



Administer Cloud Manager

Set up and administration

NetApp

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Administer Cloud Manager

NetApp accounts

Managing your NetApp 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 NetApp 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 Cloud Volumes ONTAP 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 NetApp 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. Below the title is a light blue banner with instructions: "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." Below this are three input fields: "User's Email" containing "test@netapp.com", "Role" with a dropdown menu showing "Workspace Admin", and "Associate User to Workspaces" with a dropdown menu showing "Workspace-1" and a close button (X). At the bottom are two buttons: a grey "Cancel" button and a blue "Associate User" button.



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 X

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 NetApp account.

Steps

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



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



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

Result

The user can no longer access the resources in this NetApp 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

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



2. 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", Cloud Provider "aws", and Status "Unsubscribed". The second row is "metering service subscription QA !!!!!" with Service "cloud-volumes-ontap", Cloud 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, in the Timeline, or have notifications sent to your email.

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

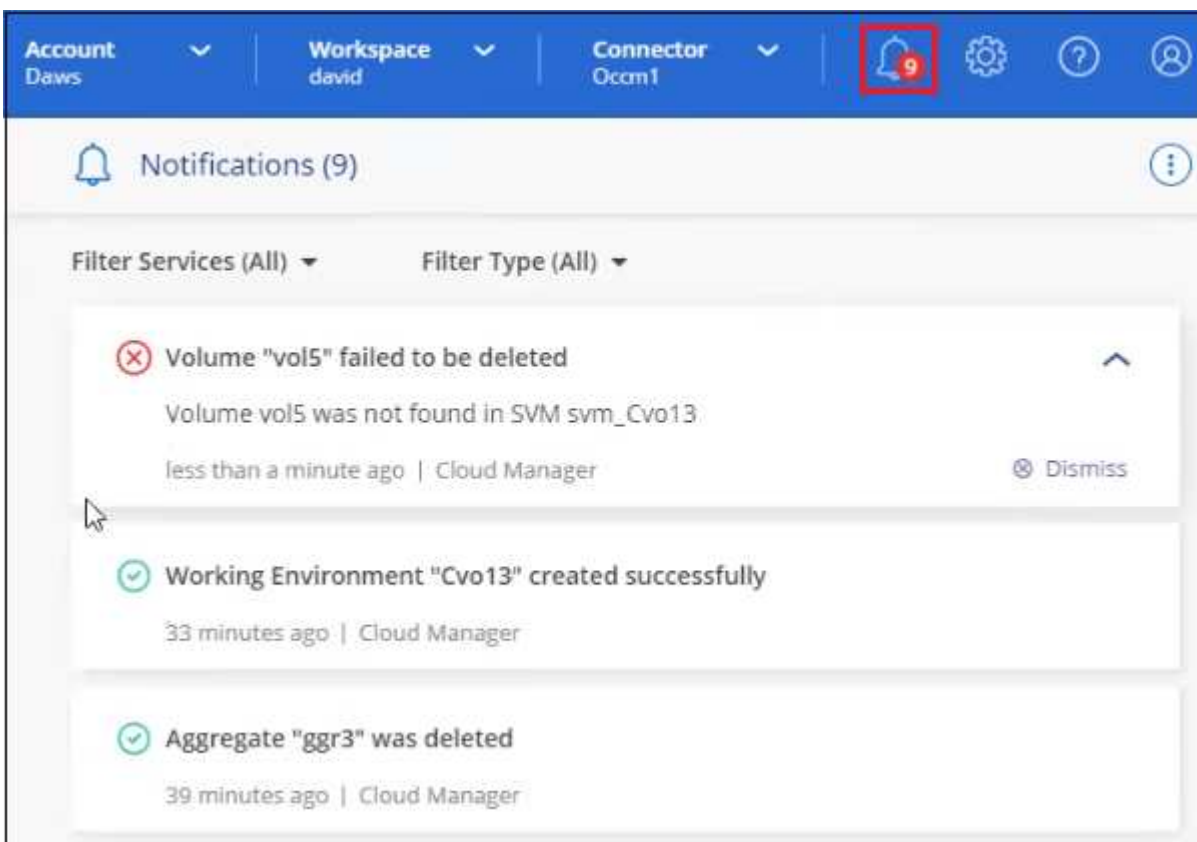
Notification Center	Timeline
Shows high level status for events and actions	Provides details for each event or action for further investigation
Shows status for the current login session - the information won't appear in the Notification Center after you log off	Retains status for the last month
Shows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

Notification Center	Timeline
Provides the ability to email notifications to Account users and to others	No email capability

Monitoring activities using the Notification Center

Notifications track the progress of operations that you've initiated in Cloud Manager so you can verify whether the operation was successful or not. They enable you to view the status for many Cloud Manager operations that you initiated during your current login session. Not all services report information into the Notification Center at this time.

You can 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.



You can also configure Cloud Manager to send notifications by email so you can be informed of important system activity even when you're not logged into the system. Emails can be sent to any Cloud Central users who are part of your NetApp Cloud Account, or to any other recipients who need to be aware of certain types of system activity. See [Setting email notification settings](#) below.

Notification types

Notifications are classified in the following categories:

Notification type	Description
Critical	A problem occurred that might lead to service disruption if corrective action is not taken immediately.
Error	An action or process ended with failure, or could lead to failure if corrective action is not taken.
Warning	An issue that you should be aware of to make sure it does not reach the critical severity. Notifications of this severity do not cause service disruption, and immediate corrective action might not be required.
Recommendation	A system recommendation for you to take an action to improve the system or a certain service; for example: costs saving, suggestion for new services, recommended security configuration, etc.
Information	A message that provides additional information about an action or process.
Success	An action or process completed successfully.

Filtering notifications

By default you'll see all notifications. You can filter the notifications that you see in the Notification Center to show only those notifications that are important to you. You can filter by Cloud Manager "Service" and by notification "Type".

Filter Services (All) ▲

☒ Digital Wallet (3)
☒ Active IQ (2)
☐ AppTemplate (1)

Clear
Apply

Filter Type (All) ▲

☐ Information (0)
☐ Success (1)
☒ Warning (2)
☒ Error (1)
☒ Critical (0)
☐ Recommendation (0)

Clear
Apply

For example, if you want to see only "Error" and "Warning" notifications for Cloud Manager operations, select those entries and you'll see only those types of notifications.

Setting email notification settings

You can send specific types of notifications by email so you can be informed of important system activity even when you're not logged into Cloud Manager. Emails can be sent to any users who are part of your NetApp Account, or to any other recipients who need to be aware of certain types of system activity.

Note: Sending email notifications is not supported when the Connector is installed in a site without internet

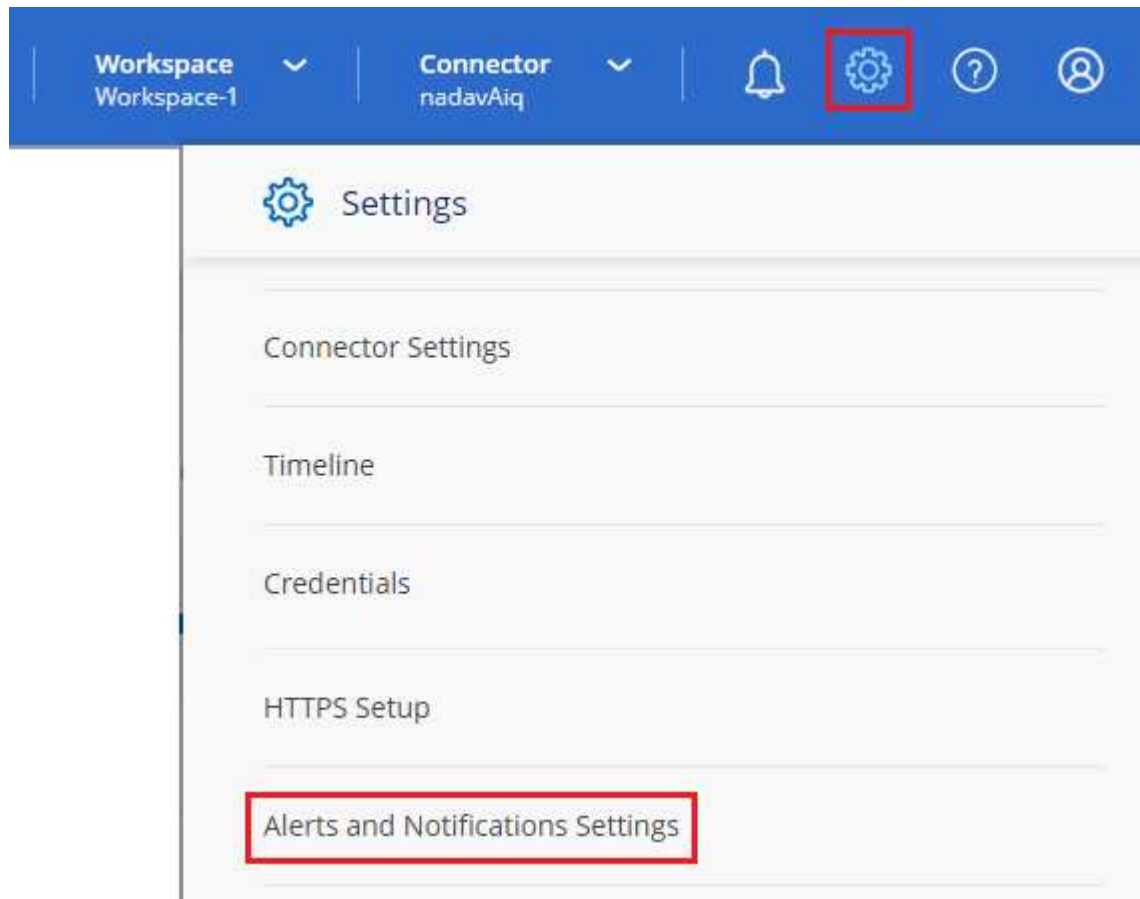
access.

By default, Cloud Manager Account Admins will receive emails for all "Critical" and "Recommendation" notifications. All other users and recipients are configured, by default, not to receive any notification emails.

You must be an Account Admin to customize the notifications settings.

Steps

1. From the Cloud Manager menu bar, click **Settings > Alerts and Notifications Settings**.



2. Select a user, or multiple users, from either the *Account Users* tab or the *Additional Recipients* tab, and choose the type of notifications to be sent:
 - To make changes for a single user, click the menu in the Notifications column for that user, check the types of Notifications to be sent, and click **Apply**.
 - To make changes for multiple users, check the box for each user, click **Manage Email Notifications**, check the types of Notifications to be sent, and click **Apply**.

Email	Name	Role
<input type="checkbox"/> Sabar@netapp.com	Sabar V	Account Admin
<input checked="" type="checkbox"/> activeiq@netapp-st.com	nadav	Account Admin
<input checked="" type="checkbox"/> nand@netapp.com	AnanK	Account Admin
<input type="checkbox"/> apra@netapp.com	Aradev	Workspace Admin
<input type="checkbox"/> ash@netapp.com	AshG	Account Admin

☒ Critical
☐ Recommendation
☐ Info
☐ Warning
☒ Error

Clear Apply

Adding additional email recipients

The users who appear in the *Account Users* tab are populated automatically from the users in your NetApp Account (from the [Manage Account page](#)). You can add email addresses in the *Additional Recipients* tab for other people, or groups, who do not have access to Cloud Manager, but who need to be notified about certain types of alerts and notifications.

Steps

1. From the Alerts and Notifications Settings page, click **Add New Recipients**.

Add New Recipient

Email: saul.jenkin@gmail.com

Name: Saul Jenkin

Notification Type: Critical Recommendation Error

Add New Recipient Cancel

2. Enter the name, email address, and select the types of Notifications that recipient will receive, and click **Add New Recipient**.

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. From the Cloud Manager menu bar, click **Settings > Timeline**.
2. Under the Filters, click **Service**, enable **Tenancy**, and click **Apply**.

Result

The Timeline updates to show you account management actions.

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
View data replication status	Yes	Yes	No	No
View the timeline	Yes	Yes	No	No
Switch between workspaces	Yes	Yes	Yes	No

Task	Account Admin	Workspace Admin	Compliance Viewer	SnapCenter Admin
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 NetApp 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 NetApp account](#)
- [Managing workspaces and users in the NetApp account](#)

Connectors

Advanced deployment

Create 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. Set up permissions in AWS:

- a. From the IAM console, create your own policy by copying and pasting the contents of [the IAM policy for the Connector](#).
 - b. 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

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

Typical Total Price: **\$0.226/hr**

Total pricing per instance for services hosted on t3.xlarge in US East (N. Virginia). [View Details](#)

Continue to Subscribe

Save to List

Overview Pricing Usage Support Reviews

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.

b

Cloud Manager - Manual Installation without access keys

Continue to Configuration

[< Product Detail](#) [Subscribe](#)

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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.

The screenshot shows the AWS EC2 console configuration page for launching an instance. The page is divided into several sections, each with a title and a set of options. The 'IAM role' section is highlighted with a red box, showing the 'Cloud_Manager' role selected. The 'Shutdown behavior' section is also highlighted with a red box, showing the 'Stop' option selected. The 'Enable termination protection' checkbox is checked, and the 'Protect against accidental termination' option is selected. The 'Monitoring' section shows the 'Enable CloudWatch detailed monitoring' checkbox is unchecked, with a note that 'Additional charges apply'.

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

- **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 NetApp account to associate with the Connector.
[Learn about NetApp accounts.](#)
 - b. Enter a name for the system.



Result

The Connector is now installed and set up with your NetApp 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](#).

If you have Amazon S3 buckets in the same AWS account where you created the Connector, you'll see an Amazon S3 working environment appear on the Canvas automatically. [Learn more about what you can do with this working environment](#).

After you finish

If you plan to deploy Cloud Volumes ONTAP systems in a subnet where an outbound internet connection won't be available, then Cloud Manager automatically configures Cloud Volumes ONTAP to use the Connector as a proxy server.

The only requirement is to ensure that the Connector's security group allows *inbound* connections over port 3128. You'll need to open this port after you deploy the Connector.

If you use the default security group for Cloud Volumes ONTAP, then no changes are needed to its security group. But if you plan to define strict outbound rules for Cloud Volumes ONTAP, then you'll also need to ensure that the Cloud Volumes ONTAP security group allows *outbound* connections over port 3128.

Create 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 NetApp account.

Steps

1. Go to the NetApp Connector VM page in the Azure Marketplace.
 - [Azure Marketplace page for commercial regions](#)
 - [Azure Marketplace page for Azure Government regions](#)
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 NetApp account to associate with the Connector.

[Learn about NetApp 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:
 - a. Copy the contents of the [custom role permissions for the Connector](#) and save them in a JSON file.
 - 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.

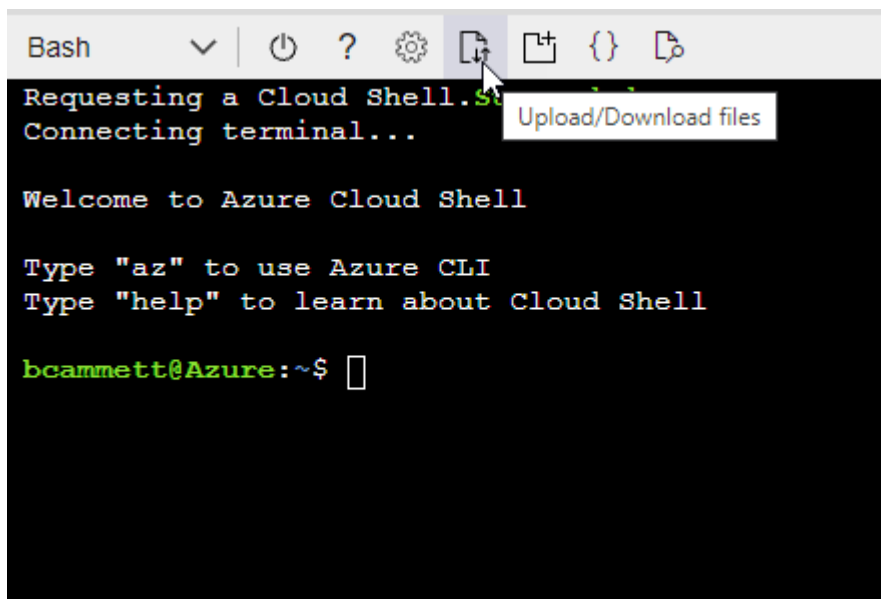
Example

```
"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 steps describe how to create the role by using Bash in Azure Cloud Shell.

- Start [Azure Cloud Shell](#) and choose the Bash environment.
- Upload the JSON file.



- Enter the following Azure CLI command:

```
az role definition create --role-definition  
Policy_for_Setup_As_Service_Azure.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) > Add > Add role assignment**.
 - c. In the **Role** tab, select the **Cloud Manager Operator** role and click **Next**.



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.

- d. In the **Members** tab, complete the following steps:
 - Assign access to a **Managed identity**.
 - Click **Select members**, select the subscription in which the Connector virtual machine was created, choose **Virtual machine**, and then select the Connector virtual machine.
 - Click **Select**.
 - Click **Next**.
- e. Click **Review + assign**.
- f. 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](#).

If you have Azure Blob storage in the same Azure account where you created the Connector, you'll see an Azure Blob working environment appear on the Canvas automatically. [Learn more about what you can do with this working environment](#).

Open port 3128 for AutoSupport messages

If you plan to deploy Cloud Volumes ONTAP systems in a subnet where an outbound internet connection won't be available, then Cloud Manager automatically configures Cloud Volumes ONTAP to use the Connector as a proxy server.

The only requirement is to ensure that the Connector's security group allows *inbound* connections over port 3128. You'll need to open this port after you deploy the Connector.

If you use the default security group for Cloud Volumes ONTAP, then no changes are needed to its security group. But if you plan to define strict outbound rules for Cloud Volumes ONTAP, then you'll also need to ensure that the Cloud Volumes ONTAP security group allows *outbound* connections over port 3128.

Install the Connector on an existing Linux host that has internet access

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. These steps are specific to hosts that have internet access.

[Learn about other ways to deploy a Connector](#).



If you want to create a Cloud Volumes ONTAP system in Google Cloud, then you must have a Connector that's running in Google Cloud as well. You can't use a Connector that's running in AWS, Azure, or on-prem.

Verify 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

16 GB

AWS EC2 instance type

An instance type that meets the CPU and RAM requirements above. We recommend t3.xlarge.

Azure VM size

An instance type that meets the CPU and RAM requirements above. We recommend DS3 v2.

GCP machine type

An instance type that meets the CPU and RAM requirements above. We recommend n2-standard-4.

The Connector is supported in Google Cloud on a VM instance with an OS that supports [Shielded VM features](#)

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 GiB of space must be available

Disk space in /var

20 GiB 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](#).

Install the Connector

After you verify that you have a supported Linux host, you can obtain the Connector software and then install it.

Required privileges

Root privileges are required to install the Connector.

About this task

- 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.

```
chmod +x OnCommandCloudManager-V3.9.19.sh
```

3. Run the installation script.

If you have a proxy server, you will need to enter the command parameters as shown below. The installer doesn't prompt you to provide information about a proxy.

```
./OnCommandCloudManager-V3.9.19.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, enter **Y** to continue with the installation.

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`

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.

6. Sign up at NetApp Cloud Central or log in.
7. If you installed the Connector in Google Cloud, set up a service account that has the permissions that Cloud Manager needs to create and manage Cloud Volumes ONTAP systems in projects.
 - a. [Create a role in GCP](#) that includes the permissions defined in the [Connector policy for GCP](#).
 - b. [Create a GCP service account and apply the custom role that you just created](#).
 - c. [Associate this service account with the Connector VM](#).
 - d. 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.
8. After you log in, set up Cloud Manager:
 - a. Specify the NetApp account to associate with the Connector.

[Learn about NetApp accounts](#).
 - b. Enter a name for the system.



Result

The Connector is now installed and set up with your NetApp 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](#)
- Google Cloud: See step 7 above

Install the Connector on-prem without internet access

You can install the Connector on an on-premises Linux host that doesn't have internet access. You can then discover on-prem ONTAP clusters, replicate data between them, back up volumes using Cloud Backup, and scan them with Cloud Data Sense.

These installation instructions are specifically for the use case described above. [Learn about other ways to deploy a Connector.](#)

Verify 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

16 GB

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 type

An SSD is required

Disk space in /opt

100 GiB of space must be available

Disk space in /var

20 GiB of space must be available

Docker Engine

Docker Engine version 19 or later is required on the host before you install the Connector. [View installation instructions.](#)

Install the Connector

After you verify that you have a supported Linux host, you can obtain the Connector software and then install it.

Required privileges

Root privileges are required to install the Connector.

Steps

1. Verify that docker is enabled and running.

```
sudo systemctl enable docker && sudo systemctl start docker
```

2. Download the Cloud Manager software from the [NetApp Support Site](#).
3. Copy the installer to the Linux host.
4. Assign permissions to run the script.

```
chmod +x /path/cloud-manager-connector-offline-v3.9.19
```

5. Run the installation script:

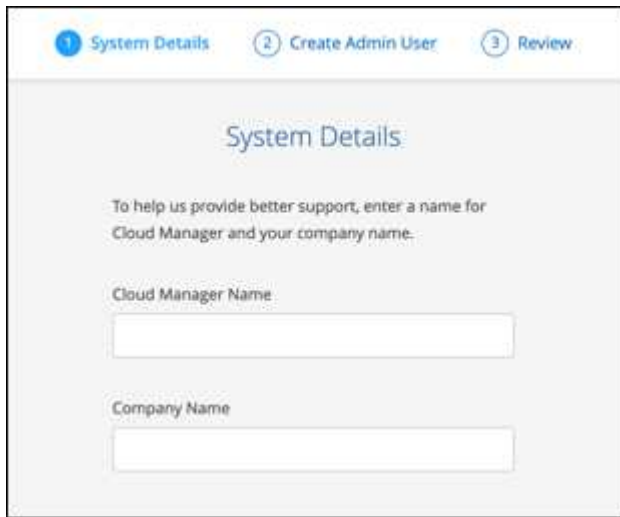
```
sudo /path/cloud-manager-connector-offline-v3.9.19
```

6. Open a web browser and enter `https://ipaddress` where *ipaddress* is the IP address of the Linux host.

You should see the following screen.



7. Click **Set Up New Cloud Manager** and follow the prompts to set up the system.
 - **System Details:** Enter a name for the Cloud Manager system and your company name.



- **Create Admin User:** Create the admin user for the system.

This user account runs locally on the system. There's no connection to NetApp Cloud Central.

- **Review:** Review the details, accept the license agreement, and then click **Set Up**.

8. Log in to Cloud Manager using the admin user that you just created.

Result

The Connector is now installed and you can start using the Cloud Manager features that are available in a dark site deployment.

What's next?

- [Discover on-prem ONTAP clusters](#)
- [Replicate data between on-prem ONTAP clusters](#)
- [Back up on-prem ONTAP volume data to StorageGRID using Cloud Backup](#)
- [Scan on-prem ONTAP volume data using Cloud Data Sense](#)

When new versions of the Connector software are available, they'll be posted to the NetApp Support Site. [Learn how to upgrade the Connector.](#)

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.

Switch 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.

Access 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. If you're accessing Cloud Manager from a Government region or a site that doesn't have outbound internet access, then you need to use the local user interface running on the Connector.

Steps

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

`https://ipaddress`

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.

2. Enter your user name and password to log in.

Download or send an AutoSupport message

If you're having problems, NetApp personnel might ask you to send an AutoSupport message to NetApp support for troubleshooting purposes.

Steps

1. Connect to the Connector local UI, as described in the section above.

2. In the upper right of the Cloud Manager console, click the Help icon, and select **Support**.



3. Click **Connector**.
4. Depending on how you need to send the information to NetApp support, choose one of the following options:
 - a. Select the option to download the AutoSupport message to your local machine. You can then send it to NetApp Support using a preferred method.
 - b. Click **Send AutoSupport** to directly send the message to NetApp Support.



Connect to the Linux VM

If you need to connect to the Linux VM that the Connector runs on, you can do so by using the connectivity options available from your cloud provider.

AWS

When you created the Connector instance in AWS, you provided an AWS access key and secret key. You can use this key pair to SSH to the instance.

[AWS Docs: Connect to your Linux instance](#)

Azure

When you created the Connector VM in Azure, you chose to authenticate with a password or SSH public key. Use the authentication method that you chose to connect to the VM.

[Azure Docs: SSH into your VM](#)

Google Cloud

You can't specify an authentication method when you create a Connector in Google Cloud. However, you can connect to the Linux VM instance using the Google Cloud Console or Google Cloud CLI (gcloud).

[Google Cloud Docs: Connect to Linux VMs](#)

Apply security updates

Update the operating system on the Connector to ensure that it's patched with the latest security updates.

Steps

1. Access the CLI shell on the Connector host.
2. Run the following commands with elevated privileges:

```
sudo -s
service service-manager stop
yum -y update --security
service service-manager start
```

Change the IP address for a Connector

If it's required for your business, you can change the internal IP address and public IP address of the Connector instance that is automatically assigned by your cloud provider.

Steps

1. Follow the instructions from your cloud provider to change the local IP address or public IP address (or both) for the Connector instance.
2. If you changed the public IP address and you need to connect to the local user interface running on the Connector, restart the Connector instance to register the new IP address with Cloud Manager.
3. If you changed the private IP address, update the backup location for Cloud Volumes ONTAP configuration files so that the backups are being sent to the new private IP address on the Connector.

- a. Run the following command from the Cloud Volumes ONTAP CLI to remove the current backup target:

```
system configuration backup settings modify -destination ""
```

- b. Go to Cloud Manager and open the working environment.
- c. Click the menu and select **Advanced > Configuration Backups**.
- d. Click **Set Backup Target**.

Edit 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**.

Fix download failures when using a Google Cloud NAT gateway

The Connector automatically downloads software updates for Cloud Volumes ONTAP. The download can fail if your configuration uses a Google Cloud NAT gateway. You can correct this issue by limiting the number of parts that the software image is divided into. This step must be completed by using the Cloud Manager API.

Step

1. Submit a PUT request to `/occm/config` with the following JSON as body:

```
{
  "maxDownloadSessions": 32
}
```

The value for *maxDownloadSessions* can be 1 or any integer greater than 1. If the value is 1, then the downloaded image will not be divided.

Note that 32 is an example value. The value that you should use depends on your NAT configuration and the number of sessions that you can have simultaneously.

[Learn more about the /occm/config API call.](#)

Upgrade the Connector on-prem without internet access

If you [installed the Connector on an on-premises host that doesn't have internet access](#), you can upgrade the Connector when a newer version is available from the NetApp Support Site.

The Connector needs to restart during the upgrade process so the user interface will be unavailable during the upgrade.

Steps

1. Download the Cloud Manager software from the [NetApp Support Site](#).
2. Copy the installer to the Linux host.
3. Assign permissions to run the script.

```
chmod +x /path/cloud-manager-connector-offline-v3.9.14
```

4. Run the installation script:

```
sudo /path/cloud-manager-connector-offline-v3.9.14
```

5. After the upgrade is complete, you can verify the Connector's version by going to **Help > Support > Connector**.

What about software upgrades on hosts that have internet access?

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

Remove 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.

Uninstall the Connector software

Uninstall the Connector software to troubleshoot issues or to permanently remove the software from the host. The steps that you need to use depends on whether you installed the Connector on a host that has internet access or a host in a restricted network that doesn't have internet access.

Uninstall from a host with internet access

The online Connector includes an uninstallation script that you can use to uninstall the software.

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.

Uninstall from a host without internet access

Use these commands if you downloaded the Connector software from the NetApp Support Site and installed it in a restricted network that doesn't have internet access.

Step

1. From the Linux host, run the following commands:

```
docker-compose -f /opt/application/netapp/ds/docker-compose.yml down -v
rm -rf /opt/application/netapp/ds
```

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	<ol style="list-style-type: none">a. Enter the host name or DNS of the Connector host (its Common Name), and then click Generate CSR. Cloud Manager displays a certificate signing request.b. Use the CSR to submit an SSL certificate request to a CA. The certificate must use the Privacy Enhanced Mail (PEM) Base-64 encoded X.509 format.c. Upload the certificate file and then click Install.
Install your own CA-signed certificate	<ol style="list-style-type: none">a. Select Install CA-signed certificate.b. Load both the certificate file and the private key and then click Install. The certificate must use the Privacy Enhanced Mail (PEM) Base-64 encoded X.509 format.

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:



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.

Configuring a Connector to use an HTTP proxy server

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



Cloud Manager doesn't support using an HTTPS proxy with the Connector.

Configuring the Connector to use an HTTP proxy server provides outbound internet access if a public IP address or a NAT gateway isn't available. This proxy server provides only the Connector with an outbound connection. It doesn't provide any connectivity for Cloud Volumes ONTAP systems.

If Cloud Volumes ONTAP systems don't have an outbound internet connection to send AutoSupport messages, Cloud Manager automatically configures those Cloud Volumes ONTAP systems to use a proxy server that's

included with the Connector. [Learn more about using a proxy server to send AutoSupport messages.](#)

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.

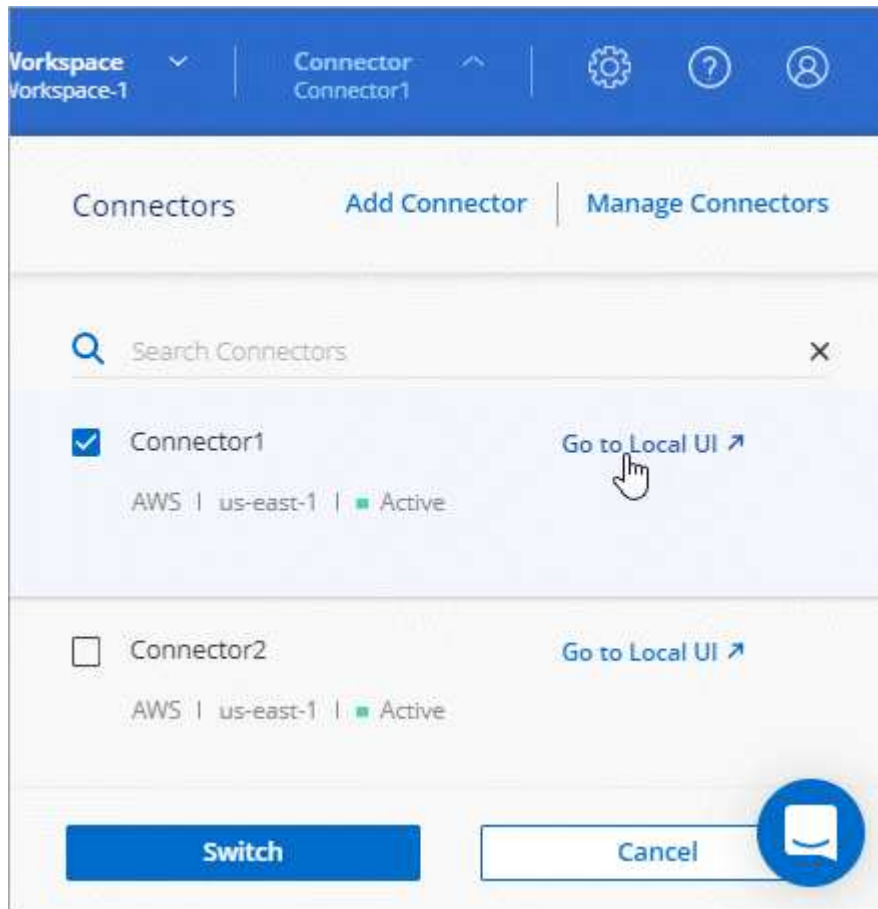
Note that this operation restarts the Connector. Ensure that the Connector isn't performing any operations before you proceed.

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.

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**.

Default configuration for the Connector

You might want to learn more about the Connector before you deploy it, or if you need to troubleshoot any issues.

Default configuration with internet access

The following configuration details apply if you deployed the Connector from Cloud Manager, from your cloud provider's marketplace, or if you manually installed the Connector on an on-premises Linux host that has internet access.

AWS details

If you deployed the Connector from Cloud Manager or from the cloud provider's marketplace, note the following:

- The EC2 instance type is t3.xlarge.
- The operating system for the image is Red Hat Enterprise Linux 7.6 (HVM).

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

- The user name for the EC2 Linux instance is ec2-user.
- The default system disk is a 100 GiB gp2 disk.

Azure details

If you deployed the Connector from Cloud Manager or from the cloud provider's marketplace, note the following:

- The VM type is DS3 v2.
- The operating system for the image is CentOS 7.6.

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

- The default system disk is a 100 GiB premium SSD disk.

Google Cloud details

If you deployed the Connector from Cloud Manager or from the cloud provider's marketplace, note the following:

- The VM instance is n2-standard-4.
- The operating system for the image is CentOS 7.9.

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

- The default system disk is a 100 GiB SSD persistent disk.

Installation folder

The Connector installation folder resides in the following location:

`/opt/application/netapp/cloudmanager`

Log files

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.

Connector service

- 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.

Packages

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

Ports

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

Default configuration without internet access

The following configuration applies if you manually installed the Connector on an on-premises Linux host that doesn't have internet access. [Learn more about this installation option.](#)

- The Connector installation folder resides in the following location:

`/opt/application/netapp/ds`

- Log files are contained in the following folders:

`/var/lib/docker/volumes/ds_occmdata/_data/log`

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

- All services are running inside docker containers

The services are dependent on the docker runtime service running

- The Connector uses the following ports on the Linux host:
 - 80 for HTTP access
 - 443 for HTTPS access

Discovered cloud storage

Viewing your Amazon S3 buckets

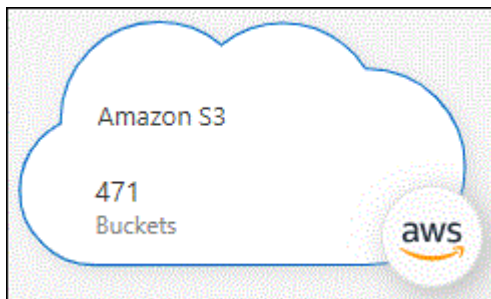
After you install a Connector in AWS, Cloud Manager can automatically discover information about the Amazon S3 buckets that reside in the AWS account where the Connector is installed. An Amazon S3 working environment is added to the Canvas so you can view this information.

You can see details about your S3 buckets, including the region, access policy, account, total and used capacity, and more. These buckets can be used as destinations for Cloud Backup, Cloud Tiering, or Cloud Sync operations. Additionally, you can use Cloud Data Sense to scan these buckets.

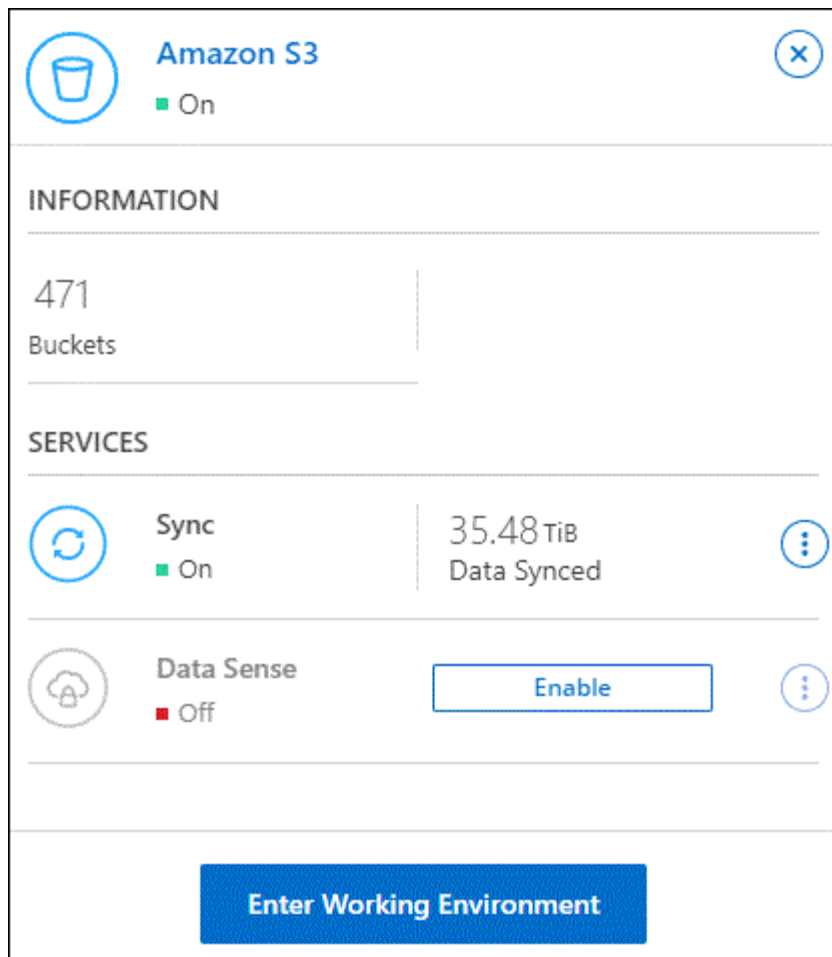
Steps

1. [Install a Connector](#) in the AWS account where you want to view your Amazon S3 buckets.

You should automatically see an Amazon S3 working environment shortly after.



2. Click the working environment and select an action from the right pane.



3. Click **Sync data** to synchronize data to or from S3 buckets.

For more details, see [the overview for the Cloud Sync service](#).

4. Click **Enable** if you want Cloud Data Sense to scan the S3 buckets for personal and sensitive data.

For more details, see [Getting started with Cloud Data Sense for Amazon S3](#).

5. Click **Enter Working Environment** to view details about the S3 buckets in your AWS account.

Amazon S3

Overview

471

Total Buckets

6.94

TiB

Total Capacity

23

Total Regions

471 Buckets

Bucket Name	AWS Account	Region	Creation Date	Encryption	Is Public	Size	Total Objects
athena-query-results-us-east-1	4642620614	US East (N. Virginia)	September 27, 2021	Disabled	Bucket and objects not public	35.27 GiB	3.01K
catalog-sg	4642620614	US East (N. Virginia)	October 1, 2021	Disabled	Bucket and objects not public	1.35 GiB	1.44K
cbsqa	4642620614	US East (N. Virginia)	August 9, 2021	Disabled	Public	33.95 GiB	185
template-19-ap-southeast-3	4642620614	ap-southeast-3	March 10, 2022	Enabled ⓘ	Objects can be public	21.38 KiB	3
template-7dxc-ca-central-1	4642620614	Canada (Central)	November 2, 2020	Enabled ⓘ	Objects can be public	24.01 KiB	2

Viewing your Azure Blob accounts

After you install a Connector in Azure, Cloud Manager can automatically discover information about the Azure storage accounts that reside in the Azure Subscriptions where the Connector is installed. An Azure Blob working environment is added to the Canvas so you can view this information.

You can see details about your Azure storage accounts, including the location, resource group, total and used capacity, and more. These accounts can be used as destinations for Cloud Backup, Cloud Tiering, or Cloud Sync operations.

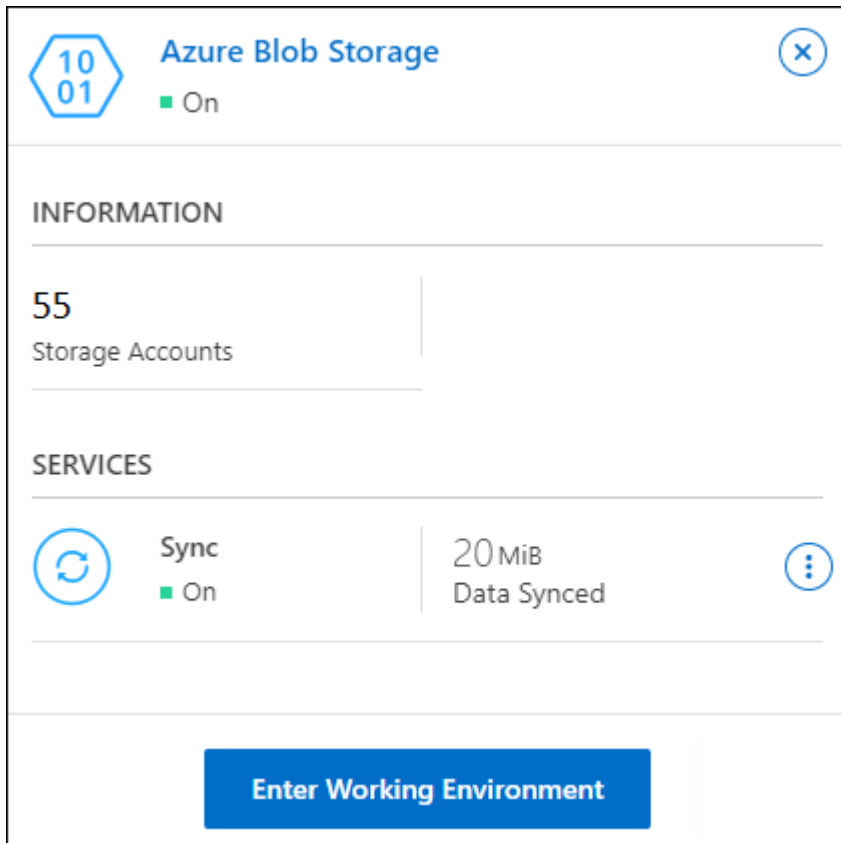
Steps

1. [Install a Connector](#) in the Azure account where you want to view your Azure storage accounts.

You should automatically see an Azure Blob working environment shortly after.



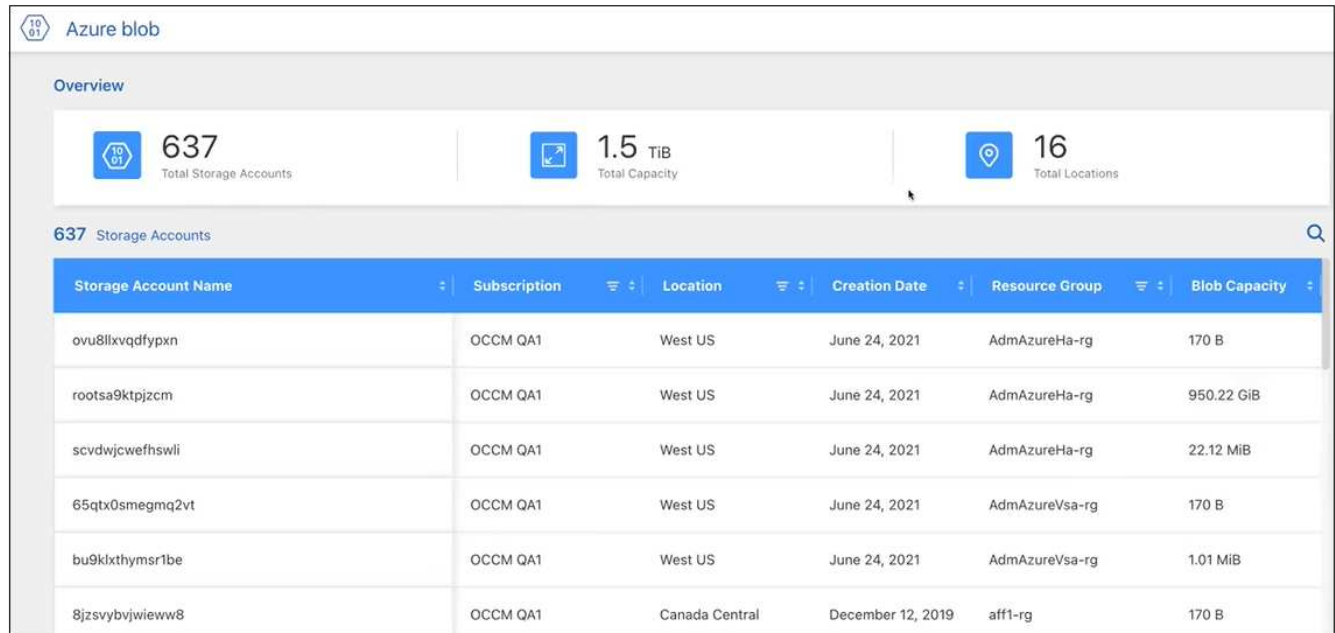
2. Click the working environment and select an action from the right pane.



3. Click **Sync data** to synchronize data to or from Azure Blob storage.

For more details, see [the overview for the Cloud Sync service](#).

4. Click **Enter Working Environment** to view details about the Azure storage accounts in your Azure Blobs.



The screenshot shows the 'Azure blob' overview page. At the top, there are three summary cards: '637 Total Storage Accounts', '1.5 TiB Total Capacity', and '16 Total Locations'. Below these is a table titled '637 Storage Accounts' with columns for Storage Account Name, Subscription, Location, Creation Date, Resource Group, and Blob Capacity. The table lists six storage accounts, all created on June 24, 2021, except for one created on December 12, 2019.

Storage Account Name	Subscription	Location	Creation Date	Resource Group	Blob Capacity
ovu8llxvqdfypxn	OCCM QA1	West US	June 24, 2021	AdmAzureHa-rg	170 B
rootsa9ktpjzcm	OCCM QA1	West US	June 24, 2021	AdmAzureHa-rg	950.22 GiB
scvdwjcwehswli	OCCM QA1	West US	June 24, 2021	AdmAzureHa-rg	22.12 MiB
65qtx0smegmq2vt	OCCM QA1	West US	June 24, 2021	AdmAzureVsa-rg	170 B
bu9kixthymr1be	OCCM QA1	West US	June 24, 2021	AdmAzureVsa-rg	1.01 MiB
8jzsvybvjwieww8	OCCM QA1	Canada Central	December 12, 2019	aff1-rg	170 B

Viewing your Google Cloud Storage buckets

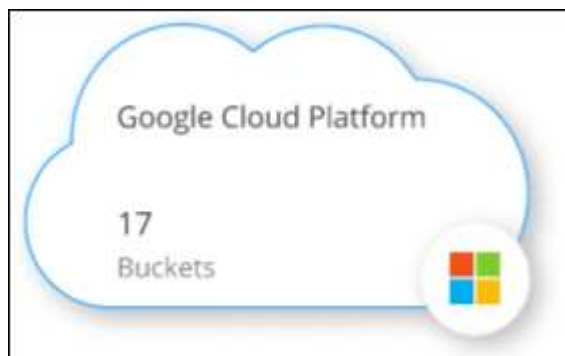
After you install a Connector in Google Cloud, Cloud Manager can automatically discover information about the Google Cloud Storage buckets that reside in the Google account where the Connector is installed. A Google Cloud Storage working environment is added to the Canvas so you can view this information.

You can see details about your Google Cloud Storage buckets, including the location, access status, storage class, total and used capacity, and more. These buckets can be used as destinations for Cloud Backup, Cloud Tiering, or Cloud Sync operations.

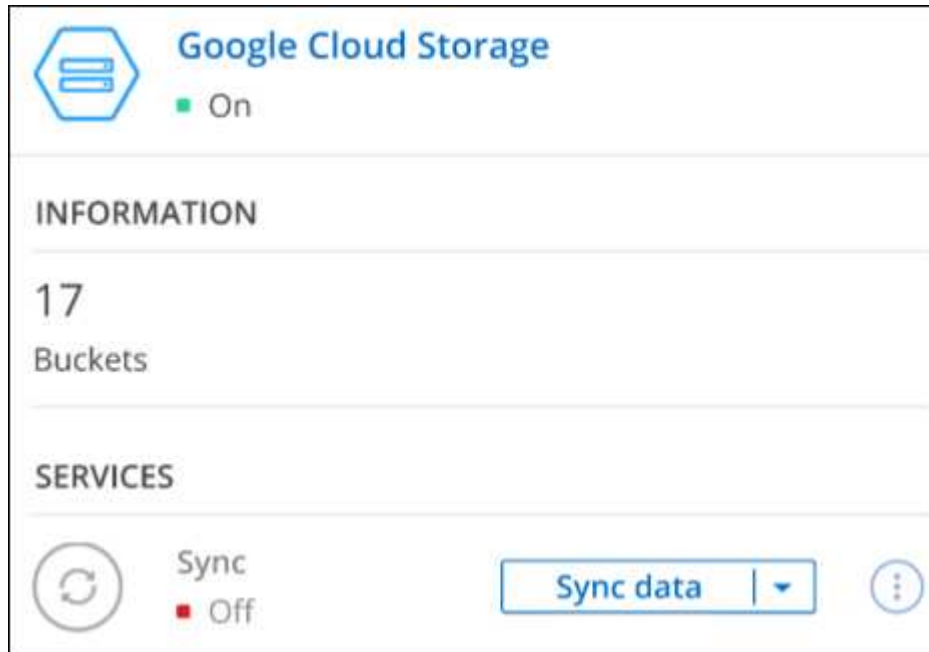
Steps

1. [Install a Connector](#) in the Google account where you want to view your Google Cloud Storage buckets.

You should automatically see a Google Cloud Storage working environment shortly after.



2. Click the working environment and select an action from the right pane.



3. Click **Sync data** to synchronize data to or from Google Cloud Storage buckets.

For more details, see [the overview for the Cloud Sync service](#).

4. Click **Enter Working Environment** to view details about the buckets in your Google account.

AWS credentials

AWS credentials and permissions

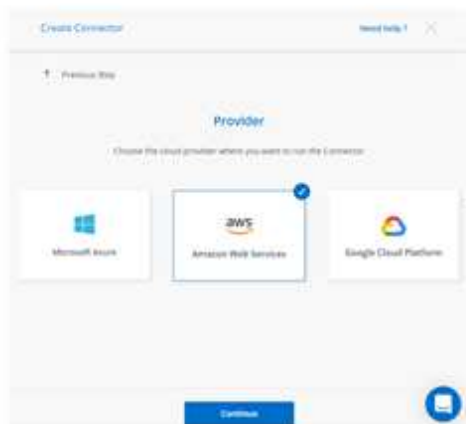
Cloud Manager enables you to choose the AWS credentials to use when deploying Cloud Volumes ONTAP. You can deploy all of your Cloud Volumes ONTAP systems using the initial AWS credentials, or you can add additional credentials.

Initial AWS credentials

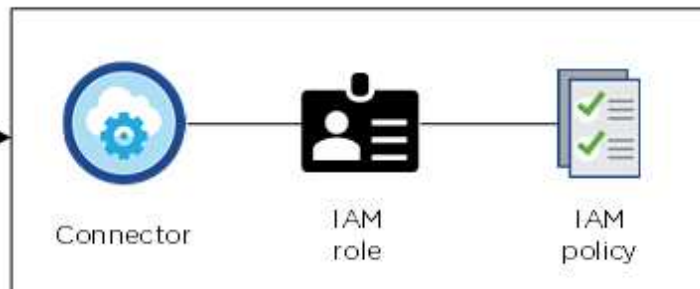
When you deploy a Connector from Cloud Manager, you need to provide the ARN of an IAM role or access keys for an IAM user. The authentication method that you use must have the required permissions to deploy the Connector instance in AWS. The required permissions are listed in the [Connector deployment 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 the Connector with permissions to manage resources and processes within that AWS account. [Review how Cloud Manager uses the permissions](#).

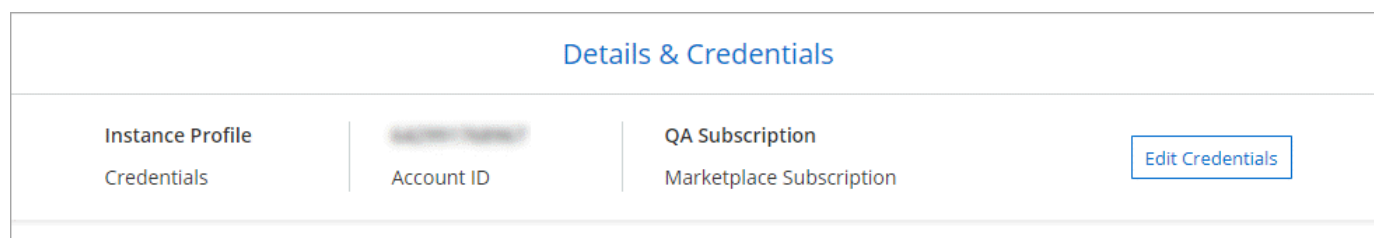
Cloud Manager



AWS account



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

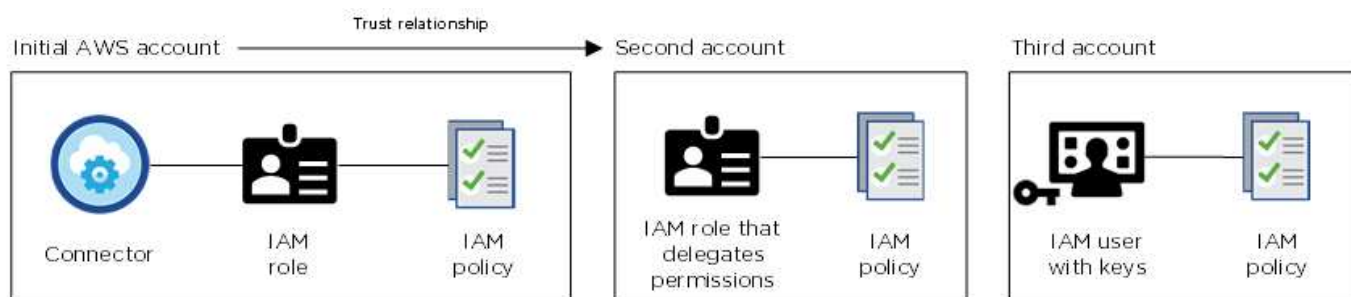


Additional AWS credentials

There are two ways to add additional AWS credentials.

Add AWS credentials to an existing Connector

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 Credentials & Add Subscription

Associate Subscription to Credentials ⓘ

Credentials

keys Account ID:
Instance Profile Account ID:

casaba QA subscription

+ Add Subscription

Apply Cancel

Add AWS credentials directly to Cloud Manager

Adding new AWS credentials to Cloud Manager gives Cloud Manager the permissions needed to create and manage an FSx for ONTAP working environment or to create a Connector.

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.

Manage AWS credentials and subscriptions for Cloud Manager

Add and manage AWS credentials so that Cloud Manager has the permissions that it needs to deploy and manage cloud resources in your AWS accounts. If you manage multiple AWS subscriptions, you can assign each one of them to different AWS credentials from the Credentials page.

Overview

You can add AWS credentials to an existing Connector or directly to Cloud Manager:

- Add additional AWS credentials to an existing Connector

Adding new AWS credentials to an existing Connector enables you to deploy Cloud Volumes ONTAP in another AWS account using the same Connector. [Learn how to add AWS credentials to a Connector.](#)

- Add AWS credentials to Cloud Manager for creating a Connector

Adding new AWS credentials to Cloud Manager gives Cloud Manager the permissions needed to create a Connector. [Learn how to add AWS credentials to Cloud Manager.](#)

- Add AWS credentials to Cloud Manager for FSx for ONTAP

Adding new AWS credentials to Cloud Manager gives Cloud Manager the permissions needed to create and manage FSx for ONTAP. [Learn how to set up permissions for FSx for ONTAP](#)

How to rotate 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 because 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.

Add additional credentials to a Connector

Add AWS credentials to a Connector so that it can deploy and manage Cloud Volumes ONTAP in other AWS accounts. You can either provide the ARN of an IAM role in another account or provide AWS access keys.

Grant permissions

Before you add additional AWS credentials to a Connector, you need to provide the required permissions. 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 the ARN of a role in a trusted account or AWS keys.



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

- [Grant permissions by assuming an IAM role in another account](#)
- [Grant permissions by providing AWS keys](#)

Grant permissions by assuming an IAM role in another account

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 IAM console in the target account where you want to deploy Cloud Volumes ONTAP.
2. Under Access Management, click **Roles > Create Role** and follow the steps to create the role.

Be sure to do the following:

- Under **Trusted entity type**, select **AWS account**.
 - Select **Another AWS account** and enter the ID of the account where the Connector instance resides.
 - Create a policy by copying and pasting the contents of [the IAM policy for the Connector](#).
3. Copy the Role ARN of the IAM role so that you can paste it in Cloud Manager later on.

Result

The account now has the required permissions. [You can now add the credentials to a Connector.](#)

Grant 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. From the IAM console, create a policy by copying and pasting the contents of [the IAM policy for the Connector](#).

[AWS Documentation: Creating IAM Policies](#)

2. 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 the credentials to a Connector.](#)

Add the credentials

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

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. Ensure that the correct Connector is currently selected in Cloud Manager.
2. In the upper right of the Cloud Manager console, click the Settings icon, and select **Credentials**.



3. Click **Add Credentials** and follow the steps in the wizard.
 - a. **Credentials Location:** Select **Amazon Web Services > Connector**.
 - b. **Define Credentials:** Provide the ARN (Amazon Resource Name) of a trusted IAM role, or enter an AWS access key and secret key.
 - c. **Marketplace Subscription:** Associate a Marketplace subscription with these credentials by subscribing now or by selecting an existing subscription.

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.

- d. **Review:** Confirm the details about the new credentials and 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 Credentials & Add Subscription

Associate Subscription to Credentials ⓘ

Credentials

keys | Account ID: [redacted]

Instance Profile | Account ID: [redacted]

casaba QA subscription

+ Add Subscription

Apply Cancel

Add credentials to Cloud Manager for creating a Connector

Add AWS credentials to Cloud Manager by providing the ARN of an IAM role that gives Cloud Manager the permissions needed to create a Connector. You can choose these credentials when creating a new Connector.

Set up the IAM role

Set up an IAM role that enables the Cloud Manager SaaS to assume the role.

Steps

1. Go to the IAM console in the target account.
2. Under Access Management, click **Roles > Create Role** and follow the steps to create the role.

Be sure to do the following:

- Under **Trusted entity type**, select **AWS account**.
- Select **Another AWS account** and enter the ID of the Cloud Manager SaaS: 952013314444
- Create a policy that includes the permissions required to create a Connector.
 - [View the permissions needed for FSx for ONTAP](#)
 - [View the Connector deployment policy](#)

3. Copy the Role ARN of the IAM role so that you can paste it in Cloud Manager in the next step.

Result

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

Add the credentials

After you provide the IAM role with the required permissions, add the role ARN to Cloud Manager.

Before you get started

If you just created the IAM role, 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 follow the steps in the wizard.
 - a. **Credentials Location:** Select **Amazon Web Services > Cloud Manager**.
 - b. **Define Credentials:** Provide the ARN (Amazon Resource Name) of the IAM role.
 - c. **Review:** Confirm the details about the new credentials and click **Add**.

Result

You can now use the credentials when creating a new Connector.

Associate an AWS subscription

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 to create a Connector](#).

Steps

1. In the upper right of the Cloud Manager console, click the Settings icon, and select **Credentials**.
2. Click the action menu for a set of credentials and then select **Associate Subscription**.



3. Select an existing 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/cloud-manager-setup-admin//media/video_subscribing_aws.mp4 (video)

Edit credentials

Edit your AWS credentials in Cloud Manager by changing the account type (AWS keys or assume role), by editing the name, or by updating the credentials themselves (the keys or the role ARN).



You can't edit the credentials for an instance profile that is associated with a Connector instance.

Steps

1. In the upper right of the Cloud Manager console, click the Settings icon, and select **Credentials**.
2. Click the action menu for a set of credentials and then select **Edit Credentials**.
3. Make the required changes and then click **Apply**.

Deleting credentials

If you no longer need a set of credentials, you can delete them from Cloud Manager. You can only delete credentials that aren't associated with a working environment.



You can't delete the credentials for an instance profile that is associated with a Connector instance.

Steps

1. In the upper right of the Cloud Manager console, click the Settings icon, and select **Credentials**.
2. Click the action menu for a set of credentials and then select **Delete Credentials**.
3. Click **Delete** to confirm.

Azure credentials

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

Details & Credentials			
Managed Service Ide...	OCCM QA1	ⓘ No subscription is associated	Edit Credentials
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:



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:

The screenshot shows the 'Edit Account & Add Subscription' form. The 'Credentials' dropdown menu is open, showing the following options:

- cloud-manager-app | Application ID: 57c42424-88a0-480a.
- Managed Service Identity** (highlighted in blue)
- 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 to use with that system. You also need to choose a Marketplace subscription, if you're using pay-as-you-go licensing. Follow the steps on this page if you need to use multiple Azure credentials or multiple Azure Marketplace subscriptions for Cloud Volumes ONTAP.

There are two ways to add additional Azure subscriptions and credentials in Cloud Manager.

1. Associate additional Azure subscriptions with the Azure managed identity.
2. If you want to deploy Cloud Volumes ONTAP using different Azure credentials, grant Azure permissions using a service principal and add its credentials to Cloud Manager.

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 Connector 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

Adding additional Azure credentials to Cloud Manager

When you deploy a Connector from Cloud Manager, Cloud Manager enables a system-assigned managed identity on the virtual machine that has the required permissions. Cloud Manager selects these Azure credentials by default when you create a new working environment for Cloud Volumes ONTAP.



An initial set of credentials isn't added if you manually installed the Connector software on an existing system. [Learn about Azure credentials and permissions.](#)

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. You can then add the new credentials to Cloud Manager.

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. Copy the contents of the [custom role permissions for the Connector](#) and save them in a JSON file.
 - 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 steps describe how to create the role by using Bash in Azure Cloud Shell.

- Start [Azure Cloud Shell](#) and choose the Bash environment.
- Upload the JSON file.



- Enter the following Azure CLI command:

```
az role definition create --role-definition  
Policy_for_Setup_As_Service_Azure.json
```

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

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. In the **Role** tab, select the **Cloud Manager Operator** role and click **Next**.
 - e. In the **Members** tab, complete the following steps:
 - Keep **User, group, or service principal** selected.
 - Click **Select members**.

Add role assignment ...

[Got feedback?](#)

Role **Members** **Review + assign**

Selected role Cloud Manager Operator 3.9.12_B

Assign access to ☒ User, group, or service principal
☐ Managed identity

Members [+ Select members](#)

- Search for the name of the application.

Here's an example:

Select members ×

Select ⓘ

test-service-principal

test-service-principal

- Select the application and click **Select**.
- Click **Next**.

f. Click **Review + assign**.

The service principal now has the required Azure permissions to deploy the Connector.

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

4. 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"/> user_impersonation 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**.



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.

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
test secret	8/16/2020	*sZ1jSe2By:D*-ZRoV4NLfdAcY7:+0vA

Copy to clipboard

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 the 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. Completing this step enables you to launch Cloud Volumes ONTAP using different Azure credentials.

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 follow the steps in the wizard.
 - a. **Credentials Location:** Select **Microsoft Azure > Connector**.
 - b. **Define Credentials:** 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](#).
 - c. **Marketplace Subscription:** Associate a Marketplace subscription with these credentials by subscribing now or by selecting an existing subscription.

To pay for Cloud Volumes ONTAP at an hourly rate (PAYGO), these Azure credentials must be associated with a subscription from the Azure Marketplace.

- d. **Review:** Confirm the details about the new credentials and click **Add**.

Result

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



Manage existing credentials

Manage the Azure credentials that you've already added to Cloud Manager by associating a Marketplace subscription, editing credentials, and deleting them.

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. Click the action menu for a set of credentials and then select **Associate Subscription**.



3. 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/cloud-manager-setup-admin//media/video_subscribing_azure.mp4

(video)

Editing credentials

Edit your Azure credentials in Cloud Manager by modifying the details about your Azure service credentials. For example, you might need to update the client secret if a new secret was created for the service principal application.

Steps

1. In the upper right of the Cloud Manager console, click the Settings icon, and select **Credentials**.
2. Click the action menu for a set of credentials and then select **Edit Credentials**.
3. Make the required changes and then click **Apply**.

Deleting credentials

If you no longer need a set of credentials, you can delete them from Cloud Manager. You can only delete credentials that aren't associated with a working environment.

Steps

1. In the upper right of the Cloud Manager console, click the Settings icon, and select **Credentials**.
2. Click the action menu for a set of credentials and then select **Delete Credentials**.
3. Click **Delete** to confirm.

Google Cloud credentials

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](#)
- [Learn how to deploy Cloud Volumes ONTAP in GCP and select a project](#)

Managing GCP credentials and subscriptions for Cloud Manager

You can manage the credentials that are associated with the Connector VM instance.

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. Click the action menu for a set of credentials and then select **Associate Subscription**.



3. Select a Google Cloud project and subscription from the down-down list.

A screenshot of a form for selecting a Google Cloud project and subscription. It 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, preceded by a green dot icon. Below the dropdowns is a blue button with a plus icon and the text "Add Subscription".

4. Click **Associate**.
5. If you don't already have a subscription, click **Add Subscription** and follow the steps to create a new subscription below.



Before you complete the following steps, ensure that you have both Billing Admin privileges in your Google Cloud account as well as a NetApp Cloud Central login.

6. Reivew the subscription steps and click **Continue**.

Add Subscription



Subscription Steps:


- 1 **Cloud Manager**
Clicking **Continue** to create your subscription from the Google Cloud Marketplace.
 - 2 **Google Cloud Marketplace**
Subscribe and then then click **Register With NetApp** to configure your account from Cloud Central.
 - 3 **Cloud Central**
Save your subscription.
 - 4 **Cloud Manager**
Associate the Marketplace subscription with your Google Cloud project.
- ▶ View video instructions


Continue

Cancel

7. After you're redirected to the [NetApp Cloud Manager page on the Google Cloud Marketplace](#), ensure that the correct project is selected at the top navigation menu.

 Google Cloud Platform 





Cloud Manager for Cloud Volumes ONTAP

NetApp, Inc.

Enterprise-grade data management and protection

[SUBSCRIBE](#)

[OVERVIEW](#) [PRICING](#) [SUPPORT](#)

Overview

Cloud Volumes ONTAP is a data-management layer that runs natively on Google Cloud infrastructure enabling enhanced control, data protection, mobility and agility for business application data. Get consistent enterprise-grade storage across your hybrid cloud platforms with built-in disaster recovery, backup and ransomware protection. Seamlessly migrate enterprise applications without reengineering. Create company-wide file shares with simultaneous NFS and CIFS/SMB access and iSCSI block storage for GCE instances with scalability up to 368TB. Automate persistent storage provisioning for your Kubernetes clusters. Accelerate CI/CD cycles with instant, zero-capacity data replication. Reduce storage costs by 70% with advanced storage efficiencies. Cloud Manager is the console used to deploy, manage and automate Cloud Volumes ONTAP instances across the hybrid multi-cloud.

[Learn more](#)

Additional details

Type: [APIs & services](#)

Last updated: 3/26/21

Category: [Storage](#)

Runs on: NetApp, Inc. Cloud Servers

8. Click **Subscribe**.
9. Select the appropriate billing account and agree to the terms and conditions.

2. Purchase details

Select a billing account *
Secondary_Billing_Account

3. Terms

Cancellation and change policy

- Usage fee is billed every month.
- You can cancel the service at any time and it will take effect immediately. You will be billed by the amount you used for that month.

Additional terms

- ☒ I understand this subscription will be automatically renewed at the end of the current term.
- ☒ I authorize Google LLC and its affiliates ("Google") to share my purchase, usage, operational (e.g., project lifecycle events), support ticket, and account information with NetApp, Inc., its affiliates and subcontractors, for the purposes of providing the service, sales attribution, and technical support. I represent that I have the authority to bind my company.
- ☒ By deploying the software or accessing the service you are agreeing to comply with the [End User License Agreement](#), [GCP Marketplace Terms of Service](#), and the terms of applicable open source software licenses bundled with the software or service. Please review these terms and licenses carefully for details about any obligations you may have related to the software or service. To the limited extent an open source software license related to the software or service expressly supersedes the GCP Marketplace Terms of Service, that open source software license governs your use of that software or service.

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Google is providing this software or service "as-is" and any support for this software or service will be provided by NetApp, Inc. under their terms of service.

SUBSCRIBE

10. Click **Subscribe**.

This step sends your transfer request to NetApp.

11. On the pop-up dialog box, click **Register with NetApp, Inc.** to be redirected to NetApp Cloud Central.



This step must be completed to link the GCP subscription to your NetApp account. The process of linking a subscription isn't complete until you are redirected from this page and then sign in to NetApp Cloud Central.

12. After you're redirected to Cloud Central, log in to NetApp Cloud Central or sign up, and then click **Done** to proceed.

The GCP subscription will be linked to all NetApp accounts that your user login is associated with.



If someone from your organization has already subscribed to the NetApp Cloud Manager subscription from your billing account, then you will be redirected to [the Cloud Volumes ONTAP page on NetApp Cloud Central](#) instead. If this is unexpected, contact your NetApp sales team. Google enables only one subscription per Google billing account.

13. Once this process is complete, navigate back to the Credentials page in Cloud Manager and select this new subscription.

Google Cloud Project

OCCM-Dev

Subscription

GCP subscription for staging

+ Add Subscription

Troubleshooting the Marketplace subscription process

Sometimes subscribing to Cloud Volumes ONTAP through the Google Cloud Marketplace can become fragmented due to incorrect permissions or accidentally not following the redirection to NetApp Cloud Central. If this happens, use the following steps to complete the subscription process.

Steps

1. Navigate to the [NetApp Cloud Manager page on the Google Cloud Marketplace](#) to check on the state of the order. If the page states **Manage on Provider**, scroll down and click **Manage Orders**.

Pricing

The product was purchased on 12/9/20.

MANAGE ORDERS

- a. If the order shows a green check mark and this is unexpected, somebody else from the organization using the same billing account might already be subscribed. If this is unexpected or you require the details of this subscription, contact your NetApp sales team.

Filter Enter property name or value										
Status	Order number	Plan	Discount	Start date ↓	Plan duration	End date	Payment Schedule	Auto-renew	Next plan	
	2eebbc...	Cloud Manager	-	10/21/21	1 month	-	Postpay	N/A	N/A	

- b. If the order shows a clock and **Pending** status, go back to the marketplace page and choose **Manage on Provider** to complete the process as documented above.

Filter Enter property name or value										
Status	Order number	Plan	Discount	Start date ↓	Plan duration	End date	Payment Schedule	Auto-renew	Next plan	
	d56c66...	Cloud Manager	-	Pending	1 month	Pending	Postpay	N/A	N/A	

Add and manage NetApp Support Site accounts in Cloud Manager

Provide the credentials for your NetApp Support Site (NSS) accounts to enable key workflows for Cloud Volumes ONTAP and to enable predictive analytics and proactive support through Active IQ.

Overview

Adding your NetApp Support Site account to Cloud Manager is required to enable the following tasks:

- To deploy Cloud Volumes ONTAP when you bring your own license (BYOL)

Providing your NSS account is required so that Cloud Manager can upload your license key and to enable the subscription for the term that you purchased. This includes automatic updates for term renewals.

- To register pay-as-you-go Cloud Volumes ONTAP systems

Providing your NSS account is required to activate support for your system and to gain access to NetApp technical support resources.

- To upgrade Cloud Volumes ONTAP software to the latest release
- To use Active IQ Digital Advisor from within Cloud Manager

Add an NSS account

The Support Dashboard enables you to add and manage all of your NetApp Support Site accounts from a single location.

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. When you're prompted, click **Continue** to be redirected to a Microsoft login page.

NetApp uses Microsoft Azure Active Directory as the identity provider for authentication services specific to support and licensing.

5. At the login page, provide your NetApp Support Site registered email address and password to perform the authentication process.

This action enables Cloud Manager to use your NSS account.

Note the following requirements for the 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.

What's next?

Users can now select the account when creating new Cloud Volumes ONTAP systems, when registering existing Cloud Volumes ONTAP systems, and when viewing data in Active IQ.

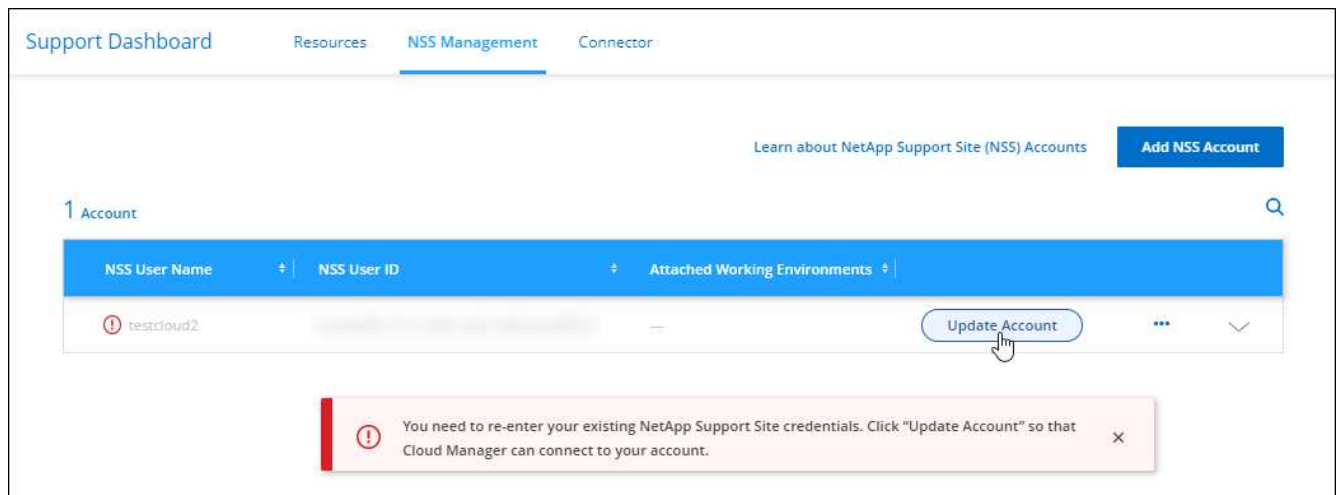
- [Launching Cloud Volumes ONTAP in AWS](#)
- [Launching Cloud Volumes ONTAP in Azure](#)
- [Launching Cloud Volumes ONTAP in GCP](#)
- [Registering pay-as-you-go systems](#)

Update an NSS account for the new authentication method

Starting in November 2021, NetApp now uses Microsoft Azure Active Directory as the identity provider for authentication services specific to support and licensing. As a result of this update, Cloud Manager will prompt you to update the credentials for any existing accounts that you previously added.

Steps

1. If you haven't already done so, [create a Microsoft Azure Active Directory B2C account that will be linked to your current NetApp account](#).
2. In the upper right of the Cloud Manager console, click the Help icon, and select **Support**.
3. Click **NSS Management**.
4. For the NSS account that you want to update, click **Update Account**.



5. When you're prompted, click **Continue** to be redirected to a Microsoft login page.

NetApp uses Microsoft Azure Active Directory as the identity provider for authentication services specific to support and licensing.

6. At the login page, provide your NetApp Support Site registered email address and password to perform the authentication process.

After the process is complete, the account that you updated should now be listed as a *new* account in the table. The *older* version of the account is still listed in the table, along with any existing working environment associations.

7. If existing Cloud Volumes ONTAP working environments are attached to the older version of the account, follow the steps below to [attach those working environments to a different NSS account](#).
8. Go to the older version of the NSS account, click **...** and then select **Delete**.

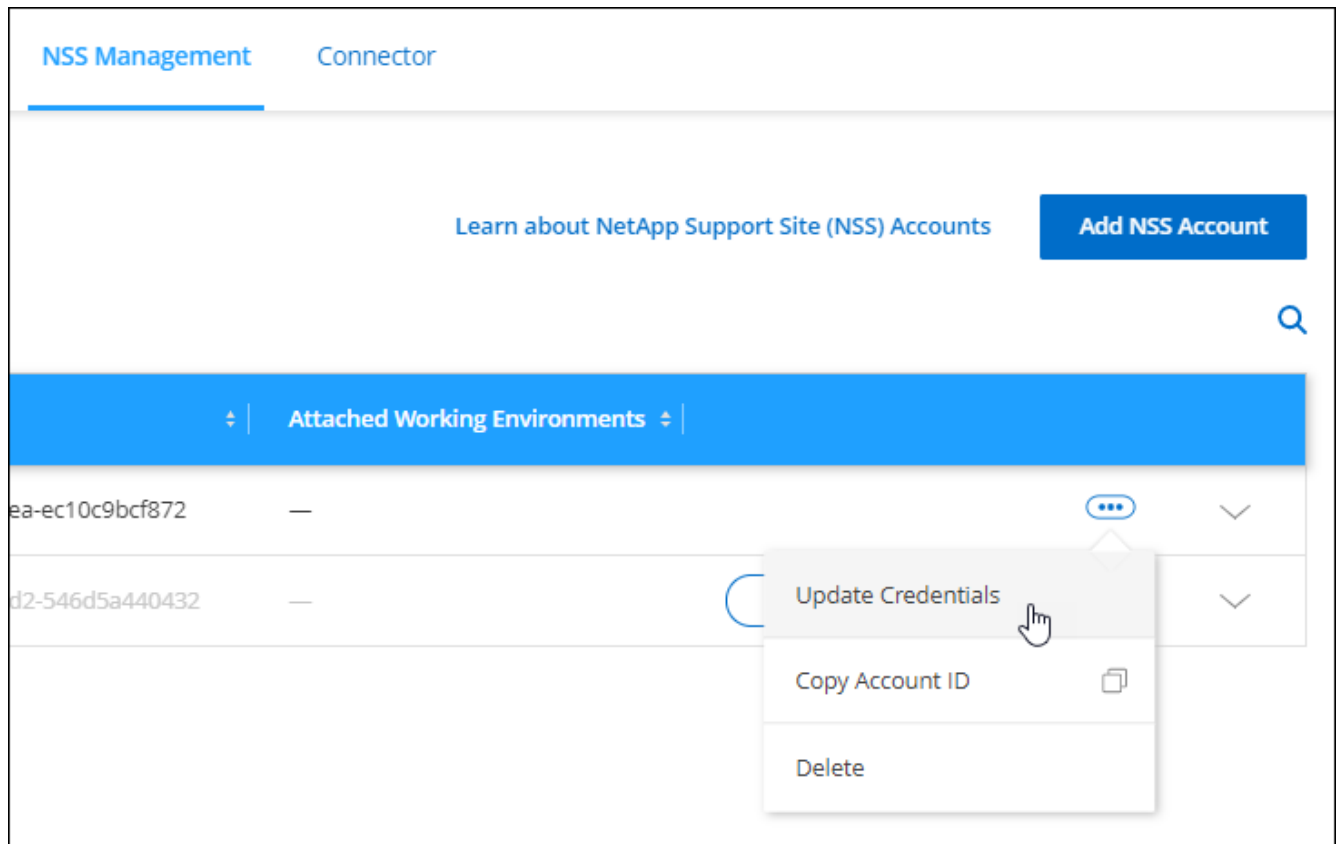
Update NSS credentials

Whenever you change the credentials for your NSS account, you'll need to update them in Cloud Manager.

Steps

1. In the upper right of the Cloud Manager console, click the Help icon, and select **Support**.
2. Click **NSS Management**.

3. For the NSS account that you want to update, click **...** and then select **Update Credentials**.



4. When you're prompted, click **Continue** to be redirected to a Microsoft login page.

NetApp uses Microsoft Azure Active Directory as the identity provider for authentication services specific to support and licensing.

5. At the login page, provide your NetApp Support Site registered email address and password to perform the authentication process.

Attach a working environment to a different NSS account

If your organization has multiple NetApp Support Site accounts, you can change which account is associated with a Cloud Volumes ONTAP system.

This feature is only supported with NSS accounts that are configured to use Microsoft Azure AD adopted by NetApp for identity management. Before you can use this feature, you need click **Add NSS Account** or **Update Account**.

Steps

1. In the upper right of the Cloud Manager console, click the Help icon, and select **Support**.
2. Click **NSS Management**.
3. Complete the following steps to change the NSS account:
 - a. Expand the row for the NetApp Support Site account that the working environment is currently associated with.
 - b. For the working environment that you want to change the association for, click **...**

c. Select **Change to a different NSS account**.



d. Select the account and then click **Save**.

Display the email address for an NSS account

Now that NetApp Support Site accounts use Microsoft Azure Active Directory for authentication services, the NSS user name that displays in Cloud Manager is typically an identifier generated by Azure AD. As a result, you might not immediately know the email address associated with that account. But Cloud Manager has an option to show you the associated email address.



When you go to the NSS Management page, Cloud Manager generates a token for each account in the table. That token includes information about the associated email address. The token is then removed when you leave the page. The information is never cached, which helps protect your privacy.

Steps

1. In the upper right of the Cloud Manager console, click the Help icon, and select **Support**.
2. Click **NSS Management**.
3. For the NSS account that you want to update, click **...** and then select **Display Email Address**.



Result

Cloud Manager displays the NetApp Support Site user name and the associated email address. You can use the copy button to copy the email address.

Remove an NSS account

Delete any of the NSS accounts that you no longer want to use with Cloud Manager.

Note that you can't delete an account that is currently associated with a Cloud Volumes ONTAP working environment. You first need to [attach those working environments to a different NSS account](#).

Steps

1. In the upper right of the Cloud Manager console, click the Help icon, and select **Support**.
2. Click **NSS Management**.
3. For the NSS account that you want to delete, click **...** and then select **Delete**.



4. Click **Delete** to confirm.

My Opportunities

On the Canvas, the **My Opportunities** tab provides a centralized location to discover existing resources that you can add to Cloud Manager for consistent data services and operations across your hybrid multicloud.

Currently, My Opportunities enables you to discover existing FSx for ONTAP file systems in your AWS account.

[Learn how to discover FSx for ONTAP using My Opportunities](#)

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