



# Provision volumes using a file service

## Cloud Manager

NetApp

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# Provision volumes using a file service

## Azure NetApp Files

### Learn about Azure NetApp Files

Azure NetApp Files enables enterprises to migrate and run their performance-intensive and latency-sensitive core, business-critical applications in Azure with no need to refactor for the cloud.

#### Features

- Support for multiple protocols enables "lift & shift" of both Linux & Windows applications to run seamlessly in Azure.
- Multiple performance tiers allow for close alignment with workload performance requirements.
- Leading certifications including SAP HANA, GDPR, and HIPPA enables migration of the most demanding workloads to Azure.

#### Additional features in Cloud Manager

- Migrate NFS or SMB data to Azure NetApp Files directly from Cloud Manager. Data migrations are powered by NetApp's Cloud Sync service. [Learn more](#).
- Using Artificial Intelligence (AI) driven technology, Cloud Compliance can help you understand data context and identify sensitive data that resides in your Azure NetApp Files accounts. [Learn more](#).

#### Cost

[View Azure NetApp Files pricing](#).

Note that your subscription and charging are maintained by the Azure NetApp Files service and not by Cloud Manager.

#### Supported regions

[View supported Azure regions](#).

#### Requesting access

You need to be granted access to Azure NetApp Files by [submitting an online request](#). You'll need to wait for approval from the Azure NetApp Files team before you can proceed.

## Getting help

For technical support issues associated with Azure NetApp Files, use the Azure portal to log a support request to Microsoft. Select your associated Microsoft subscription and select the **Azure NetApp Files** service name under **Storage**. Provide the remaining information required to create your Microsoft support request.

For issues related to Cloud Sync and Azure NetApp Files, you can start with NetApp using your Cloud Sync serial number directly from the Cloud Sync service. You will need to access the Cloud Sync service through the link in Cloud Manager. [View the process to enable Cloud Sync support.](#)

## Related links

- [NetApp Cloud Central: Azure NetApp Files](#)
- [Azure NetApp Files documentation](#)
- [Cloud Sync documentation](#)

## Setting up Azure NetApp Files

Create an Azure NetApp Files working environment in Cloud Manager to create and manage NetApp accounts, capacity pools, volumes, and snapshots.

### Quick start

Get started quickly by following these steps or scroll down to the remaining sections for full details.



#### Request access

[Submit an online request](#) to be granted access to Azure NetApp Files.



#### Set up an Azure AD application

From Azure, grant permissions to an Azure AD application and copy the application (client) ID, the directory (tenant) ID, and the value of a client secret.



#### Create an Azure NetApp Files working environment

In Cloud Manager, click **Add Working Environment** > **Microsoft Azure** > **Azure NetApp Files** and then provide details about the AD application.

### Requesting access

You need to be granted access to Azure NetApp Files by [submitting an online request](#). You'll need to

wait for approval from the Azure NetApp Files team before you can proceed.

## Setting up an Azure AD application

Cloud Manager needs permissions to set up and manage Azure NetApp Files. You can grant the required permissions to an Azure account by creating and setting up an Azure AD application and by obtaining the Azure credentials that Cloud Manager needs.

### Creating the AD application

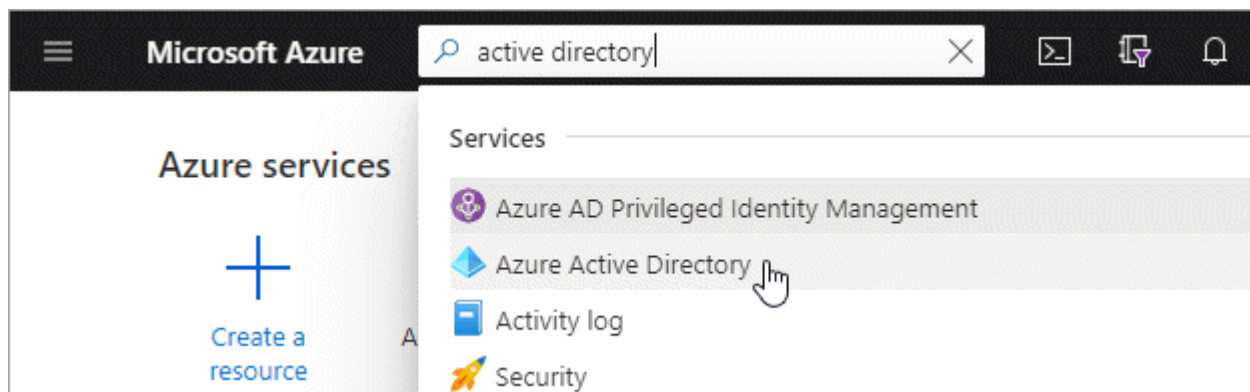
Create an Azure Active Directory (AD) application and service principal that Cloud Manager can use for role-based access control.

#### *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. Create the application:
  - a. Click **New registration**.
  - b. 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 blank.
  - c. Click **Register**.
4. Copy the **Application (client) ID** and the **Directory (tenant) ID**.

Home > NetApp HCL | App registrations >

## azure-netapp-files

Search (Ctrl+/) << Delete Endpoints

- Overview
- Quickstart
- Integration assistant (preview)
- Manage

Display name : azure-netapp-files

Application (client) ID : e461f4ca-9d9a-4aec-8f39-fc842b684c97

Directory (tenant) ID : 8e21f23a-10b9-46fb-9d50-720ef604be98

Object ID : a910846e-a497-4838-a3bc-9c2c01625056


When you create the Azure NetApp Files working environment in 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.

5. Create a client secret for the application so Cloud Manager can use it to authenticate with Azure AD:
  - a. Click **Certificates & secrets > New client secret**.
  - b. Provide a description of the secret and a duration.
  - c. Click **Add**.
  - d. Copy the value of the client secret.

Client secrets

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

+ New client secret

Description	Expires	Value	Copy to clipboard
Azure NetApp Files	7/30/2022	3gywMgvF1rxtle8jU1po6~...	

### Result

Your AD application 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 NetApp Files working environment.

### Assigning the app to a role

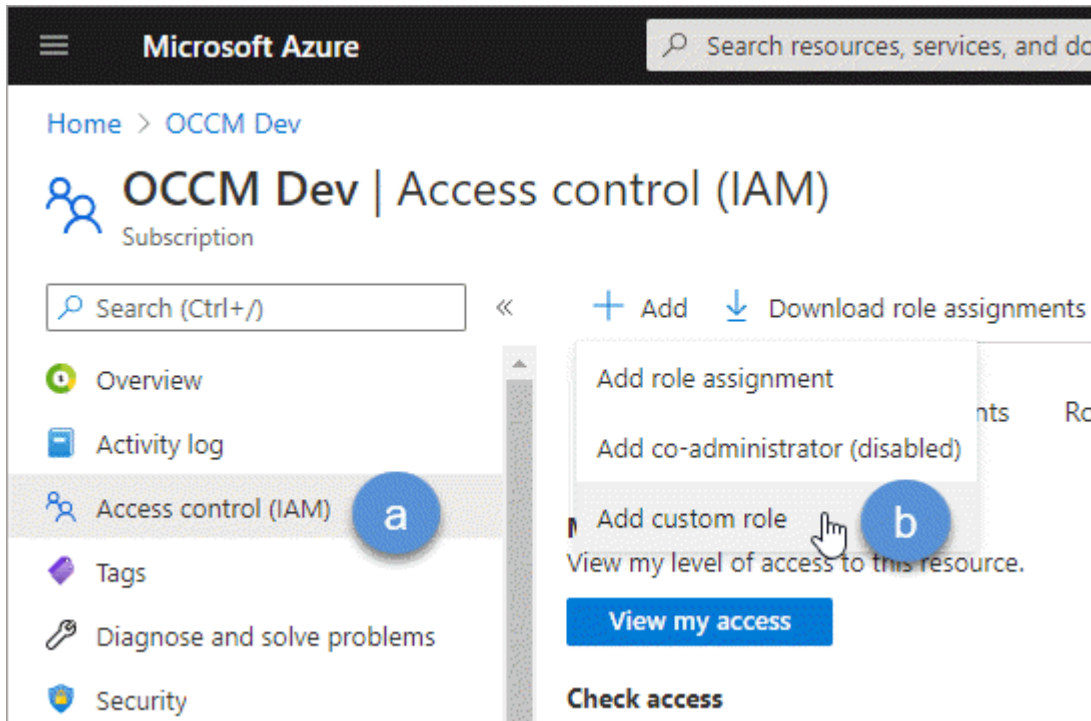
You must bind the service principal to your Azure subscription and assign it a custom role that has the required permissions.

## Steps

### 1. Create a custom role in Azure.

The following steps describe how to create the role from the Azure portal.

- a. Open the subscription and click **Access control (IAM)**.
- b. Click **Add > Add custom role**.



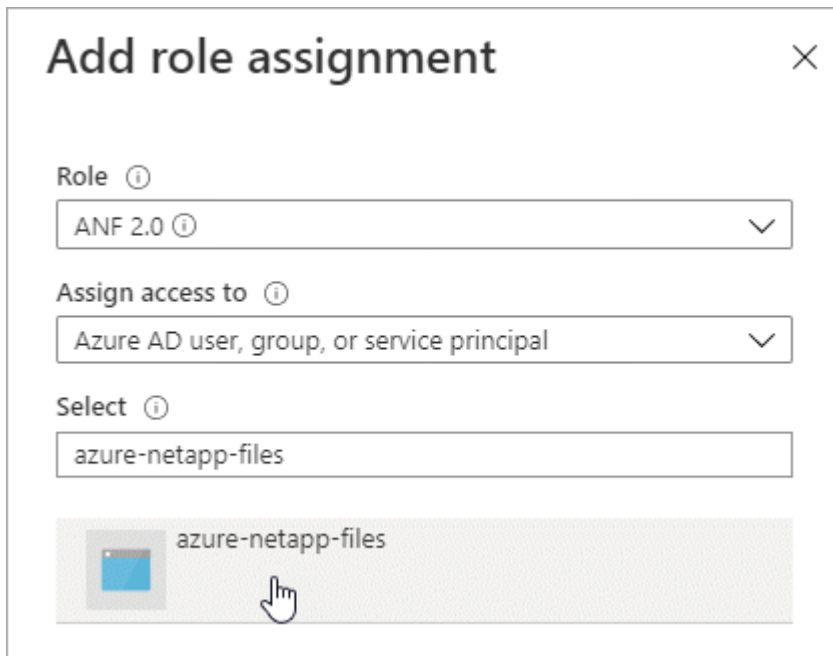
- c. In the **Basics** tab, enter a name and description for the role.
- d. Click **JSON** and click **Edit** which appears at the top right of the JSON format.
- e. Add the following permissions under *actions*:

```
"actions": [  
  "Microsoft.NetApp/*",  
  "Microsoft.Resources/resources/read",  
  "Microsoft.Resources/subscriptions/resourceGroups/read",  
  "Microsoft.Resources/subscriptions/resourcegroups/resources/read",  
  "Microsoft.Resources/subscriptions/resourceGroups/write",  
  "Microsoft.Network/virtualNetworks/read",  
  "Microsoft.Insights/Metrics/Read"  
],
```

- f. Click **Save**, click **Next**, and then click **Create**.
- ### 2. Now assign the application to the role that you just created:
- a. From the Azure portal, open the subscription and click **Access control (IAM) > Add > Add role**

**assignment.**

- b. Select the custom role that you created.
- c. Keep **Azure AD user, group, or service principal** selected.
- d. Search for the name of the application (you can't find it in the list by scrolling).



**Add role assignment** ✕

Role ⓘ  
ANF 2.0 ⓘ

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

Select ⓘ  
azure-netapp-files

azure-netapp-files

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

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

### Creating an Azure NetApp Files working environment

Set up an Azure NetApp Files working environment in Cloud Manager so you can start creating volumes.

1. From the Working Environments page, click **Add Working Environment**.
2. Select **Microsoft Azure** and then **Azure NetApp Files**.
3. Provide details about the AD application that you previously set up.



### Azure NetApp Files Credentials

Working Environment Name

ANF

Application (client) ID

e461f4ca-9d9a-4aec-8f39-fc842b684c97

Client Secret

.....

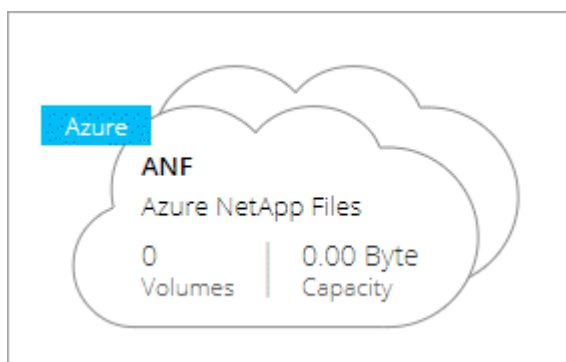
Directory (tenant) ID

8e21f23a-10b9-46fb-9d50-720ef604be98

4. Click **Add**.

#### Result

You should now have an Azure NetApp Files working environment.



#### What's next?

[Start creating and managing volumes.](#)

## Creating and managing volumes for Azure NetApp Files

After you set up your working environment, you can create and manage Azure

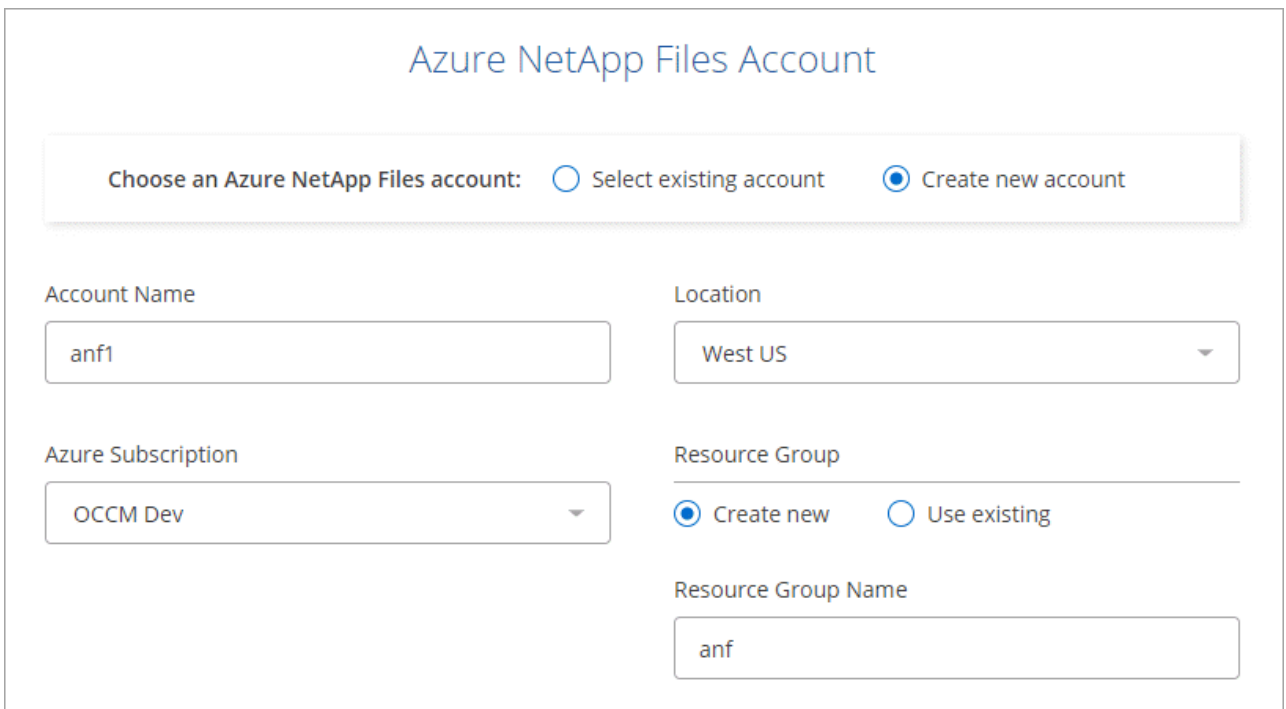
NetApp Files accounts, capacity pools, volumes, and snapshots.

## Creating volumes

You can create NFS or SMB volumes in a new or existing Azure NetApp Files account.

### Steps

1. Open the Azure NetApp Files working environment.
2. Click **Add New Volume**.
3. Provide the required information on each page:
  - **Azure NetApp Files Account:** Choose an existing Azure NetApp Files account or create a new account.



The screenshot shows the 'Azure NetApp Files Account' configuration page. At the top, the title 'Azure NetApp Files Account' is displayed in blue. Below the title, there is a section titled 'Choose an Azure NetApp Files account:' with two radio buttons: 'Select existing account' (unselected) and 'Create new account' (selected). The form is divided into two columns. The left column contains 'Account Name' (text input with 'anf1') and 'Azure Subscription' (dropdown menu with 'OCCM Dev'). The right column contains 'Location' (dropdown menu with 'West US'), 'Resource Group' (radio buttons for 'Create new' (selected) and 'Use existing'), and 'Resource Group Name' (text input with 'anf').

- **Capacity Pool:** Select an existing capacity pool or create a new capacity pool.

If you create a new capacity pool, you need to specify a size and select a [service level](#).

The minimum size for the capacity pool is 4 TB. You can specify a size in multiples of 4 TB.

- **Details & Tags:** Enter a volume name and size, the VNet and subnet where the volume should reside, and optionally specify tags for the volume.
- **Protocol:** Choose the NFS or SMB protocol and enter the required information.

Here's an example of details for NFS.

The screenshot shows the 'Protocol' configuration page. At the top, there's a title 'Protocol'. Below it, a section 'Select the volume's protocol:' has two radio buttons: 'NFS Protocol' (selected) and 'SMB Protocol'. Underneath, there are two columns. The left column has 'Volume Path' with a text input containing 'vol1' and 'Select NFS Version:' with two checkboxes: 'NFSv3' (checked) and 'NFSv4.1'. The right column is titled 'Allowed Client & Access' and shows two identical rows. Each row has a text input with '192.168.1.22/24' and two radio buttons: 'Read & Write' (selected) and 'Read Only'. Each row also has a close button 'X'.

Here's an example of details for SMB. You'll need to provide Active Directory information when you set up your first SMB volume.

The screenshot shows the 'Protocol' configuration page for SMB. At the top, there's a title 'Protocol'. Below it, a section 'Select the volume's protocol:' has two radio buttons: 'NFS Protocol' and 'SMB Protocol' (selected). Underneath, there are two columns. The left column has 'Protocol' (labeled) and 'Share Name' with a text input containing 'vol1'. The right column is titled 'Active Directory' and contains the text 'Choose an Active Directory connection joined to your Azure NetApp Files account'. Below this is a dropdown menu labeled 'Active Directory' with 'ActiveDirectory1' selected.

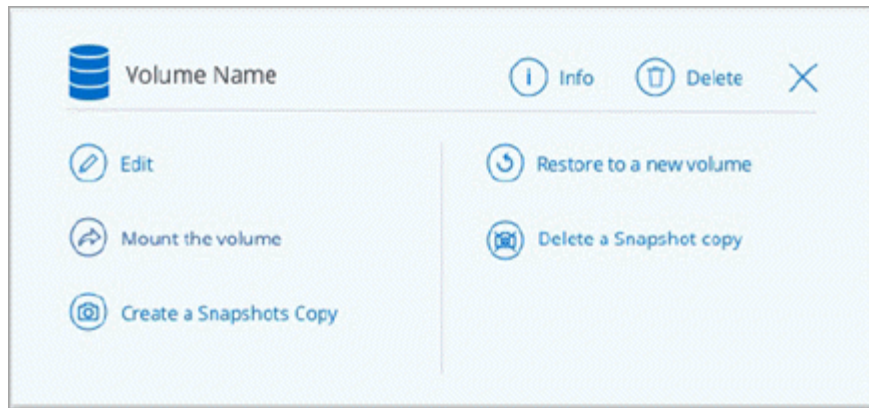
4. Click **Add Volume**.

## Mounting volumes

Access mounting instructions from within Cloud Manager so you can mount the volume to a host.

### Steps

1. Open the working environment.
2. Hover over the volume and select **Mount the volume**.



3. Follow the instructions to mount the volume.

### Editing a volume's size and tags

After you create a volume, you can modify its size and tags at any time.

#### Steps

1. Open the working environment.
2. Hover over the volume and select **Edit**.
3. Modify the size and tags as needed.
4. Click **Apply**.

### Managing Snapshot copies

Snapshot copies provide a point-in-time copy of your volume. Create Snapshot copies, restore the data to a new volume, and delete Snapshot copies.

#### Steps

1. Open the working environment.
2. Hover over the volume and choose one of the available options to manage Snapshot copies:
  - **Create a Snapshot copy**
  - **Restore to a new volume**
  - **Delete a Snapshot copy**
3. Follow the prompts to complete the selected action.

### Deleting volumes

Delete the volumes that you no longer need.

#### Steps

1. Open the working environment.
2. Hover over the volume and click **Delete**.

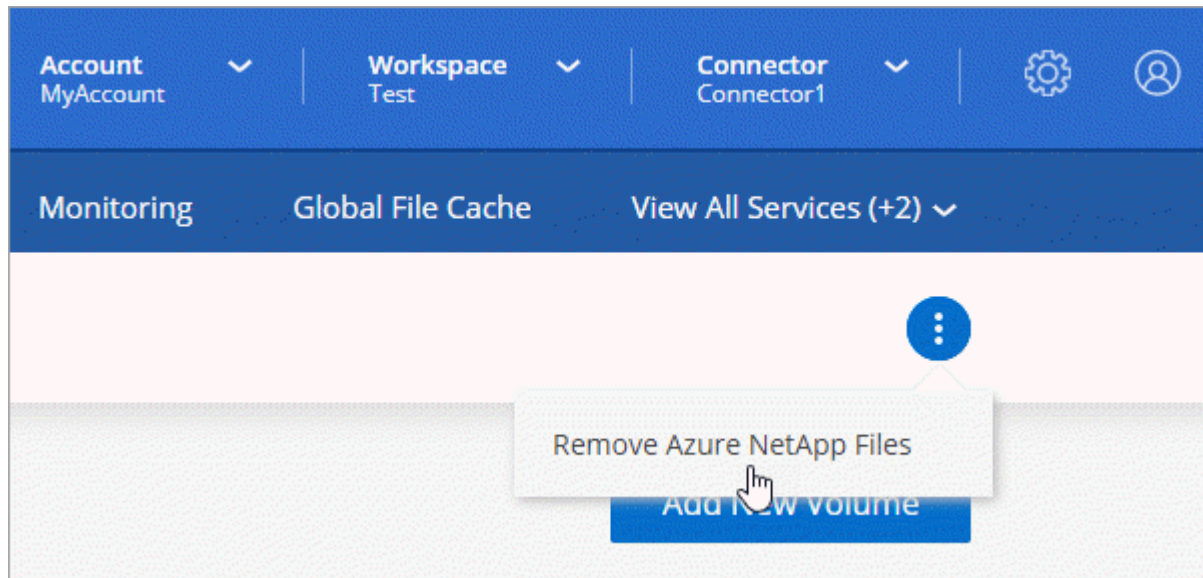
3. Confirm that you want to delete the volume.

## Removing Azure NetApp Files

This action removes Azure NetApp Files from Cloud Manager. It doesn't delete your Azure NetApp Files account or volumes. You can add Azure NetApp Files back to Cloud Manager at any time.

### Steps

1. Open the Azure NetApp Files working environment.
2. At the top right of the page, select the actions menu and click **Remove Azure NetApp Files**.



3. Click **Remove** to confirm.

## Cloud Volumes Service for AWS

### Learn about Cloud Volumes Service for AWS

NetApp Cloud Volumes Service for AWS is a cloud native file service that provides NAS volumes over NFS and SMB with all-flash performance. This service enables any workload, including legacy applications, to run in the AWS cloud.

### Benefits of using Cloud Volumes Service for AWS

Cloud Volumes Service for AWS provides the following benefits:

- Fully managed service, therefore no need to configure or manage storage devices
- Support for NFSv3 and NFSv4.1, and SMB 3.0 and 3.1.1 NAS protocols
- Secure access to Linux and Windows Elastic Container Service (ECS) instances, with support including the following:

- Amazon Linux 2, Red Hat Enterprise Linux 7.5, SLES 12 SP3, and Ubuntu 16.04 LTS
- Windows Server 2008 R2, Windows Server 2012 R2, and Windows Server 2016
- Choice of bundled and pay-as-you-go pricing

## Cost

Volumes created by the Cloud Volumes Service for AWS are charged based on your subscription to the service, not through Cloud Manager.

There are no charges to discover a Cloud Volumes Service for AWS region or volume from Cloud Manager.

## Before you get started

- Cloud Manager can discover existing Cloud Volumes Service for AWS subscriptions and volumes. See the [NetApp Cloud Volumes Service for AWS Account Setup Guide](#) if you haven't set up your subscription yet. You must follow this setup process for each region before you can add the AWS subscriptions and volumes in Cloud Manager.
- You need to obtain the Cloud Volumes API key and secret key so you can provide them to Cloud Manager. [For instructions, refer to Cloud Volumes Service for AWS documentation.](#)

## Quick start

Get started quickly by following these steps, or go to the next section for full details.



### Verify support for your configuration

You have set up AWS for Cloud Volumes Service and you must have subscribed to one of the [NetApp Cloud Volumes Service offerings on the AWS Marketplace](#).



### Add your Cloud Volumes Service for AWS subscription

You must create a working environment for the volumes based on your Cloud Volumes Service for AWS subscription.



### Create a cloud volumes

Cloud volumes that already exist for this subscription appear in the new working environment. Otherwise you create new volumes from Cloud Manager.



## Mount a cloud volume

Mount new cloud volumes to your AWS instance so that users can begin to use the storage.

### Getting help

Use the Cloud Manager chat for general service questions.

For technical support issues associated with your cloud volumes, use your 20 digit “930” serial number located in the "Support" tab of the Cloud Volumes Service user interface. Use this support ID when opening a web ticket or calling for support. Be sure to activate your Cloud Volumes Service serial number for support from the Cloud Volumes Service user interface. [Those steps are explained here.](#)

### Limitations

- Cloud Manager doesn't support data replication between working environments when using Cloud Volumes Service volumes.
- Removing your Cloud Volumes Service for AWS subscription from Cloud Manager isn't supported. You can do this only through the Cloud Volumes Service for AWS interface.

### Related links

- [NetApp Cloud Central: Cloud Volumes Service for AWS](#)
- [NetApp Cloud Volumes Service for AWS documentation](#)

## Managing Cloud Volumes Service for AWS

Cloud Manager enables you to create cloud volumes based on your [Cloud Volumes Service for AWS](#) subscription. You can also discover cloud volumes that you have already created from the Cloud Volumes Service interface and add them to a working environment.

### Add your Cloud Volumes Service for AWS subscription

Regardless of whether you have already created volumes from the Cloud Volumes Service user interface, or if you just signed up for Cloud Volumes Service for AWS and have no volumes yet, the first step is to create a working environment for the volumes based on your AWS subscription.

If cloud volumes already exist for this subscription, then the volumes are automatically added to the new working environment. If you haven't added any cloud volumes yet for the AWS subscription, then you do that after you create the new working environment.



If you have subscriptions and volumes in multiple AWS regions, you need to perform this task for each region.

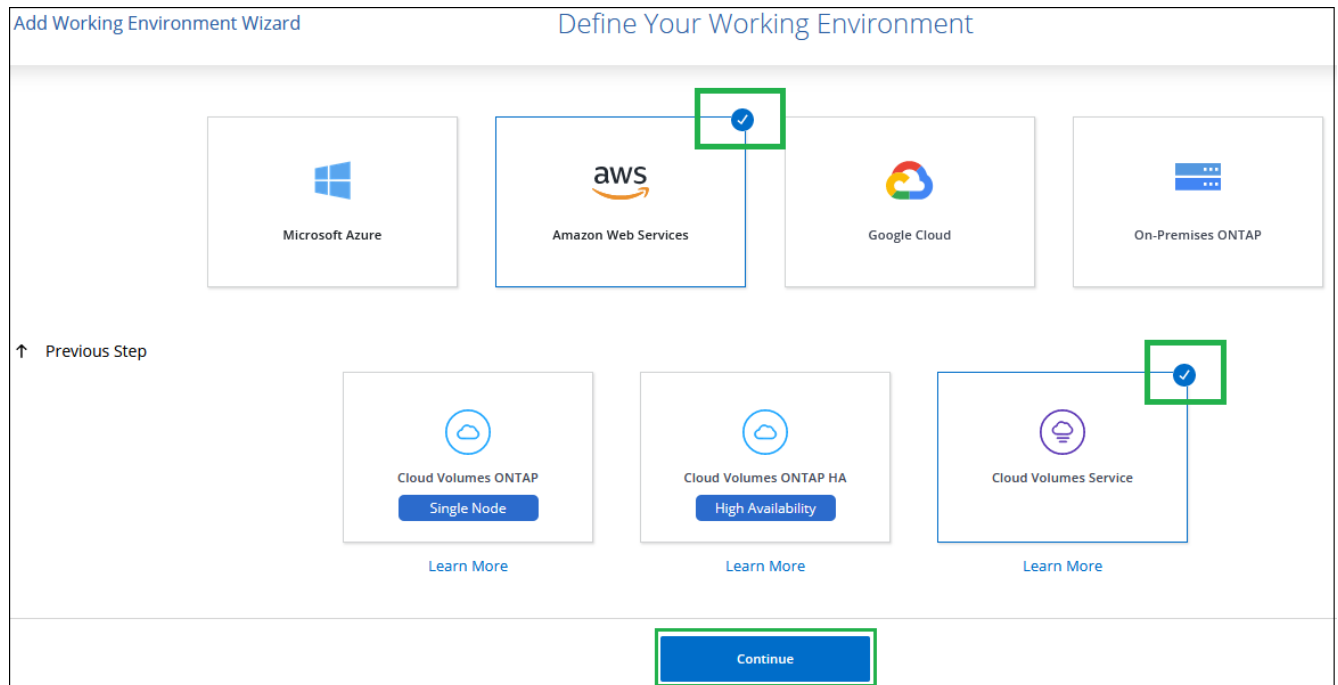
### Before you begin

You must have the following information available when adding a subscription in each region:

- Cloud Volumes API key and Secret key: [See the Cloud Volumes Service for AWS documentation to get this information.](#)
- The AWS region where the subscription was created.

### Steps

1. In Cloud Manager, add a new Working Environment, select the location **Amazon Web Services**, and click **Continue**.
2. Select **Cloud Volumes Service** and click **Continue**.



3. Provide information about your Cloud Volumes Service subscription:
  - a. Enter the Working Environment Name you want to use.
  - b. Enter the Cloud Volumes Service API key and secret key.
  - c. Select the AWS region where your cloud volumes reside, or where they will be deployed.
  - d. Click **Add**.



### Cloud Volumes Service Credentials

Working Environment Name

AWS Cloud Volume Services volumes

Cloud Volumes Service API Key

ddgdgdexample4vtbntbtbrtb

Cloud Volumes Service Secret Key

.....

AWS Region

us-east-1 | US East (N. Virginia) ▼

#### Result

Cloud Manager displays your Cloud Volumes Service for AWS configuration on the Working Environments page.



If cloud volumes already exist for this subscription, then the volumes are automatically added to the new working environment, as shown in the screenshot. You can add additional cloud volumes from Cloud Manager.

If no cloud volumes exist for this subscription, then you can create them now.

#### Create cloud volumes

For configurations where volumes already exist in the Cloud Volumes Service working environment you can use these steps to add new volumes.

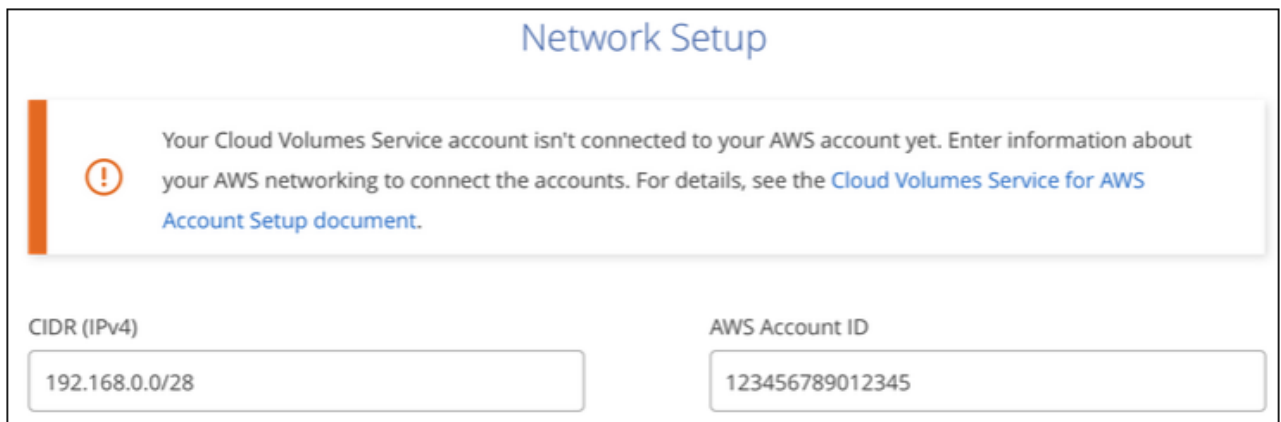
For configurations where no volumes exist, you can create your first volume directly from Cloud Manager after you have set up your Cloud Volumes Service for AWS subscription. In the past, the first volume had to be created directly in the Cloud Volumes Service user interface.

### *Before you begin*

- If you want to use SMB in AWS, you must have set up DNS and Active Directory.
- When planning to create an SMB volume, you must have a Windows Active Directory server available to which you can connect. You will enter this information when creating the volume. Also, make sure that the Admin user is able to create a machine account in the Organizational unit (OU) path specified.
- You will need this information when creating the first volume in a new region/working environment:
  - AWS account ID: A 12-digit Amazon account identifier with no dashes. To find your account ID, refer to this [AWS topic](#).
  - Classless Inter-Domain Routing (CIDR) Block: An unused IPv4 CIDR block. The network prefix must range between /16 and /28, and it must also fall within the ranges reserved for private networks (RFC 1918). Do not choose a network that overlaps your VPC CIDR allocations.

### *Steps*

1. Select the new working environment and click **Add New Volume**.
2. If you are adding the first volume to the working environment in the region, you have to add AWS networking information.
  - a. Enter the IPv4 range (CIDR) for the region.
  - b. Enter the 12-digit AWS account ID (with no dashes) to connect your Cloud Volumes account to your AWS account.
  - c. Click **Continue**.



The screenshot shows a 'Network Setup' form. At the top, the title 'Network Setup' is displayed in blue. Below the title is a message box with an orange exclamation mark icon. The message reads: 'Your Cloud Volumes Service account isn't connected to your AWS account yet. Enter information about your AWS networking to connect the accounts. For details, see the [Cloud Volumes Service for AWS Account Setup document](#).' Below the message box are two input fields. The first field is labeled 'CIDR (IPv4)' and contains the text '192.168.0.0/28'. The second field is labeled 'AWS Account ID' and contains the text '123456789012345'.

3. The Accepting Virtual Interfaces page describes some steps you will need to perform after you add the volume so that you are prepared to complete that step. Just click **Continue** again.
4. In the Details & Tags page, enter details about the volume:

- a. Enter a name for the volume.
- b. Specify a size within the range of 100 GiB to 90,000 GiB (equivalent to 88 TiBs).

[Learn more about allocated capacity.](#)

- c. Specify a service level: Standard, Premium, or Extreme.

[Learn more about service levels.](#)

- d. Enter one or more tag names to categorize the volume if you want.
- e. Click **Continue**.

5. In the Protocol page, select NFS, SMB, or Dual Protocol and then define the details. Required entries for NFS and SMB are shown in separate sections below.
6. In the Volume Path field, specify the name of the volume export you will see when you mount the volume.
7. If you select Dual-protocol you can select the security style by selecting NTFS or UNIX. Security styles affect the file permission type used and how permissions can be modified.
  - UNIX uses NFSv3 mode bits, and only NFS clients can modify permissions.
  - NTFS uses NTFS ACLs, and only SMB clients can modify permissions.
8. For NFS:
  - a. In the NFS Version field, select NFSv3, NFSv4.1, or both depending on your requirements.
  - b. Optionally, you can create an export policy to identify the clients that can access the volume. Specify the:
    - Allowed clients by using an IP address or Classless Inter-Domain Routing (CIDR).
    - Access rights as Read & Write or Read Only.
    - Access protocol (or protocols if the volume allows both NFSv3 and NFSv4.1 access) used for users.
    - Click + **Add Export Policy Rule** if you want to define additional export policy rules.

The following image shows the Volume page filled out for the NFS protocol:

Protocol

Select the volume's protocol: 
 ☒ NFS Protocol 
 ☐ SMB Protocol 
 ☐ Dual Protocol

Volume Path i

vol1

Select NFS Version:

☒ NFSv3 
 ☒ NFSv4.1

Export Policy i

Allowed Client & Access i

192.168.1.2/24

☒ Read & Write 
 ☐ Read Only

✕

Select NFS Version:

☒ NFSv3 
 ☐ NFSv4.1

---

192.168.1.22/24

☒ Read & Write 
 ☐ Read Only

✕

Select NFS Version:

☐ NFSv3 
 ☒ NFSv4.1

9. For SMB:

- a. You can enable SMB session encryption by checking the box for SMB Protocol Encryption.
- b. You can integrate the volume with an existing Windows Active Directory server by completing the fields in the Active directory section:

Field	Description
DNS Primary IP Address	The IP addresses of the DNS servers that provide name resolution for the SMB server. Use a comma to separate the IP addresses when referencing multiple servers, for example, 172.31.25.223, 172.31.2.74..
Active Directory Domain to join	The FQDN of the Active Directory (AD) domain that you want the SMB server to join. When using AWS Managed Microsoft AD, use the value from the "Directory DNS name" field.
SMB Server NetBIOS name	A NetBIOS name for the SMB server that will be created.
Credentials authorized to join the domain	The name and password of a Windows account with sufficient privileges to add computers to the specified Organizational Unit (OU) within the AD domain.

Field	Description
Organizational Unit	<p>The organizational unit within the AD domain to associate with the SMB server. The default is CN=Computers for connections to your own Windows Active Directory server.</p> <p>If you configure AWS Managed Microsoft AD as the AD server for the Cloud Volumes Service, you should enter <b>OU=Computers,OU=corp</b> in this field.</p>

The following image shows the Volume page filled out for the SMB protocol:



You should follow the guidance on AWS security group settings to enable cloud volumes to integrate with Windows Active Directory servers correctly. See [AWS security group settings for Windows AD servers](#) for more information.

10. In the Volume from Snapshot page, if you want this volume to be created based on a snapshot of an existing volume, select the snapshot from the Snapshot Name drop-down list.
11. In the Snapshot Policy page, you can enable Cloud Volumes Service to create snapshot copies of your volumes based on a schedule. You can do this now or edit the volume later to define the snapshot policy.

See [Creating a snapshot policy](#) for more information about snapshot functionality.

12. Click **Add Volume**.

The new volume is added to the working environment.

#### *After you finish*

If this is the first volume created in this AWS subscription, you need to launch the AWS Management Console to accept the two virtual interface that will be used in this AWS region to connect all your cloud volumes. See the [NetApp Cloud Volumes Service for AWS Account Setup Guide](#) for details.

You must accept the interfaces within 10 minutes after clicking the **Add Volume** button or the system may time out. If this happens, email [cvs-support@netapp.com](mailto:cvs-support@netapp.com) with your AWS Customer ID and NetApp Serial Number. Support will fix the issue and you can restart the onboarding process.

Then continue with [Mounting the cloud volume](#).

## Mount the cloud volume

You can mount a cloud volume to your AWS instance. Cloud volumes currently support NFSv3 and NFSv4.1 for Linux and UNIX clients, and SMB 3.0 and 3.1.1 for Windows clients.

**Note:** Please use the highlighted protocol/dialect supported by your client.

### *Steps*

1. Open the working environment.
2. Hover over the volume and click **Mount the volume**.

NFS and SMB volumes display mount instructions for that protocol. Dual-protocol volumes provide both sets of instructions.

3. Hover over the commands and copy them to your clipboard to make this process easier. Just add the destination directory/mount point at the end of the command.

**NFS example:**

## Mount the volume - testk

### Setting up your instance

1. Open an SSH client and connect to your instance.
2. Install the nfs client on your instance.

On Red Hat Enterprise Linux or SuSE Linux instance:

```
$ sudo yum install -y nfs-utils
```

On an Ubuntu or Debian instance:

```
$ sudo apt-get install nfs-common
```

### Mounting your volume

1. Create a new directory on your instance:

```
$ sudo mkdir /dir
```

2. Mount your NFSv3 volume using the command below:

```
sudo mount -t nfs -o rw,hard,rsize=65536,wsiz=65536,vers=3,tc...
```

3. Mount your NFSv4.1 volume using the command below:

```
sudo mount -t nfs -o rw,hard,rsize=65536,wsiz=65536,vers=4,tc...
```

The maximum I/O size defined by the `rsize` and `wsiz` options is 1048576, however 65536 is the recommended default for most use cases.

Note that Linux clients will default to NFSv4.1 unless the version is specified with the `vers=<nfs_version>` option.

### SMB example:

### Mount the volume - <Volume Name>

#### Mapping your network drive

1. Click the **Start** button and then click on **Computer**.
2. Click **Map Network Drive**.
3. In the **Drive** list, click any available drive letter.
4. In the **Folder** box, type this:

`\\test.cv-pm.local\silly-condescending-mcnulty`

To connect every time you log on to your computer, check the **Reconnect at logon** option.

5. Click **Finish**.

4. Connect to your Amazon Elastic Compute Cloud (EC2) instance by using an SSH or RDP client, and then follow the mount instructions for your instance.


After completing the steps in the mount instructions, you have successfully mounted the cloud volume to your AWS instance.

## Managing existing volumes

You can manage existing volumes as your storage needs change. You can view, edit, restore, and delete volumes.


### Steps


1. Open the working environment.
2. Hover over the volume.


 Volume Name


Info


Delete

 Edit

 Mount the volume

 Create a Snapshot copy

 Revert volume to Snapshot

 Delete a Snapshot copy

3. Manage your volumes:



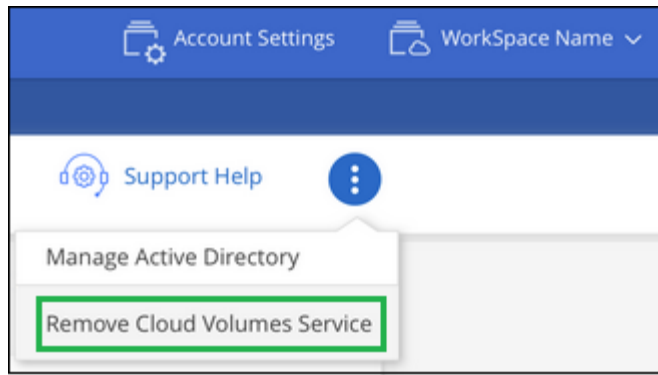
Task	Action
View information about a volume	Select a volume, and then click <b>Info</b> .
Edit a volume (including snapshot policy)	a. Select a volume, and then click <b>Edit</b> . b. Modify the volume's properties and then click <b>Update</b> .
Get the NFS or SMB mount command	a. Select a volume, and then click <b>Mount the volume</b> . b. Click <b>Copy</b> to copy the command(s).
Create a Snapshot copy on demand	a. Select a volume, and then click <b>Create a Snapshot copy</b> . b. Change the snapshot name, if needed, and then click <b>Create</b> .
Replace the volume with the contents of a Snapshot copy	a. Select a volume, and then click <b>Revert volume to Snapshot</b> . b. Select a Snapshot copy and click <b>Revert</b> .
Delete a Snapshot copy	a. Select a volume, and then click <b>Delete a Snapshot copy</b> . b. Select the Snapshot copy you want to delete and click <b>Delete</b> . c. Click <b>Delete</b> again to confirm.
Delete a volume	a. Unmount the volume from all clients: <ul style="list-style-type: none"> <li>◦ On Linux clients, use the <b>umount</b> command.</li> <li>◦ On Windows clients, click <b>Disconnect network drive</b>.</li> </ul> b. Select a volume, and then click <b>Delete</b> . c. Click <b>Delete</b> again to confirm.


## Remove Cloud Volumes Service from Cloud Manager

You can remove a Cloud Volumes Service for AWS subscription and all existing volumes from Cloud Manager. The volumes are not deleted, they are just removed from the Cloud Manager interface.

### Steps

1. Open the working environment.





2. Click the  button at the top of the page and click **Remove Cloud Volumes Service**.
3. In the confirmation dialog box, click **Remove**.

### Manage Active Directory configuration

If you change your DNS servers or Active Directory domain, you need to modify the SMB server in Cloud Volumes Services so that it can continue to serve storage to clients.

You can also delete the link to an Active Directory if you no longer need it.

#### Steps

1. Open the working environment.
2. Click the  button at the top of the page and click **Manage Active Directory**.
3. If no Active Directory is configured, you can add one now. If one is configured, you can modify the settings or delete it using the  button.
4. Specify the settings for the Active Directory that you want to join:

Field	Description
DNS Primary IP Address	The IP addresses of the DNS servers that provide name resolution for the SMB server. Use a comma to separate the IP addresses when referencing multiple servers, for example, 172.31.25.223, 172.31.2.74.
Active Directory Domain to join	The FQDN of the Active Directory (AD) domain that you want the SMB server to join. When using AWS Managed Microsoft AD, use the value from the "Directory DNS name" field.
SMB Server NetBIOS name	A NetBIOS name for the SMB server that will be created.
Credentials authorized to join the domain	The name and password of a Windows account with sufficient privileges to add computers to the specified Organizational Unit (OU) within the AD domain.

Field	Description
Organizational Unit	<p>The organizational unit within the AD domain to associate with the SMB server. The default is CN=Computers for connections to your own Windows Active Directory server.</p> <p>If you configure AWS Managed Microsoft AD as the AD server for the Cloud Volumes Service, you should enter <b>OU=Computers,OU=corp</b> in this field.</p>

- Click **Save** to save your settings.

## Manage cloud volumes snapshots

You can create a snapshot policy for each volume so that you can recover or restore the entire contents of a volume from an earlier time. You can also create an on-demand snapshot of a cloud volume when needed.

### Create an on-demand snapshot

You can create an on-demand snapshot of a cloud volume if you want to create a snapshot with the current volume state.

#### Steps

- Open the working environment.
- Hover over the volume and click **Create a snapshot copy**.
- Enter a name for the snapshot, or use the automatically generated name, and click **Create**.

### Create a Snapshot Copy - <Volume Name>

---

A NetApp Snapshot copy is a read-only, point-in-time image of a volume. The image protects your data with no performance impact and requires minimal storage.

Snapshot Copy Name



---

Create

## Create or modify a snapshot policy

You can create or modify a snapshot policy as necessary for a cloud volume. You define the snapshot policy from the *Snapshot Policy* tab either when creating a volume or when editing a volume.

### Steps

1. Open the working environment.
2. Hover over the volume and click **Edit**.
3. From the *Snapshot Policy* tab, move the enable snapshots slider to the right.
4. Define the schedule for snapshots:
  - a. Select the frequency: **Hourly**, **Daily**, **Weekly**, or **Monthly**
  - b. Select the number of snapshots you want to keep.
  - c. Select the day, hour, and minute when the snapshot should be taken.

**Schedule Snapshot Policies:**

<input checked="" type="checkbox"/> <b>Hourly</b>	Number of Snapshot to Keep	Minute	
	<input type="text" value="12"/>	<input type="text" value="30"/>	
<input type="checkbox"/> <b>Daily</b>	Number of Snapshot to Keep	Hour	Minute
	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
<input checked="" type="checkbox"/> <b>Weekly</b>	Number of Snapshot to Keep	Days	Hour Minute
	<input type="text" value="3"/>	<div>Sunday x</div>	<input type="text" value="0"/> <input type="text" value="0"/>
<input type="checkbox"/> <b>Monthly</b>	Number of Snapshot to Keep	<div><input type="checkbox"/> Sunday</div> <div><input type="checkbox"/> Monday</div> <div><input type="checkbox"/> Tuesday</div>	Hour Minute
	<input type="text" value="0"/>		<input type="text" value="0"/> <input type="text" value="0"/>

5. Click **Add volume** or **Update volume** to save your policy settings.

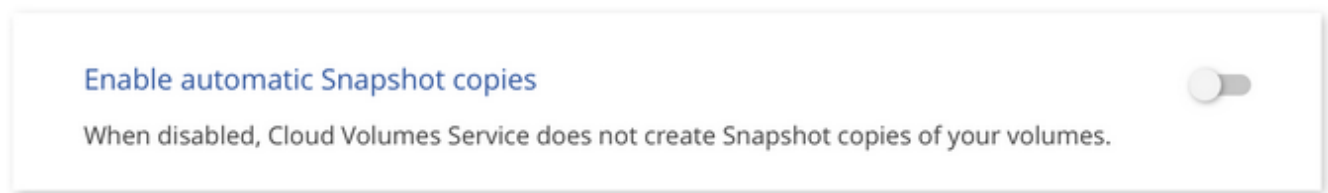
## Disable a snapshot policy

You can disable a snapshot policy to stop snapshots from being created for a short period of time while retaining your snapshot policy settings.

### Steps

1. Open the working environment.

2. Hover over the volume and click **Edit**.
3. From the *Snapshot Policy* tab, move the enable snapshots slider to the left.



4. Click **Update volume**.

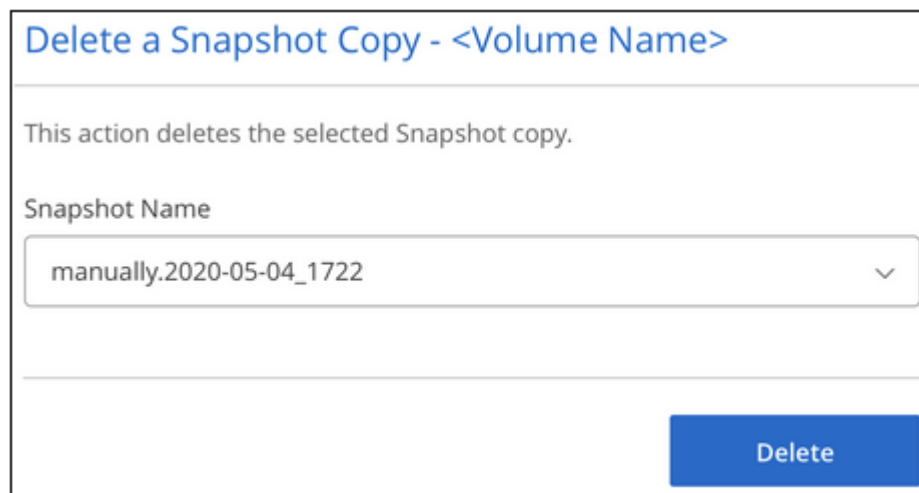
When you want to re-enable the snapshot policy, move the enable snapshots slider to the right and click **Update volume**.

### Delete a snapshot

You can delete a snapshot from the Volumes page.

#### Steps

1. Open the working environment.
2. Hover over the volume and click **Delete a Snapshot copy**.
3. Select the snapshot from the drop-down list and click **Delete**.



4. In the confirmation dialog box, click **Delete**.

### Revert a volume from a snapshot

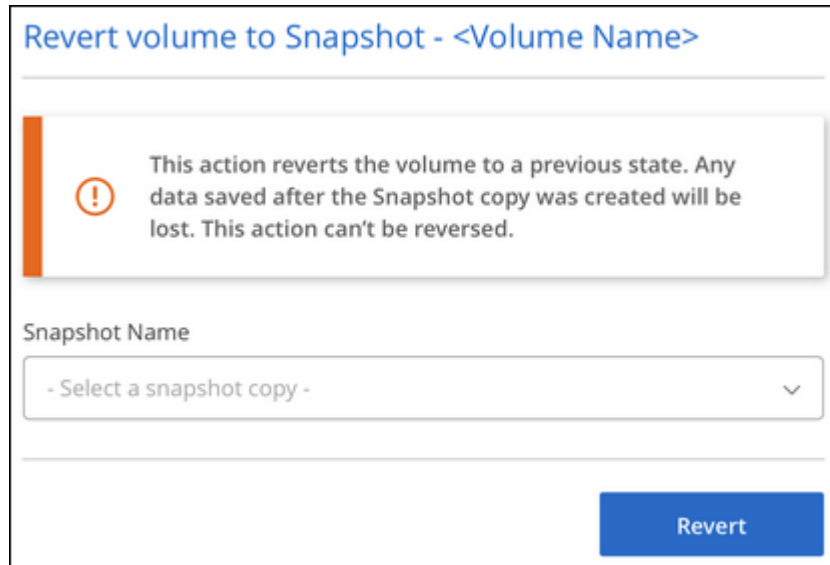
You can revert a volume to an earlier point in time from an existing snapshot.

When you revert a volume, the content of the snapshot overwrites the existing volume configuration. Any changes that were made to the data in the volume after the snapshot was created are lost.

Note that clients do not need to remount the volume after the revert operation.

### Steps

1. Open the working environment.
2. Hover over the volume and click **Revert volume to Snapshot**.
3. Select the snapshot that you want to use to restore the existing volume from the drop-down list and click **Revert**.



Revert volume to Snapshot - <Volume Name>

⚠ This action reverts the volume to a previous state. Any data saved after the Snapshot copy was created will be lost. This action can't be reversed.

Snapshot Name

- Select a snapshot copy -

Revert

## Reference

### Service levels and allocated capacity

The cost for Cloud Volumes Service for AWS is based on the *service level* and the *allocated capacity* that you select. Selecting the appropriate service level and capacity helps you meet your storage needs at the lowest cost.

### Considerations

Storage needs include two fundamental aspects:

- The storage *capacity* for holding data
- The storage *bandwidth* for interacting with data

If you consume more storage space than the capacity you selected for the volume, the following considerations apply:

- You will be billed for the additional storage capacity that you consume at the price defined by your service level.
- The amount of storage bandwidth available to the volume does not increase until you increase the allocated capacity size or change the service level.

## Service levels

Cloud Volumes Service for AWS supports three service levels. You specify your service level when you create or modify the volume.

The service levels are catered to different storage capacity and storage bandwidth needs:

- **Standard** (capacity)

If you want capacity at the lowest cost, and your bandwidth needs are limited, then the Standard service level might be most appropriate for you. An example is using the volume as a backup target.

- Bandwidth: 16 KB of bandwidth per GB provisioned capacity

- **Premium** (a balance of capacity and performance)

If your application has a balanced need for storage capacity and bandwidth, then the Premium service level might be most appropriate for you. This level is less expensive per MB/s than the Standard service level, and it is also less expensive per GB of storage capacity than the Extreme service level.

- Bandwidth: 64 KB of bandwidth per GB provisioned capacity

- **Extreme** (performance)

The Extreme service level is least expensive in terms of storage bandwidth. If your application demands storage bandwidth without the associated demand for lots of storage capacity, then the Extreme service level might be most appropriate for you.

- Bandwidth: 128 KB of bandwidth per GB provisioned capacity

## Allocated capacity

You specify your allocated capacity for the volume when you create or modify the volume.

While you would select your service level based on your general, high-level business needs, you should select your allocated capacity size based on the specific needs of applications, for example:

- How much storage space the applications need
- How much storage bandwidth per second the applications or the users require

Allocated capacity is specified in GBs. A volume's allocated capacity can be set within the range of 100 GB to 100,000 GB (equivalent to 100 TBs).

## Number of inodes

Volumes less than or equal to 1 TB can use up to 20 million inodes. The number of inodes increase by 20 million for each TB you allocate, up to a maximum of 100 million inodes.

- <= 1TB = 20 million inodes
- >1 TB to 2 TB = 40 million inodes
- >2 TB to 3 TB = 60 million inodes
- >3 TB to 4 TB = 80 million inodes
- >4 TB to 100 TB = 100 million inodes

## Bandwidth

The combination of both the service level and the allocated capacity you select determines the maximum bandwidth for the volume.

If your applications or users need more bandwidth than your selections, you can change the service level or increase the allocated capacity. The changes do not disrupt data access.

## Selecting the service level and the allocated capacity

To select the most appropriate service level and allocated capacity for your needs, you need to know how much capacity and bandwidth you require at the peak or the edge.

## List of service levels and allocated capacity

The leftmost column indicates the capacity, and the other columns define the MB/s available at each capacity point based on service level.

See [Contract subscription pricing](#) and [Metered subscription pricing](#) for complete details on pricing.

Capacity (TB)	Standard (MB/s)	Premium (MB/s)	Extreme (MB/s)
0.1 (100 GB)	1.6	6.4	12.8
1	16	64	128
2	32	128	256
3	48	192	384
4	64	256	512
5	80	320	640
6	96	384	768
7	112	448	896
8	128	512	1,024
9	144	576	1,152
10	160	640	1,280
11	176	704	1,408
12	192	768	1,536



Capacity (TB)	Standard (MB/s)	Premium (MB/s)	Extreme (MB/s)
13	208	832	1,664
14	224	896	1,792
15	240	960	1,920
16	256	1,024	2,048
17	272	1,088	2,176
18	288	1,152	2,304
19	304	1,216	2,432
20	320	1,280	2,560
21	336	1,344	2,688
22	352	1,408	2,816
23	368	1,472	2,944
24	384	1,536	3,072
25	400	1,600	3,200
26	416	1,664	3,328
27	432	1,728	3,456
28	448	1,792	3,584
29	464	1,856	3,712
30	480	1,920	3,840
31	496	1,984	3,968
32	512	2,048	4,096
33	528	2,112	4,224
34	544	2,176	4,352
35	560	2,240	4,480
36	576	2,304	4,500
37	592	2,368	4,500
38	608	2,432	4,500
39	624	2,496	4,500
40	640	2,560	4,500
41	656	2,624	4,500
42	672	2,688	4,500
43	688	2,752	4,500

Capacity (TB)	Standard (MB/s)	Premium (MB/s)	Extreme (MB/s)
44	704	2,816	4,500
45	720	2,880	4,500
46	736	2,944	4,500
47	752	3,008	4,500
48	768	3,072	4,500
49	784	3,136	4,500
50	800	3,200	4,500
51	816	3,264	4,500
52	832	3,328	4,500
53	848	3,392	4,500
54	864	3,456	4,500
55	880	3,520	4,500
56	896	3,584	4,500
57	912	3,648	4,500
58	928	3,712	4,500
59	944	3,776	4,500
60	960	3,840	4,500
61	976	3,904	4,500
62	992	3,968	4,500
63	1,008	4,032	4,500
64	1,024	4,096	4,500
65	1,040	4,160	4,500
66	1,056	4,224	4,500
67	1,072	4,288	4,500
68	1,088	4,352	4,500
69	1,104	4,416	4,500
70	1,120	4,480	4,500
71	1,136	4,500	4,500
72	1,152	4,500	4,500
73	1,168	4,500	4,500
74	1,184	4,500	4,500

Capacity (TB)	Standard (MB/s)	Premium (MB/s)	Extreme (MB/s)
75	1,200	4,500	4,500
76	1,216	4,500	4,500
77	1,232	4,500	4,500
78	1,248	4,500	4,500
79	1,264	4,500	4,500
80	1,280	4,500	4,500
81	1,296	4,500	4,500
82	1,312	4,500	4,500
83	1,328	4,500	4,500
84	1,344	4,500	4,500
85	1,360	4,500	4,500
86	1,376	4,500	4,500
87	1,392	4,500	4,500
88	1,408	4,500	4,500
89	1,424	4,500	4,500
90	1,440	4,500	4,500
91	1,456	4,500	4,500
92	1,472	4,500	4,500
93	1,488	4,500	4,500
94	1,504	4,500	4,500
95	1,520	4,500	4,500
96	1,536	4,500	4,500
97	1,552	4,500	4,500
98	1,568	4,500	4,500
99	1,584	4,500	4,500
100	1,600	4,500	4,500

### Example 1

For example, your application requires 25 TB of capacity and 100 MB/s of bandwidth. At 25 TB of capacity, the Standard service level would provide 400 MB/s of bandwidth at a cost of \$2,500 (estimate: see current pricing), making Standard the most suitable service level in this case.

### Example 2

For example, your application requires 12 TB of capacity and 800 MB/s of peak bandwidth. Although the Extreme service level can meet the demands of the application at the 12 TB mark, it is more cost-effective (estimate: see current pricing) to select 13 TB at the Premium service level.

### AWS security group settings for Windows AD servers

If you use Windows Active Directory (AD) servers with cloud volumes, you should familiarize yourself with the guidance on AWS security group settings. The settings enable cloud volumes to integrate with AD correctly.

By default, the AWS security group applied to an EC2 Windows instance does not contain inbound rules for any protocol except RDP. You must add rules to the security groups that are attached to each Windows AD instance to enable inbound communication from Cloud Volumes Service. The required ports are as follows:

Service	Port	Protocol
AD Web Services	9389	TCP
DNS	53	TCP
DNS	53	UDP
ICMPv4	N/A	Echo Reply
Kerberos	464	TCP
Kerberos	464	UDP
Kerberos	88	TCP
Kerberos	88	UDP
LDAP	389	TCP
LDAP	389	UDP
LDAP	3268	TCP
NetBIOS name	138	UDP
SAM/LSA	445	TCP
SAM/LSA	445	UDP
Secure LDAP	636	TCP
Secure LDAP	3269	TCP
w32time	123	UDP

If you are deploying and managing your AD installation domain controllers and member servers on an

AWS EC2 instance, you will require several security group rules to allow traffic for the Cloud Volumes Service. Below is an example of how to implement these rules for AD applications as part of the AWS CloudFormation template.

```
{
  "AWSTemplateFormatVersion" : "2010-09-09",
  "Description" : "Security Group for AD",
  "Parameters" :
  {
    "VPC" :
    {
      "Type" : "AWS::EC2::VPC::Id",
      "Description" : "VPC where the Security Group will belong:"
    },
    "Name" :
    {
      "Type" : "String",
      "Description" : "Name Tag of the Security Group:"
    },
    "Description" :
    {
      "Type" : "String",
      "Description" : "Description Tag of the Security Group:",
      "Default" : "Security Group for Active Directory for CVS "
    },
    "CIDRrangeforTCPandUDP" :
    {
      "Type" : "String",
      "Description" : "CIDR Range for the UDP ports 445,138,464,389,53,123 and for the TCP ports 464,339,3389,3268,88,636,9389,445 and 0-65535: *CIDR range format: 10.0.0.0/24"
    }
  },
  "Resources" :
  {
    "ADSGWest" :
    {
      "Type" : "AWS::EC2::SecurityGroup",
      "Properties" :
      {
        "GroupDescription" : {"Ref" : "Description"},
        "VpcId" : { "Ref" : "VPC" },
        "SecurityGroupIngress" : [
          {
            "IpProtocol" : "udp",
            "CidrIp" : {"Ref" : "CIDRrangeforTCPandUDP"},
            "FromPort" : "445",
```

```

        "ToPort" : "445"
    },
    {
        "IpProtocol" : "udp",
        "CidrIp" : {"Ref" : "CIDRrangeforTCPandUDP"},
        "FromPort" : "138",
        "ToPort" : "138"
    },
    {
        "IpProtocol" : "udp",
        "CidrIp" : {"Ref" : "CIDRrangeforTCPandUDP"},
        "FromPort" : "464",
        "ToPort" : "464"
    },
    {
        "IpProtocol" : "tcp",
        "CidrIp" : {"Ref" : "CIDRrangeforTCPandUDP"},
        "FromPort" : "464",
        "ToPort" : "464"
    },
    {
        "IpProtocol" : "udp",
        "CidrIp" : {"Ref" : "CIDRrangeforTCPandUDP"},
        "FromPort" : "389",
        "ToPort" : "389"
    },
    {
        "IpProtocol" : "udp",
        "CidrIp" : {"Ref" : "CIDRrangeforTCPandUDP"},
        "FromPort" : "53",
        "ToPort" : "53"
    },
    {
        "IpProtocol" : "tcp",
        "CidrIp" : {"Ref" : "CIDRrangeforTCPandUDP"},
        "FromPort" : "339",
        "ToPort" : "339"
    },
    {
        "IpProtocol" : "udp",
        "CidrIp" : {"Ref" : "CIDRrangeforTCPandUDP"},
        "FromPort" : "123",
        "ToPort" : "123"
    },
    {
        "IpProtocol" : "tcp",
        "CidrIp" : {"Ref" : "CIDRrangeforTCPandUDP"},
        "FromPort" : "3389",

```

```

        "ToPort" : "3389"
    },
    {
        "IpProtocol" : "tcp",
        "CidrIp" : {"Ref" : "CIDRrangeforTCPandUDP"},
        "FromPort" : "3268",
        "ToPort" : "3268"
    },
    {
        "IpProtocol" : "tcp",
        "CidrIp" : {"Ref" : "CIDRrangeforTCPandUDP"},
        "FromPort" : "88",
        "ToPort" : "88"
    },
    {
        "IpProtocol" : "tcp",
        "CidrIp" : {"Ref" : "CIDRrangeforTCPandUDP"},
        "FromPort" : "636",
        "ToPort" : "636"
    },
    {
        "IpProtocol" : "tcp",
        "CidrIp" : {"Ref" : "CIDRrangeforTCPandUDP"},
        "FromPort" : "3269",
        "ToPort" : "3269"
    },
    {
        "IpProtocol" : "tcp",
        "CidrIp" : {"Ref" : "CIDRrangeforTCPandUDP"},
        "FromPort" : "53",
        "ToPort" : "53"
    },
    {
        "IpProtocol" : "tcp",
        "CidrIp" : {"Ref" : "CIDRrangeforTCPandUDP"},
        "FromPort" : "0",
        "ToPort" : "65535"
    },
    {
        "IpProtocol" : "tcp",
        "CidrIp" : {"Ref" : "CIDRrangeforTCPandUDP"},
        "FromPort" : "9389",
        "ToPort" : "9389"
    },
    {
        "IpProtocol" : "tcp",
        "CidrIp" : {"Ref" : "CIDRrangeforTCPandUDP"},
        "FromPort" : "445",

```

```

        "ToPort" : "445"
      }
    ]
  },
  "Outputs" :
  {
    "SecurityGroupID" :
    {
      "Description" : "Security Group ID",
      "Value" : { "Ref" : "ADSGWest" }
    }
  }
}

```

## Cloud Volumes Service for GCP

### Learn about Cloud Volumes Service for Google Cloud

NetApp Cloud Volumes Service for Google Cloud enables you to quickly add multi-protocol workloads as well as build and deploy both Windows-based and UNIX-based apps.

#### Key features:

- Migrate data between on-premises and Google Cloud.
- Provision volumes from 1 to 100 TiB in seconds.
- Multiprotocol support (you can create an NFS or SMB volume).
- Protect data with automated, efficient snapshots.
- Accelerate app development with rapid cloning.

#### Cost

Volumes created by the Cloud Volumes Service for Google Cloud are charged to your subscription to the service, not through Cloud Manager.

[View pricing](#)

There are no charges to discover a Cloud Volumes Service for Google Cloud region or volume from Cloud Manager.



## Supported regions

[View supported Google Cloud regions.](#)

## Before you get started

Cloud Manager can discover existing Cloud Volumes Service for GCP subscriptions and volumes. See the [NetApp Cloud Volumes Service for Google Cloud documentation](#) if you haven't set up your subscription yet.

## Getting help

Use the Cloud Manager chat for general questions about Cloud Volumes Service operation in Cloud Manager.

For general questions about Cloud Volumes Service for Google Cloud, email NetApp's Google Cloud Team at [gcinfo@netapp.com](mailto:gcinfo@netapp.com).

For technical issues associated with your cloud volumes, you can create a technical support case from the Google Cloud Console. See [obtaining support](#) for details.

## Limitations

- Cloud Manager doesn't support data replication between working environments when using Cloud Volumes Service volumes.
- Deleting your Cloud Volumes Service for Google Cloud subscription from Cloud Manager isn't supported. You can do this only through the Google Cloud Console.

## Related links

- [NetApp Cloud Central: Cloud Volumes Service for Google Cloud](#)
- [NetApp Cloud Volumes Service for Google Cloud documentation](#)

## Set up Cloud Volumes Service for Google Cloud

Create a Cloud Volumes Service for Google Cloud working environment in Cloud Manager to create and manage volumes and snapshots.

## Quick start

Get started quickly by following these steps, or go to the next section for full details.



### Enable the Cloud Volumes Service API

From Google, enable the Cloud Volumes Service for GCP API so that Cloud Manager can manage the

subscription and cloud volumes.



## Create a GCP service account and download credentials

From Google, create a GCP service account and role so that Cloud Manager can access your Cloud Volumes Service for GCP account.



## Create a Cloud Volumes Service for GCP working environment

In Cloud Manager, click **Add Working Environment > Google Cloud > Cloud Volumes Service** and then provide details about the service account and Google Cloud project.

### Enable the Cloud Volumes Service API

In Google Cloud Shell, run the following command to enable the Cloud Volumes Service API:

```
gcloud --project=<my-cvs-project> services enable cloudvolumesgcp-api.netapp.com
```

### Give Cloud Manager access to the Cloud Volumes Service for GCP account

You must complete the following tasks so that Cloud Manager can access your Google Cloud project:

- Create a new service account
- Add the new service account member to your project and assign it specific roles (permissions)
- Create and download a key pair for the service account that is used to authenticate to Google

#### Steps

1. In the Google Cloud Console, go to the **Service Accounts** page.
2. Click **Select a project**, choose your project, and click **Open**.
3. Click **Create Service Account**, enter the service account name (friendly display name) and description, and click **Create**.
4. From the *IAM page* click **Add** and fill out the fields in the *Add Members* page:
  - a. In the New Members field, enter the full service account ID, for example, [user1-service-account-cvs@project1.iam.gserviceaccount.com](mailto:user1-service-account-cvs@project1.iam.gserviceaccount.com).
  - b. Add these roles:
    - *NetApp Cloud Volumes Admin*
    - *Compute Network Viewer*
    - *Folder Viewer*
  - c. Click **Save**.
5. From the *Service account details* page click **Add key > Create new key**.

6. Select **JSON** as the key type and click **Create**.

By clicking **Create** your new public/private key pair is generated and downloaded to your system. It serves as the only copy of the private key. Store this file securely because it can be used to authenticate as your service account.

For detailed steps, see the Google Cloud topics [Creating and managing service accounts](#), [Granting, changing, and revoking access to resources](#), and [Creating and managing service account keys](#).

## Create a Cloud Volumes Service for GCP working environment

Set up a Cloud Volumes Service for GCP working environment in Cloud Manager so you can start creating volumes.

Regardless of whether you have already created volumes from the Google Cloud Console, or if you just signed up for Cloud Volumes Service for GCP and have no volumes yet, the first step is to create a working environment for the volumes based on your GCP subscription.

If cloud volumes already exist for this subscription, then the volumes will appear in the new working environment. If you haven't added any cloud volumes yet for the GCP subscription, then you do that after you create the new working environment.



If you have subscriptions and volumes in multiple GCP projects, you need to perform this task for each project.

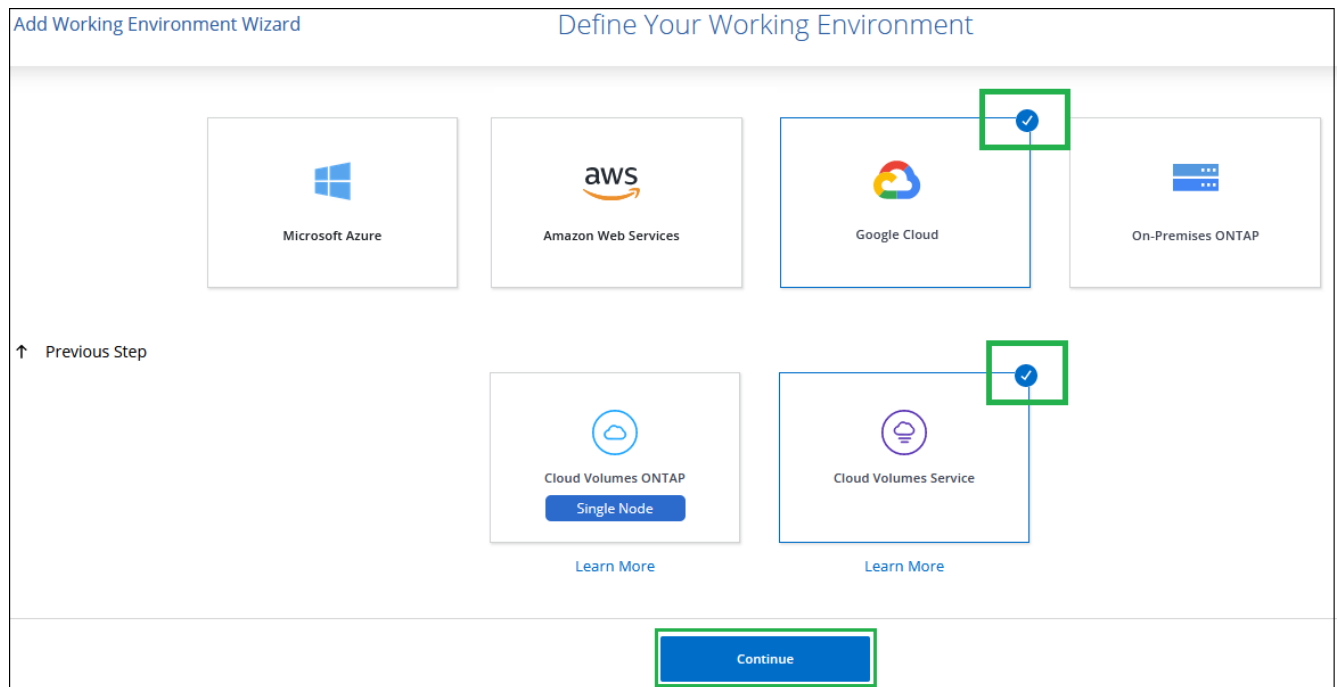
### *Before you begin*

You must have the following information available when adding a subscription for each project:

- Service account credentials (JSON private key you downloaded)
- Project name

### *Steps*

1. In Cloud Manager, add a new Working Environment, select the location **Google Cloud**, and click **Continue**.
2. Select **Cloud Volumes Service** and click **Continue**.



3. Provide information about your Cloud Volumes Service subscription:

- a. Enter the Working Environment Name you want to use.
- b. Copy/paste the JSON private key you downloaded in the previous steps.
- c. Select the name of your Google Cloud project.
- d. Click **Add**.

Cloud Volumes Service Credentials

Working Environment Name

Service Account Credentials

Paste the contents of the JSON file here

Apply

Project

- Select project -

*Result*

Cloud Manager displays your Cloud Volumes Service for Google Cloud working environment.



If cloud volumes already exist for this subscription, then the volumes appear in the new working environment, as shown in the screenshot. You can add additional cloud volumes from Cloud Manager.

If no cloud volumes exist for this subscription, create them now.

*What's next?*

[Start creating and managing volumes.](#)

## Create and manage volumes for Cloud Volumes Service for Google Cloud

Cloud Manager enables you to create cloud volumes based on your [Cloud Volumes Service for Google Cloud](#) subscription. You can also edit certain attributes of a volume, get the relevant mount commands, create snapshot copies, and delete cloud volumes.

### Create cloud volumes

You can create NFS or SMB volumes in a new or existing Cloud Volumes Service for Google Cloud account. Cloud volumes currently support NFSv3 and NFSv4.1 for Linux and UNIX clients, and SMB 3.x for Windows clients.

*Before you begin*

- If you want to use SMB in GCP, you must have set up DNS and Active Directory.
- When planning to create an SMB volume, you must have a Windows Active Directory server available to which you can connect. You will enter this information when creating the volume. Also, make sure that the Admin user is able to create a machine account in the Organizational unit (OU) path specified.

*Steps*

1. Select the working environment and click **Add New Volume**.
2. In the Details & Location page, enter details about the volume:
  - a. Enter a name for the volume.
  - b. Specify a size within the range of 1 TiB (1024 GiB) to 100 TiB.

[Learn more about allocated capacity.](#)

c. Specify a service level: Standard, Premium, or Extreme.

[Learn more about service levels.](#)

d. Select the Google Cloud region.

e. Select the VPC Network from which the volume will be accessible. Note that the VPC cannot be changed or edited after the volume is created.

f. Click **Continue**.

3. In the Protocol page, select NFS or SMB and then define the details. Required entries for NFS and SMB are shown in separate sections below.

4. For NFS:

a. In the Volume Path field, specify the name of the volume export you will see when you mount the volume.

b. Select NFSv3, NFSv4.1, or both depending on your requirements.

c. Optionally, you can create an export policy to identify the clients that can access the volume. Specify the:

- Allowed clients by using an IP address or Classless Inter-Domain Routing (CIDR).
- Access rights as Read & Write or Read Only.
- Access protocol (or protocols if the volume allows both NFSv3 and NFSv4.1 access) used for users.
- Click + **Add Export Policy Rule** if you want to define additional export policy rules.

The following image shows the Volume page filled out for the NFS protocol:

The screenshot shows the 'Protocol' configuration page for a Google Cloud volume. At the top, there's a header 'Protocol'. Below it, a section titled 'Select the volume's protocol:' has two radio buttons: 'NFS Protocol' (selected) and 'SMB Protocol'. The page is divided into two main columns: 'Protocol' on the left and 'Export Policy' on the right. In the 'Protocol' column, there's a 'Volume Path' field with the value 'vol1' and an information icon. Below it, 'Select NFS Version:' has two checkboxes: 'NFSv3' (checked) and 'NFSv4.1' (unchecked). In the 'Export Policy' column, there's a section titled 'Allowed Client & Access' with an information icon. It contains a text field with '0.0.0.0/24', two radio buttons for 'Read & Write' (selected) and 'Read Only' (unchecked), and 'Select NFS Version:' with 'NFSv3' (checked) and 'NFSv4.1' (unchecked). At the bottom, there's a button with a plus icon and the text 'Add Export Policy Rule (Up to 5)'.

5. For SMB:

- a. In the Volume Path field, specify the name of the volume export you will see when you mount the volume and click **Continue**.
- b. If Active Directory has been set up, you see the configuration. If it is the first volume being set up and no Active Directory has been set up, you can enable SMB session encryption in the SMB Connectivity Setup page:

Field	Description
DNS Primary IP Address	The IP addresses of the DNS servers that provide name resolution for the SMB server. Use a comma to separate the IP addresses when referencing multiple servers, for example, 172.31.25.223, 172.31.2.74..
Active Directory Domain to join	The FQDN of the Active Directory (AD) domain that you want the SMB server to join.
SMB Server NetBIOS name	A NetBIOS name for the SMB server that will be created.
Credentials authorized to join the domain	The name and password of a Windows account with sufficient privileges to add computers to the specified Organizational Unit (OU) within the AD domain.
Organizational Unit	The organizational unit within the AD domain to associate with the SMB server. The default is CN=Computers for connections to your own Windows Active Directory server.

The following image shows the Volume page filled out for the SMB protocol:

The screenshot shows the 'SMB Connectivity Setup' page with the following fields filled out:

- DNS Primary IP Address:** 127.0.0.1
- User Name:** administrator
- Active Directory Domain to Join:** yourdomain.com up to 107 characters
- Password:** (empty field)
- SMB Server NetBIOS Name:** WEName
- Organizational Unit:** CN=Computers

6. Click **Continue**.

7. If you want to create the volume based on a snapshot of an existing volume, select the snapshot from the Snapshot Name drop-down list. Otherwise just click **Continue**.
8. In the Snapshot Policy page, you can enable Cloud Volumes Service to create snapshot copies of

your volumes based on a schedule. You can do this now by moving the selector to the right, or you can edit the volume later to define the snapshot policy.

See [Creating a snapshot policy](#) for more information about snapshot functionality.

9. Click **Add Volume**.

The new volume is added to the working environment.

Continue with [Mounting the cloud volume](#).

### **Mount cloud volumes**

Access mounting instructions from within Cloud Manager so you can mount the volume to a host.

**Note:** Please use the highlighted protocol/dialect supported by your client.

#### *Steps*

1. Open the working environment.
2. Hover over the volume and click **Mount the volume**.

NFS and SMB volumes display mount instructions for that protocol.

3. Hover over the commands and copy them to your clipboard to make this process easier. Just add the destination directory/mount point at the end of the command.

**NFS example:**



## Mount the volume - testk

### Setting up your instance

1. Open an SSH client and connect to your instance.
2. Install the nfs client on your instance.

On Red Hat Enterprise Linux or SuSE Linux instance:

```
$ sudo yum install -y nfs-utils
```

On an Ubuntu or Debian instance:

```
$ sudo apt-get install nfs-common
```

### Mounting your volume

1. Create a new directory on your instance:

```
$ sudo mkdir /dir
```

2. Mount your NFSv3 volume using the command below:

```
sudo mount -t nfs -o rw,hard,rsize=65536,wsiz=65536,vers=3,tc...
```

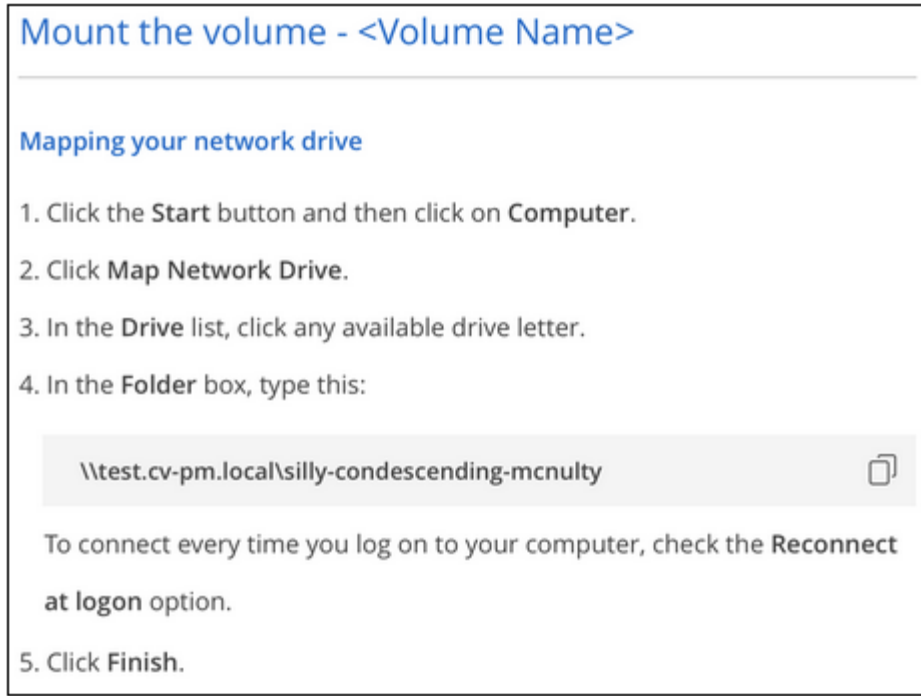
3. Mount your NFSv4.1 volume using the command below:

```
sudo mount -t nfs -o rw,hard,rsize=65536,wsiz=65536,vers=4,tc...
```

The maximum I/O size defined by the `rsize` and `wsiz` options is 1048576, however 65536 is the recommended default for most use cases.

Note that Linux clients will default to NFSv4.1 unless the version is specified with the `vers=<nfs_version>` option.

### SMB example:



4. Map your network drive by following the mount instructions for your instance.

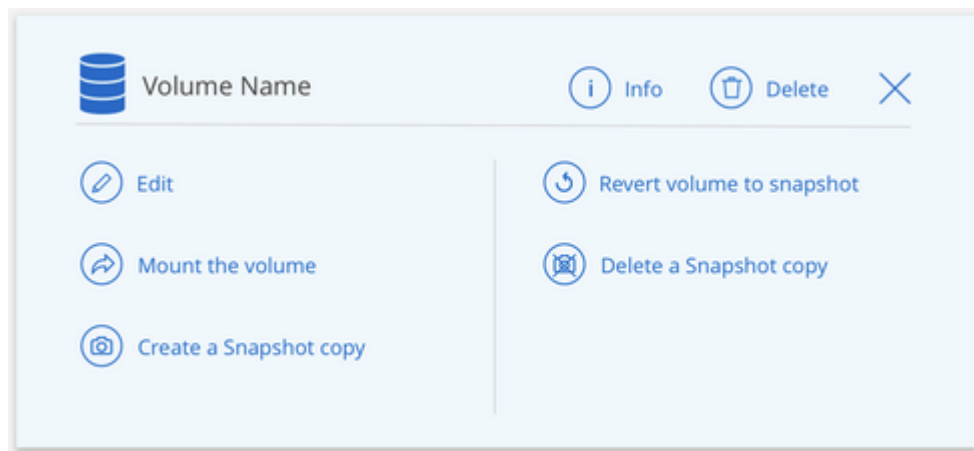
After completing the steps in the mount instructions, you have successfully mounted the cloud volume to your GCP instance.

## Manage existing volumes

You can manage existing volumes as your storage needs change. You can view, edit, restore, and delete volumes.

### Steps

1. Open the working environment.
2. Hover over the volume.




3. Manage your volumes:

Task	Action
View information about a volume	Click <b>Info</b> .
Edit a volume (including snapshot policy)	a. Click <b>Edit</b> . b. Modify the volume's properties and then click <b>Update</b> .
Get the NFS or SMB mount command	a. Click <b>Mount the volume</b> . b. Click <b>Copy</b> to copy the command(s).
Create a Snapshot copy on demand	a. Click <b>Create a Snapshot copy</b> . b. Change the name, if needed, and then click <b>Create</b> .
Replace the volume with the contents of a Snapshot copy	a. Click <b>Revert volume to snapshot</b> . b. Select a Snapshot copy and click <b>Restore</b> .
Delete a Snapshot copy	a. Click <b>Delete a Snapshot copy</b> . b. Select the snapshot and click <b>Delete</b> . c. Click <b>Delete</b> again when prompted to confirm.
Delete a volume	a. Unmount the volume from all clients: <ul style="list-style-type: none"> <li>◦ On Linux clients, use the <b>umount</b> command.</li> <li>◦ On Windows clients, click <b>Disconnect network drive</b>.</li> </ul> b. Select a volume, and then click <b>Delete</b> . c. Click <b>Delete</b> again to confirm.

## Remove Cloud Volumes Service from Cloud Manager

You can remove a Cloud Volumes Service for Google Cloud subscription and all existing volumes from Cloud Manager. The volumes are not deleted, they are just removed from the Cloud Manager interface.



### Steps

1. Open the working environment.
2. Click the  button at the top of the page and click **Remove Cloud Volumes Service**.
3. In the confirmation dialog box, click **Remove**.

## Manage Active Directory configuration

If you change your DNS servers or Active Directory domain, you need to modify the SMB server in Cloud Volumes Services so that it can continue to serve storage to clients.

### Steps

1. Open the working environment.
2. Click the  button at the top of the page and click **Manage Active Directory**.  
If no Active Directory is configured, you can add one now. If one is configured, you can modify or delete the settings using the  button.
3. Specify the settings for the SMB server:

Field	Description
DNS Primary IP Address	The IP addresses of the DNS servers that provide name resolution for the SMB server. Use a comma to separate the IP addresses when referencing multiple servers, for example, 172.31.25.223, 172.31.2.74.
Active Directory Domain to join	The FQDN of the Active Directory (AD) domain that you want the SMB server to join.
SMB Server NetBIOS name	A NetBIOS name for the SMB server that will be created.
Credentials authorized to join the domain	The name and password of a Windows account with sufficient privileges to add computers to the specified Organizational Unit (OU) within the AD domain.
Organizational Unit	The organizational unit within the AD domain to associate with the SMB server. The default is CN=Computers for connections to your own Windows Active Directory server.

4. Click **Save** to save your settings.

## Manage cloud volumes snapshots

You can create a snapshot policy for each volume so that you can recover or restore the entire contents of a volume from an earlier time. You can also create an on-demand snapshot of a cloud volume when needed.

### Create an on-demand snapshot

You can create an on-demand snapshot of a cloud volume if you want to create a snapshot with the current volume state.

### Steps

1. Open the working environment.

2. Hover over the volume and click **Create a snapshot copy**.
3. Enter a name for the snapshot, or use the automatically generated name, and click **Create**.

### Create a Snapshot Copy - <Volume Name>

A NetApp Snapshot copy is a read-only, point-in-time image of a volume. The image protects your data with no performance impact and requires minimal storage.

Snapshot Copy Name

Create

The snapshot is created.

## Create or modify a snapshot policy

You can create or modify a snapshot policy as necessary for a cloud volume. You define the snapshot policy from the *Snapshot Policy* tab either when creating a volume or when editing a volume.

### Steps

1. Open the working environment.
2. Hover over the volume and click **Edit**.
3. From the *Snapshot Policy* tab, move the enable snapshots slider to the right.
4. Define the schedule for snapshots:
  - a. Select the frequency: **Hourly**, **Daily**, **Weekly**, or **Monthly**
  - b. Select the number of snapshots you want to keep.
  - c. Select the day, hour, and minute when the snapshot should be taken.

**Schedule Snapshot Policies:**

<input checked="" type="checkbox"/> <b>Hourly</b>	Number of Snapshot to Keep	Minute	
	<input type="text" value="12"/>	<input type="text" value="30"/>	
<input type="checkbox"/> <b>Daily</b>	Number of Snapshot to Keep	Hour	Minute
	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
<input checked="" type="checkbox"/> <b>Weekly</b>	Number of Snapshot to Keep	Days	Hour Minute
	<input type="text" value="3"/>	<div>Sunday x</div> <div> <input type="checkbox"/> Sunday  <input type="checkbox"/> Monday  <input type="checkbox"/> Tuesday </div>	<input type="text" value="0"/> <input type="text" value="0"/>
<input type="checkbox"/> <b>Monthly</b>	Number of Snapshot to Keep		Hour Minute
	<input type="text" value="0"/>		<input type="text" value="0"/> <input type="text" value="0"/>

5. Click **Add volume** or **Update volume** to save your policy settings.

### Disable a snapshot policy

You can disable a snapshot policy to stop snapshots from being created for a short period of time while retaining your snapshot policy settings.

#### Steps

1. Open the working environment.
2. Hover over the volume and click **Edit**.
3. From the *Snapshot Policy* tab, move the enable snapshots slider to the left.

**Enable automatic Snapshot copies**

When disabled, Cloud Volumes Service does not create Snapshot copies of your volumes.

4. Click **Update volume**.

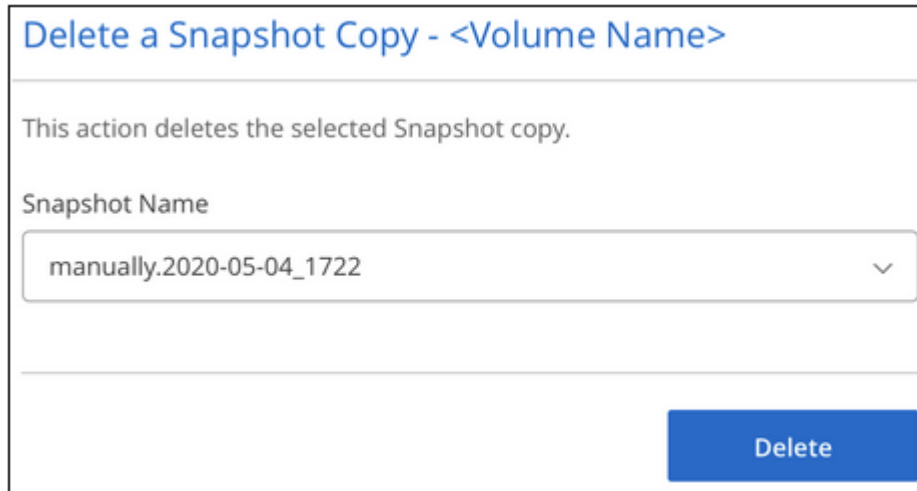
When you want to re-enable the snapshot policy, move the enable snapshots slider to the right and click **Update volume**.

## Delete a snapshot

You can delete a snapshot if it is no longer needed.

### Steps

1. Open the working environment.
2. Hover over the volume and click **Delete a Snapshot copy**.
3. Select the snapshot from the drop-down list and click **Delete**.



The screenshot shows a dialog box titled "Delete a Snapshot Copy - <Volume Name>". Inside the dialog, there is a message: "This action deletes the selected Snapshot copy." Below this message, there is a label "Snapshot Name" followed by a drop-down menu. The drop-down menu currently displays "manually.2020-05-04\_1722" with a downward arrow on the right. At the bottom right of the dialog, there is a blue button labeled "Delete".

4. In the confirmation dialog box, click **Delete**.

## Restore a snapshot to a new volume

You can restore a snapshot to a new volume as necessary.

### Steps

1. Open the working environment.
2. Hover over the volume and click **Restore to a new volume**.
3. Select the snapshot that you want to use to create the new volume from the drop-down list.
4. Enter a name for the new volume and click **Restore**.

### Restore to a new volume - <Volume Name>

This operation restores data from a Snapshot copy to a new volume.

Snapshot Name

manually.2020-05-04\_1722

Restored Volume Name:

vol\_restore

Restore

The volume is created in the working environment.

5. If you need to change any of the volume attributes, such as volume path or service level:
  - a. Hover over the volume and click **Edit**.
  - b. Make your changes and click **Update volume**.

*After you finish*

Continue with [Mounting the cloud volume](#).



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