



Get started with Cloud Manager

Cloud Manager

NetApp

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Table of Contents

- Get started with Cloud Manager 1
 - Learn about Cloud Manager 1
 - Networking overview 2
 - Signing up to NetApp Cloud Central 3
 - Logging in to Cloud Manager 4
 - Set up a Cloud Central account 4
 - Set up a Connector 14
 - Where to go next 33

Get started with Cloud Manager

Learn about Cloud Manager

Cloud Manager enables IT experts and cloud architects to centrally manage their hybrid multi-cloud infrastructure using NetApp's cloud solutions.

Features

Cloud Manager is an enterprise-class, SaaS-based management platform that keeps you in control of your data no matter where it is.

- Set up and use [Cloud Volumes ONTAP](#) for efficient, multi-protocol data management across clouds.
- Set up and use file-storage services: [Azure NetApp Files](#), [Cloud Volumes Service for AWS](#), and [Cloud Volumes Service for Google Cloud](#).
- Discover and manage your on-prem ONTAP clusters by creating volumes, backing up to the cloud, replicating data across your hybrid cloud, and tiering cold data to the cloud.
- Enable integrated cloud services and software like [Cloud Compliance](#), [Cloud Insights](#), [Cloud Backup Service](#), [Trident](#), and more.

[Learn more about Cloud Manager.](#)

Supported object storage providers

Cloud Manager enables you to manage cloud storage and use cloud services in Amazon Web Services, Microsoft Azure, and Google Cloud.

Cost

Cloud Manager software is free of charge from NetApp.

For most tasks, Cloud Manager prompts you to deploy a Connector in your cloud network, which results in charges from your cloud provider for the compute instance and associated storage. You do have the option to run the Connector software on your premises.

How Cloud Manager works

Cloud Manager includes a SaaS-based interface that is integrated with NetApp Cloud Central, and Connectors that manage Cloud Volumes ONTAP and other cloud services.

Software-as-a-service

Cloud Manager is accessible through a [SaaS-based user interface](#) and APIs. This SaaS experience enables you to automatically access the latest features as they're released and to easily switch between your Cloud Central accounts and Connectors.

NetApp Cloud Central

[NetApp Cloud Central](#) provides a centralized location to access and manage [NetApp cloud services](#). With centralized user authentication, you can use the same set of credentials to access Cloud Manager and other cloud services like Cloud Insights.

When you log in to Cloud Manager for the first time, you're prompted to create a *Cloud Central account*. This account provides multi-tenancy and enables you to organize users and resources in isolated *workspaces*.

Connectors

In most cases, an Account Admin will need to deploy a *Connector* in your cloud or on-premises network. The Connector enables Cloud Manager to manage resources and processes within your public cloud environment.

A Connector should remain running at all times. It's important for the continued health and operation of the services that you enable.

For example, a Connector is a key component in the health and operation of Cloud Volumes ONTAP PAYGO systems. If a Connector is powered down, Cloud Volumes ONTAP PAYGO systems will shut down after losing communication with a Connector for longer than 14 days.

[Learn more about when Connectors are required and how they work.](#)

Networking overview

Before users log in to Cloud Manager, you'll need to ensure that their web browsers can access specific endpoints. After that, you need to verify networking requirements for the specific type of working environment and services that will be used.

Endpoints accessed from your web browser

Users must access Cloud Manager from a web browser. The machine running the web browser must have connections to the following endpoints:

| Endpoints | Purpose |
|--|--|
| https://cloudmanager.cloud.netapp.com | To connect you to the Cloud Manager SaaS interface. |
| https://api.services.cloud.netapp.com | To contact Cloud Central APIs. |
| https://auth0.com https://cdn.auth0.com https://netapp-cloud-account.auth0.com https://services.cloud.netapp.com | Your web browser connects to these endpoints for centralized user authentication through NetApp Cloud Central. |
| https://widget.intercom.io | For in-product chat that enables you to talk to NetApp cloud experts. |

Index of networking requirements

- [Connectors](#)
- [Cloud Volumes ONTAP for AWS](#)
- [Cloud Volumes ONTAP for Azure](#)
- [Cloud Volumes ONTAP for GCP](#)
- [Data replication between ONTAP systems](#)
- [Cloud Compliance for Cloud Volumes ONTAP or Azure NetApp Files](#)
- [Cloud Compliance for Amazon S3](#)

- On-prem ONTAP clusters
 - Data tiering from ONTAP clusters to Amazon S3
 - Data tiering from ONTAP clusters to Azure Blob storage
 - Data tiering from ONTAP clusters to Google Cloud Storage
 - Data tiering from ONTAP clusters to StorageGRID

Signing up to NetApp Cloud Central

Sign up to NetApp Cloud Central so you can access NetApp's cloud services.

Steps

1. Open a web browser and go to [NetApp Cloud Central](#).
2. Click **Sign Up**.
3. Fill out the form and click **Sign Up**.

Log In to NetApp Cloud Central

Already signed up? [Login](#)

**optional*

☒ I accept the [terms and conditions](#).

4. Wait for an email from NetApp Cloud Central.
5. Click the link in the email to verify your email address.

Result

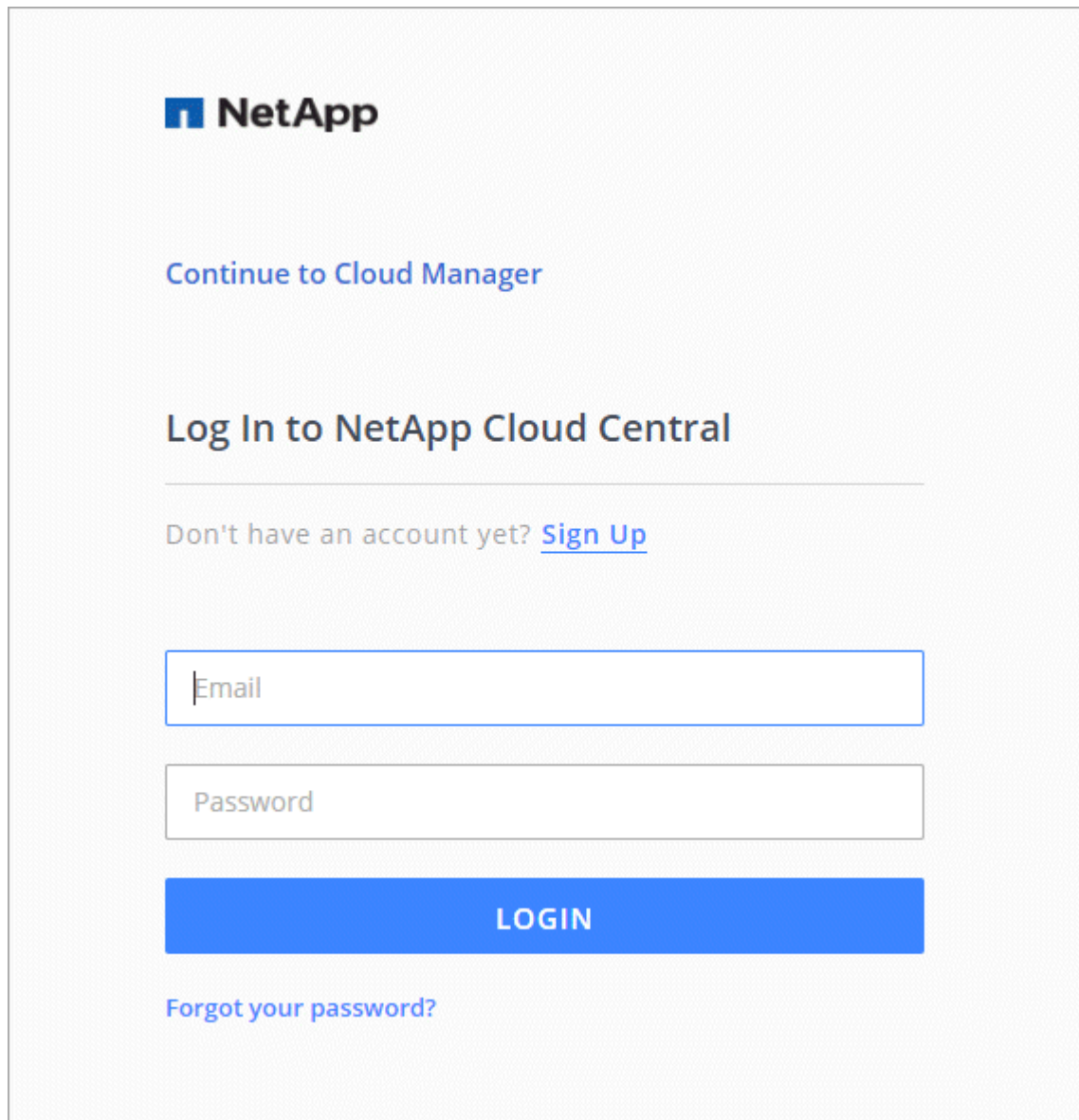
You now have an active Cloud Central user login.

Logging in to Cloud Manager

The Cloud Manager interface is accessible through a SaaS-based user interface by going to <https://cloudmanager.netapp.com>.

Steps

1. Open a web browser and go to <https://cloudmanager.netapp.com>.
2. Log in using your NetApp Cloud Central credentials.

The image shows a screenshot of the NetApp Cloud Central login page. At the top left is the NetApp logo. Below it is a blue link that says "Continue to Cloud Manager". Further down is the heading "Log In to NetApp Cloud Central" followed by a horizontal line. Below the line is the text "Don't have an account yet?" followed by a blue link "Sign Up". There are two input fields: the first is labeled "Email" and the second is labeled "Password". Below these fields is a large blue button with the text "LOGIN" in white. At the bottom left of the login area is a blue link that says "Forgot your password?".

NetApp

[Continue to Cloud Manager](#)

Log In to NetApp Cloud Central

Don't have an account yet? [Sign Up](#)

Email

Password

LOGIN

[Forgot your password?](#)

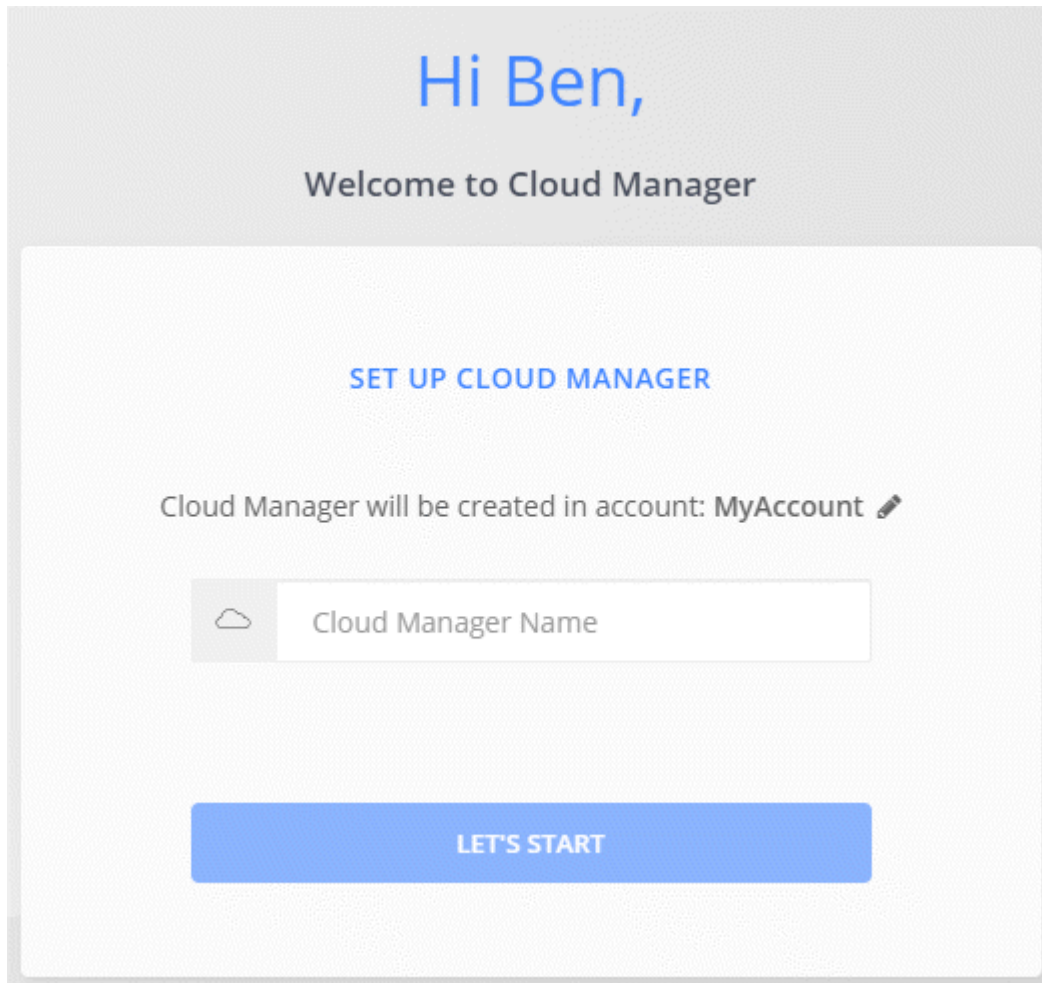
Set up a Cloud Central account

Account settings: users, workspaces, Connectors, and subscriptions

A *Cloud Central account* provides multi-tenancy and enables you to organize users and resources in isolated workspaces from within Cloud Manager.

For example, multiple users can deploy and manage Cloud Volumes ONTAP systems in isolated environments called *workspaces*. These workspaces are invisible to other users, unless they are shared.


When you first access Cloud Manager, you're prompted to select or create a Cloud Central account:


A screenshot of the Cloud Manager setup interface. At the top, it says "Hi Ben," in blue, followed by "Welcome to Cloud Manager" in dark grey. Below this is a section titled "SET UP CLOUD MANAGER" in blue. Underneath, it states "Cloud Manager will be created in account: MyAccount" with a small edit icon. There is a text input field with a cloud icon on the left and the placeholder text "Cloud Manager Name". At the bottom of this section is a large blue button labeled "LET'S START".

Hi Ben,

Welcome to Cloud Manager

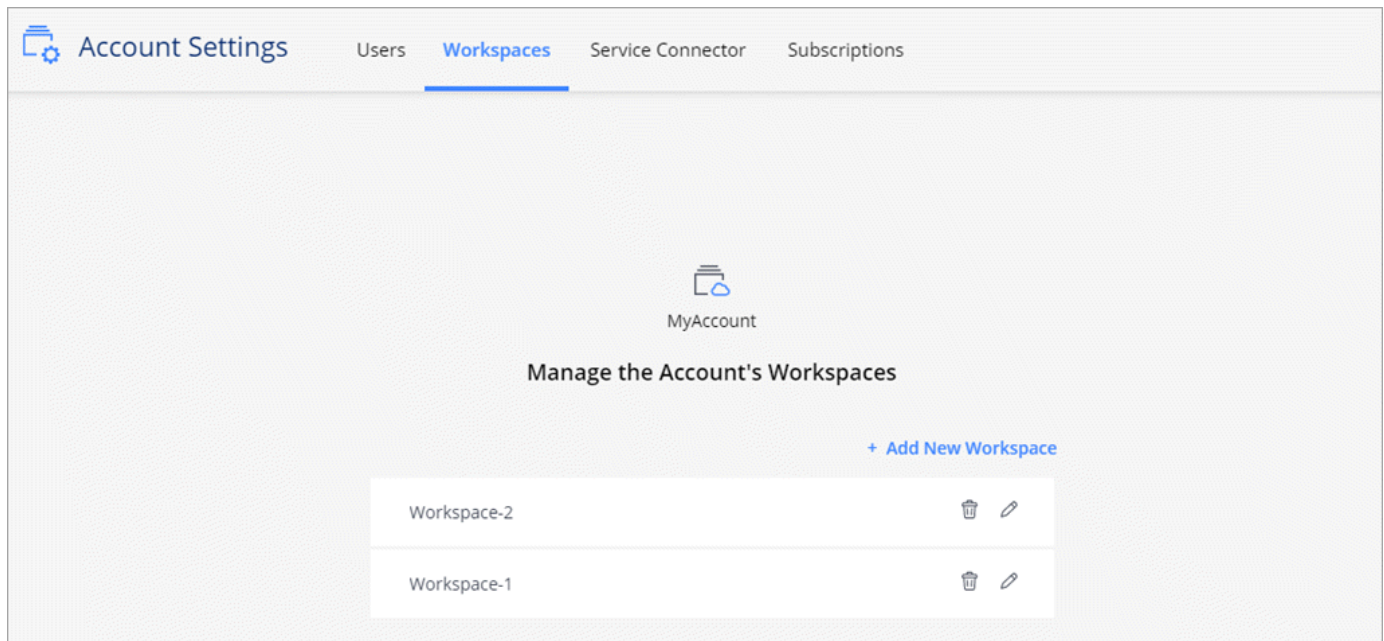
SET UP CLOUD MANAGER

Cloud Manager will be created in account: MyAccount 

 Cloud Manager Name

LET'S START

Account Admins can then modify the settings for this account by managing users, workspaces, Connectors, and subscriptions:



For step-by-step instructions, see [Setting up the Cloud Central account](#).

Account Settings

The Account Settings widget in Cloud Manager enables Account Admins to manage a Cloud Central account. If you just created your account, then you'll start from scratch. But if you've already set up an account, then you'll see *all* the users, workspaces, Connectors, and subscriptions that are associated with the account.

Users

The users that display in the Account Settings are NetApp Cloud Central users that you associate with your Cloud Central account. Associating a user with an account and one or more workspaces in that account enables those users to create and manage working environments in Cloud Manager.

When you associate a user, you assign them a role:

- *Account Admin*: Can perform any action in Cloud Manager.
- *Workspace Admin*: Can create and manage resources in the assigned workspace.
- *Cloud Compliance Viewer*: Can only view compliance information and generate reports for systems that they have permission to access.

Workspaces

In Cloud Manager, a workspace isolates any number of *working environments* from other working environments. Workspace Admins can't access the working environments in a workspace unless the Account Admin associates the admin with that workspace.

A working environment represents a storage system:

- A single-node Cloud Volumes ONTAP system or an HA pair
- An on-premises ONTAP cluster in your network
- An ONTAP cluster in a NetApp Private Storage configuration

Connectors

A Connector enables Cloud Manager to manage resources and processes within your public cloud environment. The Connector runs on a virtual machine instance that you deploy in your cloud provider, or on an on-prem host that you configured.

You can use a Connector with more than one NetApp cloud data service. For example, if you already have a Connector for Cloud Manager, you can select it when you set up the Cloud Tiering service.

Subscriptions

The Account Settings widget shows the NetApp subscriptions associated with the selected account.

When you subscribe to Cloud Manager from a cloud provider's marketplace, you're redirected to Cloud Central where you need to save your subscription and associate it with specific accounts.

After you've subscribed, each subscription is available from the Account Settings widget. You'll only see the subscriptions that are associated with the account that you're currently viewing.

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.

Examples

The following examples depict how you might set up your accounts.

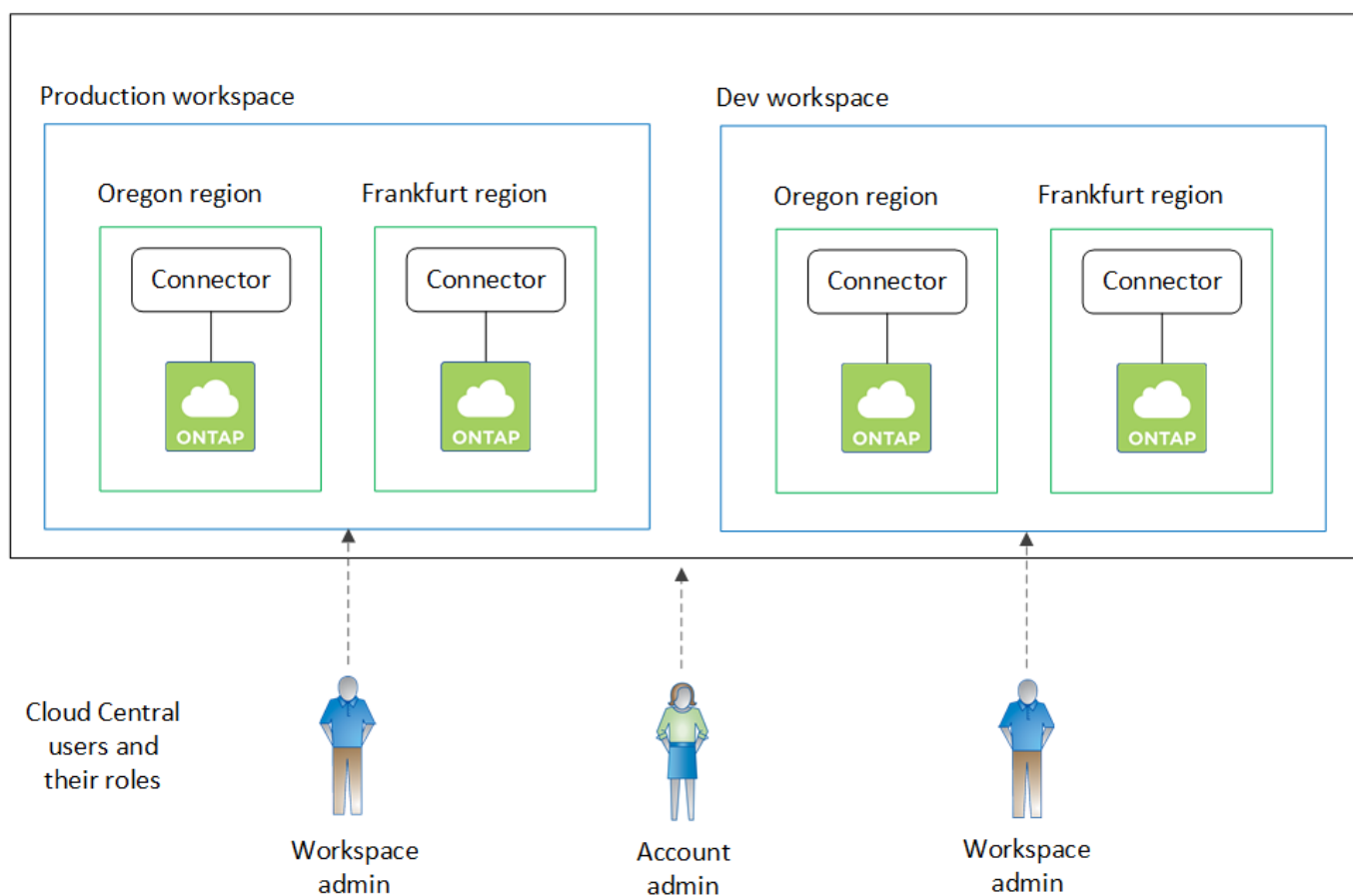


In both example images that follow, the Connector and the Cloud Volumes ONTAP systems don't actually reside *in* the NetApp Cloud Central account—they're running in a cloud provider. This is a conceptual representation of the relationship between each component.

Example 1

The following example shows an account that uses two workspaces to create isolated environments. The first workspace is for a production environment and the second is for a dev environment.

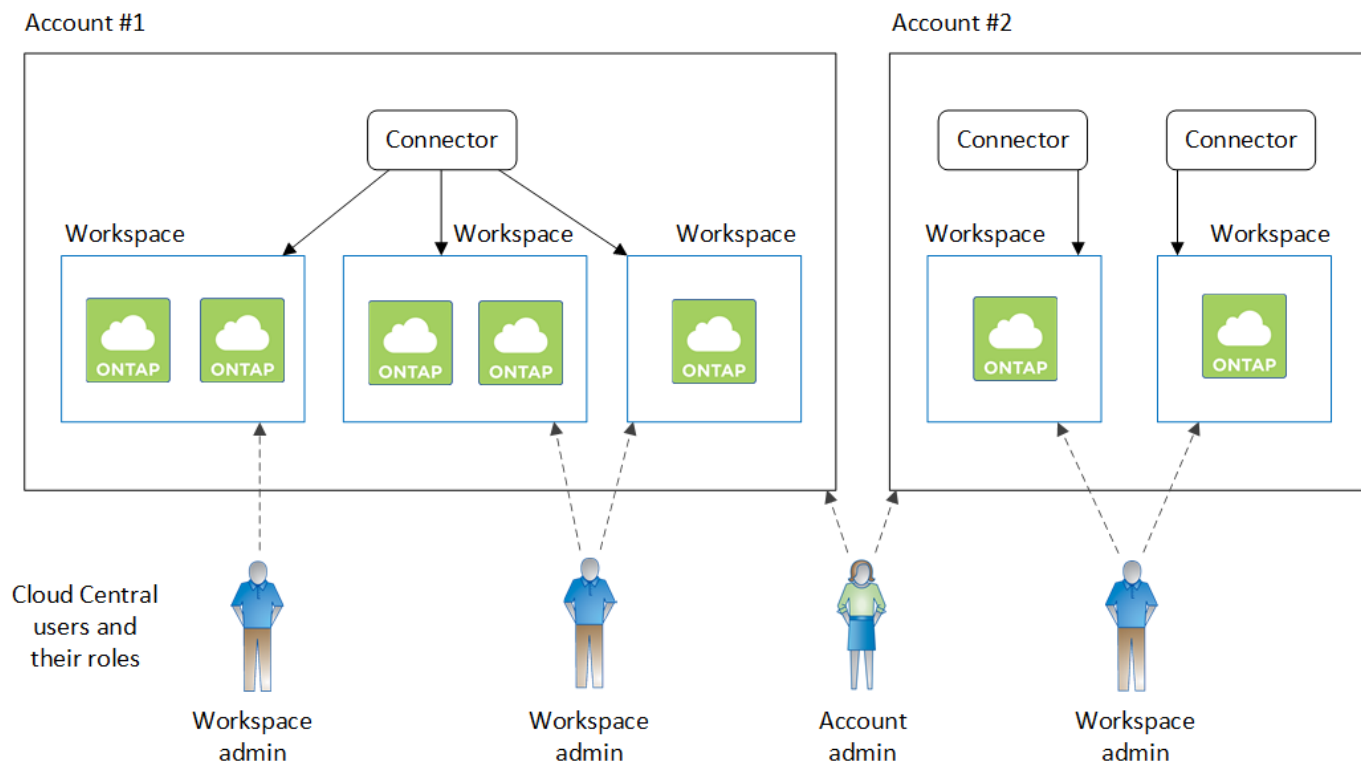
Account



Example 2

Here's another example that shows the highest level of multi-tenancy by using two separate Cloud Central accounts. For example, a service provider might use Cloud Manager in one account to provide services for their customers, while using another account to provide disaster recovery for one of their business units.

Note that account 2 includes two separate Connectors. This might happen if you have systems in separate regions or in separate cloud providers.



Setting up workspaces and users in the Cloud Central account

When you log in to Cloud Manager for the first time, you're prompted to create a *NetApp Cloud Central account*. This account provides multi-tenancy and enables you to organize users and resources in isolated *workspaces*.

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

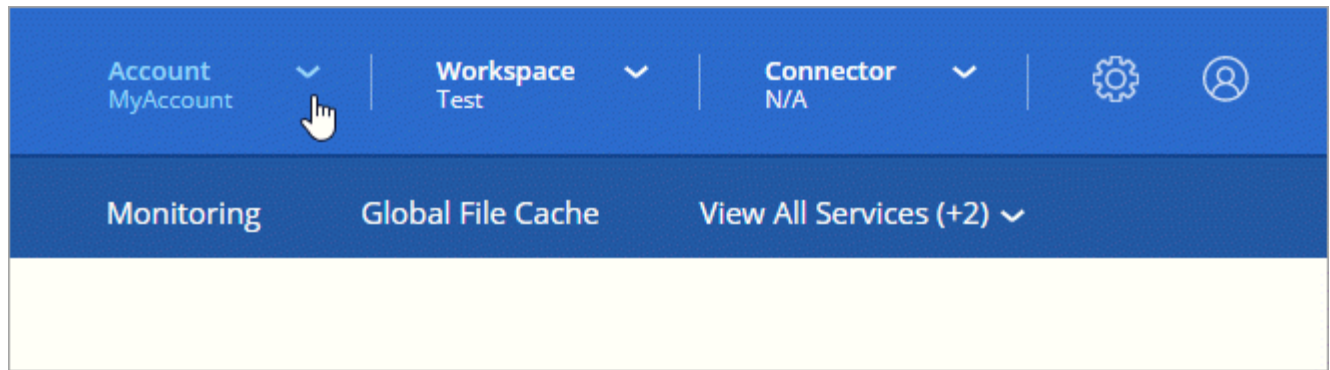
Set up your Cloud Central account so users can access Cloud Manager and access the working environments in a workspace. Just add a single user or add multiple users and workspaces.

Adding workspaces

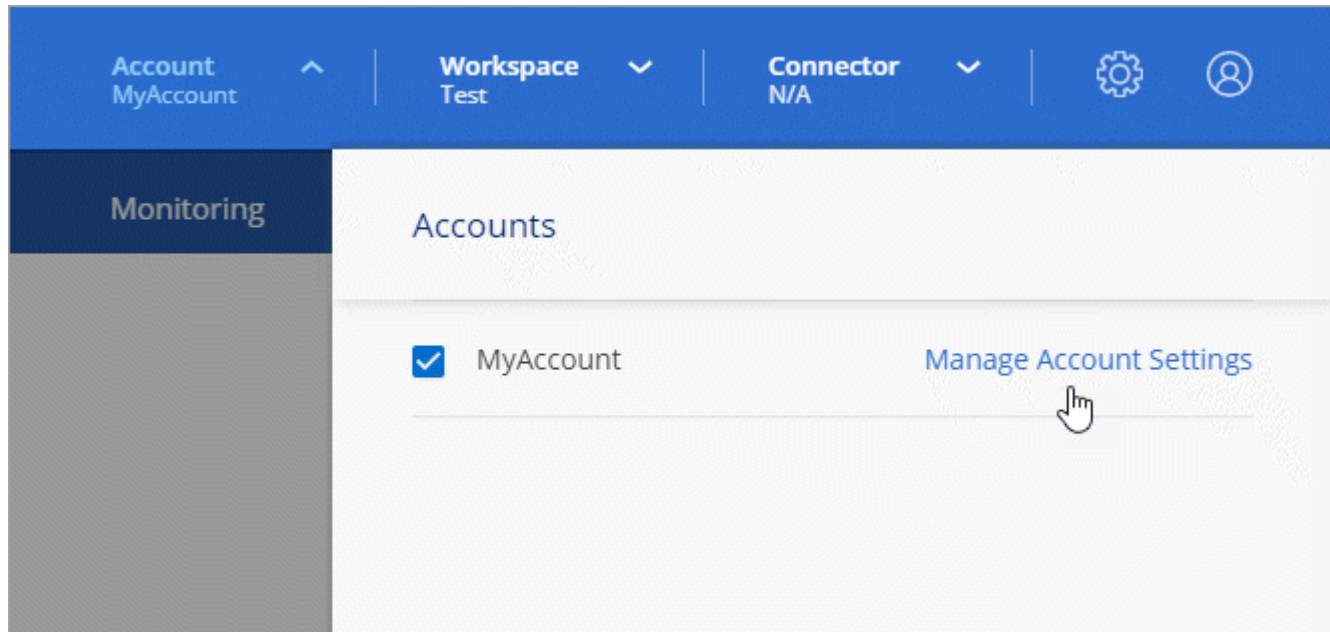
In Cloud Manager, workspaces enable you to isolate a set of working environments from other working environments and from other users. For example, you can create two workspaces and associate separate users with each workspace.

Steps

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



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



3. Click **Workspaces**.
4. Click **Add New Workspace**.
5. Enter a name for the workspace and click **Add**.

After you finish

If a Workspace Admin needs access to this workspace, then you'll need to associate the user. You'll also need to associate Connectors with the workspace so Workspace Admins can use those Connectors.

Adding users

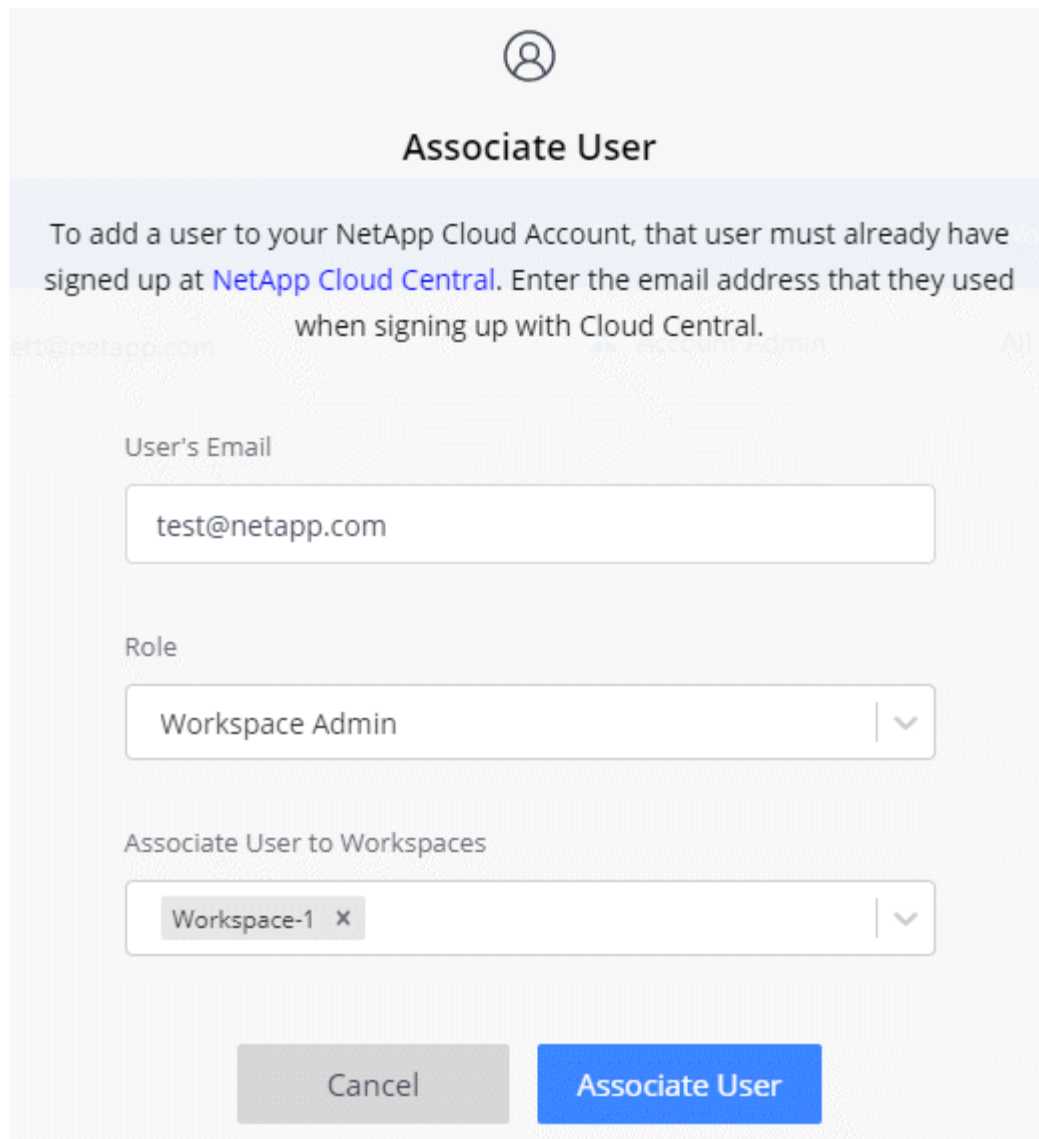
Associate Cloud Central users with the Cloud Central account so those users can create and manage working environments in Cloud Manager.

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 and click **Manage Account**.



3. From the Users tab, click **Associate User**.
4. 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 compliance information and generate reports for workspaces that they have permission to access.
5. 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 with 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

6. Click **Associate User**.

Result

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

Associating Workspace Admins with workspaces

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

Steps

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



2. From the Users tab, click the action menu in the row that corresponds to the user.



3. Click **Manage Workspaces**.

4. Select one or more workspaces 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.

Associating Connectors with workspaces

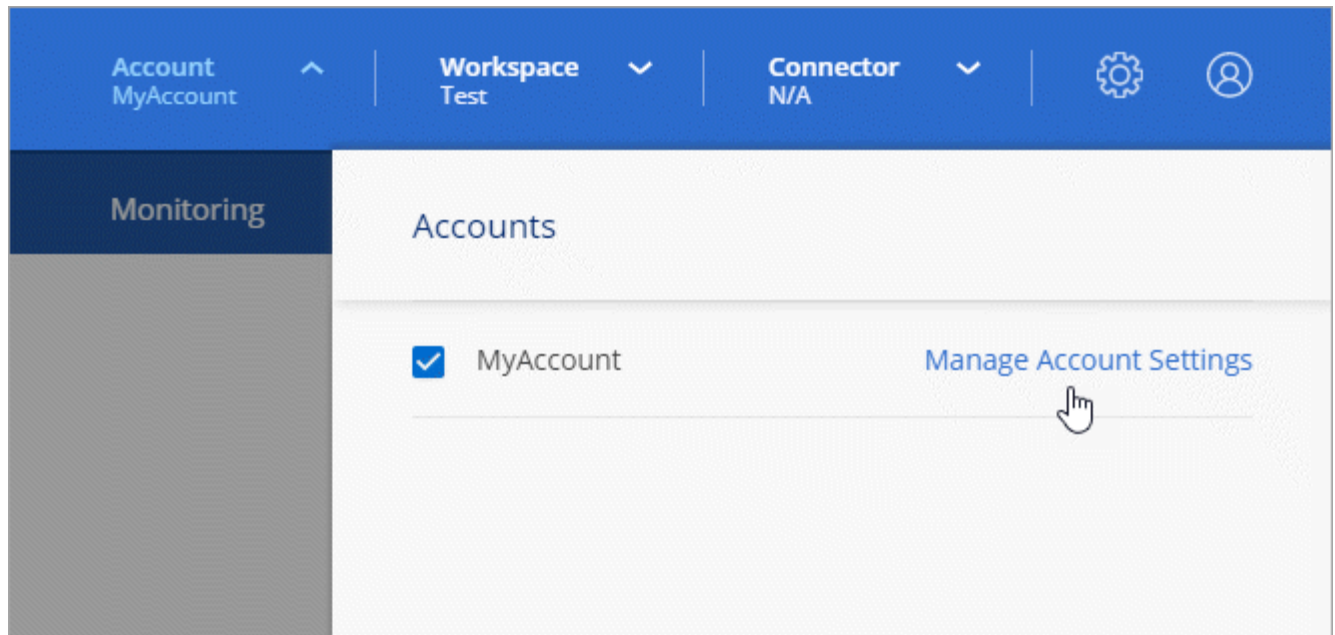
You need to associate a Connector with workspaces so Workspace Admins can use those Connectors to create Cloud Volumes ONTAP systems.

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 one or more workspaces and click **Apply**.

Result

Workspace Admins can now use those Connectors to create Cloud Volumes ONTAP systems.

What's next?

Now that you've set up your account, you can manage it any time by removing users, managing workspaces, Connectors, and subscriptions. [Learn more](#).

Set up a Connector

Learn about Connectors

In most cases, an Account Admin will need to deploy a *Connector* in your cloud or on-premises network. The Connector enables Cloud Manager to manage resources and processes within your public cloud environment.

When a Connector is required

A Connector is required to use any of the following features within Cloud Manager:

- Cloud Volumes ONTAP
- On-premises ONTAP clusters
- Cloud Compliance
- Kubernetes
- Cloud Backup
- Monitoring

- On-prem tiering
- Global File Cache
- Amazon S3 bucket discovery

A Connector is **not** required for Azure NetApp Files, Cloud Volumes Service, or Cloud Sync.



While a Connector isn't required to set up and manage Azure NetApp Files, a Connector is required if you want to use Cloud Compliance to scan Azure NetApp Files data.

Supported locations

A Connector is supported in the following locations:

- Amazon Web Services
- Microsoft Azure
- Google Cloud
- On your premises



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.

Connectors should remain running

A Connector should remain running at all times. It's important for the continued health and operation of the services that you enable.

For example, a Connector is a key component in the health and operation of Cloud Volumes ONTAP PAYGO systems. If a Connector is powered down, Cloud Volumes ONTAP PAYGO systems will shut down after losing communication with a Connector for longer than 14 days.

How to create a Connector

An Account Admin needs to create a Connector before a Workspace Admin can create a Cloud Volumes ONTAP working environment and use any of the other features listed above.

An Account Admin can create a Connector in a number of ways:

- Directly from Cloud Manager (recommended)
 - [Create in AWS](#)
 - [Create in Azure](#)
 - [Create in GCP](#)
- [From the AWS Marketplace](#)
- [From the Azure Marketplace](#)
- [By downloading and installing the software on an existing Linux host](#)

When you create your first Cloud Volumes ONTAP working environment, Cloud Manager will prompt you to create a Connector if you don't have one yet.

Permissions

Specific permissions are needed to create the Connector and another set of permissions are needed for the Connector instance itself.

Permissions to create a Connector

The user who creates a Connector from Cloud Manager needs specific permissions to deploy the instance in your cloud provider of choice. Cloud Manager will remind you of the permissions requirements when you create a Connector.

[View policies for each cloud provider.](#)

Permissions for the Connector instance

The Connector needs specific cloud provider permissions to perform operations on your behalf. For example, to deploy and manage Cloud Volumes ONTAP.

When you create a Connector directly from Cloud Manager, Cloud Manager creates the Connector with the permissions that it needs. There's nothing that you need to do.

If you create the Connector yourself from the AWS Marketplace, the Azure Marketplace, or by manually installing the software, then you'll need to make sure that the right permissions are in place.

[View policies for each cloud provider.](#)

When to use multiple Connectors

In some cases, you might only need one Connector, but you might find yourself needing two or more Connectors.

Here are a few examples:

- You're using a multi-cloud environment (AWS and Azure), so you have one Connector in AWS and another in Azure. Each manages the Cloud Volumes ONTAP systems running in those environments.
- A service provider might use one Cloud Central account to provide services for their customers, while using another account to provide disaster recovery for one of their business units. Each account would have separate Connectors.

When to switch between Connectors

When you create your first Connector, Cloud Manager automatically uses that Connector for each additional working environment that you create. Once you create an additional Connector, you'll need to switch between them to see the working environments that are specific to each Connector.

[Learn how to switch between Connectors.](#)

The local user interface

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)

[Learn how to access the local UI.](#)

Connector upgrades

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

Networking requirements for the Connector

Set up your networking so the Connector can manage resources and processes within your public cloud environment. The most important step is ensuring outbound internet access to various endpoints.



If your network uses a proxy server for all communication to the internet, you can specify the proxy server from the Settings page. Refer to [Configuring the Connector to use a proxy server](#).

Connection to target networks

A Connector requires a network connection to the type of working environment that you're creating and the services that you're planning to enable.

For example, if you install a Connector in your corporate network, then you must set up a VPN connection to the VPC or VNet in which you launch Cloud Volumes ONTAP.

Outbound internet access

The Connector requires outbound internet access to manage resources and processes within your public cloud environment. Outbound internet access is also required if you want to manually install the Connector on a Linux host or access the local UI running on the Connector.

The following sections identify the specific endpoints.

Endpoints to manage resources in AWS

A Connector contacts the following endpoints when managing resources in AWS:

| Endpoints | Purpose |
|--|--|
| <p>AWS services (amazonaws.com):</p> <ul style="list-style-type: none"> • CloudFormation • Elastic Compute Cloud (EC2) • Key Management Service (KMS) • Security Token Service (STS) • Simple Storage Service (S3) <p>The exact endpoint depends on the region in which you deploy Cloud Volumes ONTAP. Refer to AWS documentation for details.</p> | Enables the Connector to deploy and manage Cloud Volumes ONTAP in AWS. |
| https://api.services.cloud.netapp.com:443 | API requests to NetApp Cloud Central. |
| https://cloud.support.netapp.com.s3.us-west-1.amazonaws.com | Provides access to software images, manifests, and templates. |
| https://cognito-idp.us-east-1.amazonaws.com https://cognito-identity.us-east-1.amazonaws.com https://sts.amazonaws.com https://cloud-support-netapp-com-accelerated.s3.amazonaws.com | Enables the Connector to access and download manifests, templates, and Cloud Volumes ONTAP upgrade images. |
| https://cloudmanagerinfraprod.azurecr.io | Access to software images of container components for an infrastructure that's running Docker and provides a solution for service integrations with Cloud Manager. |
| https://kinesis.us-east-1.amazonaws.com | Enables NetApp to stream data from audit records. |
| https://cloudmanager.cloud.netapp.com | Communication with the Cloud Manager service, which includes Cloud Central accounts. |
| https://netapp-cloud-account.auth0.com | Communication with NetApp Cloud Central for centralized user authentication. |
| support.netapp.com:443 | Communication with NetApp AutoSupport. |
| https://support.netapp.com/svcgw https://support.netapp.com/ServiceGW/entitlement https://eval.lic.netapp.com.s3.us-west-1.amazonaws.com https://cloud-support-netapp-com.s3.us-west-1.amazonaws.com | Communication with NetApp for system licensing and support registration. |
| https://client.infra.support.netapp.com.s3.us-west-1.amazonaws.com https://cloud-support-netapp-com-accelerated.s3.us-west-1.amazonaws.com https://trigger.asup.netapp.com.s3.us-west-1.amazonaws.com | Enables NetApp to collect information needed to troubleshoot support issues. |

| Endpoints | Purpose |
|--|---|
| https://ipa-signer.cloudmanager.netapp.com | Enables Cloud Manager to generate licenses (for example, a FlexCache license for Cloud Volumes ONTAP) |
| Various third-party locations, for example: <ul style="list-style-type: none"> • https://repo1.maven.org/maven2 • https://oss.sonatype.org/content/repositories • https://repo.typesafe.com Third-party locations are subject to change. | During upgrades, Cloud Manager downloads the latest packages for third-party dependencies. |

Endpoints to manage resources in Azure

A Connector contacts the following endpoints when managing resources in Azure:

| Endpoints | Purpose |
|--|--|
| https://management.azure.com https://login.microsoftonline.com | Enables Cloud Manager to deploy and manage Cloud Volumes ONTAP in most Azure regions. |
| https://management.microsoftazure.de https://login.microsoftonline.de | Enables Cloud Manager to deploy and manage Cloud Volumes ONTAP in the Azure Germany regions. |
| https://management.usgovcloudapi.net https://login.microsoftonline.com | Enables Cloud Manager to deploy and manage Cloud Volumes ONTAP in the Azure US Gov regions. |
| https://api.services.cloud.netapp.com:443 | API requests to NetApp Cloud Central. |
| https://cloud.support.netapp.com.s3.us-west-1.amazonaws.com | Provides access to software images, manifests, and templates. |
| https://cognito-idp.us-east-1.amazonaws.com https://cognito-identity.us-east-1.amazonaws.com https://sts.amazonaws.com https://cloud-support-netapp-com-accelerated.s3.amazonaws.com | Enables the Connector to access and download manifests, templates, and Cloud Volumes ONTAP upgrade images. |
| https://cloudmanagerinfraprod.azurecr.io | Access to software images of container components for an infrastructure that's running Docker and provides a solution for service integrations with Cloud Manager. |
| https://kinesis.us-east-1.amazonaws.com | Enables NetApp to stream data from audit records. |
| https://cloudmanager.cloud.netapp.com | Communication with the Cloud Manager service, which includes Cloud Central accounts. |
| https://netapp-cloud-account.auth0.com | Communication with NetApp Cloud Central for centralized user authentication. |
| support.netapp.com:443 | Communication with NetApp AutoSupport. |

| Endpoints | Purpose |
|--|---|
| https://support.netapp.com/svcgw https://support.netapp.com/ServiceGW/entitlement https://eval.lic.netapp.com.s3.us-west-1.amazonaws.com https://cloud-support-netapp-com.s3.us-west-1.amazonaws.com | Communication with NetApp for system licensing and support registration. |
| https://client.infra.support.netapp.com.s3.us-west-1.amazonaws.com https://cloud-support-netapp-com-accelerated.s3.us-west-1.amazonaws.com https://trigger.asup.netapp.com.s3.us-west-1.amazonaws.com | Enables NetApp to collect information needed to troubleshoot support issues. |
| https://ipa-signer.cloudmanager.netapp.com | Enables Cloud Manager to generate licenses (for example, a FlexCache license for Cloud Volumes ONTAP) |
| *.blob.core.windows.net | Required for HA pairs when using a proxy. |
| <p>Various third-party locations, for example:</p> <ul style="list-style-type: none"> • https://repo1.maven.org/maven2 • https://oss.sonatype.org/content/repositories • https://repo.typesafe.com <p>Third-party locations are subject to change.</p> | During upgrades, Cloud Manager downloads the latest packages for third-party dependencies. |

Endpoints to manage resources in GCP

A Connector contacts the following endpoints when managing resources in GCP:

| Endpoints | Purpose |
|--|--|
| https://www.googleapis.com | Enables the Connector to contact Google APIs for deploying and managing Cloud Volumes ONTAP in GCP. |
| https://api.services.cloud.netapp.com:443 | API requests to NetApp Cloud Central. |
| https://cloud.support.netapp.com.s3.us-west-1.amazonaws.com | Provides access to software images, manifests, and templates. |
| https://cognito-idp.us-east-1.amazonaws.com https://cognito-identity.us-east-1.amazonaws.com https://sts.amazonaws.com https://cloud-support-netapp-com-accelerated.s3.amazonaws.com | Enables the Connector to access and download manifests, templates, and Cloud Volumes ONTAP upgrade images. |
| https://cloudmanagerinfraprod.azurecr.io | Access to software images of container components for an infrastructure that's running Docker and provides a solution for service integrations with Cloud Manager. |

| Endpoints | Purpose |
|--|---|
| https://kinesis.us-east-1.amazonaws.com | Enables NetApp to stream data from audit records. |
| https://cloudmanager.cloud.netapp.com | Communication with the Cloud Manager service, which includes Cloud Central accounts. |
| https://netapp-cloud-account.auth0.com | Communication with NetApp Cloud Central for centralized user authentication. |
| support.netapp.com:443 | Communication with NetApp AutoSupport. |
| https://support.netapp.com/svcgw https://support.netapp.com/ServiceGW/entitlement https://eval.lic.netapp.com.s3.us-west-1.amazonaws.com https://cloud-support-netapp-com.s3.us-west-1.amazonaws.com | Communication with NetApp for system licensing and support registration. |
| https://client.infra.support.netapp.com.s3.us-west-1.amazonaws.com https://cloud-support-netapp-com-accelerated.s3.us-west-1.amazonaws.com https://trigger.asup.netapp.com.s3.us-west-1.amazonaws.com | Enables NetApp to collect information needed to troubleshoot support issues. |
| https://ipa-signer.cloudmanager.netapp.com | Enables Cloud Manager to generate licenses (for example, a FlexCache license for Cloud Volumes ONTAP) |
| <p>Various third-party locations, for example:</p> <ul style="list-style-type: none"> • https://repo1.maven.org/maven2 • https://oss.sonatype.org/content/repositories • https://repo.typesafe.com <p>Third-party locations are subject to change.</p> | During upgrades, Cloud Manager downloads the latest packages for third-party dependencies. |

Endpoints to install the Connector on a Linux host

You have the option to manually install the Connector software on your own Linux host. If you do, the installer for the Connector must access the following URLs during the installation process:

- <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.

Endpoints accessed from your web browser when using 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. The machine running the web browser must have connections to the following endpoints:

| Endpoints | Purpose |
|--|--|
| The Connector host | <p>You must enter the host's IP address from a web browser to load the Cloud Manager console.</p> <p>Depending on your connectivity to your cloud provider, you can use the private IP or a public IP assigned to the host:</p> <ul style="list-style-type: none">• A private IP works if you have a VPN and direct connect access to your virtual network• A public IP works in any networking scenario <p>In any case, you should secure network access by ensuring that security group rules allow access from only authorized IPs or subnets.</p> |
| https://auth0.com https://cdn.auth0.com https://netapp-cloud-account.auth0.com https://services.cloud.netapp.com | Your web browser connects to these endpoints for centralized user authentication through NetApp Cloud Central. |
| https://widget.intercom.io | For in-product chat that enables you to talk to NetApp cloud experts. |

Ports and security groups

There's no incoming traffic to the Connector, unless you initiate it. HTTP and HTTPS provide access to the [local UI](#), which you'll use in rare circumstances. SSH is only needed if you need to connect to the host for troubleshooting.

Rules for the Connector in AWS

The security group for the Connector requires both inbound and outbound rules.

Inbound rules

| Protocol | Port | Purpose |
|----------|------|---|
| SSH | 22 | Provides SSH access to the Connector host |
| HTTP | 80 | Provides HTTP access from client web browsers to the local user interface and connections from Cloud Compliance |
| HTTPS | 443 | Provides HTTPS access from client web browsers to the local user interface |
| TCP | 3128 | Provides the Cloud Compliance instance with internet access, if your AWS network doesn't use a NAT or proxy |

Outbound rules

The predefined security group for the Connector opens all outbound traffic. If that is acceptable, follow the basic outbound rules. If you need more rigid rules, use the advanced outbound rules.

Basic outbound rules

The predefined security group for the Connector includes the following outbound rules.

| Protocol | Port | Purpose |
|----------|------|----------------------|
| All TCP | All | All outbound traffic |
| All UDP | All | All outbound traffic |

Advanced outbound rules

If you need rigid rules for outbound traffic, you can use the following information to open only those ports that are required for outbound communication by the Connector.



The source IP address is the Connector host.

| Service | Protocol | Port | Destination | Purpose |
|---------------------------|----------|------|--|--|
| Active Directory | TCP | 88 | Active Directory forest | Kerberos V authentication |
| | TCP | 139 | Active Directory forest | NetBIOS service session |
| | TCP | 389 | Active Directory forest | LDAP |
| | TCP | 445 | Active Directory forest | Microsoft SMB/CIFS over TCP with NetBIOS framing |
| | TCP | 464 | Active Directory forest | Kerberos V change & set password (SET_CHANGE) |
| | TCP | 749 | Active Directory forest | Active Directory Kerberos V change & set password (RPCSEC_GSS) |
| | UDP | 137 | Active Directory forest | NetBIOS name service |
| | UDP | 138 | Active Directory forest | NetBIOS datagram service |
| | UDP | 464 | Active Directory forest | Kerberos key administration |
| API calls and AutoSupport | HTTPS | 443 | Outbound internet and ONTAP cluster management LIF | API calls to AWS and ONTAP, and sending AutoSupport messages to NetApp |
| API calls | TCP | 3000 | ONTAP cluster management LIF | API calls to ONTAP |
| | TCP | 8088 | Backup to S3 | API calls to Backup to S3 |
| DNS | UDP | 53 | DNS | Used for DNS resolve by Cloud Manager |
| Cloud Compliance | HTTP | 80 | Cloud Compliance instance | Cloud Compliance for Cloud Volumes ONTAP |

Rules for the Connector in Azure

The security group for the Connector requires both inbound and outbound rules.

Inbound rules

| Port | Protocol | Purpose |
|------|----------|--|
| 22 | SSH | Provides SSH access to the Connector host |
| 80 | HTTP | Provides HTTP access from client web browsers to the local user interface |
| 443 | HTTPS | Provides HTTPS access from client web browsers to the local user interface |

Outbound rules

The predefined security group for the Connector opens all outbound traffic. If that is acceptable, follow the basic outbound rules. If you need more rigid rules, use the advanced outbound rules.

Basic outbound rules

The predefined security group for the Connector includes the following outbound rules.

| Port | Protocol | Purpose |
|------|----------|----------------------|
| All | All TCP | All outbound traffic |
| All | All UDP | All outbound traffic |

Advanced outbound rules

If you need rigid rules for outbound traffic, you can use the following information to open only those ports that are required for outbound communication by the Connector.



The source IP address is the Connector host.

| Service | Port | Protocol | Destination | Purpose |
|---------------------------|------|----------|--|--|
| Active Directory | 88 | TCP | Active Directory forest | Kerberos V authentication |
| | 139 | TCP | Active Directory forest | NetBIOS service session |
| | 389 | TCP | Active Directory forest | LDAP |
| | 445 | TCP | Active Directory forest | Microsoft SMB/CIFS over TCP with NetBIOS framing |
| | 464 | TCP | Active Directory forest | Kerberos V change & set password (SET_CHANGE) |
| | 749 | TCP | Active Directory forest | Active Directory Kerberos V change & set password (RPCSEC_GSS) |
| | 137 | UDP | Active Directory forest | NetBIOS name service |
| | 138 | UDP | Active Directory forest | NetBIOS datagram service |
| | 464 | UDP | Active Directory forest | Kerberos key administration |
| API calls and AutoSupport | 443 | HTTPS | Outbound internet and ONTAP cluster management LIF | API calls to AWS and ONTAP, and sending AutoSupport messages to NetApp |
| API calls | 3000 | TCP | ONTAP cluster management LIF | API calls to ONTAP |
| DNS | 53 | UDP | DNS | Used for DNS resolve by Cloud Manager |

Rules for the Connector in GCP

The firewall rules for the Connector requires both inbound and outbound rules.

Inbound rules

| Protocol | Port | Purpose |
|----------|------|--|
| SSH | 22 | Provides SSH access to the Connector host |
| HTTP | 80 | Provides HTTP access from client web browsers to the local user interface |
| HTTPS | 443 | Provides HTTPS access from client web browsers to the local user interface |

Outbound rules

The predefined firewall rules for the Connector opens all outbound traffic. If that is acceptable, follow the basic outbound rules. If you need more rigid rules, use the advanced outbound rules.

Basic outbound rules

The predefined firewall rules for the Connector includes the following outbound rules.

| Protocol | Port | Purpose |
|----------|------|----------------------|
| All TCP | All | All outbound traffic |
| All UDP | All | All outbound traffic |

Advanced outbound rules

If you need rigid rules for outbound traffic, you can use the following information to open only those ports that are required for outbound communication by the Connector.



The source IP address is the Connector host.

| Service | Protocol | Port | Destination | Purpose |
|---------------------------|----------|------|--|--|
| Active Directory | TCP | 88 | Active Directory forest | Kerberos V authentication |
| | TCP | 139 | Active Directory forest | NetBIOS service session |
| | TCP | 389 | Active Directory forest | LDAP |
| | TCP | 445 | Active Directory forest | Microsoft SMB/CIFS over TCP with NetBIOS framing |
| | TCP | 464 | Active Directory forest | Kerberos V change & set password (SET_CHANGE) |
| | TCP | 749 | Active Directory forest | Active Directory Kerberos V change & set password (RPCSEC_GSS) |
| | UDP | 137 | Active Directory forest | NetBIOS name service |
| | UDP | 138 | Active Directory forest | NetBIOS datagram service |
| | UDP | 464 | Active Directory forest | Kerberos key administration |
| API calls and AutoSupport | HTTPS | 443 | Outbound internet and ONTAP cluster management LIF | API calls to GCP and ONTAP, and sending AutoSupport messages to NetApp |
| API calls | TCP | 3000 | ONTAP cluster management LIF | API calls to ONTAP |
| DNS | UDP | 53 | DNS | Used for DNS resolve by Cloud Manager |

Creating a Connector in AWS from Cloud Manager

An Account Admin needs to deploy a *Connector* before you can use most Cloud Manager features. [Learn when a Connector is required](#). The Connector enables Cloud Manager to manage resources and processes within your public cloud environment.

This page describes how to create a Connector in AWS directly from Cloud Manager. You also have the option to [create the Connector from the AWS Marketplace](#), or to [download the software and install it on your own host](#).

These steps must be completed by a user who has the Account Admin role. A Workspace Admin can't create a Connector.



When you create your first Cloud Volumes ONTAP working environment, Cloud Manager will prompt you to create a Connector if you don't have one yet.

Setting up AWS permissions to create a Connector

Before you can deploy a Connector from Cloud Manager, you need to ensure that your AWS account has the correct permissions.

Steps

1. Download the Connector IAM policy from the following location:

[NetApp Cloud Manager: AWS, Azure, and GCP Policies](#)

2. From the AWS IAM console, create your own policy by copying and pasting the text from the Connector IAM policy.
3. Attach the policy that you created in the previous step to the IAM user who will create the Connector from Cloud Manager.

Result

The AWS user now has the permissions required to create the Connector from Cloud Manager. You'll need to specify AWS access keys for this user when you're prompted by Cloud Manager.

Creating a Connector in AWS

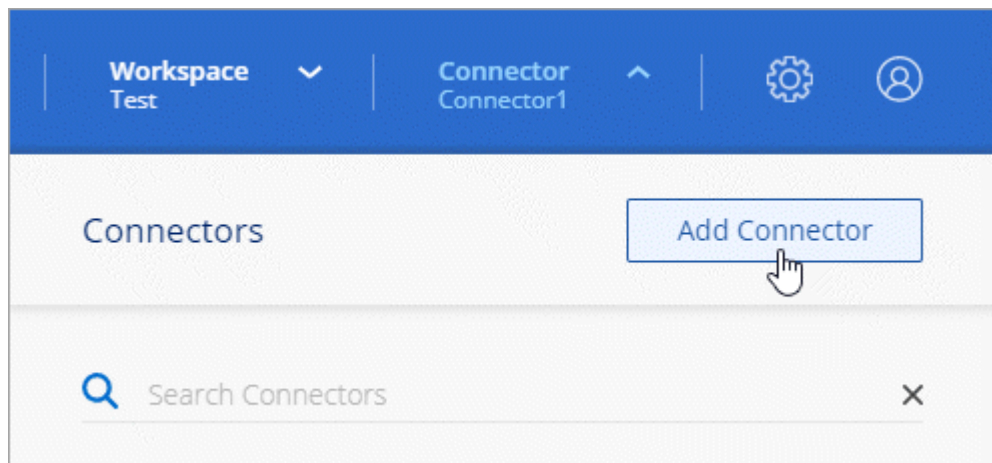
Cloud Manager enables you to create a Connector in AWS directly from its user interface.

What you'll need

- An AWS access key and secret key for an IAM user who has the [required permissions](#).
- A VPC, subnet, and keypair in your AWS region of choice.

Steps

1. If you're creating your first Working Environment, click **Add Working Environment** and follow the prompts. Otherwise, click the **Connector** drop-down and select **Add Connector**.



2. Click **Let's Start**.
3. Choose **Amazon Web Services** as your cloud provider.

Remember that the Connector must have a network connection to the type of working environment that you're creating and the services that you're planning to enable.

[Learn more about networking requirements for the Connector.](#)

4. Review what you'll need and click **Continue**.

5. Provide the required information:

- **AWS Credentials:** Enter a name for the instance and specify the AWS access key and secret key that meet permissions requirements.
- **Location:** Specify an AWS region, VPC, and subnet for the instance.
- **Network:** Select the key pair to use with the instance, whether to enable a public IP address, and optionally specify a proxy configuration.
- **Security Group:** Choose whether to create a new security group or whether to select an existing security group that allows inbound HTTP, HTTPS, and SSH access.



There's no incoming traffic to the Connector, unless you initiate it. HTTP and HTTPS provide access to the [local UI](#), which you'll use in rare circumstances. SSH is only needed if you need to connect to the host for troubleshooting.

6. Click **Create**.

The instance should be ready in about 7 minutes. You should stay on the page until the process is complete.

After you finish

You need to associate a Connector with workspaces so Workspace Admins can use those Connectors to create Cloud Volumes ONTAP systems. 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](#).

Creating a Connector in Azure from Cloud Manager

An Account Admin needs to deploy a *Connector* before you can use most Cloud Manager features. [Learn when a Connector is required](#). The Connector enables Cloud Manager to manage resources and processes within your public cloud environment.

This page describes how to create a Connector in Azure directly from Cloud Manager. You also have the option to [create the Connector from the Azure Marketplace](#), or to [download the software and install it on your own host](#).

These steps must be completed by a user who has the Account Admin role. A Workspace Admin can't create a Connector.



When you create your first Cloud Volumes ONTAP working environment, Cloud Manager will prompt you to create a Connector if you don't have one yet.

Setting up Azure permissions to create a Connector

Before you can deploy a Connector from Cloud Manager, you need to ensure that your Azure account has the correct permissions.

Steps

1. Create a custom role using the Azure policy for the Connector:
 - a. Download the [Azure policy for the Connector](#).



Right-click the link and click **Save link as...** to download the file.

- b. Modify the JSON file by adding your Azure subscription ID to the assignable scope.

Example

```
"AssignableScopes": [  
  "/subscriptions/d333af45-0d07-4154-943d-c25fbzzzzzzz"  
]
```

- 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_Setup_As_Service_Azure.json
```

You should now have a custom role called *Azure SetupAsService*.

2. Assign the role to the user who will deploy the Connector from Cloud Manager:

- a. Open the **Subscriptions** service and select the user's subscription.
- b. Click **Access control (IAM)**.
- c. Click **Add > Add role assignment** and then add the permissions:
 - Select the **Azure SetupAsService** role.



Azure SetupAsService is the default name provided in the [Connector deployment policy for Azure](#). If you chose a different name for the role, then select that name instead.

- Assign access to an **Azure AD user, group, or application**.
- Select the user account.
- Click **Save**.

Result

The Azure user now has the permissions required to deploy the Connector from Cloud Manager.

Creating a Connector in Azure

Cloud Manager enables you to create a Connector in Azure directly from its user interface.

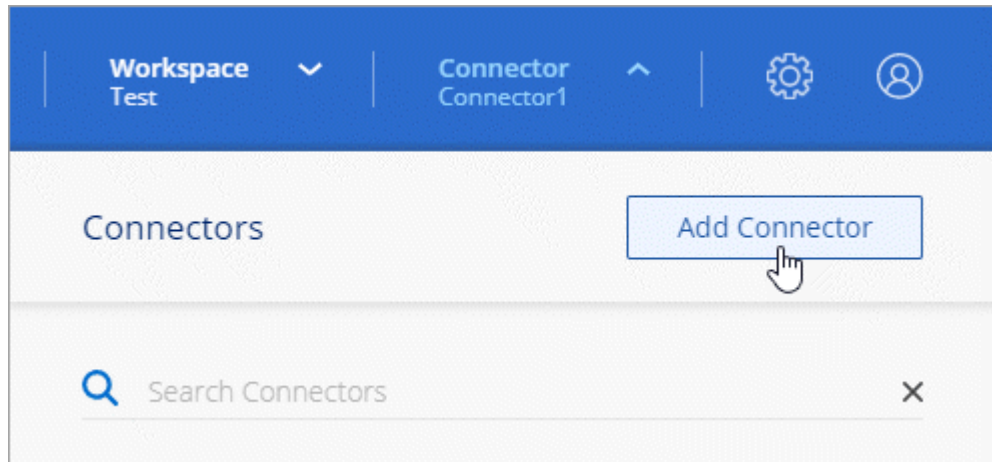
What you'll need

- The [required permissions](#) for your Azure account.
- An Azure subscription.
- A VNet and subnet in your Azure region of choice.

Steps

1. If you're creating your first Working Environment, click **Add Working Environment** and follow the prompts.

Otherwise, click the **Connector** drop-down and select **Add Connector**.



2. Click **Let's Start**.
3. Choose **Microsoft Azure** as your cloud provider.

Remember that the Connector must have a network connection to the type of working environment that you're creating and the services that you're planning to enable.

[Learn more about networking requirements for the Connector.](#)

4. Review what you'll need and click **Continue**.
5. If you're prompted, log in to your Microsoft account, which should have the required permissions to create the virtual machine.

The form is owned and hosted by Microsoft. Your credentials are not provided to NetApp.



If you're already logged in to an Azure account, then Cloud Manager will automatically use that account. If you have multiple accounts, then you might need to log out first to ensure that you're using the right account.

6. Provide the required information:
 - **VM Authentication:** Enter a name for the virtual machine and a user name and password or public key.
 - **Basic Settings:** Choose an Azure subscription, an Azure region, and whether to create a new resource group or to use an existing resource group.
 - **Network:** Choose a VNet and subnet, whether to enable a public IP address, and optionally specify a proxy configuration.
 - **Security Group:** Choose whether to create a new security group or whether to select an existing security group that allows inbound HTTP, HTTPS, and SSH access.



There's no incoming traffic to the Connector, unless you initiate it. HTTP and HTTPS provide access to the [local UI](#), which you'll use in rare circumstances. SSH is only needed if you need to connect to the host for troubleshooting.

7. Click **Create**.

The virtual machine should be ready in about 7 minutes. You should stay on the page until the process is

complete.

After you finish

You need to associate a Connector with workspaces so Workspace Admins can use those Connectors to create Cloud Volumes ONTAP systems. 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](#).

Creating a Connector in GCP from Cloud Manager

An Account Admin needs to deploy a *Connector* before you can use most Cloud Manager features. [Learn when a Connector is required](#). The Connector enables Cloud Manager to manage resources and processes within your public cloud environment.

This page describes how to create a Connector in GCP directly from Cloud Manager. You also have the option to [download the software and install it on your own host](#).

These steps must be completed by a user who has the Account Admin role. A Workspace Admin can't create a Connector.



When you create your first Cloud Volumes ONTAP working environment, Cloud Manager will prompt you to create a Connector if you don't have one yet.

Setting up GCP permissions to create a Connector

Before you can deploy a Connector from Cloud Manager, you need to ensure that your GCP account has the correct permissions and that a service account is set up for the Connector VM.

Steps

1. Ensure that the GCP user who deploys Cloud Manager from NetApp Cloud Central has the permissions in the [Connector deployment policy for GCP](#).

[You can create a custom role using the YAML file](#) and then attach it to the user. You'll need to use the gcloud command line to create the role.

2. Set up a service account that has the permissions that Cloud Manager needs to create and manage Cloud Volumes ONTAP systems in projects.

You'll associate this service account with the Connector VM when you create it from Cloud Manager.

- a. [Create a role in GCP](#) that includes the permissions defined in the [Cloud Manager policy for GCP](#). Again, you'll need to use the gcloud command line.

The permissions contained in this YAML file are different than the permissions in step 1.

- b. [Create a GCP service account and apply the custom role that you just created](#).
- c. 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.

Result

The GCP user now has the permissions required to create the Connector from Cloud Manager and the service account for the Connector VM is set up.

Enabling Google Cloud APIs

Several APIs are required to deploy the Connector and Cloud Volumes ONTAP.

Step

1. [Enable the following Google Cloud APIs in your project.](#)
 - Cloud Deployment Manager V2 API
 - Cloud Logging API
 - Cloud Resource Manager API
 - Compute Engine API
 - Identity and Access Management (IAM) API

Creating a Connector in GCP

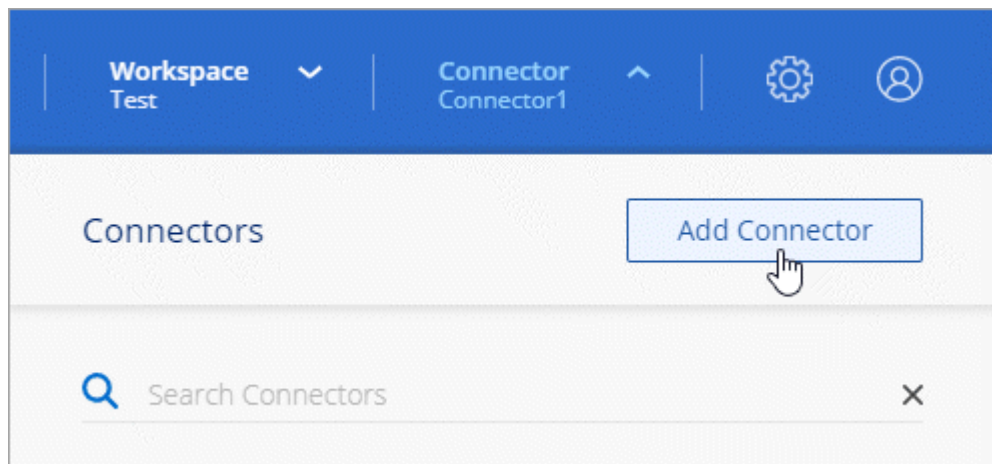
Cloud Manager enables you to create a Connector in GCP directly from its user interface.

What you'll need

- The [required permissions](#) for your Google Cloud account.
- A Google Cloud project.
- A service account that has the required permissions to create and manage Cloud Volumes ONTAP.
- A VPC and subnet in your Google Cloud region of choice.

Steps

1. If you're creating your first Working Environment, click **Add Working Environment** and follow the prompts. Otherwise, click the **Connector** drop-down and select **Add Connector**.



2. Click **Let's Start**.
3. Choose **Google Cloud Platform** as your cloud provider.

Remember that the Connector must have a network connection to the type of working environment that you're creating and the services that you're planning to enable.

[Learn more about networking requirements for the Connector.](#)

4. Review what you'll need and click **Continue**.

5. If you're prompted, log in to your Google account, which should have the required permissions to create the virtual machine instance.

The form is owned and hosted by Google. Your credentials are not provided to NetApp.

6. Provide the required information:

- **Basic Settings:** Enter a name for the virtual machine instance and specify a project and service account that has the required permissions.
- **Location:** Specify a region, zone, VPC, and subnet for the instance.
- **Network:** Choose whether to enable a public IP address and optionally specify a proxy configuration.
- **Firewall Policy:** Choose whether to create a new firewall policy or whether to select an existing firewall policy that allows inbound HTTP, HTTPS, and SSH access.



There's no incoming traffic to the Connector, unless you initiate it. HTTP and HTTPS provide access to the [local UI](#), which you'll use in rare circumstances. SSH is only needed if you need to connect to the host for troubleshooting.

7. Click **Create**.

The instance should be ready in about 7 minutes. You should stay on the page until the process is complete.

After you finish

You need to associate a Connector with workspaces so Workspace Admins can use those Connectors to create Cloud Volumes ONTAP systems. 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](#).

Where to go next

Now that you've logged in and set up Cloud Manager, users can start creating and discovering working environments.

- [Get started with Cloud Volumes ONTAP for AWS](#)
- [Get started with Cloud Volumes ONTAP for Azure](#)
- [Get started with Cloud Volumes ONTAP for Google Cloud](#)
- [Set up Azure NetApp Files](#)
- [Set up Cloud Volumes Service for AWS](#)
- [Discover an on-premises ONTAP cluster](#)
- [Discover your Amazon S3 buckets](#)

If you're an administrator, you can manage Cloud Manager settings after you create your first Connector.

- [Learn about Connectors](#)
- [Manage an HTTPS certificate for secure access](#)
- [Configure proxy settings](#)

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