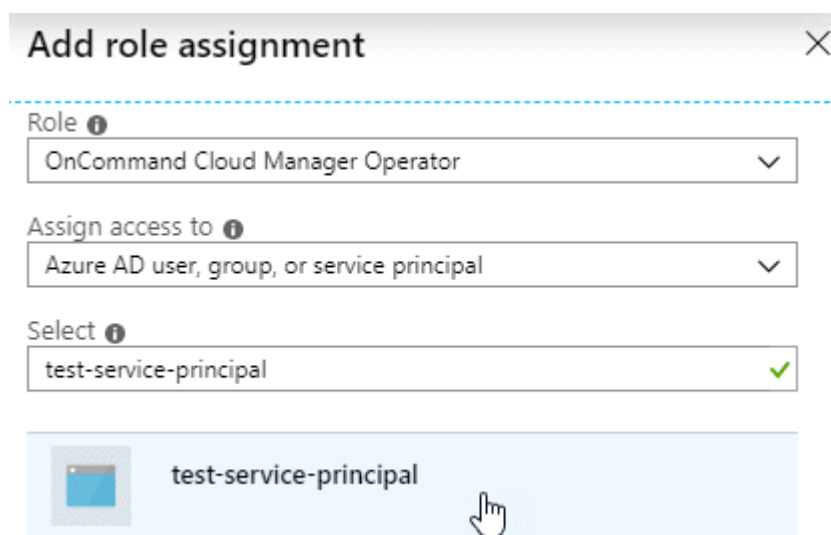
```
az role definition create --role-definition
```

C:\Policy\_for\_cloud\_Manager\_Azure\_3.9.8.json

You should now have a custom role called *Cloud Manager Operator*.

2. Assign the application to the role:
  - a. From the Azure portal, open the **Subscriptions** service.
  - b. Select the subscription.
  - c. Click **Access control (IAM) > Add > Add role assignment**.
  - d. Select the **Cloud Manager Operator** role.
  - e. Keep **Azure AD user, group, or service principal** selected.
  - f. Search for the name of the application (you can't find it in the list by scrolling).

Here's an example:





**Add role assignment** ✕

---

Role ⓘ  
OnCommand Cloud Manager Operator ▼

Assign access to ⓘ  
Azure AD user, group, or service principal ▼

Select ⓘ  
test-service-principal ✓

 test-service-principal 

- g. Select the application and click **Save**.

The service principal for Cloud Manager now has the required Azure permissions for that subscription.

If you want to deploy Cloud Volumes ONTAP from multiple Azure subscriptions, then you must bind the service principal to each of those subscriptions. Cloud Manager enables you to select the subscription that you want to use when deploying Cloud Volumes ONTAP.

## Adding Windows Azure Service Management API permissions

The service principal must have "Windows Azure Service Management API" permissions.

### Steps

1. In the **Azure Active Directory** service, click **App registrations** and select the application.
2. Click **API permissions > Add a permission**.
3. Under **Microsoft APIs**, select **Azure Service Management**.

## Request API permissions

### Select an API

[Microsoft APIs](#) [APIs my organization uses](#) [My APIs](#)

#### Commonly used Microsoft APIs

##### Microsoft Graph

Take advantage of the tremendous amount of data in Office 365, Enterprise Mobility + Security, and Windows 10. Access Azure AD, Excel, Intune, Outlook/Exchange, OneDrive, OneNote, SharePoint, Planner, and more through a single endpoint.



##### Azure Batch

Schedule large-scale parallel and HPC applications in the cloud

##### Azure Data Catalog

Programmatic access to Data Catalog resources to register, annotate and search data assets

##### Azure Data Explorer

Perform ad-hoc queries on terabytes of data to build near real-time and complex analytics solutions

##### Azure Data Lake

Access to storage and compute for big data analytic scenarios

##### Azure DevOps

Integrate with Azure DevOps and Azure DevOps server

##### Azure Import/Export

Programmatic control of import/export jobs

##### Azure Key Vault

Manage your key vaults as well as the keys, secrets, and certificates within your Key Vaults

##### Azure Rights Management Services

Allow validated users to read and write protected content

##### Azure Service Management

Programmatic access to much of the functionality available through the Azure portal

##### Azure Storage

Secure, massively scalable object and data lake storage for unstructured and semi-structured data

##### Customer Insights

Create profile and interaction models for your products

##### Data Export Service for Microsoft Dynamics 365

Export data from Microsoft Dynamics CRM organization to an external destination

- Click **Access Azure Service Management as organization users** and then click **Add permissions**.

## Request API permissions

[← All APIs](#)



Azure Service Management

<https://management.azure.com/> [Docs](#) [↗](#)

What type of permissions does your application require?

### Delegated permissions

Your application needs to access the API as the signed-in user.

### Application permissions

Your application runs as a background service or daemon without a signed-in user.

Select permissions

[expand all](#)

Type to search	
PERMISSION	ADMIN CONSENT REQUIRED
<input checked="" type="checkbox"/> <b>user_impersonation</b> Access Azure Service Management as organization users (preview) ⓘ	-

## Getting the application ID and directory ID

When you add the Azure account to Cloud Manager, you need to provide the application (client) ID and the directory (tenant) ID for the application. Cloud Manager uses the IDs to programmatically sign in.

### Steps

1. In the **Azure Active Directory** service, click **App registrations** and select the application.
2. Copy the **Application (client) ID** and the **Directory (tenant) ID**.

Delete Endpoints

Welcome to the new and improved App registrations. Looking to learn

Display name : test-service-principal

Application (client) ID : 73de25f9-99be-4ae0-8b24-538ca787a6b3

Directory (tenant) ID : 4b0911a0-929b-4715-944b-c03745165b3a

Object ID : b37489a9-379f-49c2-b27c-e630514106a5

## Creating a client secret

You need to create a client secret and then provide Cloud Manager with the value of the secret so Cloud Manager can use it to authenticate with Azure AD.



When you add the account to Cloud Manager, Cloud Manager refers to the client secret as the Application Key.

### Steps



1. Open the **Azure Active Directory** service.
2. Click **App registrations** and select your application.
3. Click **Certificates & secrets > New client secret**.
4. Provide a description of the secret and a duration.
5. Click **Add**.
6. Copy the value of the client secret.

#### Client secrets

A secret string that the application uses to prove its identity when requesting a token. Also can be referred to as application password.

+ New client secret			
DESCRIPTION	EXPIRES	VALUE	Copy to clipboard
test secret	8/16/2020	*sZ1jSe2By:D*-ZRov4NLfdAcY7:+0vA	

### Result

Your service principal is now setup and you should have copied the application (client) ID, the directory (tenant) ID, and the value of the client secret. You need to enter this information in Cloud Manager when you add an Azure account.

### Adding Azure credentials to Cloud Manager

After you provide an Azure account with the required permissions, you can add the credentials for that account to Cloud Manager. This enables you to launch Cloud Volumes ONTAP systems in that account.

### Before you get started

If you just created these credentials in your cloud provider, it might take a few minutes until they are available for use. Wait a few minutes before you add the credentials to Cloud Manager.

### What you'll need

You need to create a Connector before you can change Cloud Manager settings. [Learn how](#).

### Steps

1. In the upper right of the Cloud Manager console, click the Settings icon, and select **Credentials**.



2. Click **Add Credentials** and select **Microsoft Azure**.
3. Enter information about the Azure Active Directory service principal that grants the required permissions:
  - Application (client) ID: See [Getting the application ID and directory ID](#).
  - Directory (tenant) ID: See [Getting the application ID and directory ID](#).
  - Client Secret: See [Creating a client secret](#).
4. Confirm that the policy requirements have been met and then click **Continue**.

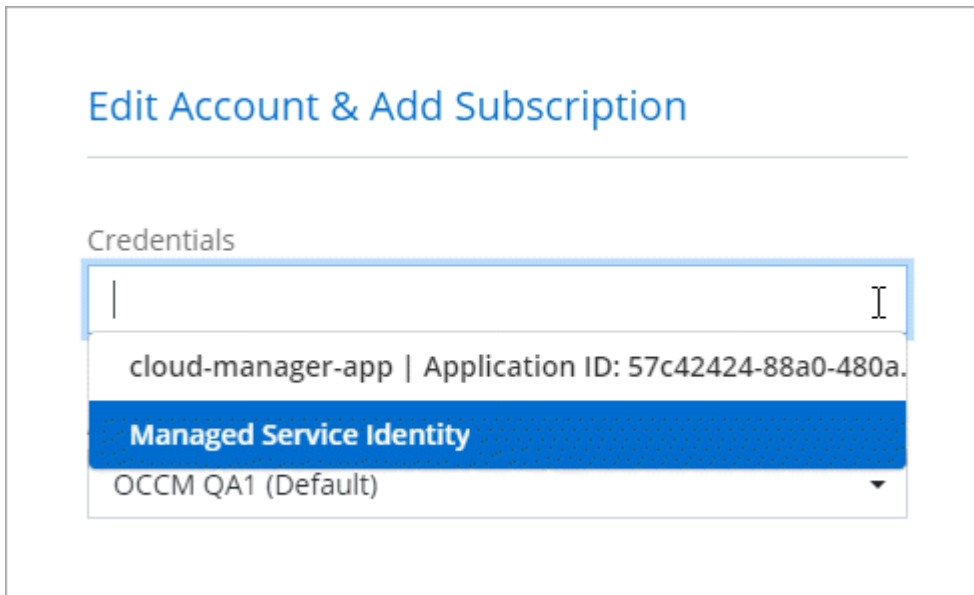
5. Choose the pay-as-you-go subscription that you want to associate with the credentials, or click **Add Subscription** if you don't have one yet.

To create a pay-as-you-go Cloud Volumes ONTAP system, Azure credentials must be associated with a subscription to Cloud Volumes ONTAP from the Azure Marketplace.

6. Click **Add**.

### Result

You can now switch to different set of credentials from the Details and Credentials page [when creating a new working environment](#):



### Associating an Azure Marketplace subscription to credentials

After you add your Azure credentials to Cloud Manager, you can associate an Azure Marketplace subscription to those credentials. The subscription enables you to create a pay-as-you-go Cloud Volumes ONTAP system, and to use other NetApp cloud services.

There are two scenarios in which you might associate an Azure Marketplace subscription after you've already added the credentials to Cloud Manager:

- You didn't associate a subscription when you initially added the credentials to Cloud Manager.
- You want to replace an existing Azure Marketplace subscription with a new subscription.

### What you'll need

You need to create a Connector before you can change Cloud Manager settings. [Learn how](#).

### Steps

1. In the upper right of the Cloud Manager console, click the Settings icon, and select **Credentials**.
2. Hover over a set of credentials and click the action menu.
3. From the menu, click **Associate Subscription**.



4. Select a subscription from the down-down list or click **Add Subscription** and follow the steps to create a new subscription.

The following video starts from the context of the working environment wizard, but shows you the same workflow after you click **Add Subscription**:

► [https://docs.netapp.com/us-en/occm//media/video\\_subscribing\\_azure.mp4](https://docs.netapp.com/us-en/occm//media/video_subscribing_azure.mp4) (video)

#### Associating additional Azure subscriptions with a managed identity

Cloud Manager enables you to choose the Azure credentials and Azure subscription in which you want to deploy Cloud Volumes ONTAP. You can't select a different Azure subscription for the managed identity profile unless you associate the [managed identity](#) with those subscriptions.

#### About this task

A managed identity is [the initial Azure account](#) when you deploy a Connector from Cloud Manager. When you deployed the Connector, Cloud Manager created the Cloud Manager Operator role and assigned it to the Connector virtual machine.

#### Steps

1. Log in to the Azure portal.
2. Open the **Subscriptions** service and then select the subscription in which you want to deploy Cloud Volumes ONTAP.
3. Click **Access control (IAM)**.

- a. Click **Add > Add role assignment** and then add the permissions:

- Select the **Cloud Manager Operator** role.



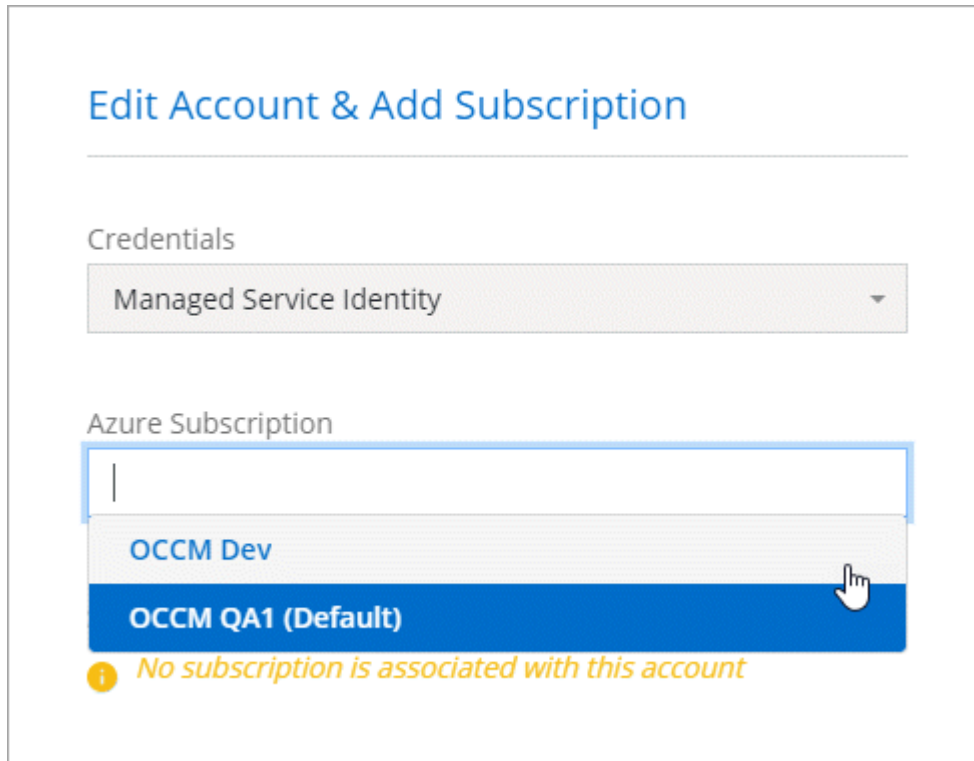
Cloud Manager Operator is the default name provided in the [Cloud Manager policy](#). If you chose a different name for the role, then select that name instead.

- Assign access to a **Virtual Machine**.
- Select the subscription in which the Connector virtual machine was created.
- Select the Connector virtual machine.
- Click **Save**.

4. Repeat these steps for additional subscriptions.

#### Result

When you create a new working environment, you should now have the ability to select from multiple Azure subscriptions for the managed identity profile.



**Edit Account & Add Subscription**

Credentials

Managed Service Identity

Azure Subscription

OCCM Dev

OCCM QA1 (Default)

*No subscription is associated with this account*

## GCP

### Google Cloud projects, permissions, and accounts

A service account provides Cloud Manager with permissions to deploy and manage Cloud Volumes ONTAP systems that are in the same project as the Connector, or in different projects.

#### Project and permissions for Cloud Manager

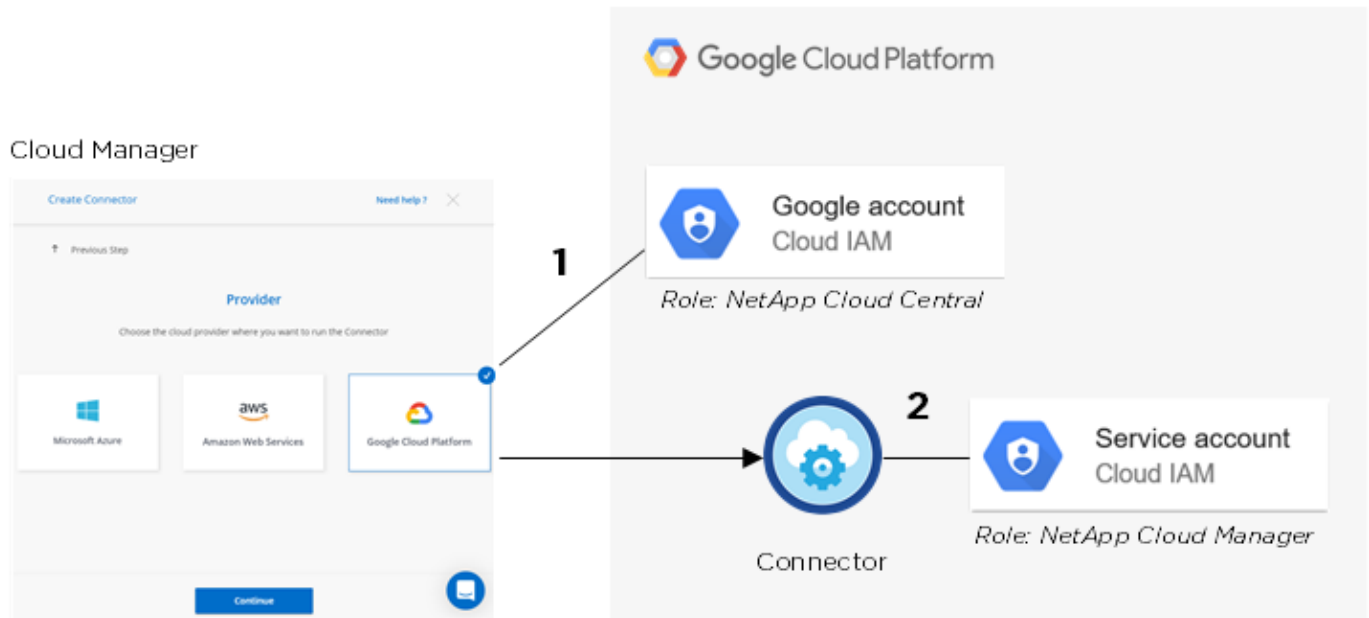
Before you can deploy Cloud Volumes ONTAP in Google Cloud, you must first deploy a Connector in a Google Cloud project. The Connector can't be running on your premises, or in a different cloud provider.

Two sets of permissions must be in place before you deploy a Connector directly from Cloud Manager:

1. You need to deploy a Connector using a Google account that has permissions to launch the Connector VM instance from Cloud Manager.
2. When deploying the Connector, you are prompted to select a [service account](#) for the VM instance. Cloud Manager gets permissions from the service account to create and manage Cloud Volumes ONTAP systems on your behalf. Permissions are provided by attaching a custom role to the service account.

We have set up two YAML files that include the required permissions for the user and the service account. [Learn how to use the YAML files to set up permissions.](#)

The following image depicts the permission requirements described in numbers 1 and 2 above:



### Project for Cloud Volumes ONTAP

Cloud Volumes ONTAP can reside in the same project as the Connector, or in a different project. To deploy Cloud Volumes ONTAP in a different project, you need to first add the Connector service account and role to that project.

- [Learn how to set up service account \(see step 2\).](#)
- [Learn how to deploy Cloud Volumes ONTAP in GCP and select a project.](#)

### Account for data tiering



Cloud Manager requires a GCP account for Cloud Volumes ONTAP 9.6, but not for 9.7 and later. If you want to use data tiering with Cloud Volumes ONTAP 9.7 or later, then follow step 4 in [Getting started with Cloud Volumes ONTAP in Google Cloud Platform](#).

Adding a Google Cloud account to Cloud Manager is required to enable data tiering on a Cloud Volumes ONTAP 9.6 system. Data tiering automatically tiers cold data to low-cost object storage, enabling you to reclaim space on your primary storage and shrink secondary storage.

When you add the account, you need to provide Cloud Manager with a storage access key for a service account that has Storage Admin permissions. Cloud Manager uses the access keys to set up and manage a Cloud Storage bucket for data tiering.

After you add a Google Cloud account, you can then enable data tiering on individual volumes when you create, modify, or replicate them.

- [Learn how to set up and add GCP accounts to Cloud Manager.](#)
- [Learn how to tier inactive data to low-cost object storage.](#)

### Managing GCP credentials and subscriptions for Cloud Manager

You can manage two types of Google Cloud Platform credentials from Cloud Manager: the credentials that are associated with the Connector VM instance and storage access keys used with a Cloud Volumes ONTAP 9.6 system for [data tiering](#).

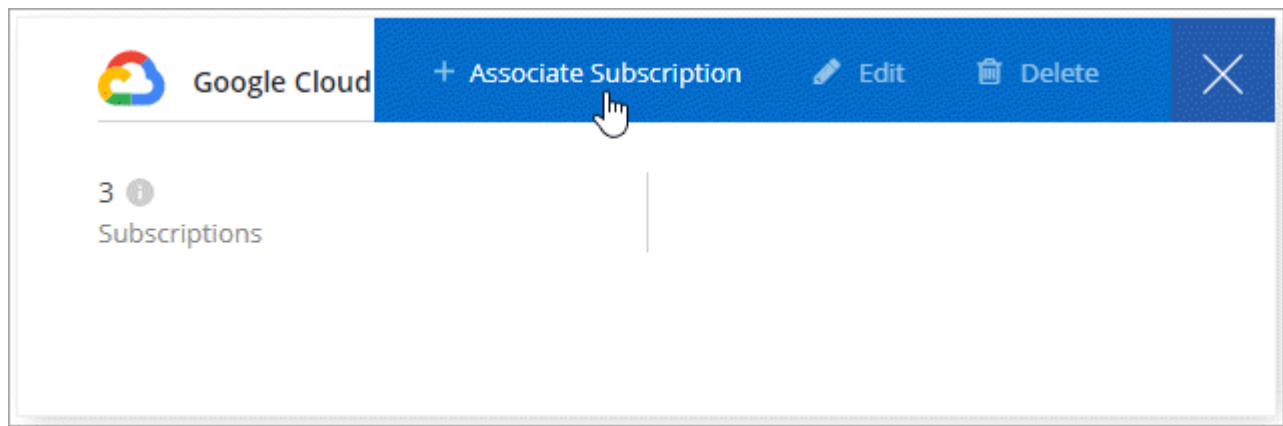
## Associating a Marketplace subscription with GCP credentials

When you deploy a Connector in GCP, Cloud Manager creates a default set of credentials that are associated with the Connector VM instance. These are the credentials that Cloud Manager uses to deploy Cloud Volumes ONTAP.

At any time, you can change the Marketplace subscription that's associated with these credentials. The subscription enables you to create a pay-as-you-go Cloud Volumes ONTAP system, and to use other NetApp cloud services.

### Steps

1. In the upper right of the Cloud Manager console, click the Settings icon, and select **Credentials**.
2. Hover over a set of credentials and click the action menu.
3. From the menu, click **Associate Subscription**.



4. Select a Google Cloud project and subscription from the down-down list or click **Add Subscription** and follow the steps to create a new subscription.

A screenshot of the 'Add Subscription' form in the Google Cloud console. The form has two dropdown menus. The first is labeled 'Google Cloud Project' and has 'OCCM-Dev' selected. The second is labeled 'Subscription' and has 'GCP subscription for staging' selected, which is preceded by a green circle icon. At the bottom of the form, there is a blue button with a plus icon and the text 'Add Subscription'.

5. Click **Associate**.

## Setting up and adding GCP accounts for data tiering with Cloud Volumes ONTAP 9.6

If you want to enable a Cloud Volumes ONTAP 9.6 system for [data tiering](#), you need to provide Cloud Manager with a storage access key for a service account that has Storage Admin permissions. Cloud Manager uses the

access keys to set up and manage a Cloud Storage bucket for data tiering.



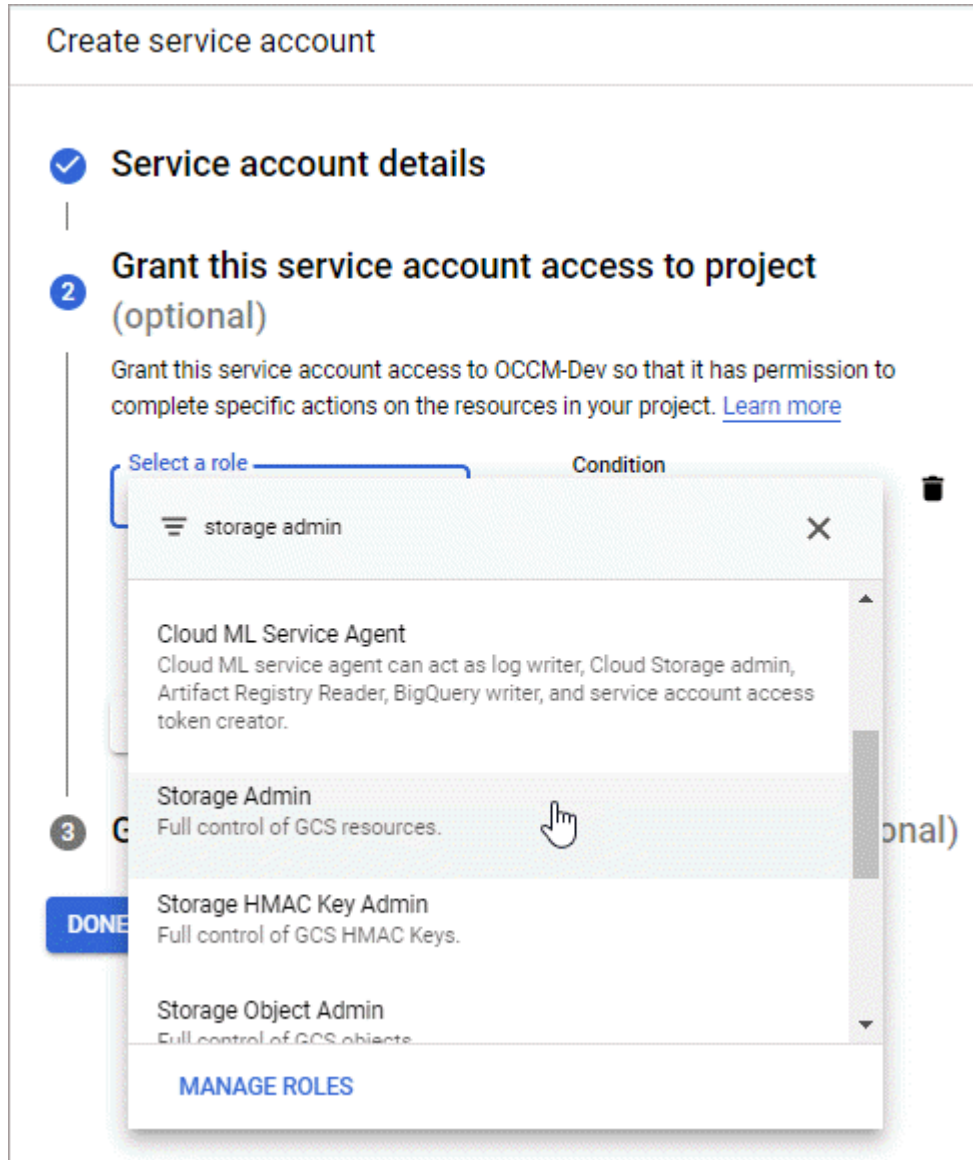
If you want to use data tiering with Cloud Volumes ONTAP 9.7 or later, then follow step 4 in [Getting started with Cloud Volumes ONTAP in Google Cloud Platform](#).

## Setting up a service account and access keys for Google Cloud Storage

A service account enables Cloud Manager to authenticate and access Cloud Storage buckets used for data tiering. The keys are required so that Google Cloud Storage knows who is making the request.

### Steps

1. Open the GCP IAM console and [create a service account that has the Storage Admin role](#).



2. Go to [GCP Storage Settings](#).
3. If you're prompted, select a project.
4. Click the **Interoperability** tab.
5. If you haven't already done so, click **Enable interoperability access**.

6. Under **Access keys for service accounts**, click **Create a key for a service account**.
7. Select the service account that you created in step 1.

## Select a service account

Email	Name	Keys
<input checked="" type="radio"/> data-tiering-for-netapp@top-monitor-250116.iam.gserviceaccount.com	data tiering for netapp	—

[CANCEL](#) [CREATE KEY](#) | [CREATE NEW ACCOUNT](#)

8. Click **Create Key**.
9. Copy the access key and secret.

You'll need to enter this information in Cloud Manager when you add the GCP account for data tiering.

## Adding a GCP account to Cloud Manager

Now that you have an access key for a service account, you can add it to Cloud Manager.

### What you'll need

You need to create a Connector before you can change Cloud Manager settings. [Learn how](#).

### Steps

1. In the upper right of the Cloud Manager console, click the Settings icon, and select **Credentials**.



2. Click **Add Credentials** and select **Google Cloud**.
3. Enter the access key and secret for the service account.

The keys enable Cloud Manager to set up a Cloud Storage bucket for data tiering.

4. Confirm that the policy requirements have been met and then click **Create Account**.

### What's next?

You can now enable data tiering on individual volumes on a Cloud Volumes ONTAP 9.6 system when you create, modify, or replicate them. For details, see [Tiering inactive data to low-cost object storage](#).

But before you do, be sure that the subnet in which Cloud Volumes ONTAP resides is configured for Private Google Access. For instructions, refer to [Google Cloud Documentation: Configuring Private Google Access](#).



# Adding NetApp Support Site accounts to Cloud Manager

Adding your NetApp Support Site account to Cloud Manager is required to deploy a node-based BYOL system or to enter the serial number for a capacity-based license. It's also required to register pay-as-you-go systems and to upgrade ONTAP software.

## Steps

1. If you don't have a NetApp Support Site account yet, [register for one](#).
2. In the upper right of the Cloud Manager console, click the Help icon, and select **Support**.
3. Click **NSS Management > Add NSS Account**.
4. Enter the user name and password for your account.
  - The account must be a customer-level account (not a guest or temp account).
  - If you plan to deploy a node-based BYOL system:
    - The account must be authorized to access the serial numbers of the BYOL systems.
    - If you purchased a secure BYOL subscription, then a secure NSS account is required.
5. Click **Register**.

## What's next?

Users can now select the account when creating new Cloud Volumes ONTAP systems and when registering existing systems.

- [Launching Cloud Volumes ONTAP in AWS](#)
- [Launching Cloud Volumes ONTAP in Azure](#)
- [Registering pay-as-you-go systems](#)
- [Learn how Cloud Manager manages license files](#)

## Managing your account

[After you perform initial setup](#), you can administer your account settings later by managing users, service accounts, workspaces, Connectors, and subscriptions.

[Learn more about how Cloud Central accounts work.](#)

## Managing your account with the Tenancy API

If you want to manage your account settings by sending API requests, then you'll need to use the *Tenancy* API. This API is different than the Cloud Manager API, which you use to create and manage working environments.

[View endpoints for the Tenancy API.](#)

## Creating and managing users

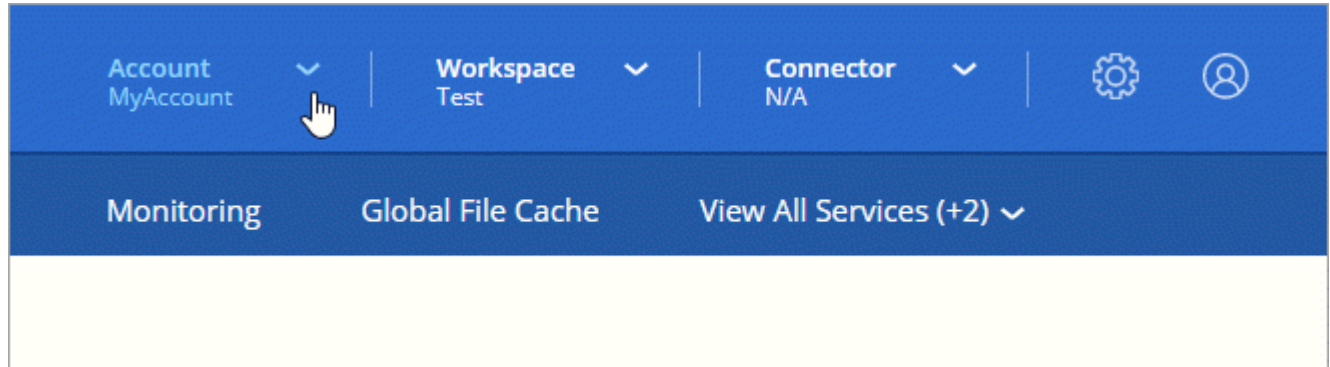
The user's in your account can access the manage the resources in your account's workspaces.

## Adding users

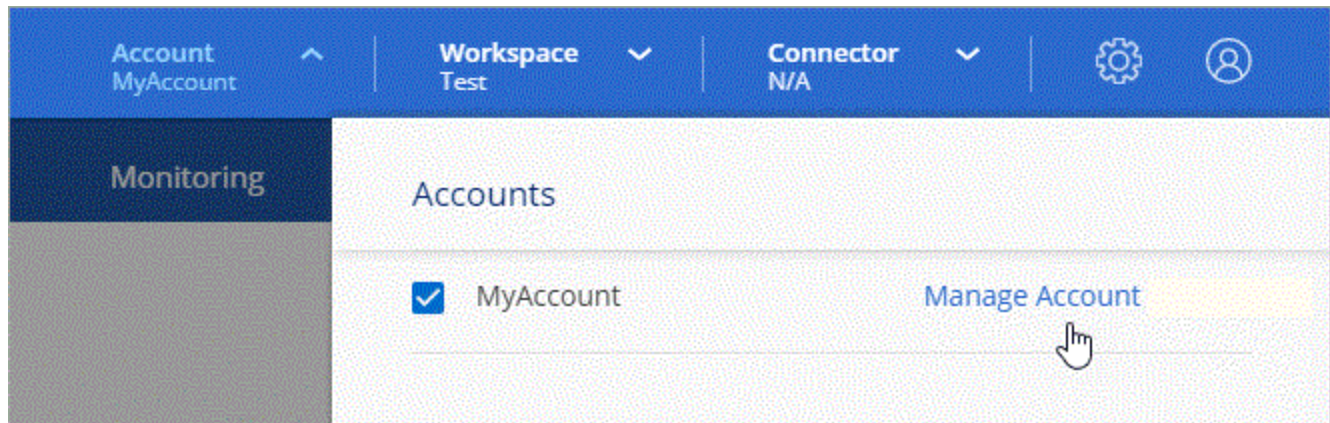
Associate Cloud Central users with the Cloud Central account so those users can create and manage working environments in Cloud Manager.

### Steps

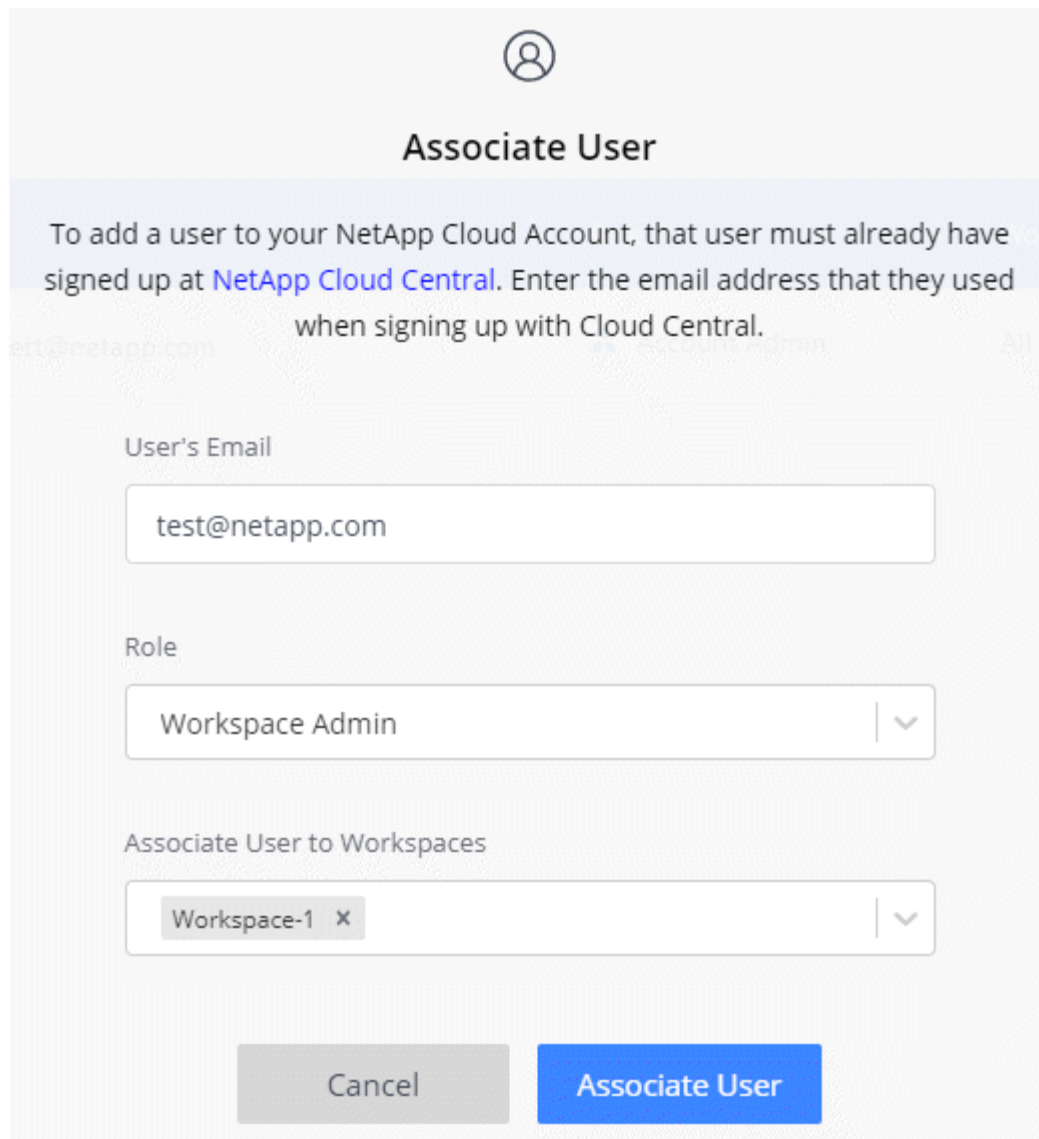
1. If the user hasn't already done so, ask the user to go to [NetApp Cloud Central](#) and sign up.
2. From the top of Cloud Manager, click the **Account** drop-down.




3. Click **Manage Account** next to the currently selected account.



4. From the Members tab, click **Associate User**.
5. Enter the user's email address and select a role for the user:
  - **Account Admin:** Can perform any action in Cloud Manager.
  - **Workspace Admin:** Can create and manage resources in assigned workspaces.
  - **Compliance Viewer:** Can only view Cloud Data Sense compliance information and generate reports for workspaces that they have permission to access.
  - **SnapCenter Admin:** Can use the SnapCenter Service to create application consistent backups and restore data using those backups. *This service is currently in Beta.*
6. If you selected Workspace Admin or Compliance Viewer, select one or more workspaces to associate with that user.



The image shows a dialog box titled "Associate User" with a user icon at the top. It contains instructions on how to add a user, a text input for the user's email (test@netapp.com), a dropdown menu for the role (Workspace Admin), and another dropdown menu for associating the user to workspaces (Workspace-1). At the bottom are "Cancel" and "Associate User" buttons.



### Associate User

To add a user to your NetApp Cloud Account, that user must already have signed up at [NetApp Cloud Central](#). Enter the email address that they used when signing up with Cloud Central.

User's Email

test@netapp.com

Role

Workspace Admin

Associate User to Workspaces

Workspace-1

Cancel Associate User

7. Click **Associate**.

### Result

The user should receive an email from NetApp Cloud Central titled "Account Association." The email includes the information needed to access Cloud Manager.

### Removing users

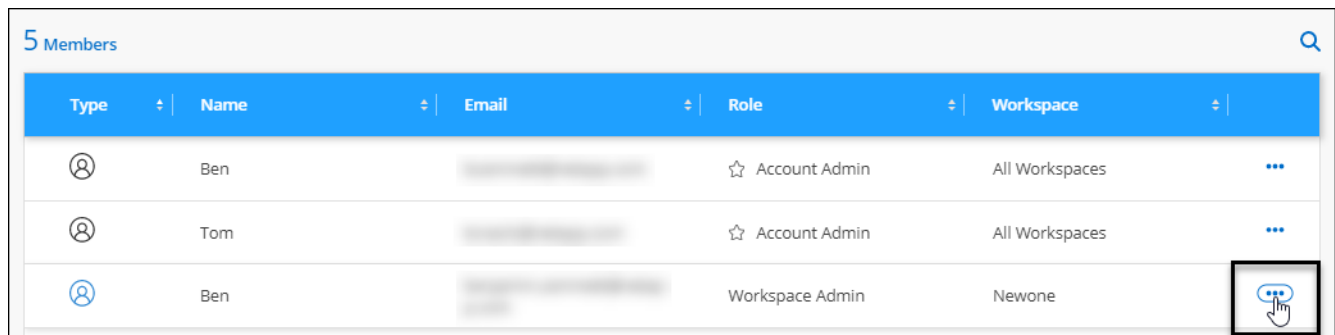
Disassociating a user makes it so they can no longer access the resources in a Cloud Central account.

### Steps

1. From the top of Cloud Manager, click the **Account** drop-down and click **Manage Account**.



- From the Members tab, click the action menu in the row that corresponds to the user.



- Click **Disassociate User** and click **Disassociate** to confirm.

## Result

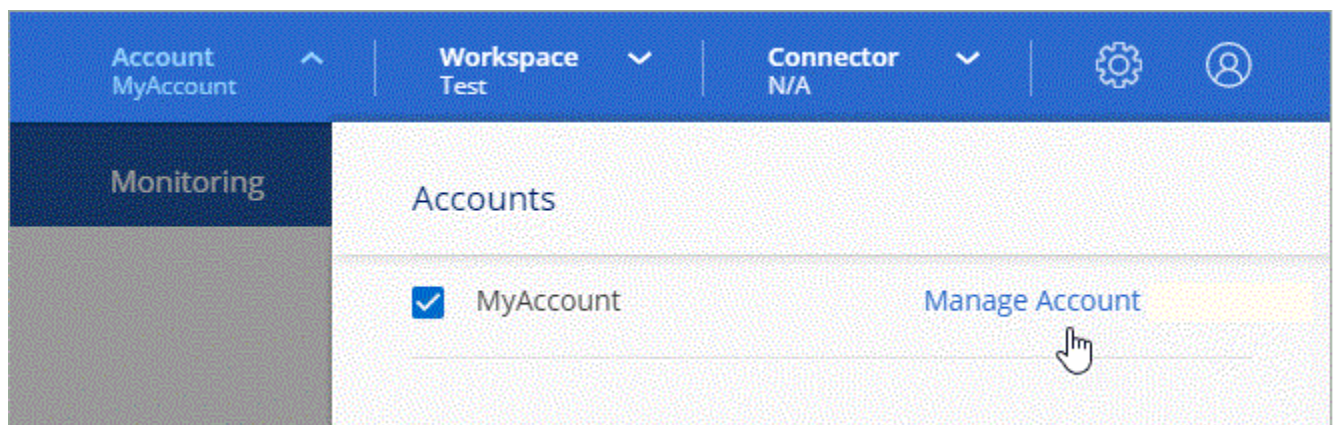
The user can no longer access the resources in this Cloud Central account.

## Managing a Workspace Admin's workspaces

You can associate and disassociate Workspace Admins with workspaces at any time. Associating the user enables them to create and view the working environments in that workspace.






## Steps


- From the top of Cloud Manager, click the **Account** drop-down and click **Manage Account**.



- From the Members tab, click the action menu in the row that corresponds to the user.

5 Members

Type	Name	Email	Role	Workspace
	Ben		 Account Admin	All Workspaces
	Tom		 Account Admin	All Workspaces
	Ben		Workspace Admin	Newone



3. Click **Manage Workspaces**.

4. Select the workspaces to associate with the user and click **Apply**.

### Result

The user can now access those workspaces from Cloud Manager, as long as the Connector was also associated with the workspaces.

## Creating and managing service accounts

A service account acts as a "user" that can make authorized API calls to Cloud Manager for automation purposes. This makes it easier to manage automation because you don't need to build automation scripts based on a real person's user account who can leave the company at any time. And if you're using federation, you can create a token without generating a refresh token from the cloud.

You give permissions to a service account by assigning it a role, just like any other Cloud Manager user. You can also associate the service account with specific workspaces in order to control the working environments (resources) that the service can access.

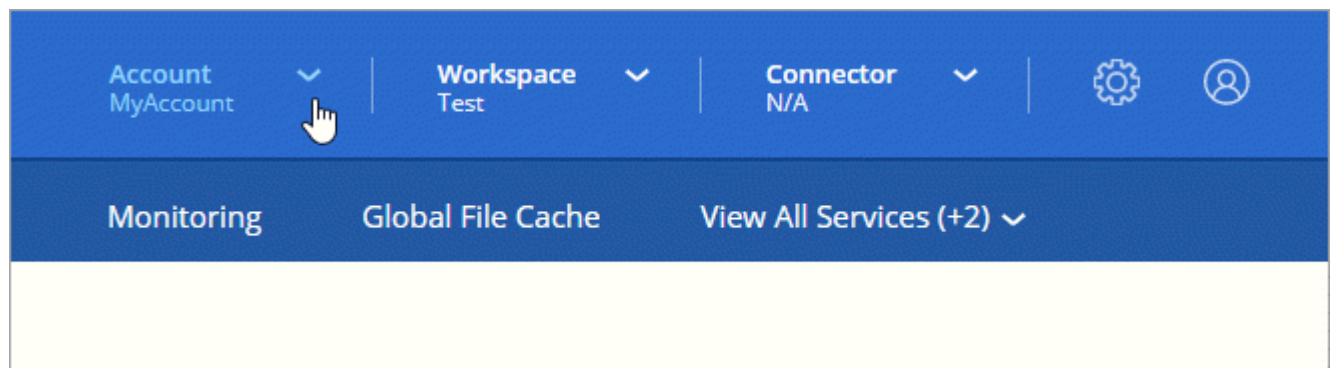
When you create the service account, Cloud Manager enables you to copy or download a client ID and client secret for the service account. This key pair is used for authentication with Cloud Manager.

### Creating a service account

Create as many service accounts as you need to manage the resources in your working environments.

### Steps

1. From the top of Cloud Manager, click the **Account** drop-down.



2. Click **Manage Account** next to the currently selected account.



3. From the Members tab, click **Create Service Account**.
4. Enter a name and select a role. If you chose a role other than Account Admin, choose the workspace to associate with this service account.
5. Click **Create**.
6. Copy or download the client ID and client secret.

The client secret is visible only once and is not stored anywhere by Cloud Manager. Copy or download the secret and store it safely.

7. Click **Close**.

### Obtaining a bearer token for a service account

In order to make API calls to the [Tenancy API](#), you'll need to obtain a bearer token for a service account.

```
curl --location --request POST 'https://netapp-cloud-account.auth0.com/oauth/token' \
--header 'Content-Type: application/json' \
--data-raw '{
  "grant_type": "client_credentials",
  "client_secret": "<client secret>",
  "audience": "https://api.cloud.netapp.com",
  "client_id": "<client id>"
}'
```

### Copying the client ID

You can copy a service account's client ID at any time.

#### Steps

1. From the Members tab, click the action menu in the row that corresponds to the service account.



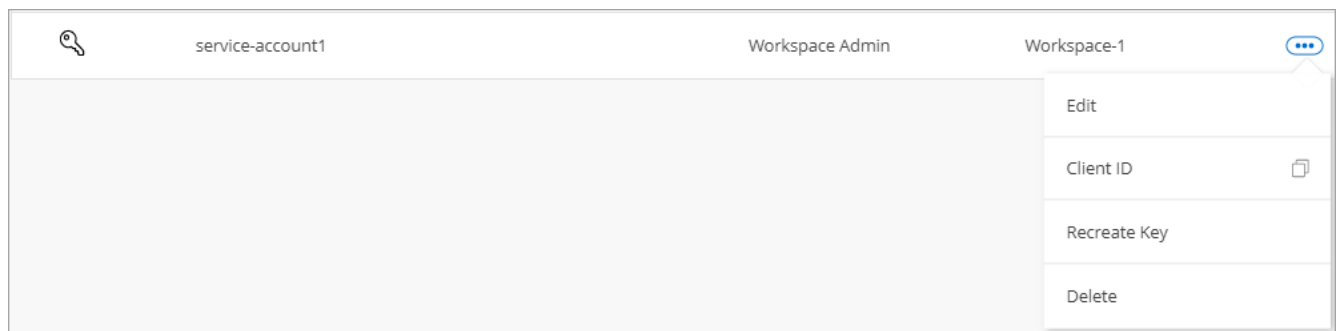
2. Click **Client ID**.
3. The ID is copied to your clipboard.

## Recreating keys

Recreating the key will delete the existing key for this service account and then create a new key. You won't be able to use the previous key.

### Steps

1. From the Members tab, click the action menu in the row that corresponds to the service account.



2. Click **Recreate Key**.
3. Click **Recreate** to confirm.
4. Copy or download the client ID and client secret.

The client secret is visible only once and is not stored anywhere by Cloud Manager. Copy or download the secret and store it safely.

5. Click **Close**.

## Deleting a service account

Delete a service account if you no longer need to use it.

### Steps

1. From the Members tab, click the action menu in the row that corresponds to the service account.





2. Click **Delete**.
3. Click **Delete** again to confirm.

## Managing workspaces

Manage your workspaces by creating, renaming, and deleting them. Note that you can't delete a workspace if it contains any resources. It must be empty.

### Steps

1. From the top of Cloud Manager, click the **Account** drop-down and click **Manage Account**.
2. Click **Workspaces**.
3. Choose one of the following options:
  - Click **Add New Workspace** to create a new workspace.
  - Click **Rename** to rename the workspace.
  - Click **Delete** to delete the workspace.

## Managing a Connector's workspaces

You need to associate the Connector with workspaces so Workspace Admins can access those workspaces from Cloud Manager.

If you only have Account Admins, then associating the Connector with workspaces isn't required. Account Admins have the ability to access all workspaces in Cloud Manager by default.

[Learn more about users, workspaces, and Connectors.](#)

### Steps

1. From the top of Cloud Manager, click the **Account** drop-down and click **Manage Account**.
2. Click **Connector**.
3. Click **Manage Workspaces** for the Connector that you want to associate.
4. Select the workspaces to associate with the Connector and click **Apply**.

## Managing subscriptions

After you subscribe from a cloud provider's marketplace, each subscription is available from the Account Settings widget. You have the option to rename a subscription and to disassociate the subscription from one or more accounts.

For example, let's say that you have two accounts and each is billed through separate subscriptions. You might



disassociate a subscription from one of the accounts so the users in that account don't accidentally choose the wrong subscription when creating a Cloud Volume ONTAP working environment.

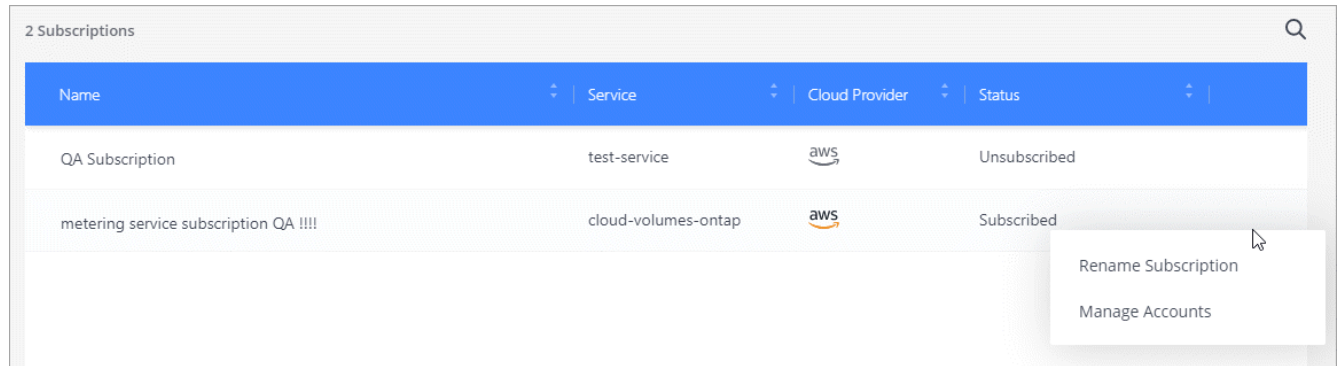
[Learn more about subscriptions.](#)

### Steps

1. From the top of Cloud Manager, click the **Account** drop-down and click **Manage Account**.
2. Click **Subscriptions**.

You'll only see the subscriptions that are associated with the account that you're currently viewing.

3. Click the action menu in the row that corresponds to the subscription that you want to manage.



The screenshot shows a table titled "2 Subscriptions" with a search icon in the top right corner. The table has four columns: Name, Service, Cloud Provider, and Status. There are two rows of data. The first row is "QA Subscription" with service "test-service", provider "aws", and status "Unsubscribed". The second row is "metering service subscription QA !!!!", with service "cloud-volumes-ontap", provider "aws", and status "Subscribed". An action menu is open for the second row, showing two options: "Rename Subscription" and "Manage Accounts".

Name	Service	Cloud Provider	Status
QA Subscription	test-service	aws	Unsubscribed
metering service subscription QA !!!!	cloud-volumes-ontap	aws	Subscribed

4. Choose to rename the subscription or to manage the accounts that are associated with the subscription.

## Changing your account name

Change you account name at any time to change it to something meaningful for you.

### Steps

1. From the top of Cloud Manager, click the **Account** drop-down and click **Manage Account**.
2. In the **Overview** tab, click the edit icon next to the account name.
3. Type a new account name and click **Save**.

## Allowing private previews

Allow private previews in your account to get access to new NetApp cloud services that are made available as a preview in Cloud Manager.

Services in private preview are not guaranteed to behave as expected and might sustain outages and be missing functionality.

### Steps

1. From the top of Cloud Manager, click the **Account** drop-down and click **Manage Account**.
2. In the **Overview** tab, enable the **Allow Private Preview** setting.

## Allowing third-party services

Allow third-party services in your account to get access to third-party services that are available in Cloud Manager. Third-party services are cloud services similar to the services that NetApp offers, but they're

managed and supported by third-party companies.

**Steps**

1. From the top of Cloud Manager, click the **Account** drop-down and click **Manage Account**.
2. In the **Overview** tab, enable the **Allow Third Party Services** setting.

**Disabling the SaaS platform**

We don't recommend disabling the SaaS platform unless you need to in order to comply with your company's security policies. Disabling the SaaS platform limits your ability to use NetApp's integrated cloud services.

The following services aren't available from Cloud Manager if you disable the SaaS platform:

- Cloud Data Sense
- Kubernetes
- Cloud Tiering
- Global File Cache

If you do disable the SaaS platform, you'll need to perform all tasks from [the local user interface that is available on a Connector](#).



This is an irreversible action that will prevent you from using the Cloud Manager SaaS platform. You'll need to perform actions from the local Connector. You won't have the ability to use many of NetApp's integrated cloud services, and re-enabling the SaaS platform will require the help of NetApp support.

**Steps**

1. From the top of Cloud Manager, click the **Account** drop-down and click **Manage Account**.
2. In the Overview tab, toggle the option to disable use of the SaaS platform.

**Monitoring operations in your account**

You can monitor the status of the operations that Cloud Manager is performing to see if there are any issues that you need to address. You can view the status in the Notification Center or in the Timeline.

This table provides a comparison of the Notification Center and the Timeline so you can understand what each has to offer.

Notification Center	Timeline
Shows high level status for events and actions	Provides details for each event or action for further investigation
Shows status for the current login session - the information won't appear in the Notification Center after you log off	Retains status for up to the last month
Shows only actions initiated in the user interface	Shows all actions from the UI or APIs

Notification Center	Timeline
Shows user-initiated actions	Shows all actions, whether user-initiated or system-initiated
Filter results by importance	Filter by service, action, user, status, and more

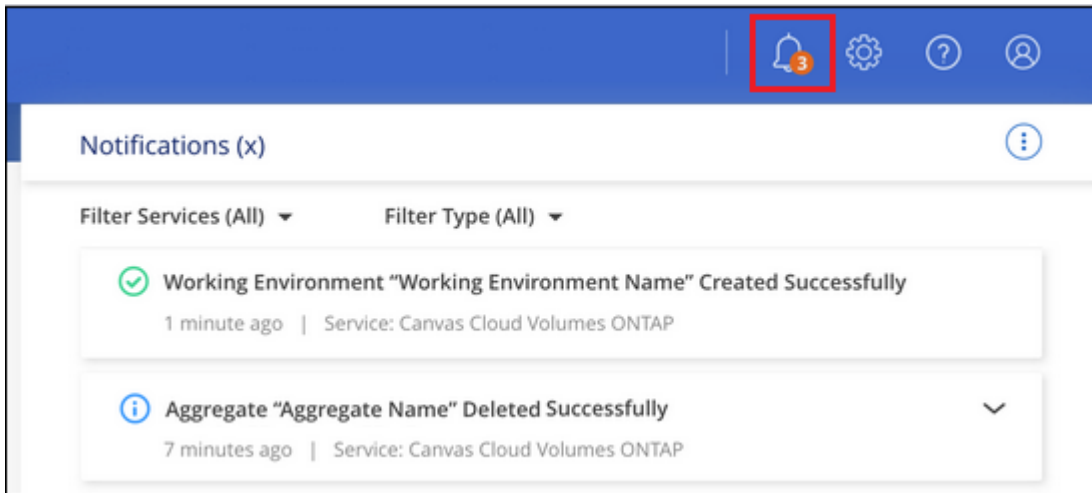
## Monitoring operations status using the Notification Center

Notifications are like events where they track the progress of operations that you have initiated in Cloud Manager so you can verify whether the operation was successful, or if it failed. They enable you to view the status for Cloud Manager operations (and cloud services operations in the future) that have been initiated during your current login session.

At this time, only notifications for creating and deleting the following Cloud Volumes ONTAP objects are supported:

- working environments
- aggregates
- volumes

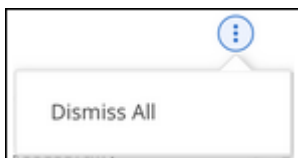
You display the notifications by clicking the notification bell (🔔) in the menu bar. The color of the little bubble in the bell indicates the highest level severity notification that is active. So if you see a red bubble, it means there's an important notification that you should look at.



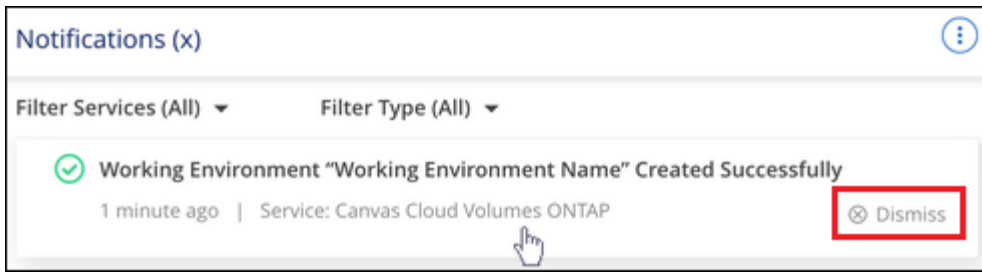
## Dismissing notifications

You can remove notifications from the page if you no longer need to see them. You can dismiss all notifications at once, or you can dismiss individual notifications.

To dismiss all notifications, in the Notification Center, click ⋮ and select **Dismiss All**.



To dismiss individual notifications, hover your cursor over the notification and click **Dismiss**.



## Auditing user activity in your account

The Timeline in Cloud Manager shows the actions that users completed to manage your account. This includes management actions such as associating users, creating workspaces, creating Connectors, and more.

Checking the Timeline can be helpful if you need to identify who performed a specific action, or if you need to identify the status of an action.

### Steps

1. Click **All Services > Timeline**.
2. Under the Filters, click **Service**, enable **Tenancy**, and click **Apply**.

### Result

The Timeline updates to show you account management actions.

## Managing an HTTPS certificate for secure access

By default, Cloud Manager uses a self-signed certificate for HTTPS access to the web console. You can install a certificate signed by a certificate authority (CA), which provides better security protection than a self-signed certificate.

## Before you get started

You need to create a Connector before you can change Cloud Manager settings. [Learn how](#).

## Installing an HTTPS certificate

Install a certificate signed by a CA for secure access.

### Steps

1. In the upper right of the Cloud Manager console, click the Settings icon, and select **HTTPS Setup**.



2. In the HTTPS Setup page, install a certificate by generating a certificate signing request (CSR) or by installing your own CA-signed certificate:


Option	Description
Generate a CSR	<p>a. Enter the host name or DNS of the Connector host (its Common Name), and then click <b>Generate CSR</b>.</p> <p>Cloud Manager displays a certificate signing request.</p> <p>b. Use the CSR to submit an SSL certificate request to a CA.</p> <p>The certificate must use the Privacy Enhanced Mail (PEM) Base-64 encoded X.509 format.</p> <p>c. Upload the certificate file and then click <b>Install</b>.</p>
Install your own CA-signed certificate	<p>a. Select <b>Install CA-signed certificate</b>.</p> <p>b. Load both the certificate file and the private key and then click <b>Install</b>.</p> <p>The certificate must use the Privacy Enhanced Mail (PEM) Base-64 encoded X.509 format.</p>

## Result

Cloud Manager now uses the CA-signed certificate to provide secure HTTPS access. The following image shows a Cloud Manager system that is configured for secure access:

## HTTPS Certificate

[Change Certificate](#)

 **HTTPS Setup is active**

---

Expiration: Aug 15, 2029 10:09:01 am

---

Issuer: C=IL, ST=Israel, L=Tel Aviv, O=NetApp, OU=Dev, CN= Localhost, E=Admin@netapp.com

---

Subject: C=IL, ST=Israel, L=Tel Aviv, O=NetApp, OU=Dev, CN= Localhost, E=Admin@netapp.com

---

Certificate: [View CSR](#)

---

## Renewing the Cloud Manager HTTPS certificate

You should renew the Cloud Manager HTTPS certificate before it expires to ensure secure access to the Cloud Manager web console. If you do not renew the certificate before it expires, a warning appears when users access the web console using HTTPS.

## Steps

1. In the upper right of the Cloud Manager console, click the Settings icon, and select **HTTPS Setup**.

Details about the Cloud Manager certificate displays, including the expiration date.

2. Click **Change Certificate** and follow the steps to generate a CSR or install your own CA-signed certificate.

## Result

Cloud Manager uses the new CA-signed certificate to provide secure HTTPS access.

# Removing Cloud Volumes ONTAP working environments

The Account Admin can remove a Cloud Volumes ONTAP working environment to move it to another system or to troubleshoot discovery issues.

## About this task

Removing a Cloud Volumes ONTAP working environment removes it from Cloud Manager. It does not delete the Cloud Volumes ONTAP system. You can later rediscover the working environment.

Removing a working environment from Cloud Manager enables you to do the following:

- Rediscover it in another workspace
- Rediscover it from another Cloud Manager system
- Rediscover it if you had problems during the initial discovery

## Steps

1. In the upper right of the Cloud Manager console, click the Settings icon, and select **Tools**.



2. From the Tools page, click **Launch**.
3. Select the Cloud Volumes ONTAP working environment that you want to remove.
4. On the Review and Approve page, click **Go**.

## Result

Cloud Manager removes the working environment. Users can rediscover this working environment from the Canvas page at any time.

# Configuring a Connector to use a proxy server

If your corporate policies dictate that you use a proxy server for all HTTP communication to the internet, then you must configure your Connectors to use that proxy server. The proxy server can be in the cloud or in your network.

## Enable a proxy on a Connector

When you configure a Connector to use a proxy server, that Connector and the Cloud Volumes ONTAP systems that it manages (including any HA mediators), all use the proxy server.

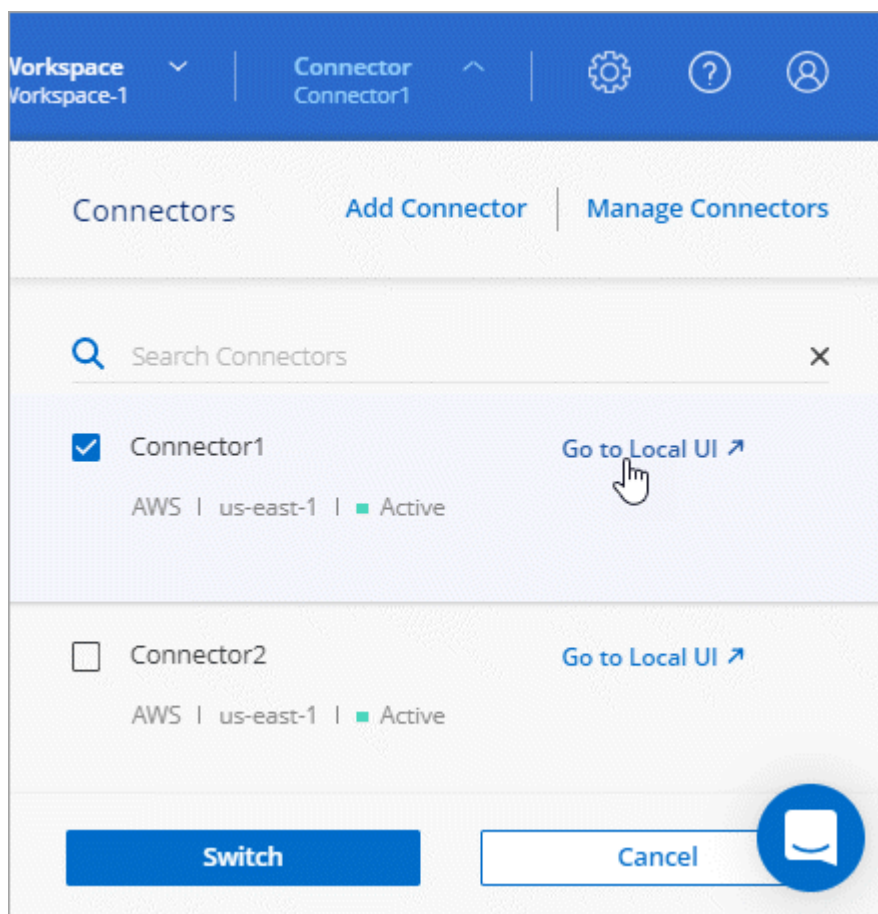
Note that this operation restarts the Connector. Ensure that the Connector isn't performing any operations before you proceed.

### Steps

1. [Log in to the Cloud Manager SaaS interface](#) from a machine that has a network connection to the Connector instance.

If the Connector doesn't have a public IP address, you'll need a VPN connection or you'll need to connect from a jump host that's in the same network as the Connector.

2. Click the **Connector** drop-down and then click **Go to local UI** for a specific Connector.



The Cloud Manager interface running on the Connector loads in a new browser tab.

3. In the upper right of the Cloud Manager console, click the Settings icon, and select **Connector Settings**.



4. Under **General**, click **HTTP Proxy Configuration**.
5. Set up the proxy:
  - a. Click **Enable Proxy**.
  - b. Specify the server using the syntax `http://address:port`
  - c. Specify a user name and password if basic authentication is required for the server
  - d. Click **Save**.



Cloud Manager doesn't support passwords that include the @ character.

## Result

After you specify the proxy server, new Cloud Volumes ONTAP systems are automatically configured to use the proxy server when sending AutoSupport messages. If you didn't specify the proxy server before users create Cloud Volumes ONTAP systems, then they must use System Manager to manually set the proxy server in the AutoSupport options for each system.

## Enable direct API traffic

If you configured a proxy server, you can send API calls directly to Cloud Manager without going through the proxy. This option is supported with Connectors that are running in AWS, in Azure, or in Google Cloud.

### Steps

1. In the upper right of the Cloud Manager console, click the Settings icon, and select **Connector Settings**.



2. Under **General**, click **Support Direct API Traffic**.
3. Click the checkbox to enable the option and then click **Save**.

## Reference

### Roles

The Account Admin, Workspace Admin, Compliance Viewer, and SnapCenter Admin roles provide specific permissions to users.

The Compliance Viewer role is for read-only Cloud Data Sense access.

Task	Account Admin	Workspace Admin	Compliance Viewer	SnapCenter Admin
Manage working environments	Yes	Yes	No	No
Enable services on working environments	Yes	Yes	No	No



Task	Account Admin	Workspace Admin	Compliance Viewer	SnapCenter Admin
View data replication status	Yes	Yes	No	No
View the timeline	Yes	Yes	No	No
Switch between workspaces	Yes	Yes	Yes	No
View Data Sense scan results	Yes	Yes	Yes	No
Delete working environments	Yes	No	No	No
Connect Kubernetes clusters to working environments	Yes	No	No	No
Receive the Cloud Volumes ONTAP report	Yes	No	No	No
Create Connectors	Yes	No	No	No
Manage Cloud Central accounts	Yes	No	No	No
Manage credentials	Yes	No	No	No
Modify Cloud Manager settings	Yes	No	No	No
View and manage the Support Dashboard	Yes	No	No	No
Remove working environments from Cloud Manager	Yes	No	No	No
Install an HTTPS certificate	Yes	No	No	No
Use the SnapCenter Service	Yes	Yes	No	Yes

#### Related links

- [Setting up workspaces and users in the Cloud Central account](#)
- [Managing workspaces and users in the Cloud Central account](#)

## How Cloud Manager uses cloud provider permissions

Cloud Manager requires permissions to perform actions in your cloud provider. These permissions are included in [the policies provided by NetApp](#). You might want to understand what Cloud Manager does with these permissions.

## What Cloud Manager does with AWS permissions

Cloud Manager uses an AWS account to make API calls to several AWS services, including EC2, S3, CloudFormation, IAM, the Security Token Service (STS), and the Key Management Service (KMS).

Actions	Purpose
"ec2:StartInstances", "ec2:StopInstances", "ec2:DescribeInstances", "ec2:DescribeInstanceStatus", "ec2:RunInstances", "ec2:TerminateInstances", "ec2:ModifyInstanceAttribute",	Launches a Cloud Volumes ONTAP instance and stops, starts, and monitors the instance.
"ec2:DescribeInstanceAttribute",	Verifies that enhanced networking is enabled for supported instance types.
"ec2:DescribeRouteTables", "ec2:DescribeImages",	Launches a Cloud Volumes ONTAP HA configuration.
"ec2:CreateTags",	Tags every resource that Cloud Manager creates with the "WorkingEnvironment" and "WorkingEnvironmentId" tags. Cloud Manager uses these tags for maintenance and cost allocation.
"ec2:CreateVolume", "ec2:DescribeVolumes", "ec2:ModifyVolumeAttribute", "ec2:AttachVolume", "ec2:DeleteVolume", "ec2:DetachVolume",	Manages the EBS volumes that Cloud Volumes ONTAP uses as back-end storage.
"ec2:CreateSecurityGroup", "ec2>DeleteSecurityGroup", "ec2:DescribeSecurityGroups", "ec2:RevokeSecurityGroupEgress", "ec2:AuthorizeSecurityGroupEgress", "ec2:AuthorizeSecurityGroupIngress", "ec2:RevokeSecurityGroupIngress",	Creates predefined security groups for Cloud Volumes ONTAP.
"ec2:CreateNetworkInterface", "ec2:DescribeNetworkInterfaces", "ec2>DeleteNetworkInterface", "ec2:ModifyNetworkInterfaceAttribute",	Creates and manages network interfaces for Cloud Volumes ONTAP in the target subnet.
"ec2:DescribeSubnets", "ec2:DescribeVpcs",	Gets the list of destination subnets and security groups, which is needed when creating a new working environment for Cloud Volumes ONTAP.
"ec2:DescribeDhcpOptions",	Determines DNS servers and the default domain name when launching Cloud Volumes ONTAP instances.
"ec2:CreateSnapshot", "ec2>DeleteSnapshot", "ec2:DescribeSnapshots",	Takes snapshots of EBS volumes during initial setup and whenever a Cloud Volumes ONTAP instance is stopped.

Actions	Purpose
"ec2:GetConsoleOutput",	Captures the Cloud Volumes ONTAP console, which is attached to AutoSupport messages.
"ec2:DescribeKeyPairs",	Obtains the list of available key pairs when launching instances.
"ec2:DescribeRegions",	Gets a list of available AWS regions.
"ec2:DeleteTags", "ec2:DescribeTags",	Manages tags for resources associated with Cloud Volumes ONTAP instances.
"cloudformation:CreateStack", "cloudformation>DeleteStack", "cloudformation:DescribeStacks", "cloudformation:DescribeStackEvents", "cloudformation:ValidateTemplate",	Launches Cloud Volumes ONTAP instances.
"iam:PassRole", "iam:CreateRole", "iam>DeleteRole", "iam:PutRolePolicy", "iam:CreateInstanceProfile", "iam>DeleteRolePolicy", "iam:AddRoleToInstanceProfile", "iam:RemoveRoleFromInstanceProfile", "iam:DeleteInstanceProfile",	Launches a Cloud Volumes ONTAP HA configuration.
"iam:ListInstanceProfiles", "sts:DecodeAuthorizationMessage", "ec2:AssociateIamInstanceProfile", "ec2:DescribeIamInstanceProfileAssociations", "ec2:DisassociateIamInstanceProfile",	Manages instance profiles for Cloud Volumes ONTAP instances.
"s3:GetBucketTagging", "s3:GetBucketLocation", "s3:ListAllMyBuckets", "s3:ListBucket"	Obtains information about AWS S3 buckets so Cloud Manager can integrate with the NetApp Data Fabric Cloud Sync service.
"s3:CreateBucket", "s3>DeleteBucket", "s3:GetLifecycleConfiguration", "s3:PutLifecycleConfiguration", "s3:PutBucketTagging", "s3:ListBucketVersions", "s3:GetBucketPolicyStatus", "s3:GetBucketPublicAccessBlock", "s3:GetBucketAcl", "s3:GetBucketPolicy", "s3:PutBucketPublicAccessBlock"	Manages the S3 bucket that a Cloud Volumes ONTAP system uses as a capacity tier for data tiering.
"kms:List*", "kms:ReEncrypt*", "kms:Describe*", "kms:CreateGrant",	Enables data encryption of Cloud Volumes ONTAP using the AWS Key Management Service (KMS).

Actions	Purpose
"ce:GetReservationUtilization", "ce:GetDimensionValues", "ce:GetCostAndUsage", "ce:GetTags"	Obtains AWS cost data for Cloud Volumes ONTAP.
"ec2:CreatePlacementGroup", "ec2:DeletePlacementGroup"	When you deploy an HA configuration in a single AWS Availability Zone, Cloud Manager launches the two HA nodes and the mediator in an AWS spread placement group.
"ec2:DescribeReservedInstancesOfferings"	Cloud Manager uses the permission as part of Cloud Data Sense deployment to choose which instance type to use.
"ec2:CreateTags", "ec2:DeleteTags", "ec2:DescribeTags", "tag:getResources", "tag:getTagKeys", "tag:getTagValues", "tag:TagResources", "tag:UntagResources"	Enables you to manage tags on your AWS resources using the Cloud Manager Tagging service.
"s3:DeleteBucket", "s3:GetLifecycleConfiguration", "s3:PutLifecycleConfiguration", "s3:PutBucketTagging", "s3:ListBucketVersions", "s3:GetObject", "s3:ListBucket", "s3:ListAllMyBuckets", "s3:GetBucketTagging", "s3:GetBucketLocation", "s3:GetBucketPolicyStatus", "s3:GetBucketPublicAccessBlock", "s3:GetBucketAcl", "s3:GetBucketPolicy", "s3:PutBucketPublicAccessBlock"	Cloud Manager uses these permissions when you enable the Backup to S3 service.

### What Cloud Manager does with Azure permissions

The Cloud Manager Azure policy includes the permissions that Cloud Manager needs to deploy and manage Cloud Volumes ONTAP in Azure.

Actions	Purpose
"Microsoft.Compute/locations/operations/read", "Microsoft.Compute/locations/vmSizes/read", "Microsoft.Compute/operations/read", "Microsoft.Compute/virtualMachines/instanceView/read", "Microsoft.Compute/virtualMachines/powerOff/action", "Microsoft.Compute/virtualMachines/read", "Microsoft.Compute/virtualMachines/restart/action", "Microsoft.Compute/virtualMachines/start/action", "Microsoft.Compute/virtualMachines/deallocate/action", "Microsoft.Compute/virtualMachines/vmSizes/read", "Microsoft.Compute/virtualMachines/write",	Creates Cloud Volumes ONTAP and stops, starts, deletes, and obtains the status of the system.
"Microsoft.Compute/images/write", "Microsoft.Compute/images/read",	Enables Cloud Volumes ONTAP deployment from a VHD.
"Microsoft.Compute/disks/delete", "Microsoft.Compute/disks/read", "Microsoft.Compute/disks/write", "Microsoft.Storage/checknameavailability/read", "Microsoft.Storage/operations/read", "Microsoft.Storage/storageAccounts/listkeys/action", "Microsoft.Storage/storageAccounts/read", "Microsoft.Storage/storageAccounts/regeneratekey/action", "Microsoft.Storage/storageAccounts/write", "Microsoft.Storage/storageAccounts/delete", "Microsoft.Storage/usages/read",	Manages Azure storage accounts and disks, and attaches the disks to Cloud Volumes ONTAP.
"Microsoft.Storage/storageAccounts/blobServices/containers/read", "Microsoft.KeyVault/vaults/read", "Microsoft.KeyVault/vaults/accessPolicies/write"	Enables backups to Azure Blob storage and encryption of storage accounts
"Microsoft.Network/networkInterfaces/read", "Microsoft.Network/networkInterfaces/write", "Microsoft.Network/networkInterfaces/join/action",	Creates and manages network interfaces for Cloud Volumes ONTAP in the target subnet.
"Microsoft.Network/networkSecurityGroups/read", "Microsoft.Network/networkSecurityGroups/write", "Microsoft.Network/networkSecurityGroups/join/action",	Creates predefined network security groups for Cloud Volumes ONTAP.

Actions	Purpose
"Microsoft.Resources/subscriptions/locations/read", "Microsoft.Network/locations/operationResults/read", "Microsoft.Network/locations/operations/read", "Microsoft.Network/virtualNetworks/read", "Microsoft.Network/virtualNetworks/checkIpAddressAvailability/read", "Microsoft.Network/virtualNetworks/subnets/read", "Microsoft.Network/virtualNetworks/subnets/virtualMachines/read", "Microsoft.Network/virtualNetworks/virtualMachines/read", "Microsoft.Network/virtualNetworks/subnets/join/action",	Gets network information about regions, the target VNet and subnet, and adds Cloud Volumes ONTAP to VNets.
"Microsoft.Network/virtualNetworks/subnets/write", "Microsoft.Network/routeTables/join/action",	Enables VNet service endpoints for data tiering.
"Microsoft.Resources/deployments/operations/read", "Microsoft.Resources/deployments/read", "Microsoft.Resources/deployments/write",	Deploys Cloud Volumes ONTAP from a template.
"Microsoft.Resources/deployments/operations/read", "Microsoft.Resources/deployments/read", "Microsoft.Resources/deployments/write", "Microsoft.Resources/resources/read", "Microsoft.Resources/subscriptions/operationresults/read", "Microsoft.Resources/subscriptions/resourceGroups/delete", "Microsoft.Resources/subscriptions/resourceGroups/read", "Microsoft.Resources/subscriptions/resourcegroups/resources/read", "Microsoft.Resources/subscriptions/resourceGroups/write",	Creates and manages resource groups for Cloud Volumes ONTAP.
"Microsoft.Compute/snapshots/write", "Microsoft.Compute/snapshots/read", "Microsoft.Compute/snapshots/delete", "Microsoft.Compute/disks/beginGetAccess/action",	Creates and manages Azure managed snapshots.
"Microsoft.Compute/availabilitySets/write", "Microsoft.Compute/availabilitySets/read",	Creates and manages availability sets for Cloud Volumes ONTAP.
"Microsoft.MarketplaceOrdering/offertypes/publishers/offers/plans/agreements/read", "Microsoft.MarketplaceOrdering/offertypes/publishers/offers/plans/agreements/write",	Enables programmatic deployments from the Azure Marketplace.

Actions	Purpose
"Microsoft.Network/loadBalancers/read", "Microsoft.Network/loadBalancers/write", "Microsoft.Network/loadBalancers/delete", "Microsoft.Network/loadBalancers/backendAddressPools/read", "Microsoft.Network/loadBalancers/backendAddressPools/join/action", "Microsoft.Network/loadBalancers/frontendIPConfigurations/read", "Microsoft.Network/loadBalancers/loadBalancingRules/read", "Microsoft.Network/loadBalancers/probes/read", "Microsoft.Network/loadBalancers/probes/join/action",	Manages an Azure load balancer for HA pairs.
"Microsoft.Authorization/locks/*",	Enables management of locks on Azure disks.
"Microsoft.Authorization/roleDefinitions/write", "Microsoft.Authorization/roleAssignments/write", "Microsoft.Web/sites/*"	Manages failover for HA pairs.
"Microsoft.Network/privateEndpoints/write", "Microsoft.Storage/storageAccounts/PrivateEndpointConnectionsApproval/action", "Microsoft.Storage/storageAccounts/privateEndpointConnections/read", "Microsoft.Network/privateEndpoints/read", "Microsoft.Network/privateDnsZones/write", "Microsoft.Network/privateDnsZones/virtualNetworkLinks/write", "Microsoft.Network/virtualNetworks/join/action", "Microsoft.Network/privateDnsZones/A/write", "Microsoft.Network/privateDnsZones/read", "Microsoft.Network/privateDnsZones/virtualNetworkLinks/read",	Enables the management of private endpoints. Private endpoints are used when connectivity isn't provided to outside the subnet. Cloud Manager creates the storage account for HA with only internal connectivity within the subnet.
"Microsoft.NetApp/netAppAccounts/capacityPools/volumes/delete",	Enables Cloud Manager to delete volumes for Azure NetApp Files.
"Microsoft.Resources/deployments/operationStatuses/read"	Azure requires this permission for some virtual machine deployments (it depends on the underlying physical hardware that's used during deployment).
"Microsoft.Resources/deployments/operationStatuses/read", "Microsoft.Insights/Metrics/Read", "Microsoft.Compute/virtualMachines/extensions/write", "Microsoft.Compute/virtualMachines/extensions/read", "Microsoft.Compute/virtualMachines/extensions/delete", "Microsoft.Compute/virtualMachines/delete", "Microsoft.Network/networkInterfaces/delete", "Microsoft.Network/networkSecurityGroups/delete", "Microsoft.Resources/deployments/delete",	Enables you to use Global File Cache.

Actions	Purpose
"Microsoft.Network/privateEndpoints/delete", "Microsoft.Compute/availabilitySets/delete",	Enables Cloud Manager to remove resources from a resource group that belong to Cloud Volumes ONTAP in case of deployment failure or deletion.
"Microsoft.Compute/diskEncryptionSets/read" "Microsoft.Compute/diskEncryptionSets/write", "Microsoft.Compute/diskEncryptionSets/delete" "Microsoft.KeyVault/vaults/deploy/action", "Microsoft.KeyVault/vaults/read", "Microsoft.KeyVault/vaults/accessPolicies/write"	Enables use of customer-managed encryption keys with Cloud Volumes ONTAP. This feature is supported using APIs.
"Microsoft.Resources/tags/read", "Microsoft.Resources/tags/write", "Microsoft.Resources/tags/delete"	Enables you to manage tags on your Azure resources using the Cloud Manager Tagging service.

### What Cloud Manager does with GCP permissions

The Cloud Manager policy for GCP includes the permissions that Cloud Manager needs to deploy and manage Cloud Volumes ONTAP.

Actions	Purpose
- compute.disks.create - compute.disks.createSnapshot - compute.disks.delete - compute.disks.get - compute.disks.list - compute.disks.setLabels - compute.disks.use	To create and manage disks for Cloud Volumes ONTAP.
- compute.firewalls.create - compute.firewalls.delete - compute.firewalls.get - compute.firewalls.list	To create firewall rules for Cloud Volumes ONTAP.
- compute.globalOperations.get	To get the status of operations.
- compute.images.get - compute.images.getFromFamily - compute.images.list - compute.images.useReadOnly	To get images for VM instances.
- compute.instances.attachDisk - compute.instances.detachDisk	To attach and detach disks to Cloud Volumes ONTAP.
- compute.instances.create - compute.instances.delete	To create and delete Cloud Volumes ONTAP VM instances.
- compute.instances.get	To list VM instances.
- compute.instances.getSerialPortOutput	To get console logs.
- compute.instances.list	To retrieve the list of instances in a zone.
- compute.instances.setDeletionProtection	To set deletion protection on the instance.



Actions	Purpose
- compute.instances.setLabels	To add labels.
- compute.instances.setMachineType - compute.instances.setMinCpuPlatform	To change the machine type for Cloud Volumes ONTAP.
- compute.instances.setMetadata	To add metadata.
- compute.instances.setTags	To add tags for firewall rules.
- compute.instances.start - compute.instances.stop - compute.instances.updateDisplayDevice	To start and stop Cloud Volumes ONTAP.
- compute.machineTypes.get	To get the numbers of cores to check quotas.
- compute.projects.get	To support multi-projects.
- compute.snapshots.create - compute.snapshots.delete - compute.snapshots.get - compute.snapshots.list - compute.snapshots.setLabels	To create and manage persistent disk snapshots.
- compute.networks.get - compute.networks.list - compute.regions.get - compute.regions.list - compute.subnetworks.get - compute.subnetworks.list - compute.zoneOperations.get - compute.zones.get - compute.zones.list	To get the networking information needed to create a new Cloud Volumes ONTAP virtual machine instance.
- deploymentmanager.compositeTypes.get - deploymentmanager.compositeTypes.list - deploymentmanager.deployments.create - deploymentmanager.deployments.delete - deploymentmanager.deployments.get - deploymentmanager.deployments.list - deploymentmanager.manifests.get - deploymentmanager.manifests.list - deploymentmanager.operations.get - deploymentmanager.operations.list - deploymentmanager.resources.get - deploymentmanager.resources.list - deploymentmanager.typeProviders.get - deploymentmanager.typeProviders.list - deploymentmanager.types.get - deploymentmanager.types.list	To deploy the Cloud Volumes ONTAP virtual machine instance using Google Cloud Deployment Manager.
- logging.logEntries.list - logging.privateLogEntries.list	To get stack log drives.
- resourcemanager.projects.get	To support multi-projects.

Actions	Purpose
<ul style="list-style-type: none"> <li>- storage.buckets.create</li> <li>- storage.buckets.delete</li> <li>- storage.buckets.get</li> <li>- storage.buckets.list</li> <li>- storage.buckets.update</li> </ul>	To create and manage a Google Cloud Storage bucket for data tiering.
<ul style="list-style-type: none"> <li>- cloudkms.cryptoKeyVersions.useToEncrypt</li> <li>- cloudkms.cryptoKeys.get</li> <li>- cloudkms.cryptoKeys.list</li> <li>- cloudkms.keyRings.list</li> </ul>	To use customer-managed encryption keys from the Cloud Key Management Service with Cloud Volumes ONTAP.
<ul style="list-style-type: none"> <li>- compute.instances.setServiceAccount</li> <li>- iam.serviceAccounts.actAs</li> <li>- iam.serviceAccounts.getIamPolicy</li> <li>- iam.serviceAccounts.list</li> <li>- storage.objects.get</li> <li>- storage.objects.list</li> </ul>	To set a service account on the Cloud Volumes ONTAP instance. This service account provides permissions for data tiering to a Google Cloud Storage bucket.
<ul style="list-style-type: none"> <li>- compute.addresses.list</li> <li>- compute.backendServices.create</li> <li>- compute.networks.updatePolicy</li> <li>- compute.regionBackendServices.create</li> <li>- compute.regionBackendServices.get</li> <li>- compute.regionBackendServices.list</li> </ul>	To deploy HA pairs.
<ul style="list-style-type: none"> <li>- compute.subnetworks.use</li> <li>- compute.subnetworks.useExternallp</li> <li>- compute.instances.addAccessConfig</li> </ul>	To enable Cloud Data Sense.

## AWS Marketplace pages for Cloud Manager and Cloud Volumes ONTAP

Several offerings are available in the AWS Marketplace for Cloud Manager and Cloud Volumes ONTAP. If need help understanding the purpose of each page, read the descriptions below.

In all cases, remember that you can't launch Cloud Volumes ONTAP in AWS from the AWS Marketplace. You need to launch it directly from Cloud Manager.

Goal	AWS Marketplace page to use	More information
Enable the use of Cloud Volumes ONTAP PAYGO, Cloud Tiering, Cloud Data Sense (Cloud Compliance), and other add-on services	<a href="#">Cloud Manager - Deploy &amp; Manage NetApp Cloud Data Services</a>	<p>This subscription enables charging for the PAYGO version of Cloud Volumes ONTAP 9.6 and later. It also enables charging for Cloud Tiering, Cloud Data Sense, and other add-on services.</p> <p>You should subscribe to this offering when Cloud Manager prompts you and redirects you to the page. Cloud Manager prompts you in the Working Environment wizard or when you add new credentials in the Settings.</p> <p>This page doesn't enable you to launch Cloud Manager in AWS. That should be done from <a href="#">NetApp Cloud Central</a>, or alternatively using the AMI listed in row 3 of this table.</p>
Enable the use of Cloud Volumes ONTAP PAYGO, Cloud Tiering, Cloud Data Sense, and other add-on services <i>using an annual contract</i>	<a href="#">Cloud Manager (Contracts) - Deploy &amp; Manage NetApp Cloud Data Services</a>	This subscription is an alternative to the subscription in the first row. It enables you to get an annual upfront payment for the listings. It's mostly for NetApp partners.
Deploy Cloud Manager from the AWS Marketplace using an AMI	<a href="#">Cloud Manager - Manual installation without access keys</a>	We recommend that you launch Cloud Manager in AWS from <a href="#">NetApp Cloud Central</a> , but you can launch it from this AWS Marketplace page, if you prefer.
Enable deployment of Cloud Volumes ONTAP PAYGO (9.5 or earlier)	<ul style="list-style-type: none"> <li>• <a href="#">Cloud Volumes ONTAP for AWS</a></li> <li>• <a href="#">Cloud Volumes ONTAP for AWS - High Availability</a></li> </ul>	<p>These AWS Marketplace pages enable you to subscribe to the single node or HA versions of Cloud Volumes ONTAP PAYGO for versions 9.5 and earlier.</p> <p>Starting with version 9.6, you need to subscribe through the AWS Marketplace page listed in row 1 of this table for PAYGO deployments.</p>

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