# Back up data to the cloud

## Cloud Manager

NetApp
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# Back up data to the cloud

## Learn about Cloud Backup

Cloud Backup is a service for Cloud Manager working environments that provides backup and restore capabilities for protection and long-term archive of your data. Backups are automatically generated and stored in an object store in your public or private cloud account, independent of volume Snapshot copies used for near-term recovery or cloning.

When necessary, you can restore an entire *volume*, or one or more *files*, from a backup to the same or different working environment.

Learn more about Cloud Backup.

### Features

Backup features:

- Back up independent copies of your data volumes to low-cost object storage.
- Apply a single backup policy to all volumes in a cluster, or assign different backup policies to volumes that have unique recovery point objectives.
- Tier older backup files to archival storage to save costs (supported with AWS and Azure when using ONTAP 9.10.1+)
- Back up from cloud to cloud, and from on-premises systems to public or private cloud.
- For Cloud Volumes ONTAP systems, your backups can reside on a different subscription/account or different region.
- Backup data is secured with AES-256 bit encryption at-rest and TLS 1.2 HTTPS connections in-flight.
- Use your own customer-managed keys for data encryption instead of using the default encryption keys from your cloud provider.
- Support for up to 4,000 backups of a single volume.

Restore features:

- Restore data from a specific point in time.
- Restore a volume, or individual files, to the source system or to a different system.
- Restore data to a working environment using a different subscription/account or that is in a different region.
- Restores data on a block level, placing the data directly in the location you specify, all while preserving the original ACLs.
- Browsable file catalog for selecting individual files for single file restore.

### Supported working environments and object storage providers

Cloud Backup enables you to back up volumes from the following working environments to object storage in the following public and private cloud providers:

| Source Working Environment | Backup File Destination |
|---|---|
| Cloud Volumes ONTAP in AWS | Amazon S3 |
| Cloud Volumes ONTAP in Azure | Azure Blob |
| Cloud Volumes ONTAP in Google | Google Cloud Storage |
| On-premises ONTAP system | Amazon S3<br>Azure Blob<br>Google Cloud Storage<br>NetApp StorageGRID |
| Kubernetes cluster in AWS | Amazon S3 |
| Kubernetes cluster in Azure | Azure Blob |
| Kubernetes cluster in Google | Google Cloud Storage |

You can restore a volume, or individual files, from a backup file to the following working environments:

| Backup File | | Destination Working Environment | |
|---|---|---|---|
| **Location** | **Type** | **Volume Restore** | **File Restore** |
| Amazon S3 | ONTAP | Cloud Volumes ONTAP in AWS<br>On-premises ONTAP system | Cloud Volumes ONTAP in AWS<br>On-premises ONTAP system |
| Amazon S3 | Kubernetes | Kubernetes cluster in AWS | |
| Azure Blob | ONTAP | Cloud Volumes ONTAP in Azure<br>On-premises ONTAP system | Cloud Volumes ONTAP in Azure<br>On-premises ONTAP system |
| Azure Blob | Kubernetes | Kubernetes cluster in Azure | |
| Google Cloud Storage | ONTAP | Cloud Volumes ONTAP in Google<br>On-premises ONTAP system | |
| Google Cloud Storage | Kubernetes | Kubernetes cluster in Google | |
| NetApp StorageGRID | ONTAP | On-premises ONTAP system | |

## Cost

There are two types of costs associated with using Cloud Backup: resource charges and service charges.

**Resource charges**

Resource charges are paid to the cloud provider for object storage capacity and for running a virtual machine/instance in the cloud.

- For Backup, you pay your cloud provider for object storage costs.

  Since Cloud Backup preserves the storage efficiencies of the source volume, you pay the cloud provider object storage costs for the data *after* ONTAP efficiencies (for the smaller amount of data after

deduplication and compression have been applied).

- For File Restore, you pay your cloud provider for compute costs only when the Restore instance is running.

  The instance resides in the same subnet as the Connector, and it runs only when browsing a backup file to locate the individual files you want to restore. The instance is turned off when not in use to save costs.

  - In AWS, the Restore instance runs on an m5n.xlarge instance with 4 CPUs, 16 GiB memory, and EBS Only instance storage. The operating system image is Amazon Linux 2.

    In regions where m5n.xlarge instance isn't available, Restore runs on an m5.xlarge instance instead.

  - In Azure, the Restore virtual machine runs on a Standard_D4s_v3 VM with 4 CPUs, 16 GiB memory, and a 32 GiB disk. The operating system image is CentOS 7.5).

    The instance is named *Cloud-Restore-Instance* with your Account ID concatenated to it. For example: *Cloud-Restore-Instance-MyAccount*.

- For Volume Restore there is no cost because no separate instance or virtual machine is required.
- If you need to restore volume data from a backup file that has been moved to archival storage (supported with AWS and Azure when using ONTAP 9.10.1+), then there is an additional per-GB retrieval fee and per-request fee from the cloud provider.

#### Service charges

Service charges are paid to NetApp and cover both the cost to *create* backups and to *restore* volumes, or files, from those backups. You pay only for the data that you protect, calculated by the source logical used capacity (*before* ONTAP efficiencies) of ONTAP volumes which are backed up to object storage. This capacity is also known as Front-End Terabytes (FETB).

There are three ways to pay for the Backup service. The first option is to subscribe from your cloud provider, which enables you to pay per month. The second option is to get an annual contract - this is only available through AWS. The third option is to purchase licenses directly from NetApp. Read the Licensing section for details.

## Licensing

Cloud Backup is available in three licensing options: Pay As You Go (PAYGO), an annual contract from the AWS Marketplace, and Bring Your Own License (BYOL). A 30-day free trial is available if you don't have a license.

#### Free trial

When using the 30-day free trial, you are notified about the number of free trial days that remain. At the end of your free trial, backups stop being created. You must subscribe to the service or purchase a license to continue using the service.

Backup files are not deleted when the service is disabled. You'll continue to be charged by your cloud provider for object storage costs for the capacity that your backups use unless you delete the backups.

#### Pay-as-you-go subscription

Cloud Backup offers consumption-based licensing in a pay-as-you-go model. After subscribing through your cloud provider's marketplace, you pay per GB for data that's backed up—there's no up-front payment. You are billed by your cloud provider through your monthly bill.

You should subscribe even if you have a free trial or if you bring your own license (BYOL):

- Subscribing ensures that there's no disruption of service after your free trial ends.

  When the trial ends, you'll be charged hourly according to the amount of data that you back up.

- If you back up more data than allowed by your BYOL license, then data backup continues through your pay-as-you-go subscription.

  For example, if you have a 10 TB BYOL license, all capacity beyond the 10 TB is charged through the PAYGO subscription.

You won't be charged from your pay-as-you-go subscription during your free trial or if you haven't exceeded your BYOL license.

Learn how to set up a pay-as-you-go subscription.

#### Annual contract (AWS only)

Two annual contracts are available from the AWS Marketplace:

- An annual contract that enables you to back up Cloud Volumes ONTAP data and on-premises ONTAP data.

  You'll also need to pay for your Cloud Volumes ONTAP systems using this annual contract subscription since you can assign only one active subscription to your AWS credentials in Cloud Manager.

- A Professional Package that enables you to bundle Cloud Volumes ONTAP and Cloud Backup by using an annual contract for 12, 24, or 36 months. This option doesn't enable you to back up on-prem data.

  You can set up the annual contract when you create a Cloud Volumes ONTAP working environment and Cloud Manager will prompt you to subscribe to the AWS Marketplace.

Learn how to set up yearly AWS contracts.

#### Bring your own license

BYOL is term-based (12, 24, or 36 months) *and* capacity-based in 1 TB increments. You pay NetApp to use the service for a period of time, say 1 year, and for a maximum amount capacity, say 10 TB.

You'll receive a serial number that you enter in the Cloud Manager Digital Wallet page to enable the service. When either limit is reached, you'll need to renew the license. The Backup BYOL license applies to all Cloud Volumes ONTAP and on-premises ONTAP systems associated with your Cloud Manager account.

Learn how to manage your BYOL licenses.

##### BYOL license considerations

When using a Cloud Backup BYOL license, Cloud Manager displays a warning in the user interface when the size of all volumes you are backing up is nearing the capacity limit or nearing the license expiration date. You receive these warnings:

- When backups have reached 80% of licensed capacity, and again when you have reached the limit
- 30 days before a license is due to expire, and again when the license expires

Use the chat icon in the lower right of the Cloud Manager interface to renew your license when you see these warnings.

Two things can happen when your license expires:

- If the account you are using for your ONTAP systems has a marketplace account, the backup service continues to run, but you are shifted over to a PAYGO licensing model. You are charged for the capacity that your backups are using.
- If the account you are using for your ONTAP systems does not have a marketplace account, the backup service continues to run, but you will continue to see the warnings.

Once you renew your BYOL subscription, Cloud Manager automatically updates the license. If Cloud Manager can't access the license file over the secure internet connection (for example, when installed in a dark site), you can obtain the file yourself and manually upload it to Cloud Manager. For instructions, see how to update a Cloud Backup license.

Systems that were shifted over to a PAYGO license are returned to the BYOL license automatically. And systems that were running without a license will stop seeing the warnings and will be charged for backup activity that occurred while the license was expired.

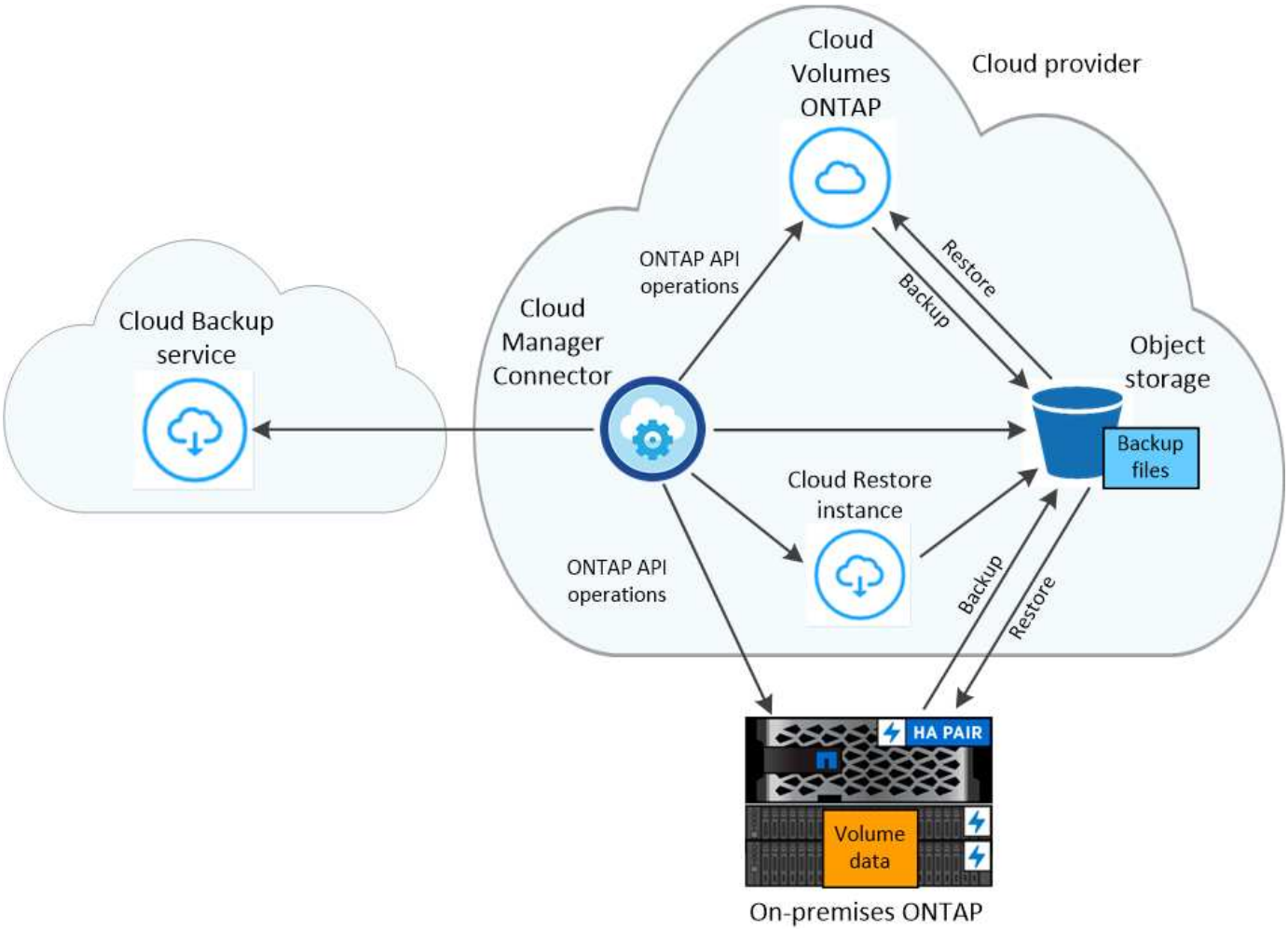
## How Cloud Backup works

When you enable Cloud Backup on a Cloud Volumes ONTAP or on-premises ONTAP system, the service performs a full backup of your data. Volume snapshots are not included in the backup image. After the initial backup, all additional backups are incremental, which means that only changed blocks and new blocks are backed up. This keeps network traffic to a minimum.

In most cases you'll use the Cloud Manager UI for all backup operations. However, starting with ONTAP 9.9.1 you can initiate volume backup operations of your on-premises ONTAP clusters using ONTAP System Manager. See how to use System Manager to back up your volumes to the cloud using Cloud Backup.

Any actions taken directly from your cloud provider environment to manage or change backup files may corrupt the files and will result in an unsupported configuration.

The following image shows the relationship between each component:




### Where backups reside

Backup copies are stored in an object store that Cloud Manager creates in your cloud account. There's one object store per cluster/working environment, and Cloud Manager names the object store as follows: "netapp-backup-clusteruuid". Be sure not to delete this object store.

- In AWS, Cloud Manager enables the Amazon S3 Block Public Access feature on the S3 bucket.
- In Azure, Cloud Manager uses a new or existing resource group with a storage account for the Blob container. Cloud Manager blocks public access to your blob data by default.
- In GCP, Cloud Manager uses a new or existing project with a storage account for the Google Cloud Storage bucket.
- In StorageGRID, Cloud Manager uses an existing storage account for the object store bucket.

If you want to change the destination object store for a cluster in the future, you'll need to unregister Cloud Backup for the working environment, and then enable Cloud Backup using the new cloud provider information.

### Supported storage classes or access tiers

- In AWS, backups start in the *Standard* storage class and transition to the *Standard-Infrequent Access* storage class after 30 days.

  If your cluster is using ONTAP 9.10.1 or greater, you can choose to tier older backups to either *S3 Glacier* or *S3 Glacier Deep Archive* storage after a certain number of days for further cost optimization. Learn more

about AWS archival storage.

- In Azure, backups are associated with the *Cool* access tier.

  If your cluster is using ONTAP 9.10.1 or greater, you can choose to tier older backups to *Azure Archive* storage after a certain number of days for further cost optimization. Learn more about Azure archival storage.

- In GCP, backups are associated with the *Standard* storage class by default.

  You can also use the lower cost *Nearline* storage class, or the *Coldline* or *Archive* storage classes. See the Google topic Storage classes for information about changing the storage class.

- In StorageGRID, backups are associated with the *Standard* storage class.

**Customizable backup schedule and retention settings per cluster**

When you enable Cloud Backup for a working environment, all the volumes you initially select are backed up using the default backup policy that you define. If you want to assign different backup policies to certain volumes that have different recovery point objectives (RPO), you can create additional policies for that cluster and assign those policies to other volumes.

You can choose a combination of hourly, daily, weekly, and monthly backups of all volumes. You can also select one of the system-defined policies that provide backups and retention for 3 months, 1 year, and 7 years. These policies are:

| Backup Policy Name | Backups per interval… | | | Max. Backups |
|---|---|---|---|---|
| | Daily | Weekly | Monthly | |
| Netapp3MonthsRetention | 30 | 13 | 3 | 46 |
| Netapp1YearRetention | 30 | 13 | 12 | 55 |
| Netapp7YearsRetention | 30 | 53 | 84 | 167 |

Backup protection policies that you have created on the cluster using ONTAP System Manager or the ONTAP CLI will also appear as selections.

Once you have reached the maximum number of backups for a category, or interval, older backups are removed so you always have the most current backups.

Note that you can create an on-demand backup of a volume from the Backup Dashboard at any time, in addition to those backup files created from the scheduled backups.

The retention period for backups of data protection volumes is the same as defined in the source SnapMirror relationship. You can change this if you want by using the API.

**Backups are taken at midnight**

- Hourly backups start 5 minutes past the hour, every hour.
- Daily backups start just after midnight each day.
- Weekly backups start just after midnight on Sunday mornings.
- Monthly backups start just after midnight on the first day of each month.

The start time is based on the time zone set on each source ONTAP system. You can't schedule backup operations at a user-specified time from the UI. For more information, contact your System Engineer.

#### Backup copies are associated with your NetApp account

Backup copies are associated with the NetApp account in which the Connector resides.

If you have multiple Connectors in the same NetApp account, each Connector will display the same list of backups. That includes the backups associated with Cloud Volumes ONTAP and on-premises ONTAP instances from other Connectors.

## FabricPool tiering policy considerations

There are certain things you need to be aware of when the volume you are backing up resides on a FabricPool aggregate and it has an assigned policy other than `none`:

- The first backup of a FabricPool-tiered volume requires reading all local and all tiered data (from the object store). A backup operation does not "reheat" the cold data tiered in object storage.

  This operation could cause a one-time increase in cost to read the data from your cloud provider.

  - Subsequent backups are incremental and do not have this effect.
  - If the tiering policy is assigned to the volume when it is initially created you will not see this issue.
- Consider the impact of backups before assigning the `all` tiering policy to volumes. Because data is tiered immediately, Cloud Backup will read data from the cloud tier rather than from the local tier. Because concurrent backup operations share the network link to the cloud object store, performance degradation might occur if network resources become saturated. In this case, you may want to proactively configure multiple network interfaces (LIFs) to decrease this type of network saturation.

## Supported volumes

Cloud Backup supports FlexVol read-write volumes and SnapMirror data protection (DP) destination volumes.

FlexGroup volumes and SnapLock volumes aren't currently supported.

## Limitations

- The ability to tier older backup files to archival storage requires that the cluster is running ONTAP 9.10.1 or greater (supported currently with AWS and Azure). Restoring volumes from backup files that reside in archival storage also requires that the destination cluster is running ONTAP 9.10.1+.
- When creating or editing a backup policy when no volumes are assigned to the policy, the number of retained backups can be a maximum of 1018. As a workaround you can reduce the number of backups to create the policy. Then you can edit the policy to create up to 4000 backups after you assign volumes to the policy.
- When backing up data protection (DP) volumes, relationships with the following SnapMirror labels won't be backed up to cloud:
  - app_consistent
  - all_source_snapshot
- SVM-DR volume backup is supported with the following restrictions:
  - Backups are supported from the ONTAP secondary only.

    - The Snapshot policy applied to the volume must be one of the policies recognized by Cloud Backup, including daily, weekly, monthly, etc. The default "sm_created" policy (used for **Mirror All Snapshots**) is not recognized and the DP volume will not be shown in the list of volumes that can be backed up.
- Ad-hoc volume backups using the **Backup Now** button aren't supported on data protection volumes.
- SM-BC configurations are not supported.
- MetroCluster (MCC) backup is supported from ONTAP secondary only: MCC > SnapMirror > ONTAP > Cloud Backup > object storage.
- ONTAP doesn't support fan-out of SnapMirror relationships from a single volume to multiple object stores; therefore, this configuration is not supported by Cloud Backup.
- WORM/Compliance mode on an object store is not supported.

#### Single File Restore limitations

- Single file restore can restore up to 100 individual files at a time. There is currently no support for restoring folders/directories.
- The file being restored must be using the same language as the language on the destination volume. You will receive an error message if the languages are not the same.
- File level restore is not supported when using the same account with different Cloud Managers in different subnets.

# Back up Cloud Volumes ONTAP data

## Backing up Cloud Volumes ONTAP data to Amazon S3

Complete a few steps to get started backing up data from Cloud Volumes ONTAP to Amazon S3.

#### Quick start

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

**Verify support for your configuration**

- You're running Cloud Volumes ONTAP 9.6 or later in AWS.
- You have a valid cloud provider subscription for the storage space where your backups will be located.
- You have subscribed to the Cloud Manager Marketplace Backup offering, an AWS annual contract, or you have purchased and activated a Cloud Backup BYOL license from NetApp.
- The IAM role that provides the Cloud Manager Connector with permissions includes S3 permissions from the latest Cloud Manager policy.

**Enable Cloud Backup on your new or existing system**

- New systems: Cloud Backup is enabled by default in the working environment wizard. Be sure to keep the option enabled.
- Existing systems: Select the working environment and click **Enable** next to the Backup & Restore service in the right-panel, and then follow the setup wizard.

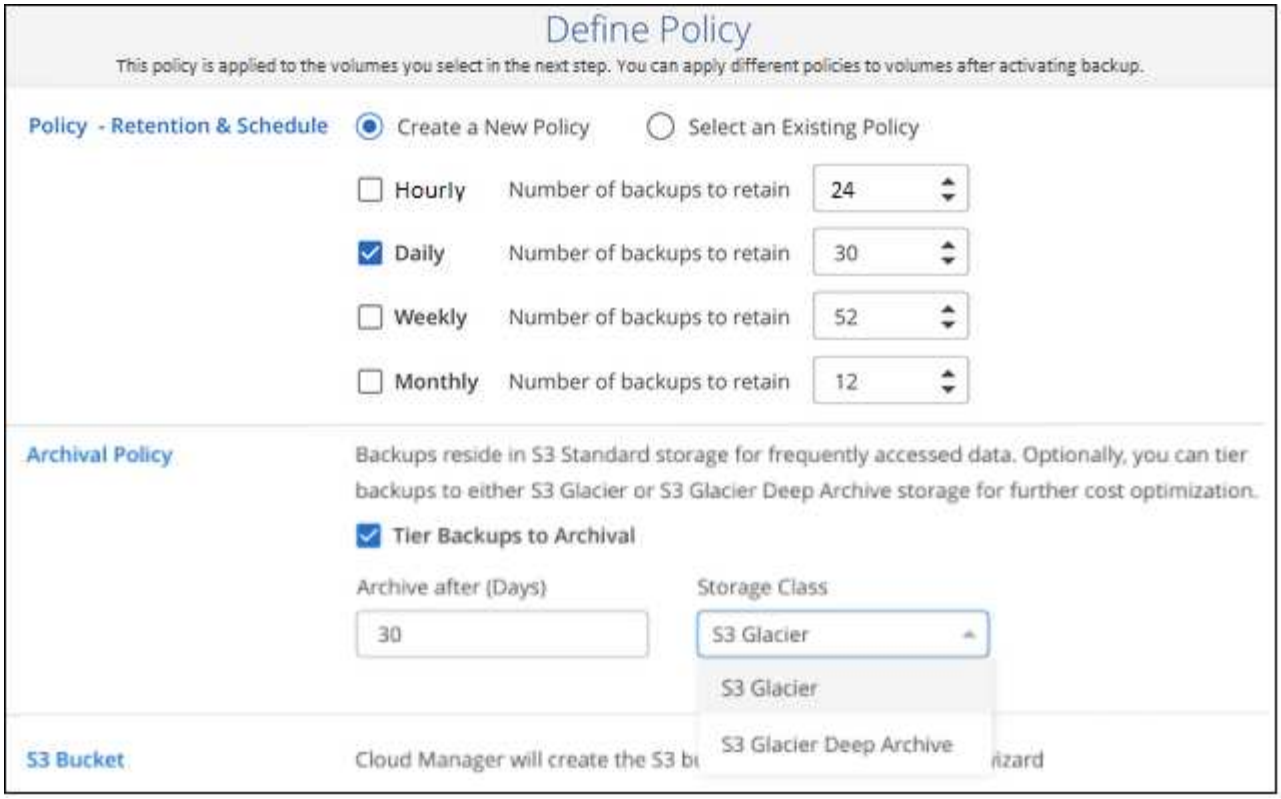
### 3 Enter the provider details

Select the AWS Account and the region where you want to create the backups. You can also choose your own customer-managed key for data encryption instead of using the default Amazon S3 encryption key.

### 4 Define the default backup policy

The default policy backs up volumes every day and retains the most recent 30 backup copies of each volume. Change to hourly, daily, weekly, or monthly backups, or select one of the system-defined policies that provide more options. You can also change the number of backup copies you want to retain.

Backups are stored in S3 Standard storage by default. If your cluster is using ONTAP 9.10.1 or greater, you can choose to tier backups to either S3 Glacier or S3 Glacier Deep Archive storage after a certain number of days for further cost optimization.



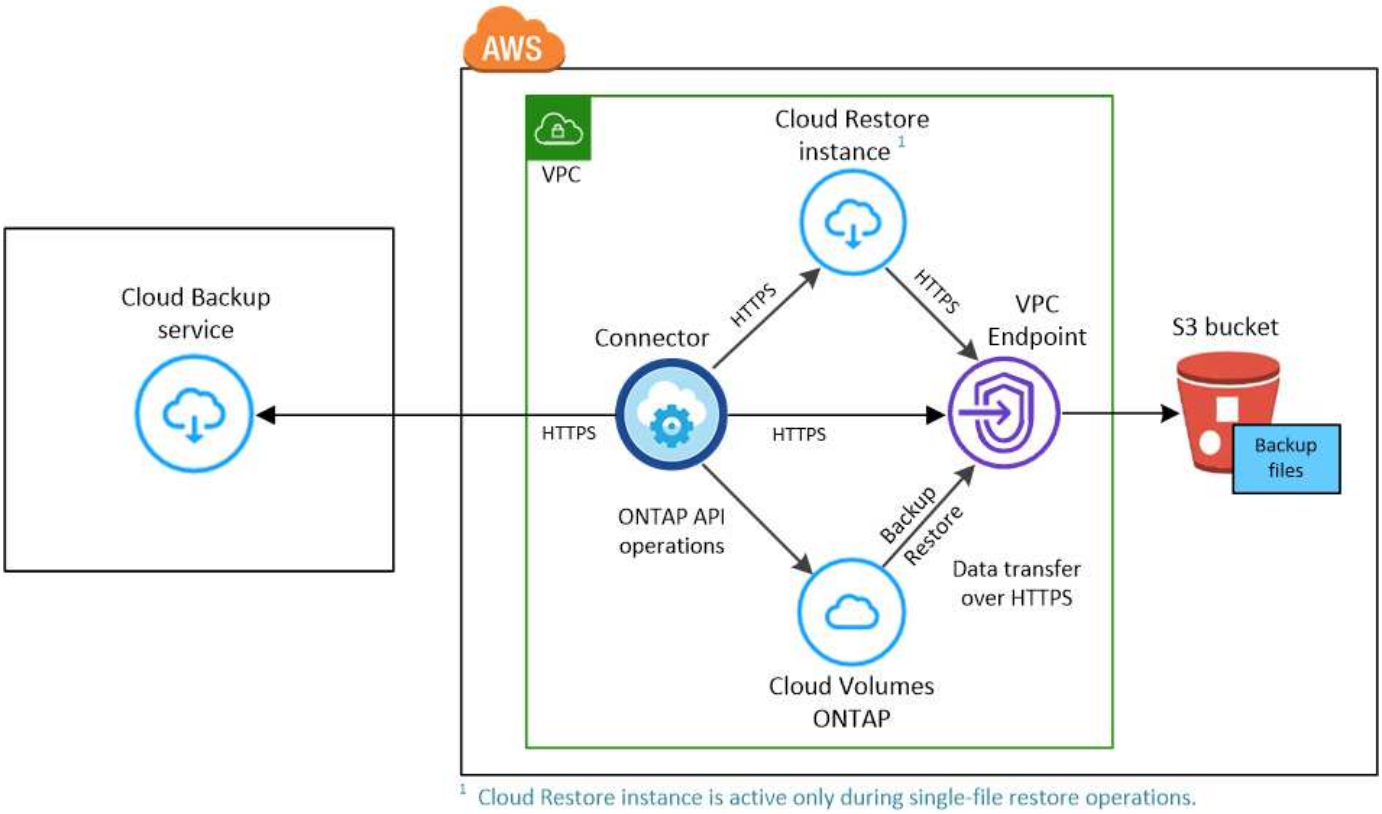

### 5 Select the volumes that you want to back up

Identify which volumes you want to back up using the default backup policy in the Select Volumes page. If you want to assign different backup policies to certain volumes, you can create additional policies and apply them to volumes later.

#### Requirements

Read the following requirements to make sure that you have a supported configuration before you start backing up volumes to S3.

The following image shows each component and the connections that you need to prepare between them:




When the Cloud Restore instance is deployed in the cloud, it is located in the same subnet as the Connector.

**Supported ONTAP versions**

Cloud Volumes ONTAP 9.6 and later.

**License requirements**

For Cloud Backup PAYGO licensing, a Cloud Manager subscription is available in the AWS Marketplace that enables deployments of Cloud Volumes ONTAP and Cloud Backup. You need to subscribe to this Cloud Manager subscription before you enable Cloud Backup. Billing for Cloud Backup is done through this subscription.

For an annual contract that enables you to back up both Cloud Volumes ONTAP data and on-premises ONTAP data, you need to subscribe from the AWS Marketplace page and then associate the subscription with your AWS credentials.

For an annual contract that enables you to bundle Cloud Volumes ONTAP and Cloud Backup, you must set up the annual contract when you create a Cloud Volumes ONTAP working environment. This option doesn't enable you to back up on-prem data.

For Cloud Backup BYOL licensing, you need the serial number from NetApp that enables you to use the service for the duration and capacity of the license. Learn how to manage your BYOL licenses.

And you need to have an AWS account for the storage space where your backups will be located.

**Supported AWS regions**

Cloud Backup is supported in all AWS regions where Cloud Volumes ONTAP is supported.

### Required setup for creating backups in a different AWS account

By default, backups are created using the same account as the one used for your Cloud Volumes ONTAP system. If you want to use a different AWS account for your backups, you must log in to the AWS portal and link the two accounts.

### Required information for using customer-managed keys for data encryption

You can choose your own customer-managed keys for data encryption in the activation wizard instead of using the default Amazon S3 encryption keys. In this case you'll need to have the encryption managed keys already set up. See how to use your own keys.

### AWS Backup permissions required

The IAM role that provides Cloud Manager with permissions must include S3 permissions from the latest Cloud Manager policy.

Here are the specific permissions from the policy:

```
{
            "Sid": "backupPolicy",
            "Effect": "Allow",
            "Action": [
                "s3:DeleteBucket",
                "s3:GetLifecycleConfiguration",
                "s3:PutLifecycleConfiguration",
                "s3:PutBucketTagging",
                "s3:ListBucketVersions",
                "s3:GetObject",
                "s3:DeleteObject",
                "s3:ListBucket",
                "s3:ListAllMyBuckets",
                "s3:GetBucketTagging",
                "s3:GetBucketLocation",
                "s3:GetBucketPolicyStatus",
                "s3:GetBucketPublicAccessBlock",
                "s3:GetBucketAcl",
                "s3:GetBucketPolicy",
                "s3:PutBucketPublicAccessBlock"
            ],
            "Resource": [
                "arn:aws:s3:::netapp-backup-*"
            ]
        },
```

### AWS Restore permissions required

The following EC2 permissions are needed for the IAM role that provides Cloud Manager with permissions so that it can start, stop, and terminate the Cloud Restore instance:

```
            "Action": [
                "ec2:DescribeInstanceTypeOfferings",
                "ec2:StartInstances",
                "ec2:StopInstances",
                "ec2:TerminateInstances"
            ],
```

### Required outbound internet access for AWS deployments

The Cloud Restore instance requires outbound internet access. If your virtual or physical network uses a proxy server for internet access, ensure that the instance has outbound internet access to contact the following endpoints.

| Endpoints | Purpose |
|---|---|
| http://amazonlinux.us-east-1.amazonaws.com/2/extras/docker/stable/x86_64/4bf88ee77c395ffe1e0c3ca68530dfb3a683ec65a4a1ce9c0ff394be50e922b2/ | CentOS package for the Cloud Restore Instance AMI. |
| http://cloudmanagerinfraprod.azurecr.io<br>https://cloudmanagerinfraprod.azurecr.io | Cloud Restore Instance image repository. |

### Enabling Cloud Backup on a new system

Cloud Backup is enabled by default in the working environment wizard. Be sure to keep the option enabled.

See Launching Cloud Volumes ONTAP in AWS for requirements and details for creating your Cloud Volumes ONTAP system.

#### Steps

1. Click **Create Cloud Volumes ONTAP**.
2. Select Amazon Web Services as the cloud provider and then choose a single node or HA system.
3. Fill out the Details & Credentials page.
4. On the Services page, leave the service enabled and click **Continue**.

5. Complete the pages in the wizard to deploy the system.

#### Result

Cloud Backup is enabled on the system and backs up volumes every day and retains the most recent 30 backup copies.

#### What's next?

You can start and stop backups for volumes or change the backup schedule.
You can also restore entire volumes or individual files from a backup file to a Cloud Volumes ONTAP system in AWS, or to an on-premises ONTAP system.

### Enabling Cloud Backup on an existing system

Enable Cloud Backup at any time directly from the working environment.

#### Steps

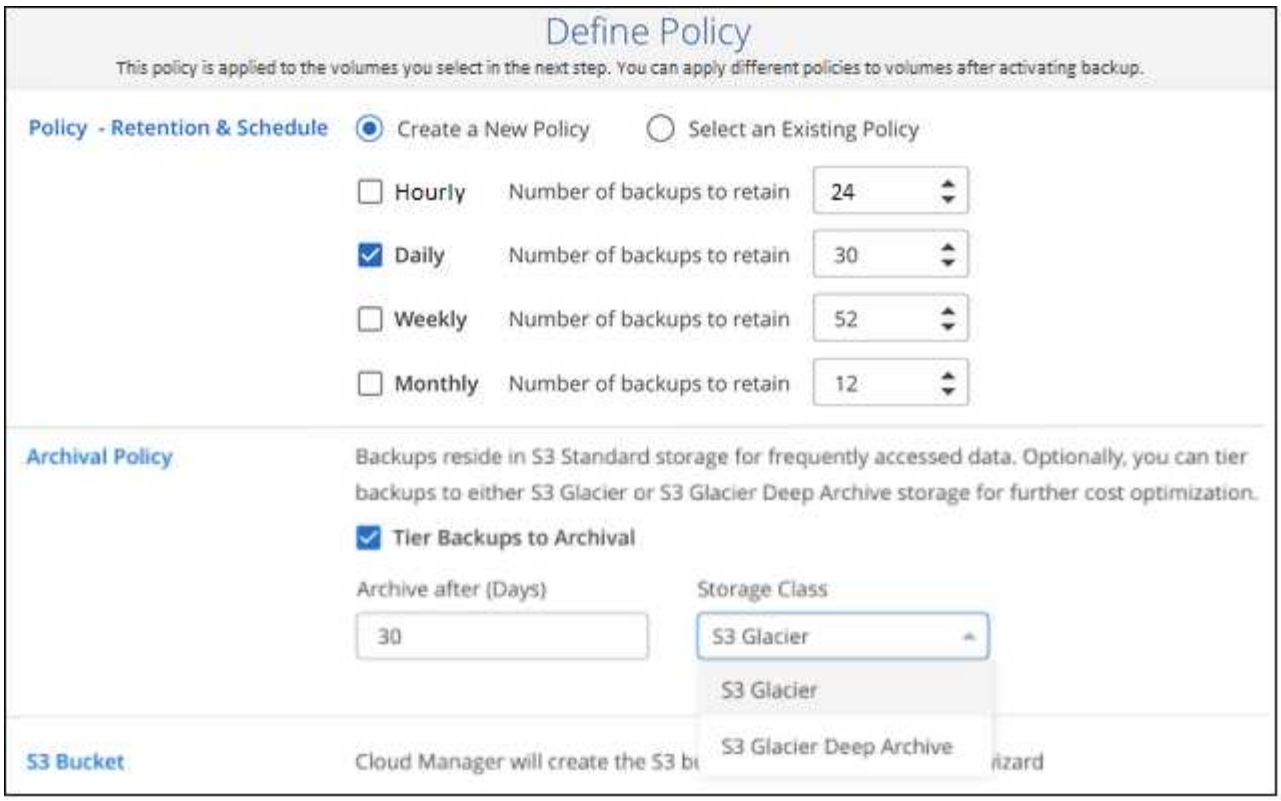
1. Select the working environment and click **Enable** next to the Backup & Restore service in the right-panel.

2. Select the provider details and click **Next**.
   a. The AWS Account used to store the backups. This can be a different account than where the Cloud Volumes ONTAP system resides.

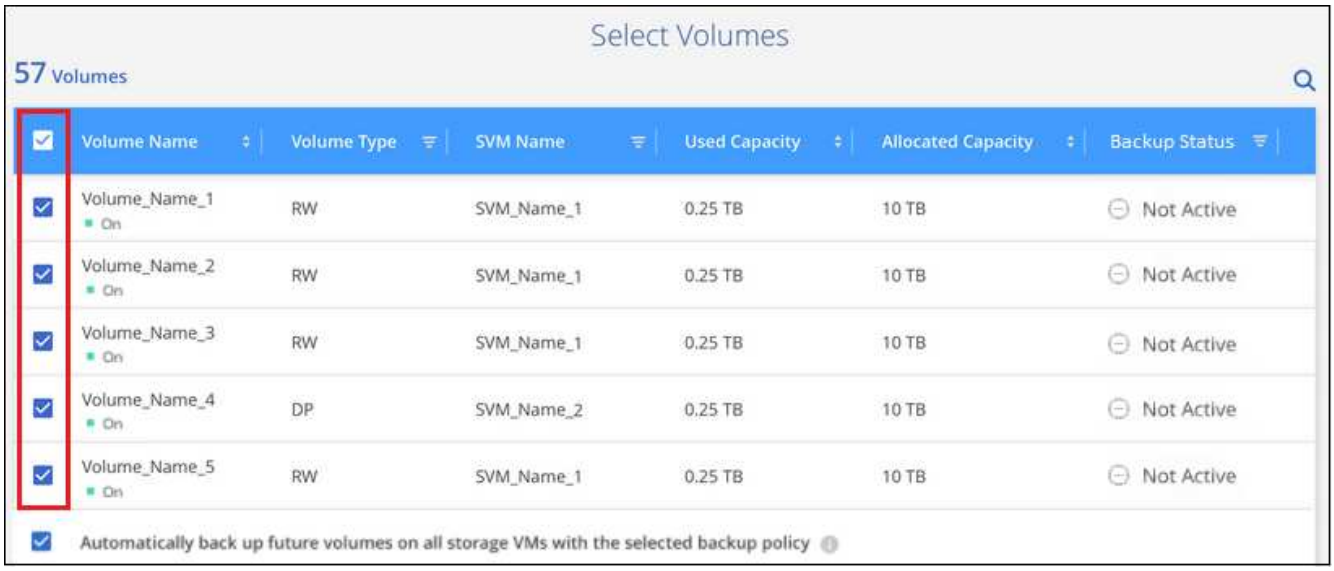
      If you want to use a different AWS account for your backups, you must log in to the AWS portal and link the two accounts.

   b. The region where the backups will be stored. This can be a different region than where the Cloud Volumes ONTAP system resides.
   c. Whether you'll use the default Amazon S3 encryption keys or choose your own customer-managed keys from your AWS account to manage encryption of your data. (See how to use your own encryption keys).

3. Enter the default backup policy details and click **Next**.
   a. Define the backup schedule and choose the number of backups to retain. See the list of existing policies you can choose.
   b. When using ONTAP 9.10.1 and greater, you can choose to tier backups to either S3 Glacier or S3 Glacier Deep Archive storage after a certain number of days for further cost optimization. Learn more about using archival tiers.




4. Select the volumes that you want to back up using the default backup policy in the Select Volumes page. If you want to assign different backup policies to certain volumes, you can create additional policies and apply them to those volumes later.




   - To back up all volumes, check the box in the title row ( Volume Name ).
   - To back up individual volumes, check the box for each volume ( Volume_1 ).

5. If you want all volumes added in the future to have backup enabled, just leave the checkbox for "Automatically back up future volumes…" checked. If you disable this setting, you'll need to manually enable backups for future volumes.
6. Click **Activate Backup** and Cloud Backup starts taking the initial backups of each selected volume.

### Result

Cloud Backup starts taking the initial backups of each selected volume and the Volume Backup Dashboard is displayed so you can monitor the state of the backups.

### What's next?

You can start and stop backups for volumes or change the backup schedule.
You can also restore entire volumes or individual files from a backup file to a Cloud Volumes ONTAP system in AWS, or to an on-premises ONTAP system.

## Backing up Cloud Volumes ONTAP data to Azure Blob storage

Complete a few steps to get started backing up data from Cloud Volumes ONTAP to Azure Blob storage.

### Quick start

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

**Verify support for your configuration**

- You're running Cloud Volumes ONTAP 9.7P5 or later in Azure.
- You have a valid cloud provider subscription for the storage space where your backups will be located.
- You have subscribed to the Cloud Manager Marketplace Backup offering, or you have purchased and activated a Cloud Backup BYOL license from NetApp.

**Enable Cloud Backup on your new or existing system**

- New systems: Cloud Backup is enabled by default in the working environment wizard. Be sure to keep the option enabled.
- Existing systems: Select the working environment and click **Enable** next to the Backup & Restore service in the right-panel, and then follow the setup wizard.

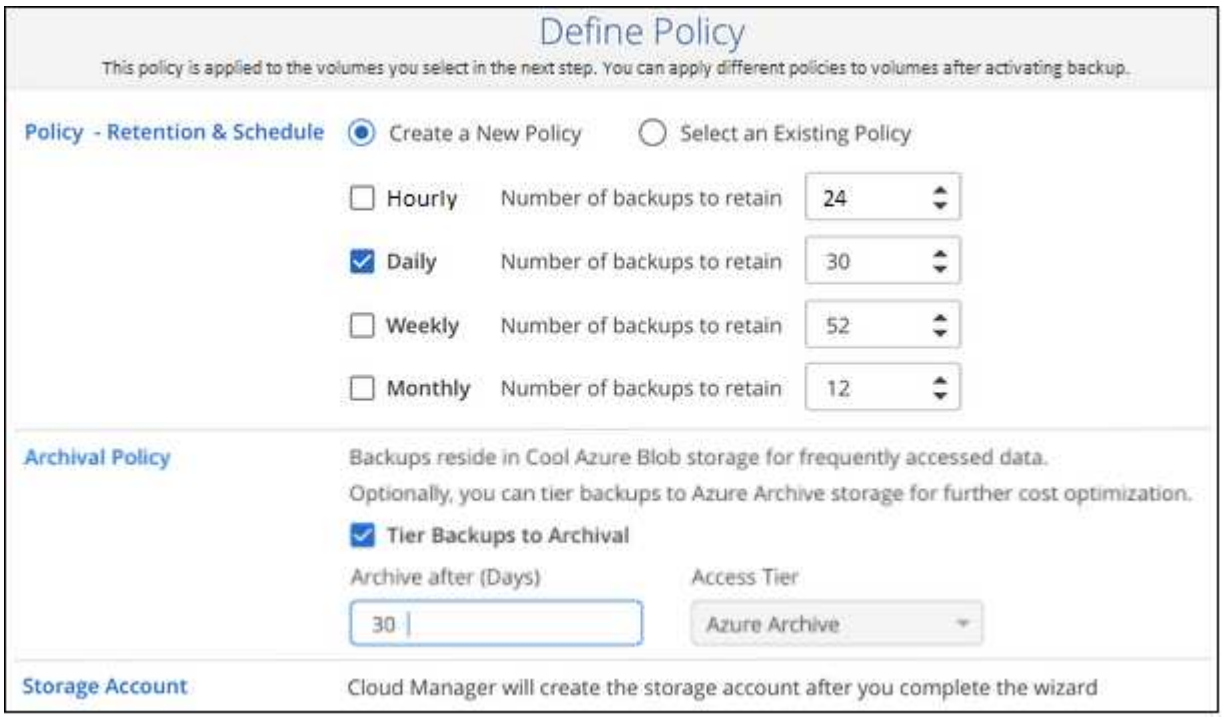
**Enter the provider details**

Select the provider subscription and region, and choose whether you want to create a new resource group or use an already existing resource group. You can also choose your own customer-managed keys for data encryption instead of using the default Microsoft-managed encryption key.

### 4 Define the default backup policy

The default policy backs up volumes every day and retains the most recent 30 backup copies of each volume. Change to hourly, daily, weekly, or monthly backups, or select one of the system-defined policies that provide more options. You can also change the number of backup copies you want to retain.

By default, backups are stored in the Cool access tier. If your cluster is using ONTAP 9.10.1 or greater, you can choose to tier backups to Azure Archive storage after a certain number of days for further cost optimization.



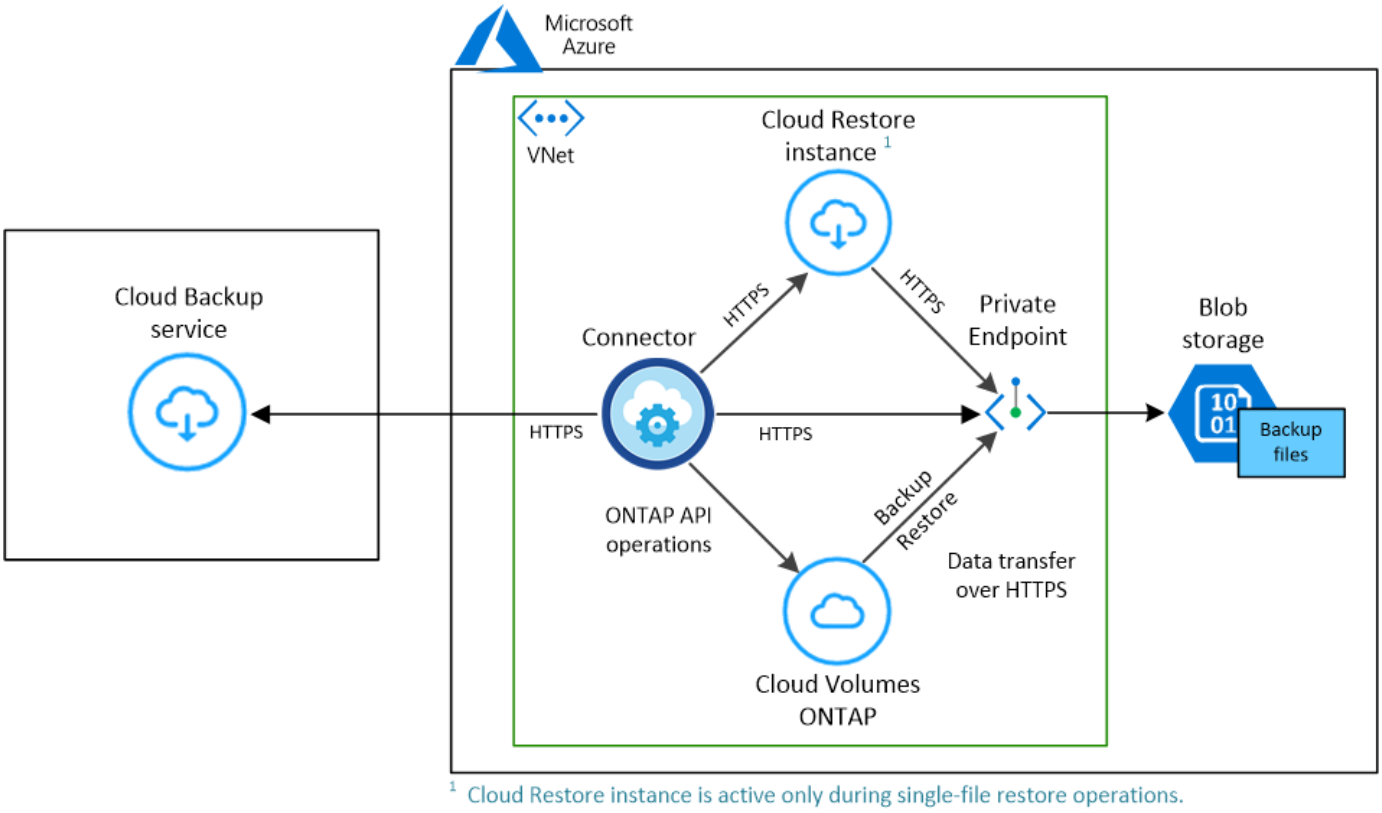

### 5 Select the volumes that you want to back up

Identify which volumes you want to back up using the default backup policy in the Select Volumes page. If you want to assign different backup policies to certain volumes, you can create additional policies and apply them to volumes later.

### Requirements

Read the following requirements to make sure that you have a supported configuration before you start backing up volumes to Azure Blob storage.

The following image shows each component and the connections that you need to prepare between them:




When the Cloud Restore virtual machine is deployed in the cloud, it is located in the same subnet as the Connector.

#### Supported ONTAP versions

Cloud Volumes ONTAP 9.7P5 and later.

#### License requirements

For Cloud Backup PAYGO licensing, a subscription through the Azure Marketplace is required before you enable Cloud Backup. Billing for Cloud Backup is done through this subscription. You can subscribe from the Details & Credentials page of the working environment wizard.

For Cloud Backup BYOL licensing, you need the serial number from NetApp that enables you to use the service for the duration and capacity of the license. Learn how to manage your BYOL licenses.

And you need to have a Microsoft Azure subscription for the storage space where your backups will be located.

#### Supported Azure regions

Cloud Backup is supported in all Azure regions where Cloud Volumes ONTAP is supported.

#### Required setup for creating backups in a different Azure subscription

By default, backups are created using the same subscription as the one used for your Cloud Volumes ONTAP system. If you want to use a different Azure subscription for your backups, you must log in to the

Azure portal and link the two subscriptions.

**Required information for using customer-managed keys for data encryption**

You can use your own customer-managed keys for data encryption in the activation wizard instead of using the default Microsoft-managed encryption keys. In this case you will need to have the Azure Subscription, Key Vault name, and the Key. See how to use your own keys.

**Required outbound internet access for Azure deployments**

The Cloud Restore virtual machine requires outbound internet access. If your virtual or physical network uses a proxy server for internet access, ensure that the instance has outbound internet access to contact the following endpoints.

| Endpoints | Purpose |
|---|---|
| http://olcentgbl.trafficmanager.net<br>https://olcentgbl.trafficmanager.net | Provides CentOS packages for the Cloud Restore virtual machine. |
| http://cloudmanagerinfraprod.azurecr.io<br>https://cloudmanagerinfraprod.azurecr.io | Cloud Restore virtual machine image repository. |

### Enabling Cloud Backup on a new system

Cloud Backup is enabled by default in the working environment wizard. Be sure to keep the option enabled.

See Launching Cloud Volumes ONTAP in Azure for requirements and details for creating your Cloud Volumes ONTAP system.

If you want to pick the name of the resource group, **disable** Cloud Backup when deploying Cloud Volumes ONTAP. Follow the steps for enabling Cloud Backup on an existing system to enable Cloud Backup and choose the resource group.

**Steps**

1. Click **Create Cloud Volumes ONTAP**.
2. Select Microsoft Azure as the cloud provider and then choose a single node or HA system.
3. In the Define Azure Credentials page, enter the credentials name, client ID, client secret, and directory ID, and click **Continue**.
4. Fill out the Details & Credentials page and be sure that an Azure Marketplace subscription is in place, and click **Continue**.
5. On the Services page, leave the service enabled and click **Continue**.

6. Complete the pages in the wizard to deploy the system.

**Result**

Cloud Backup is enabled on the system and backs up volumes every day and retains the most recent 30 backup copies.

**What's next?**

You can start and stop backups for volumes or change the backup schedule.
You can also restore entire volumes or individual files from a backup file to a Cloud Volumes ONTAP system in Azure, or to an on-premises ONTAP system.

### Enabling Cloud Backup on an existing system

Enable Cloud Backup at any time directly from the working environment.

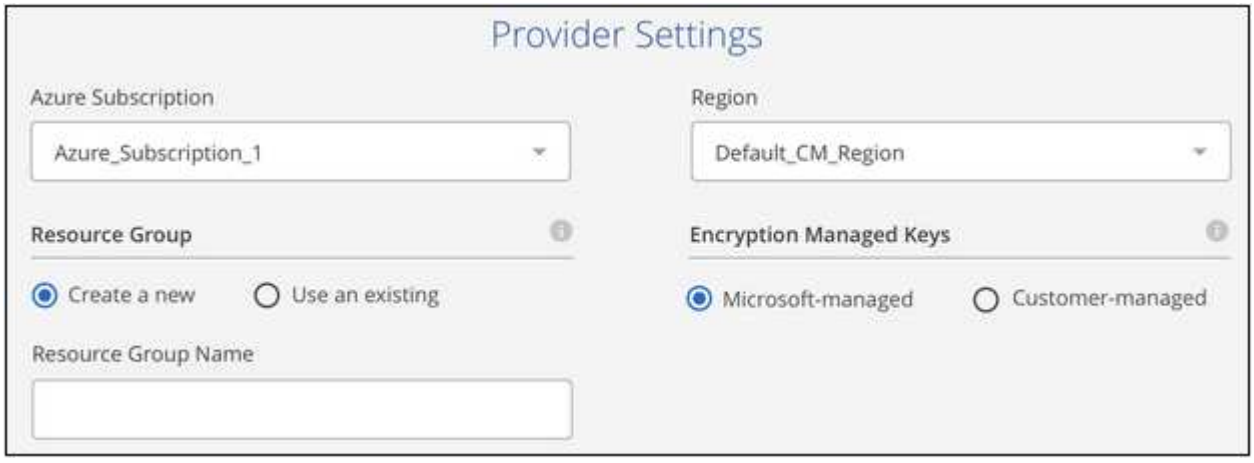
**Steps**

1. Select the working environment and click **Enable** next to the Backup & Restore service in the right-panel.

2. Select the provider details and click **Next**.
   a. The Azure subscription used to store the backups. This can be a different subscription than where the Cloud Volumes ONTAP system resides.

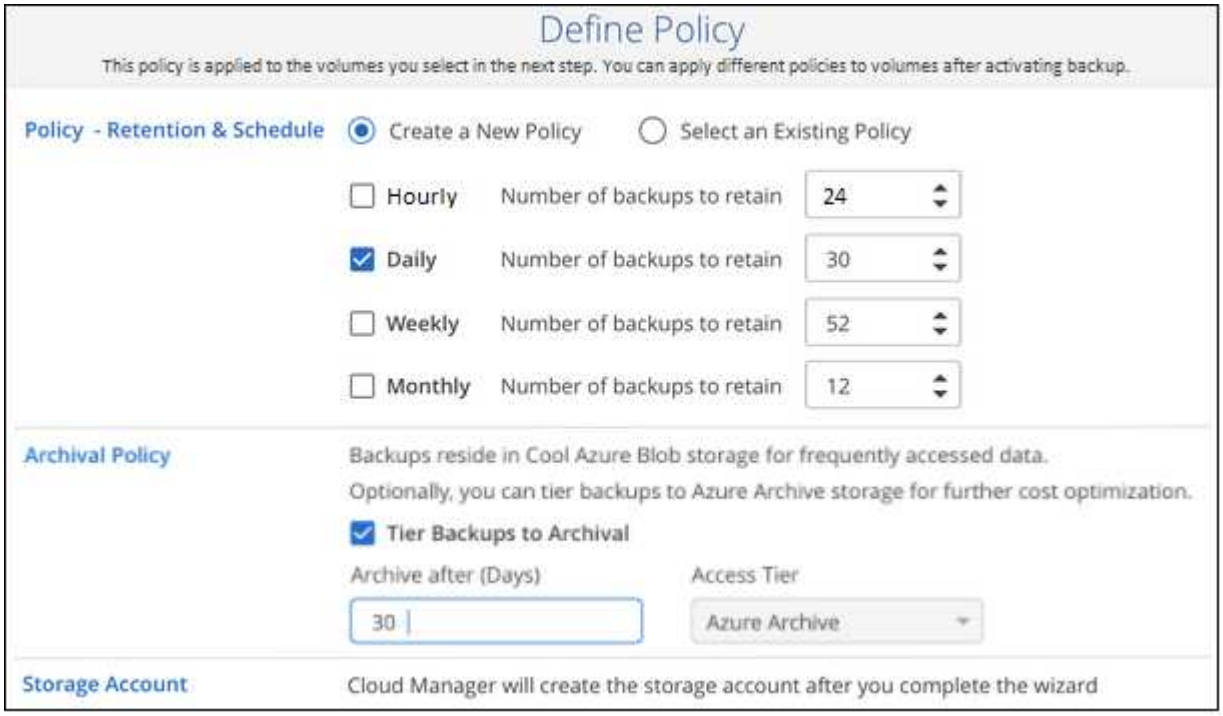
      If you want to use a different Azure subscription for your backups, you must log in to the Azure portal and link the two subscriptions.

   b. The region where the backups will be stored. This can be a different region than where the Cloud Volumes ONTAP system resides.
   c. The resource group that manages the Blob container - you can create a new resource group or select an existing resource group.
   d. Whether you'll use the default Microsoft-managed encryption key or choose your own customer-managed keys to manage encryption of your data. (See how to use your own keys).

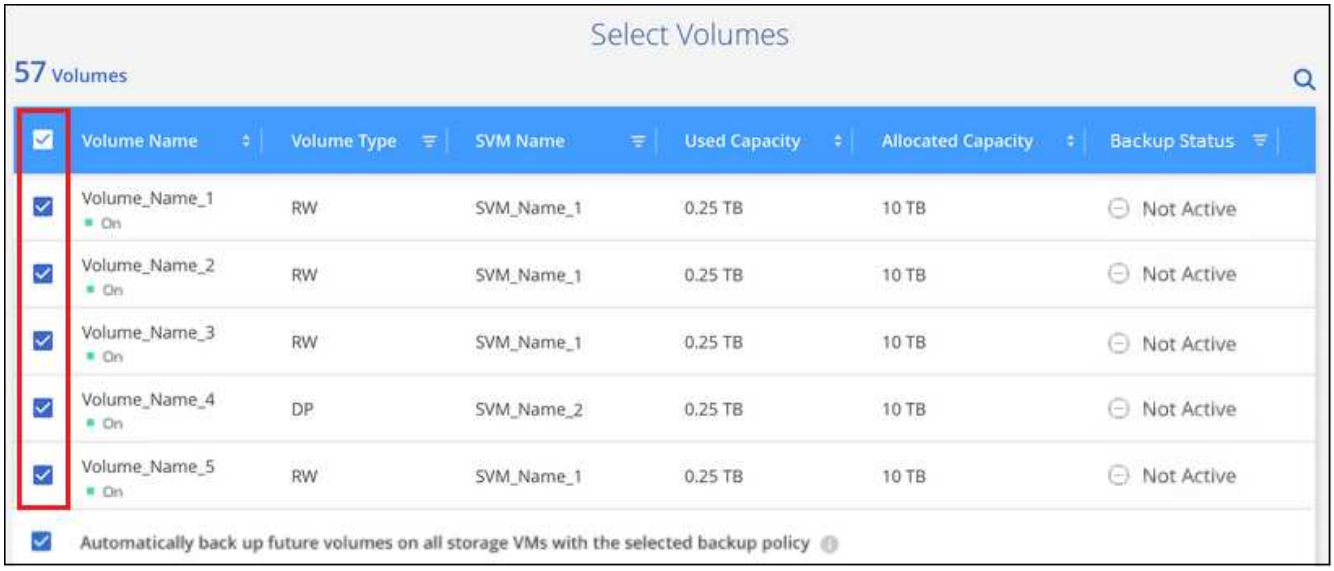



3. Enter the default backup policy details and click **Next**.
   a. Define the backup schedule and choose the number of backups to retain. See the list of existing policies you can choose.
   b. When using ONTAP 9.10.1 and greater, you can choose to tier backups to Azure Archive storage after

a certain number of days for further cost optimization. Learn more about using archival tiers.




4. Select the volumes that you want to back up using the default backup policy in the Select Volumes page. If you want to assign different backup policies to certain volumes, you can create additional policies and apply them to those volumes later.




   - To back up all volumes, check the box in the title row ( Volume Name ).
   - To back up individual volumes, check the box for each volume ( Volume_1 ).
5. If you want all volumes added in the future to have backup enabled, just leave the checkbox for "Automatically back up future volumes…" checked. If you disable this setting, you'll need to manually enable backups for future volumes.
6. Click **Activate Backup** and Cloud Backup starts taking the initial backups of each selected volume.

**Result**

Cloud Backup starts taking the initial backups of each selected volume and the Volume Backup Dashboard is displayed so you can monitor the state of the backups.

**What's next?**

You can start and stop backups for volumes or change the backup schedule.
You can also restore entire volumes or individual files from a backup file to a Cloud Volumes ONTAP system in Azure, or to an on-premises ONTAP system.

## Backing up Cloud Volumes ONTAP data to Google Cloud Storage

Complete a few steps to get started backing up data from Cloud Volumes ONTAP to Google Cloud Storage.

**Quick start**

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

### 1 Verify support for your configuration

- You're running Cloud Volumes ONTAP 9.7P5 or later in GCP.
- You have a valid GCP subscription for the storage space where your backups will be located.
- You have a service account in your Google Cloud Project that has the predefined Storage Admin role.
- You have subscribed to the Cloud Manager Marketplace Backup offering, or you have purchased and activated a Cloud Backup BYOL license from NetApp.

### 2 Enable Cloud Backup on your new or existing system

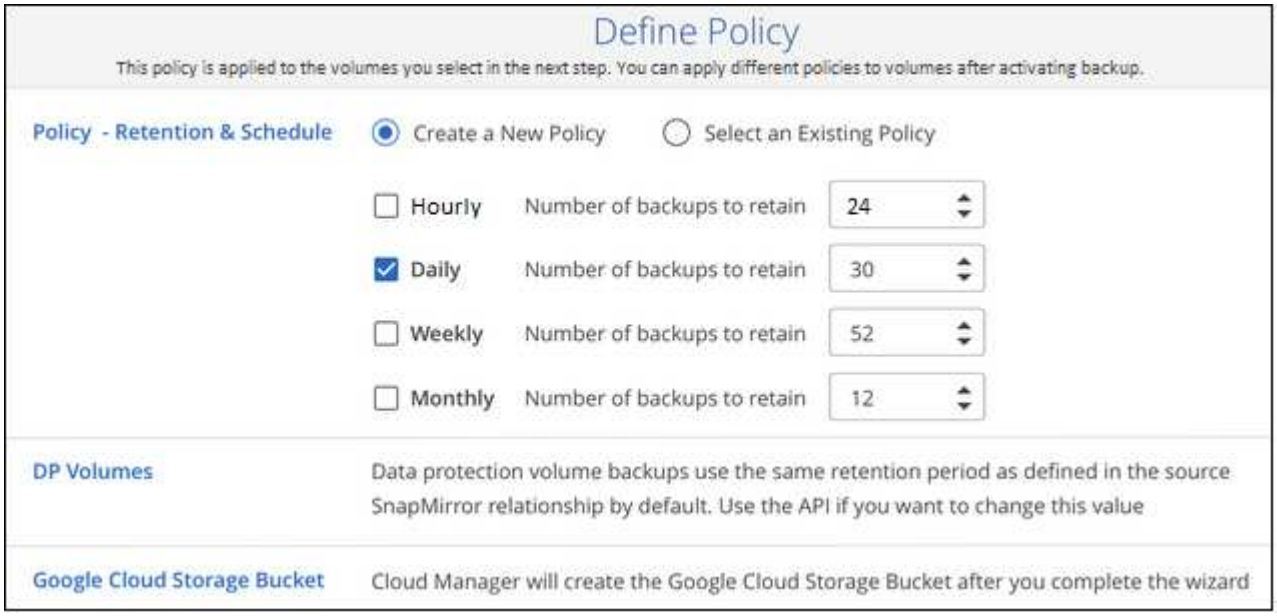
- New systems: Cloud Backup can be enabled when you complete the new working environment wizard.
- Existing systems: Select the working environment and click **Enable** next to the Backup & Restore service in the right-panel, and then follow the setup wizard.

### 3 Enter the provider details

Select the Google Cloud Project where you want the Google Cloud Storage bucket to be created for backups.

### 4 Define the default backup policy

The default policy backs up volumes every day and retains the most recent 30 backup copies of each volume. Change to hourly, daily, weekly, or monthly backups, or select one of the system-defined policies that provide more options. You can also change the number of backup copies you want to retain.



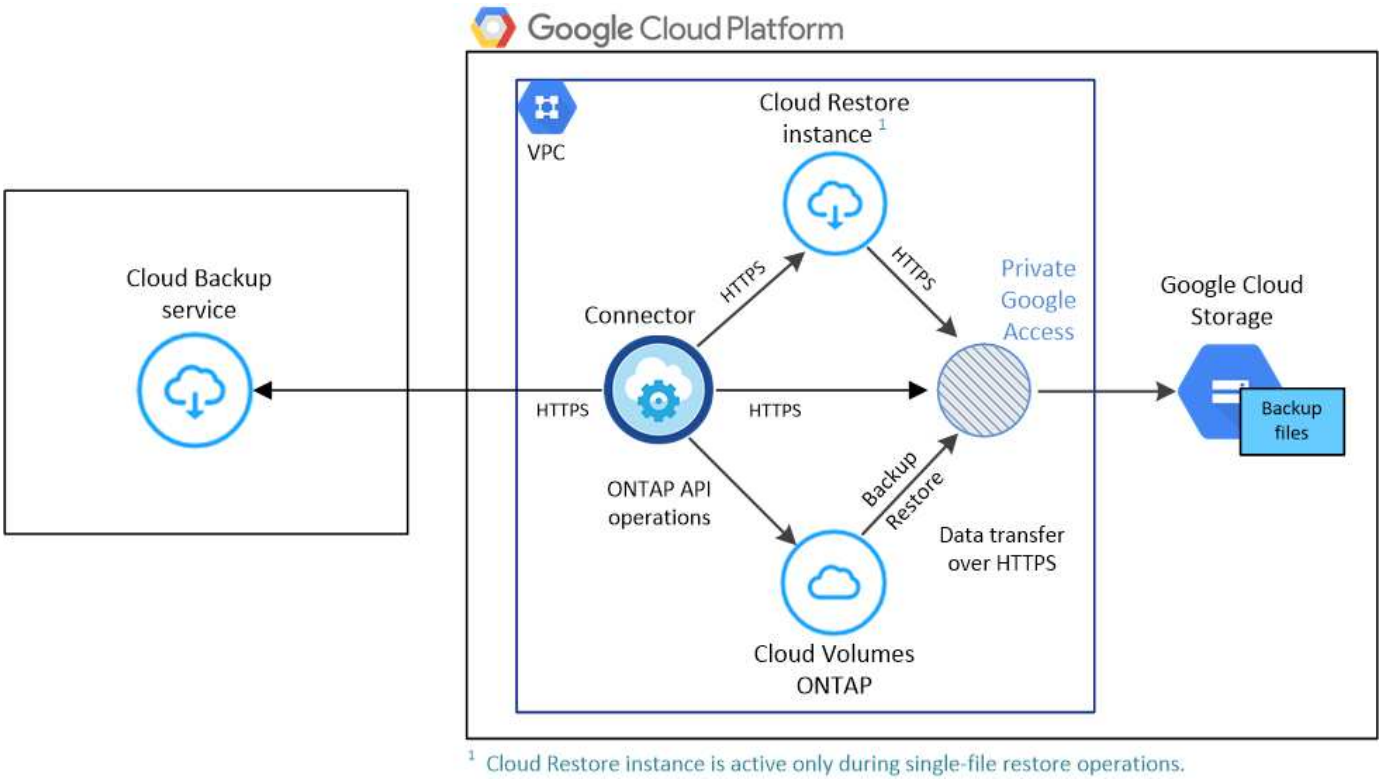

### 5 Select the volumes that you want to back up

Identify which volumes you want to back up using the default backup policy in the Select Volumes page. If you want to assign different backup policies to certain volumes, you can create additional policies and apply them to volumes later.

#### Requirements

Read the following requirements to make sure that you have a supported configuration before you start backing up volumes to Google Cloud storage.

The following image shows each component and the connections that you need to prepare between them:




**Supported ONTAP versions**

Cloud Volumes ONTAP 9.7P5 and later.

**Supported GCP regions**

Cloud Backup is supported in all GCP regions where Cloud Volumes ONTAP is supported.

**License requirements**

For Cloud Backup PAYGO licensing, a subscription through the GCP Marketplace is required before you enable Cloud Backup. Billing for Cloud Backup is done through this subscription. You can subscribe from the Details & Credentials page of the working environment wizard.

For Cloud Backup BYOL licensing, you need the serial number from NetApp that enables you to use the service for the duration and capacity of the license. Learn how to manage your BYOL licenses.

And you need to have a Google subscription for the storage space where your backups will be located.

**GCP Service Account**

You need to have a service account in your Google Cloud Project that has the predefined Storage Admin role. Learn how to create a service account.

### Enabling Cloud Backup on a new system

Cloud Backup can be enabled when you complete the working environment wizard to create a new Cloud Volumes ONTAP system.

You must have a Service Account already configured. If you don't select a service account when you create the Cloud Volumes ONTAP system, then you'll need to turn off the system and add the service account to Cloud Volumes ONTAP from the GCP console.

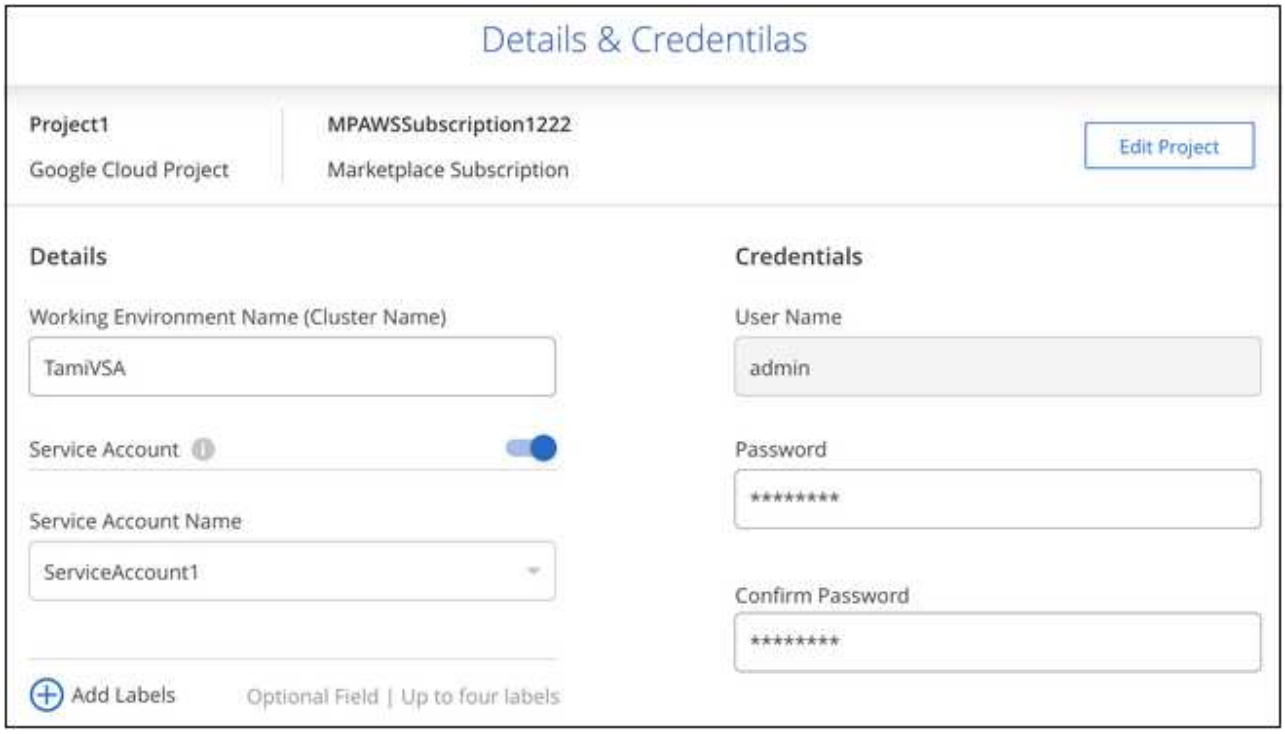
See Launching Cloud Volumes ONTAP in GCP for requirements and details for creating your Cloud Volumes

ONTAP system.

**Steps**

1. On the Working Environments page, click **Add Working Environment** and follow the prompts.
2. **Choose a Location**: Select **Google Cloud Platform**.
3. **Choose Type**: Select **Cloud Volumes ONTAP** (either single-node or high-availability).
4. **Details & Credentials**: Enter the following information:
   a. Click **Edit Project** and select a new project if the one you want to use is different than the default Project (where Cloud Manager resides).
   b. Specify the cluster name.
   c. Enable the **Service Account** switch and select the Service Account that has the predefined Storage Admin role. This is required to enable backups and tiering.
   d. Specify the credentials.

      Make sure that a GCP Marketplace subscription is in place.




5. **Services**: Leave the Cloud Backup service enabled and click **Continue**.

6. Complete the pages in the wizard to deploy the system as described in Launching Cloud Volumes ONTAP in GCP.

### Result

Cloud Backup is enabled on the system and backs up the volume you created every day and retains the most recent 30 backup copies.

You can start and stop backups for volumes or change the backup schedule.
You can also restore entire volumes from a backup file to a Cloud Volumes ONTAP system in Google, or to an on-premises ONTAP system.

### Enabling Cloud Backup on an existing system

You can enable Cloud Backup at any time directly from the working environment.

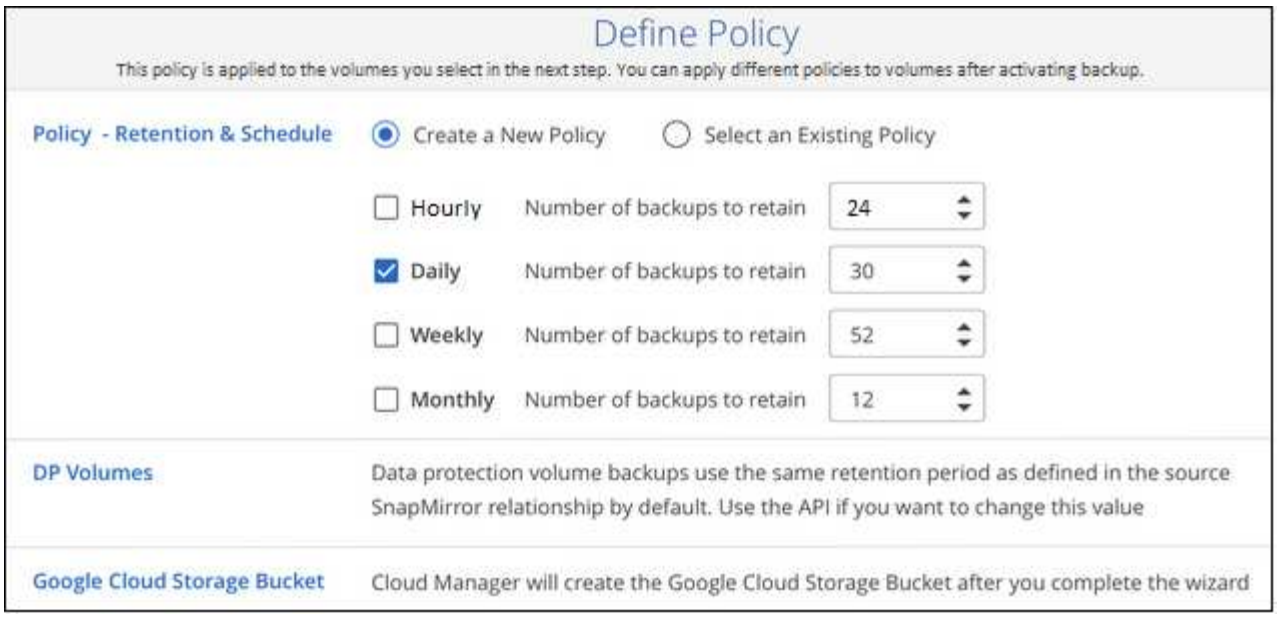
### Steps

1. Select the working environment and click **Enable** next to the Backup & Restore service in the right-panel.

2. Select the Google Cloud Project and region where you want the Google Cloud Storage bucket to be created for backups, and click **Next**.

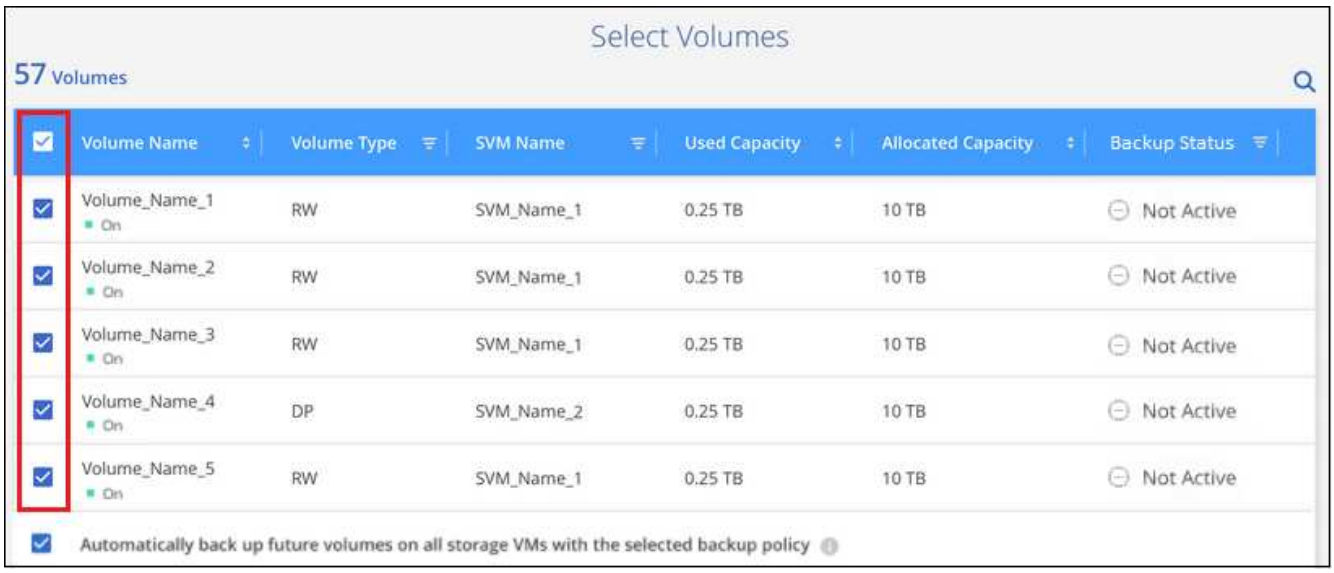
   Note that the Project must have a Service Account that has the predefined Storage Admin role.

3. In the *Define Policy* page, select the default backup schedule and retention value and click **Next**.




See the list of existing policies.

4. Select the volumes that you want to back up using the default backup policy in the Select Volumes page. If you want to assign different backup policies to certain volumes, you can create additional policies and apply them to those volumes later.




   - To back up all volumes, check the box in the title row ( Volume Name ).
   - To back up individual volumes, check the box for each volume ( Volume_1 ).

5. If you want all volumes added in the future to have backup enabled, just leave the checkbox for "Automatically back up future volumes…" checked. If you disable this setting, you'll need to manually enable backups for future volumes.
6. Click **Activate Backup** and Cloud Backup starts taking the initial backups of each selected volume.

**Result**

Cloud Backup starts taking the initial backups of each selected volume and the Volume Backup Dashboard is displayed so you can monitor the state of the backups.

**What's next?**

You can start and stop backups for volumes or change the backup schedule.
You can also restore entire volumes from a backup file to a Cloud Volumes ONTAP system in Google, or to an on-premises ONTAP system.

# Back up on-premises ONTAP data

## Backing up on-premises ONTAP data to Amazon S3

Complete a few steps to get started backing up data from your on-premises ONTAP systems to Amazon S3 storage.

In most cases you'll use Cloud Manager for all backup and restore operations. However, starting with ONTAP 9.9.1 you can initiate volume backup operations of your on-premises ONTAP clusters using ONTAP System Manager. See how to use System Manager to back up your volumes to the cloud using Cloud Backup.

**Quick start**

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

**Verify support for your configuration**

- You have discovered the on-premises cluster and added it to a working environment in Cloud Manager. See Discovering ONTAP clusters for details.
  - The cluster is running ONTAP 9.7P5 or later.
  - The cluster has a SnapMirror license — it is included as part of the Premium Bundle or Data Protection Bundle.
  - The cluster must have the required network connections to S3 storage and to the Connector.
- The Connector must have the required network connections to S3 storage and to the cluster, and the required permissions.
- You have a valid AWS subscription for the object storage space where your backups will be located.
- You have an AWS Account with an access key and secret key, and the required permissions so the ONTAP cluster can back up and restore data.

**Enable Cloud Backup on the system**

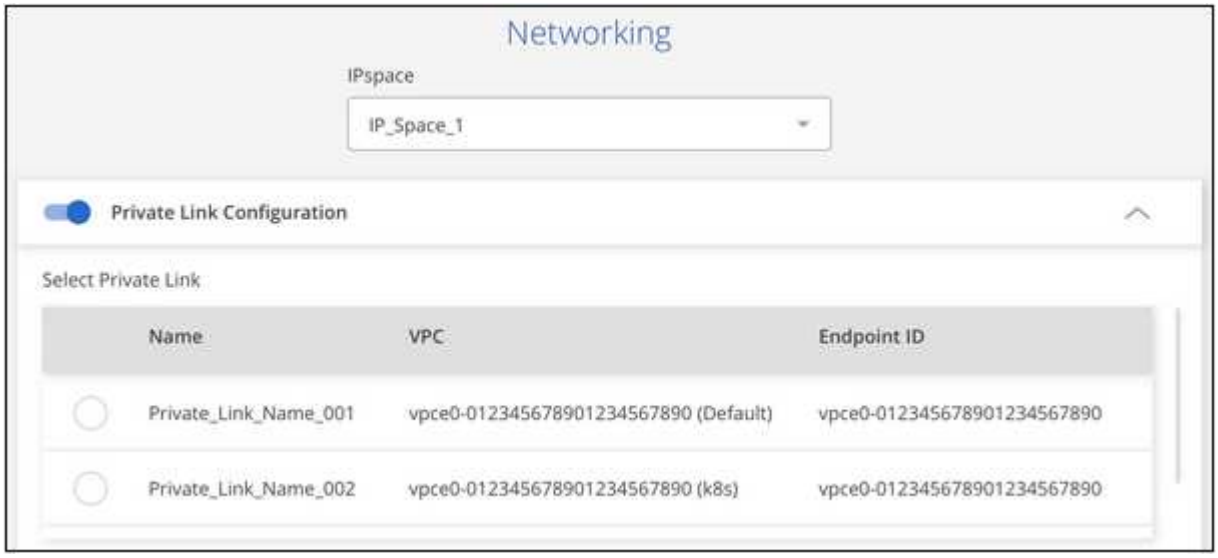
Select the working environment and click **Enable** next to the Backup & Restore service in the right-panel, and then follow the setup wizard.

**Select the cloud provider and enter the provider details**

Select Amazon Web Services as your provider and then enter the provider details. You'll need to select the AWS Account and the region where you want to create the backups. You can also choose your own customer-managed key for data encryption instead of using the default Amazon S3 encryption key.

### 4 Select the cluster IPspace and optionally select an AWS PrivateLink connection

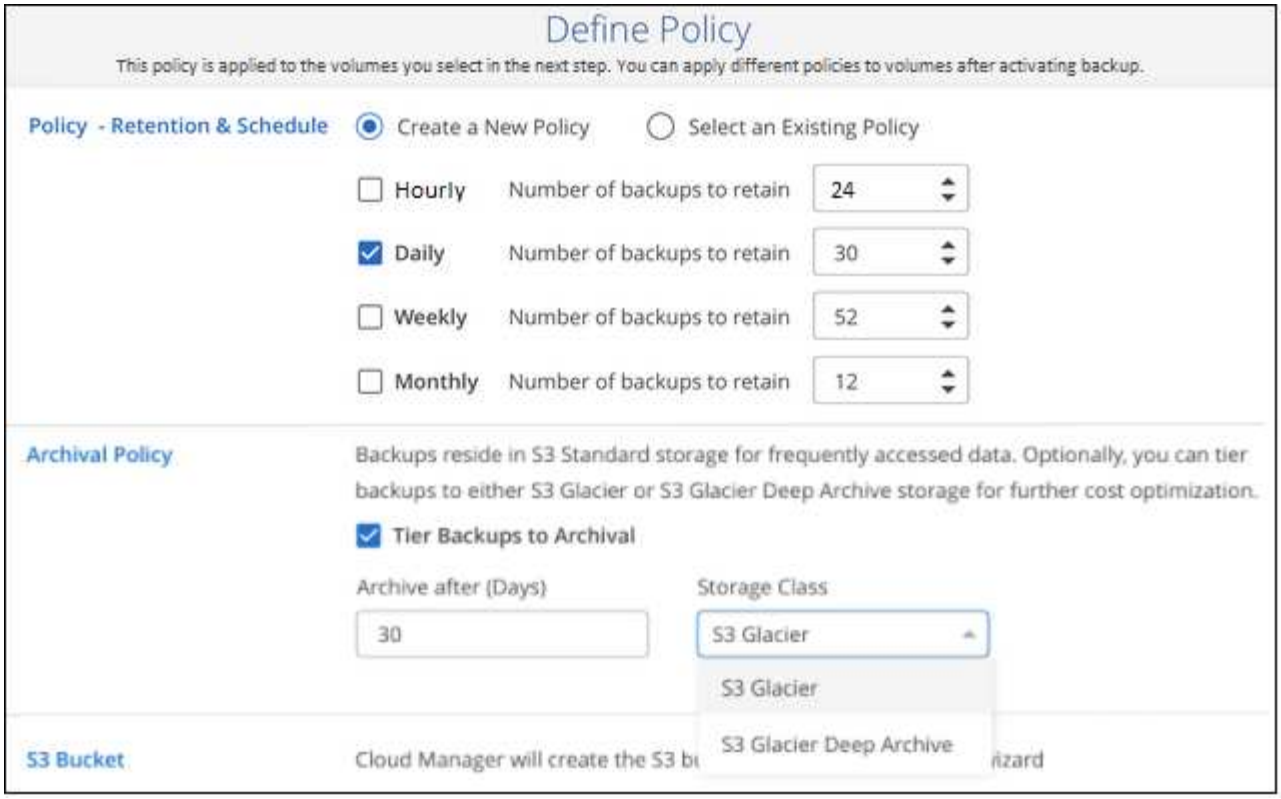
Select the IPspace in the ONTAP cluster where the volumes reside. You can also choose to use an existing AWS PrivateLink configuration for a more secure connection to the VPC from your on-prem data center.




### 5 Define the default backup policy

The default policy backs up volumes every day and retains the most recent 30 backup copies of each volume. Change to hourly, daily, weekly, or monthly backups, or select one of the system-defined policies that provide more options. You can also change the number of backup copies you want to retain.

By default, backups are stored in S3 Standard storage. If your cluster is using ONTAP 9.10.1 or greater, you can choose to tier backups to either S3 Glacier or S3 Glacier Deep Archive storage after a certain number of days for further cost optimization.



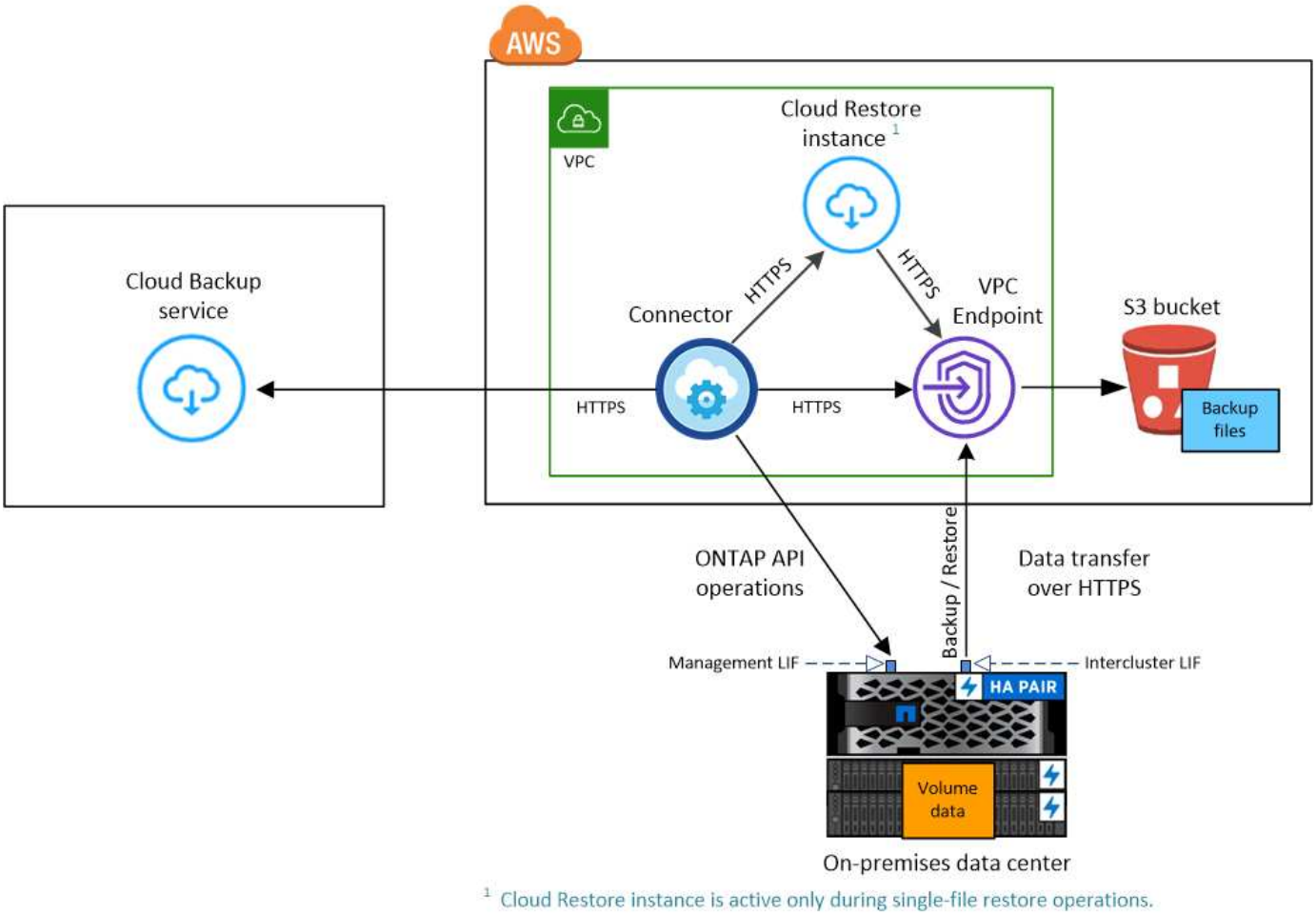

### 6 Select the volumes that you want to back up

Identify which volumes you want to back up using the default backup policy in the Select Volumes page. If you want to assign different backup policies to certain volumes, you can create additional policies and apply them to volumes later.

#### Requirements

Read the following requirements to make sure you have a supported configuration before you start backing up on-premises volumes to S3 storage.

The following image shows each component and the connections that you need to prepare between them:




Note that when the Cloud Restore instance is deployed in the cloud, it is located in the same subnet as the Connector.

#### Preparing your ONTAP clusters

You need to discover your on-premises ONTAP clusters in Cloud Manager before you can start backing up volume data.

Learn how to discover a cluster.

### ONTAP requirements

- ONTAP 9.7P5 and later.
- A SnapMirror license (included as part of the Premium Bundle or Data Protection Bundle).

  **Note:** The "Hybrid Cloud Bundle" is not required when using Cloud Backup.

  See how to manage your cluster licenses.

- Time and time zone are set correctly.

  See how to configure your cluster time.

### Cluster networking requirements

- The ONTAP cluster initiates an HTTPS connection over port 443 from the intercluster LIF to Amazon S3 storage for backup and restore operations.

  ONTAP reads and writes data to and from object storage. The object storage never initiates, it just responds.

- ONTAP requires an inbound connection from the Connector to the cluster management LIF. The Connector can reside in an AWS VPC.
- An intercluster LIF is required on each ONTAP node that hosts the volumes you want to back up. The LIF must be associated with the *IPspace* that ONTAP should use to connect to object storage. Learn more about IPspaces.

  When you set up Cloud Backup, you are prompted for the IPspace to use. You should choose the IPspace that each LIF is associated with. That might be the "Default" IPspace or a custom IPspace that you created.

- The nodes' intercluster LIFs are able to access the object store.
- DNS servers have been configured for the storage VM where the volumes are located. See how to configure DNS services for the SVM.
- Note that if you use are using a different IPspace than the Default, then you might need to create a static route to get access to the object storage.
- Update firewall rules, if necessary, to allow Cloud Backup service connections from ONTAP to object storage through port 443 and name resolution traffic from the storage VM to the DNS server over port 53 (TCP/UDP).

#### Creating or switching Connectors

A Connector is required to back up data to the cloud, and the Connector must be in an AWS VPC when backing up data to AWS S3 storage. You can't use a Connector that's deployed on-premises. You'll either need to create a new Connector or make sure that the currently selected Connector resides in the correct provider.

- Learn about Connectors
- Creating a Connector in AWS
- Switching between Connectors

#### Preparing networking for the Connector

Ensure that the Connector has the required networking connections.

**Steps**

1. Ensure that the network where the Connector is installed enables the following connections:
   - An outbound internet connection to the Cloud Backup service over port 443 (HTTPS)
   - An HTTPS connection over port 443 to your S3 object storage
   - An HTTPS connection over port 443 to your ONTAP clusters
2. Enable a VPC Endpoint to S3. This is needed if you have a Direct Connect or VPN connection from your ONTAP cluster to the VPC and you want communication between the Connector and S3 to stay in your AWS internal network.

#### Supported regions

You can create backups from on-premises systems to Amazon S3 in all regions where Cloud Volumes ONTAP is supported. You specify the region where the backups will be stored when you set up the service.

#### License requirements

Before your 30-day free trial of Cloud Backup expires, you need to subscribe to a pay-as-you-go (PAYGO) Cloud Manager Marketplace offering from AWS, or purchase and activate a Cloud Backup BYOL license from NetApp. These licenses are for the account and can be used across multiple systems.

- For Cloud Backup PAYGO licensing, you'll need a subscription to the AWS Cloud Manager Marketplace offering to continue using Cloud Backup. Billing for Cloud Backup is done through this subscription.
- For Cloud Backup BYOL licensing, you don't need a subscription. You need the serial number from NetApp that enables you to use the service for the duration and capacity of the license. Learn how to manage your BYOL licenses.

You need to have an AWS subscription for the object storage space where your backups will be located.

A SnapMirror license is required on the cluster. Note that the "Hybrid Cloud Bundle" is not required when using Cloud Backup.

#### Preparing Amazon S3 for backups

When you are using Amazon S3, you must configure permissions for the Connector to create and manage the S3 bucket, and you must configure permissions so the on-premises ONTAP cluster can read and write to the S3 bucket.

**Steps**

1. Confirm that the following S3 permissions (from the latest Cloud Manager policy) are part of the IAM role that provides the Connector with permissions:

```
{
            "Sid": "backupPolicy",
            "Effect": "Allow",
            "Action": [
                "s3:DeleteBucket",
                "s3:GetLifecycleConfiguration",
                "s3:PutLifecycleConfiguration",
                "s3:PutBucketTagging",
                "s3:ListBucketVersions",
                "s3:GetObject",
                "s3:ListBucket",
                "s3:ListAllMyBuckets",
                "s3:GetBucketTagging",
                "s3:GetBucketLocation",
                "s3:GetBucketPolicyStatus",
                "s3:GetBucketPublicAccessBlock",
                "s3:GetBucketAcl",
                "s3:GetBucketPolicy",
                "s3:PutBucketPublicAccessBlock"
            ],
            "Resource": [
                "arn:aws:s3:::netapp-backup-*"
            ]
        },
```

2. Add the following EC2 permissions to the IAM role that provides the Connector with permissions so that it can start, stop, and terminate the Cloud Restore instance:

```
            "Action": [
                "ec2:DescribeInstanceTypeOfferings",
                "ec2:StartInstances",
                "ec2:StopInstances",
                "ec2:TerminateInstances"
            ],
```

3. During the Backup wizard you will be prompted to enter an access key and secret key. For that, you will need to create an IAM user with the following permissions. Cloud Backup passes these credentials on to the ONTAP cluster so that ONTAP can backup and restore data to the S3 bucket.

```
"s3:ListAllMyBuckets",
"s3:ListBucket",
"s3:GetBucketLocation",
"s3:GetObject",
"s3:PutObject",
"s3:PutBucketencryption",
"s3:DeleteObject"
```

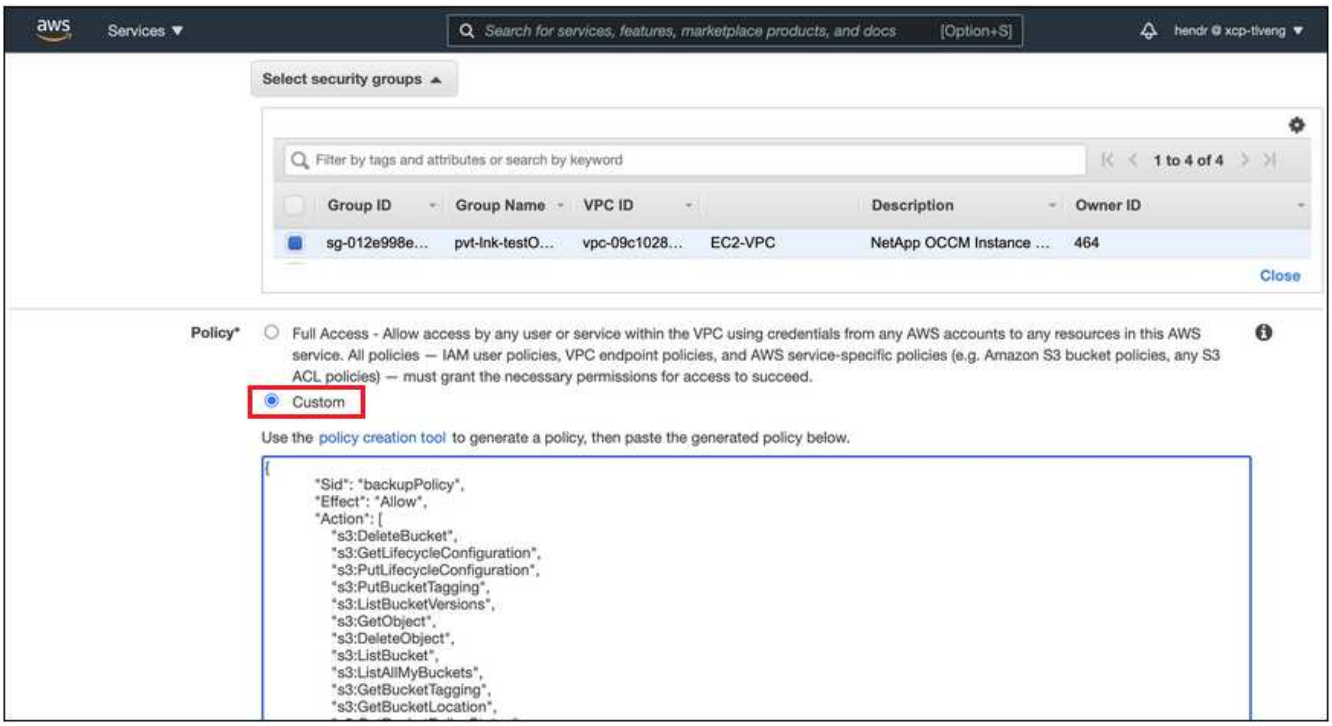
See the AWS Documentation: Creating a Role to Delegate Permissions to an IAM User for details.

4. If your virtual or physical network uses a proxy server for internet access, ensure that the Cloud Restore instance has outbound internet access to contact the following endpoints.

| Endpoints | Purpose |
|---|---|
| http://amazonlinux.us-east-1.amazonaws.com/2/extras/docker/stable/x86_64/4bf88ee77c395ffe1e0c3ca68530dfb3a683ec65a4a1ce9c0ff394be50e922b2/ | CentOS package for the Cloud Restore Instance AMI. |
| http://cloudmanagerinfraprod.azurecr.io<br>https://cloudmanagerinfraprod.azurecr.io | Cloud Restore Instance image repository. |

5. You can choose your own custom-managed keys for data encryption in the activation wizard instead of using the default Amazon S3 encryption keys. In this case you'll need to have the encryption managed keys already set up. See how to use your own keys.
6. If you want to have a more secure connection over the public internet from your on-prem data center to the VPC, there is an option to select an AWS PrivateLink connection in the activation wizard. It is required if you are connecting your on-premises system via VPN/DirectConnect. In this case you'll need to have created an Interface endpoint configuration using the Amazon VPC console or the command line. See details about using AWS PrivateLink for Amazon S3.

   Note that you'll also need to modify the security group configuration that is associated with the Cloud Manager Connector. You must change the policy to "Custom" (from "Full Access"), and you must add the permissions from the backup policy as shown earlier (above).




### Enabling Cloud Backup

Enable Cloud Backup at any time directly from the on-premises working environment.

#### Steps

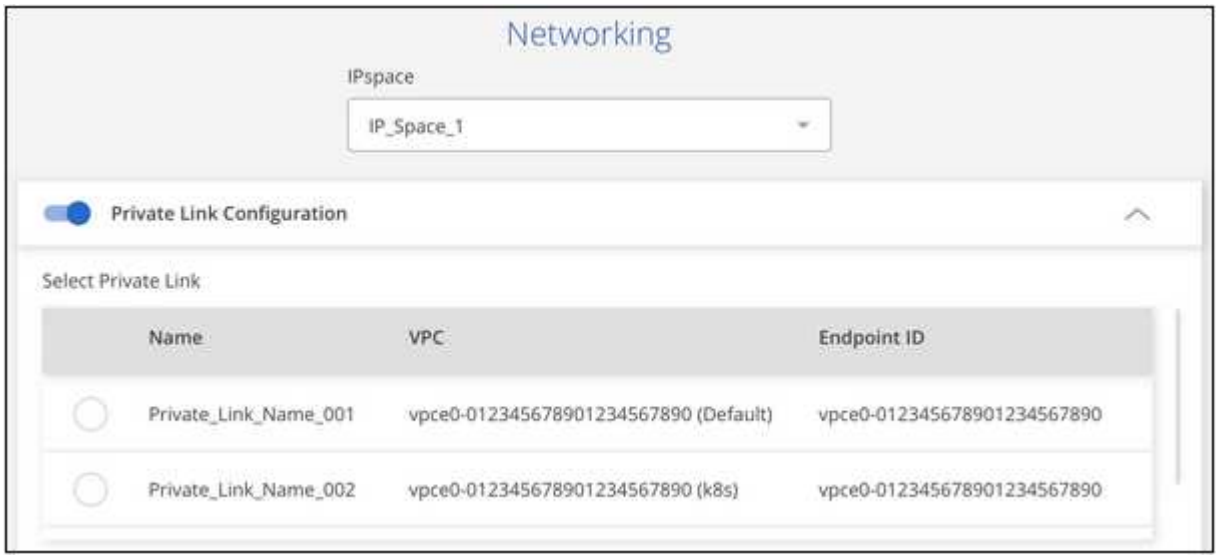
1. From the Canvas, select the working environment and click **Enable** next to the Backup & Restore service in the right-panel.

2. Select Amazon Web Services as your provider and click **Next**.
3. Enter the provider details and click **Next**.
   a. The AWS Account, the AWS Access Key, and the Secret Key used to store the backups.

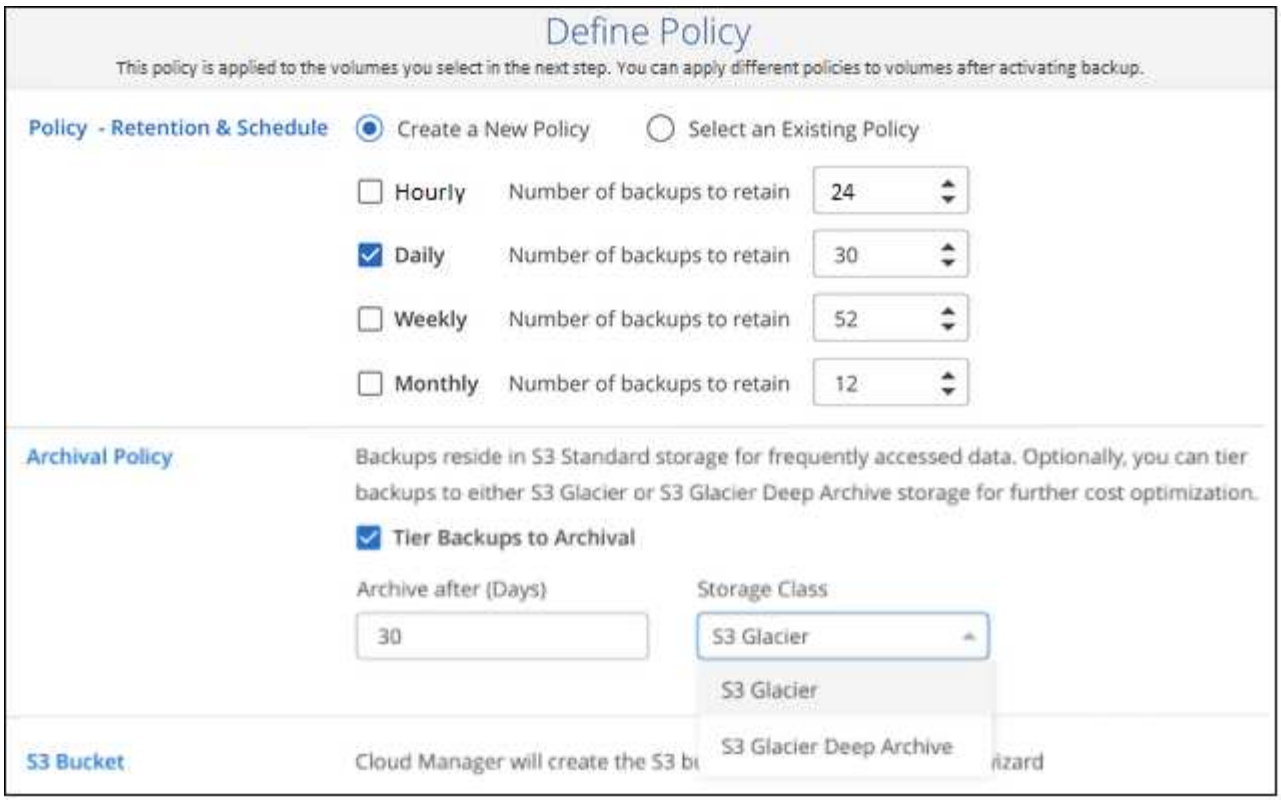
      The access key and secret key are for the user you created to give the ONTAP cluster access to the S3 bucket.

   b. The AWS region where the backups will be stored.
   c. Whether you'll use the default Amazon S3 encryption keys or choose your own customer-managed keys from your AWS account to manage encryption of your data. (See how to use your own keys).

4. Enter the networking details and click **Next**.
   a. The IPspace in the ONTAP cluster where the volumes you want to back up reside. The intercluster LIFs for this IPspace must have outbound internet access.
   b. Optionally, choose whether you'll use an AWS PrivateLink that you have previously configured. See details about using AWS PrivateLink for Amazon S3.

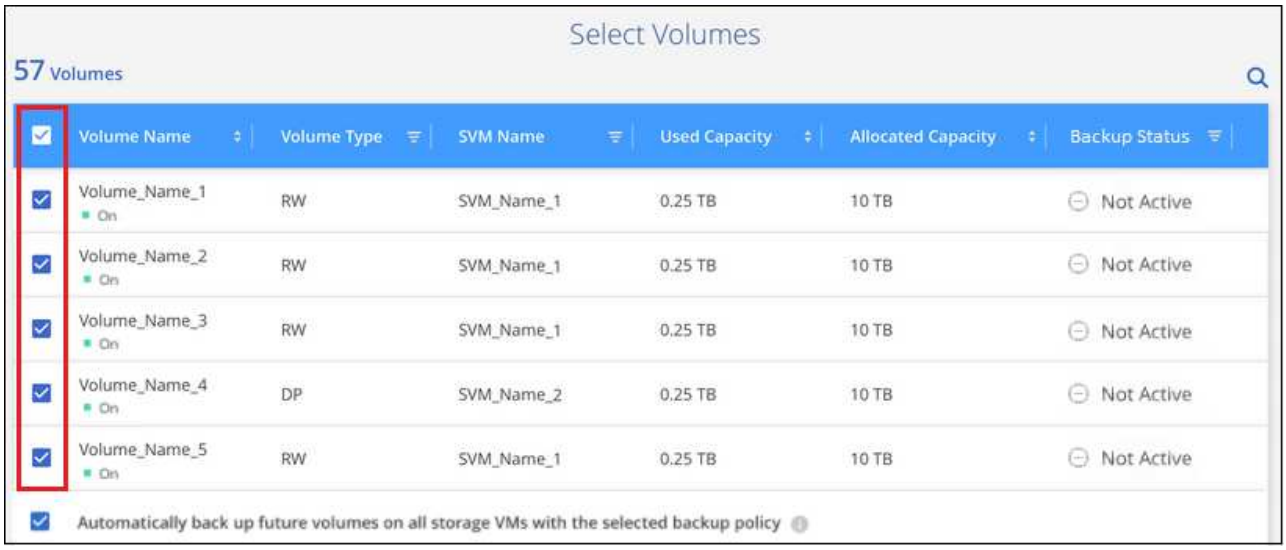



5. Enter the default backup policy details and click **Next**.
   a. Define the backup schedule and choose the number of backups to retain. See the list of existing policies you can choose.
   b. When using ONTAP 9.10.1 and greater, you can choose to tier backups to either S3 Glacier or S3 Glacier Deep Archive storage after a certain number of days for further cost optimization. Learn more about using archival tiers.




6. Select the volumes that you want to back up using the default backup policy in the Select Volumes page. If you want to assign different backup policies to certain volumes, you can create additional policies and apply them to those volumes later.

   - To back up all volumes, check the box in the title row ( Volume Name ).
   - To back up individual volumes, check the box for each volume ( Volume_1 ).




   If you want all volumes added in the future to have backup enabled, just leave the checkbox for "Automatically back up future volumes…" checked. If you disable this setting, you'll need to manually enable backups for future volumes.

7. Click **Activate Backup** and Cloud Backup starts taking the initial backups of your volumes.

### Result

Cloud Backup starts taking the initial backups of each selected volume and the Volume Backup Dashboard is displayed so you can monitor the state of the backups.

### What's next?

You can start and stop backups for volumes or change the backup schedule.
You can also restore entire volumes or individual files from a backup file to a Cloud Volumes ONTAP system in AWS, or to an on-premises ONTAP system.

## Backing up on-premises ONTAP data to Azure Blob storage

Complete a few steps to get started backing up data from your on-premises ONTAP systems to Azure Blob storage.

In most cases you'll use Cloud Manager for all backup and restore operations. However, starting with ONTAP 9.9.1 you can initiate volume backup operations of your on-premises ONTAP clusters using ONTAP System Manager. See how to use System Manager to back up your volumes to the cloud using Cloud Backup.

### Quick start

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

#### 1 Verify support for your configuration

- You have discovered the on-premises cluster and added it to a working environment in Cloud Manager. See Discovering ONTAP clusters for details.
  - The cluster is running ONTAP 9.7P5 or later.
  - The cluster has a SnapMirror license — it is included as part of the Premium Bundle or Data Protection Bundle.
  - The cluster must have the required network connections to Blob storage and to the Connector.
- The Connector must have the required network connections to Blob storage and to the cluster, and the required permissions.
- You have a valid Azure subscription for the object storage space where your backups will be located.

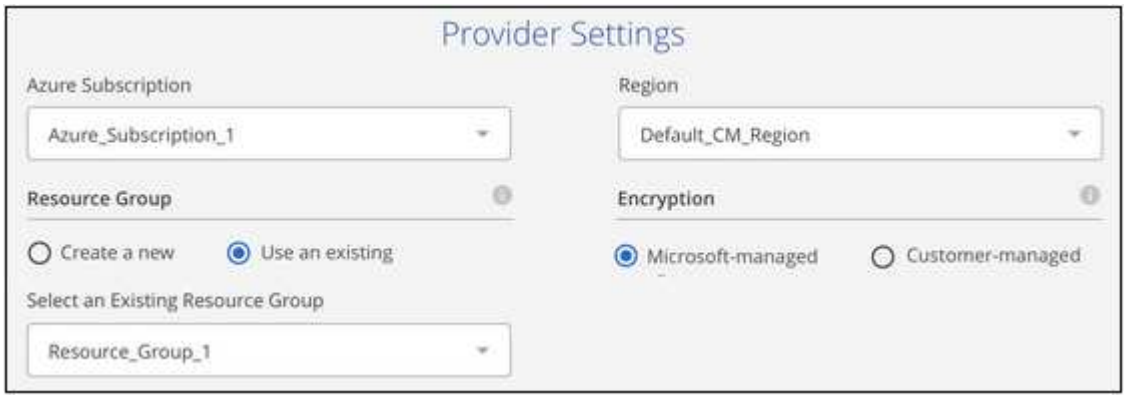
#### 2 Enable Cloud Backup on the system

Select the working environment and click **Enable** next to the Backup & Restore service in the right-panel, and then follow the setup wizard.

#### 3 Select the cloud provider and enter the provider details

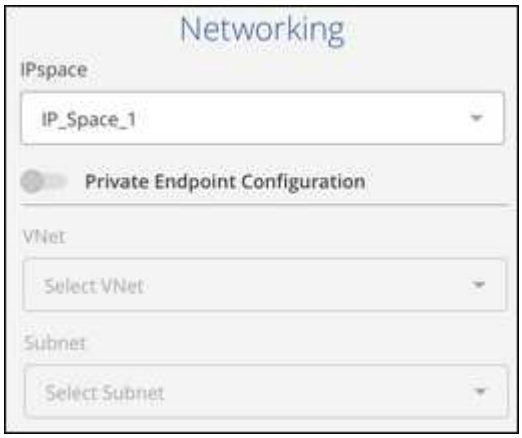
Select Microsoft Azure as your provider and then enter the provider details. You'll need to select the Azure

Subscription and the region where you want to create the backups. You can also choose your own customer-managed key for data encryption instead of using the default Microsoft-managed encryption key.




4 **Select the cluster IPspace and optional use of a private VNet endpoint**

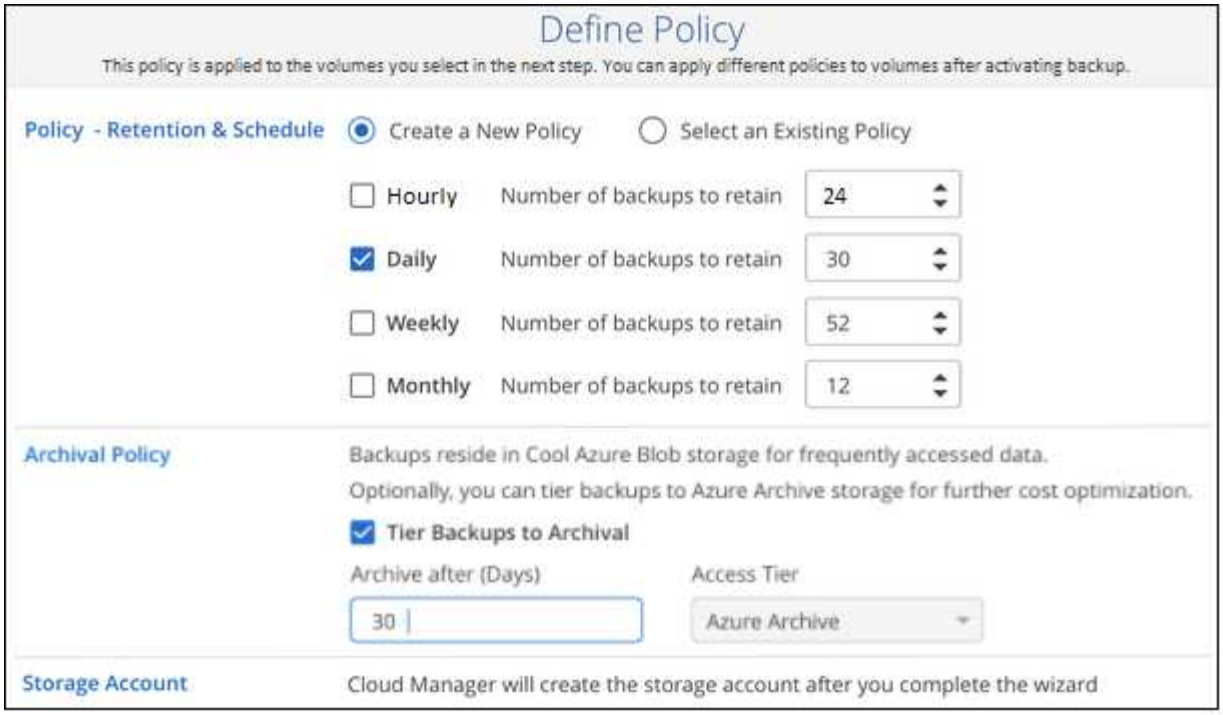
Select the IPspace in the ONTAP cluster where the volumes reside. You can also choose to use an existing Azure Private Endpoint for a more secure connection to the VNet from your on-prem data center.




5 **Define the default backup policy**

The default policy backs up volumes every day and retains the most recent 30 backup copies of each volume. Change to hourly, daily, weekly, or monthly backups, or select one of the system-defined policies that provide more options. You can also change the number of backup copies you want to retain.

By default, backups are stored in the Cool access tier. If your cluster is using ONTAP 9.10.1 or greater, you can choose to tier backups to Azure Archive storage after a certain number of days for further cost optimization.



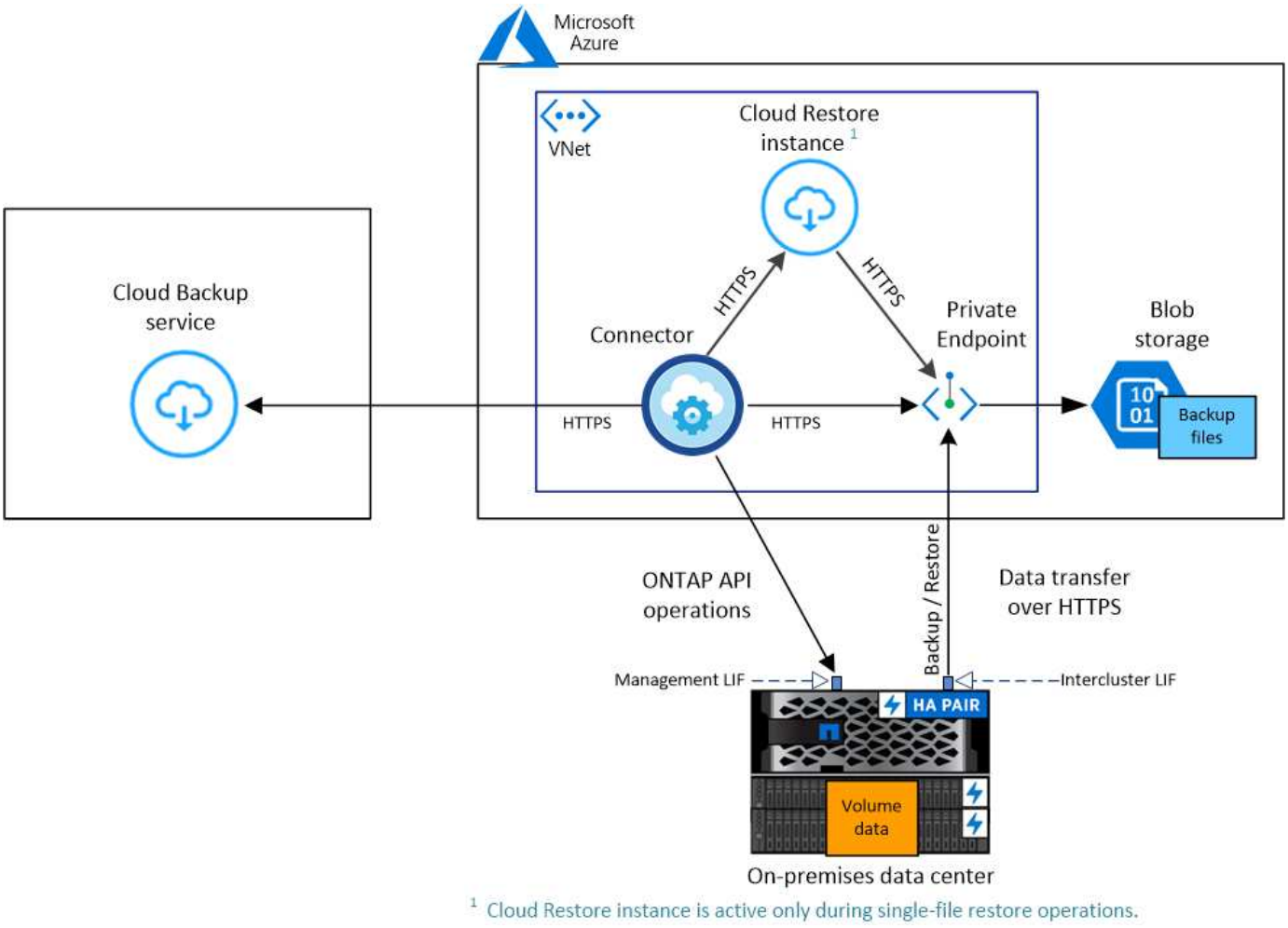

### 6 Select the volumes that you want to back up

Identify which volumes you want to back up using the default backup policy in the Select Volumes page. If you want to assign different backup policies to certain volumes, you can create additional policies and apply them to volumes later.

#### Requirements

Read the following requirements to make sure you have a supported configuration before you start backing up on-premises volumes to Azure Blob storage.

The following image shows each component and the connections that you need to prepare between them:




Note that when the Cloud Restore instance is deployed in the cloud, it is located in the same subnet as the Connector.

#### Preparing your ONTAP clusters

You need to discover your on-premises ONTAP clusters in Cloud Manager before you can start backing up volume data.

Learn how to discover a cluster.

### ONTAP requirements

- ONTAP 9.7P5 and later.
- A SnapMirror license (included as part of the Premium Bundle or Data Protection Bundle).

  **Note:** The "Hybrid Cloud Bundle" is not required when using Cloud Backup.

  See how to manage your cluster licenses.

- Time and time zone are set correctly.

  See how to configure your cluster time.

### Cluster networking requirements

- The ONTAP cluster initiates an HTTPS connection over port 443 from the intercluster LIF to Azure Blob storage for backup and restore operations.

  ONTAP reads and writes data to and from object storage. The object storage never initiates, it just responds.

- ONTAP requires an inbound connection from the Connector to the cluster management LIF. The Connector can reside in an Azure VNet.
- An intercluster LIF is required on each ONTAP node that hosts the volumes you want to back up. The LIF must be associated with the *IPspace* that ONTAP should use to connect to object storage. Learn more about IPspaces.

  When you set up Cloud Backup, you are prompted for the IPspace to use. You should choose the IPspace that each LIF is associated with. That might be the "Default" IPspace or a custom IPspace that you created.

- The nodes' and intercluster LIFs are able to access the object store.
- DNS servers have been configured for the storage VM where the volumes are located. See how to configure DNS services for the SVM.
- Note that if you use are using a different IPspace than the Default, then you might need to create a static route to get access to the object storage.
- Update firewall rules, if necessary, to allow Cloud Backup service connections from ONTAP to object storage through port 443 and name resolution traffic from the storage VM to the DNS server over port 53 (TCP/UDP).

#### Creating or switching Connectors

A Connector is required to back up data to the cloud, and the Connector must be in an Azure VNet when backing up data to Azure Blob storage. You can't use a Connector that's deployed on-premises. You'll either need to create a new Connector or make sure that the currently selected Connector resides in the correct provider.

- Learn about Connectors
- Creating a Connector in Azure
- Switching between Connectors

#### Preparing networking for the Connector

Ensure that the Connector has the required networking connections.

**Steps**

1. Ensure that the network where the Connector is installed enables the following connections:
   - An outbound internet connection to the Cloud Backup service over port 443 (HTTPS)
   - An HTTPS connection over port 443 to your Blob object storage
   - An HTTPS connection over port 443 to your ONTAP clusters
2. Enable a VNet Private Endpoint to Azure storage. This is needed if you have an ExpressRoute or VPN connection from your ONTAP cluster to the VNet and you want communication between the Connector and Blob storage to stay in your virtual private network.

#### Supported regions

You can create backups from on-premises systems to Azure Blob in all regions where Cloud Volumes ONTAP is supported. You specify the region where the backups will be stored when you set up the service.

#### License requirements

Before your 30-day free trial of Cloud Backup expires, you need to subscribe to a pay-as-you-go (PAYGO) Cloud Manager Marketplace offering from Azure, or purchase and activate a Cloud Backup BYOL license from NetApp. These licenses are for the account and can be used across multiple systems.

- For Cloud Backup PAYGO licensing, you'll need a subscription to the Azure Cloud Manager Marketplace offering to continue using Cloud Backup. Billing for Cloud Backup is done through this subscription.
- For Cloud Backup BYOL licensing, you don't need a subscription. You need the serial number from NetApp that enables you to use the service for the duration and capacity of the license. Learn how to manage your BYOL licenses.

You need to have an Azure subscription for the object storage space where your backups will be located.

A SnapMirror license is required on the cluster. Note that the "Hybrid Cloud Bundle" is not required when using Cloud Backup.

#### Preparing Azure Blob storage for backups

1. If your virtual or physical network uses a proxy server for internet access, ensure that the Cloud Restore virtual machine has outbound internet access to contact the following endpoints.

| Endpoints | Purpose |
|---|---|
| http://olcentgbl.trafficmanager.net<br>https://olcentgbl.trafficmanager.net | Provides CentOS packages for the Cloud Restore virtual machine. |
| http://cloudmanagerinfraprod.azurecr.io<br>https://cloudmanagerinfraprod.azurecr.io | Cloud Restore virtual machine image repository. |

2. You use choose your own custom-managed keys for data encryption in the activation wizard instead of using the default Microsoft-managed encryption keys. In this case you will need to have the Azure Subscription, Key Vault name, and the Key. See how to use your own keys.
3. If you want to have a more secure connection over the public internet from your on-prem data center to the VNet, there is an option to configure an Azure Private Endpoint in the activation wizard. In this case you will need to know the VNet and Subnet for this connection. See details about using a Private Endpoint.

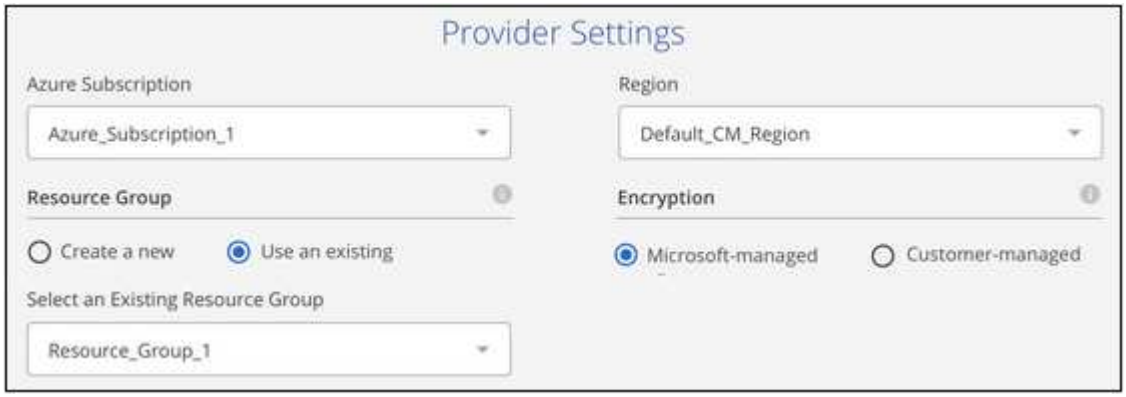
### Enabling Cloud Backup

Enable Cloud Backup at any time directly from the on-premises working environment.

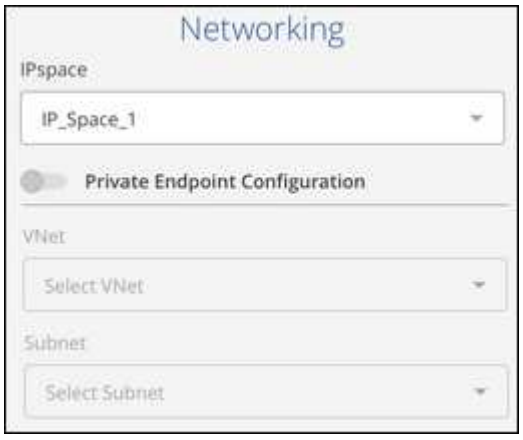
#### Steps

1. From the Canvas, select the working environment and click **Enable** next to the Backup & Restore service in the right-panel.

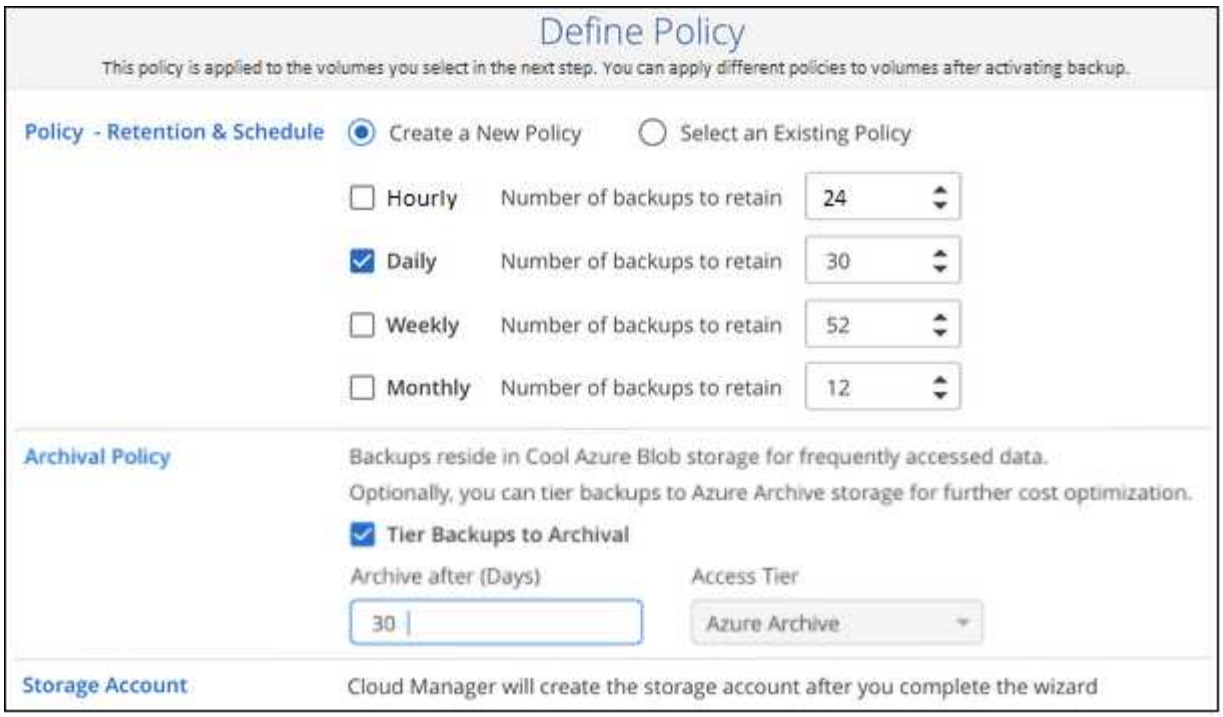
2. Select Microsoft Azure as your provider and click **Next**.
3. Enter the provider details and click **Next**.
   a. The Azure subscription used for backups and the Azure region where the backups will be stored.
   b. The resource group that manages the Blob container - you can create a new resource group or select an existing resource group.
   c. Whether you will use the default Microsoft-managed encryption key or choose your own customer-managed keys to manage encryption of your data. (See how to use your own keys).




4. Enter the networking details and click **Next**.
   a. The IPspace in the ONTAP cluster where the volumes you want to back up reside. The intercluster LIFs for this IPspace must have outbound internet access.
   b. Optionally, choose whether you will configure an Azure Private Endpoint. See details about using a Private Endpoint.




5. Enter the default backup policy details and click **Next**.
   a. Define the backup schedule and choose the number of backups to retain. See the list of existing policies you can choose.
   b. When using ONTAP 9.10.1 and greater, you can choose to tier backups to Azure Archive storage after a certain number of days for further cost optimization. Learn more about using archival tiers.

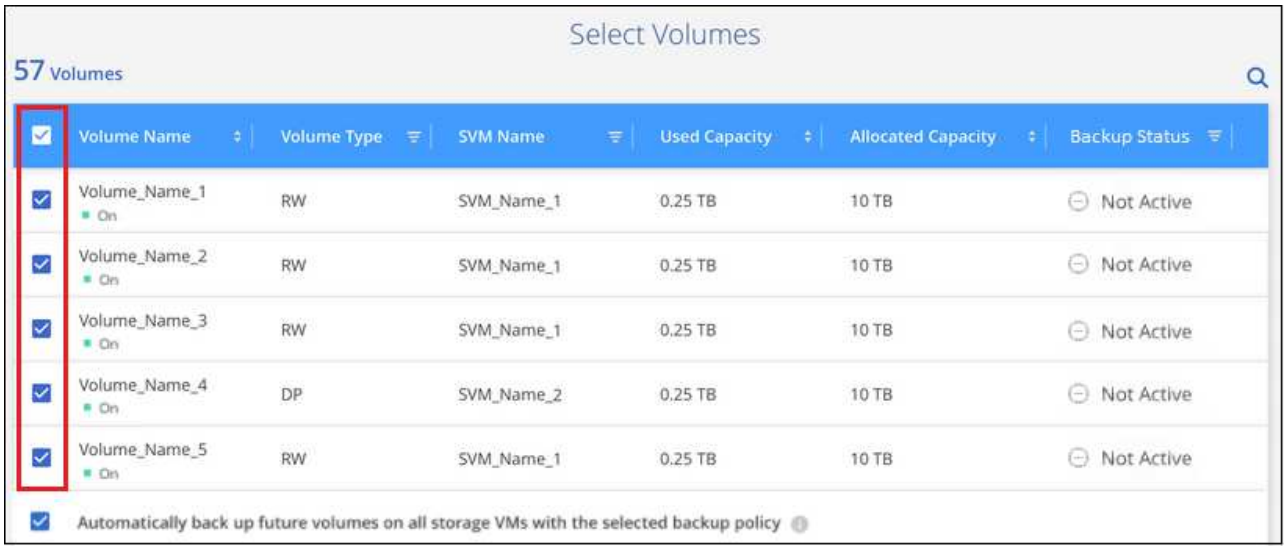



6. Select the volumes that you want to back up using the default backup policy in the Select Volumes page. If you want to assign different backup policies to certain volumes, you can create additional policies and apply them to those volumes later.

   - To back up all volumes, check the box in the title row (

).
   - To back up individual volumes, check the box for each volume (

).




   If you want all volumes added in the future to have backup enabled, just leave the checkbox for "Automatically back up future volumes…" checked. If you disable this setting, you'll need to manually enable backups for future volumes.

7. Click **Activate Backup** and Cloud Backup starts taking the initial backups of your volumes.

**Result**

Cloud Backup starts taking the initial backups of each selected volume and the Volume Backup Dashboard is

displayed so you can monitor the state of the backups.

**What's next?**

You can start and stop backups for volumes or change the backup schedule.
You can also restore entire volumes or individual files from a backup file to a Cloud Volumes ONTAP system in Azure, or to an on-premises ONTAP system.

## Backing up on-premises ONTAP data to Google Cloud Storage

Complete a few steps to get started backing up data from your on-premises ONTAP systems to Google Cloud Storage.

In most cases you'll use Cloud Manager for all backup and restore operations. However, starting with ONTAP 9.9.1 you can initiate volume backup operations of your on-premises ONTAP clusters using ONTAP System Manager. See how to use System Manager to back up your volumes to the cloud using Cloud Backup.

**Quick start**

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

### 1 Verify support for your configuration

- You have discovered the on-premises cluster and added it to a working environment in Cloud Manager. See Discovering ONTAP clusters for details.
  - The cluster is running ONTAP 9.7P5 or later.
  - The cluster has a SnapMirror license — it is included as part of the Premium Bundle or Data Protection Bundle.
  - The cluster must have the required network connections to Google storage and to the Connector.
- The Connector must have the required network connections to Google storage and to the cluster.
- You have a valid Google subscription for the object storage space where your backups will be located.
- You have a Google account with an access key and secret key so the ONTAP cluster can back up and restore data.

### 2 Enable Cloud Backup on the system

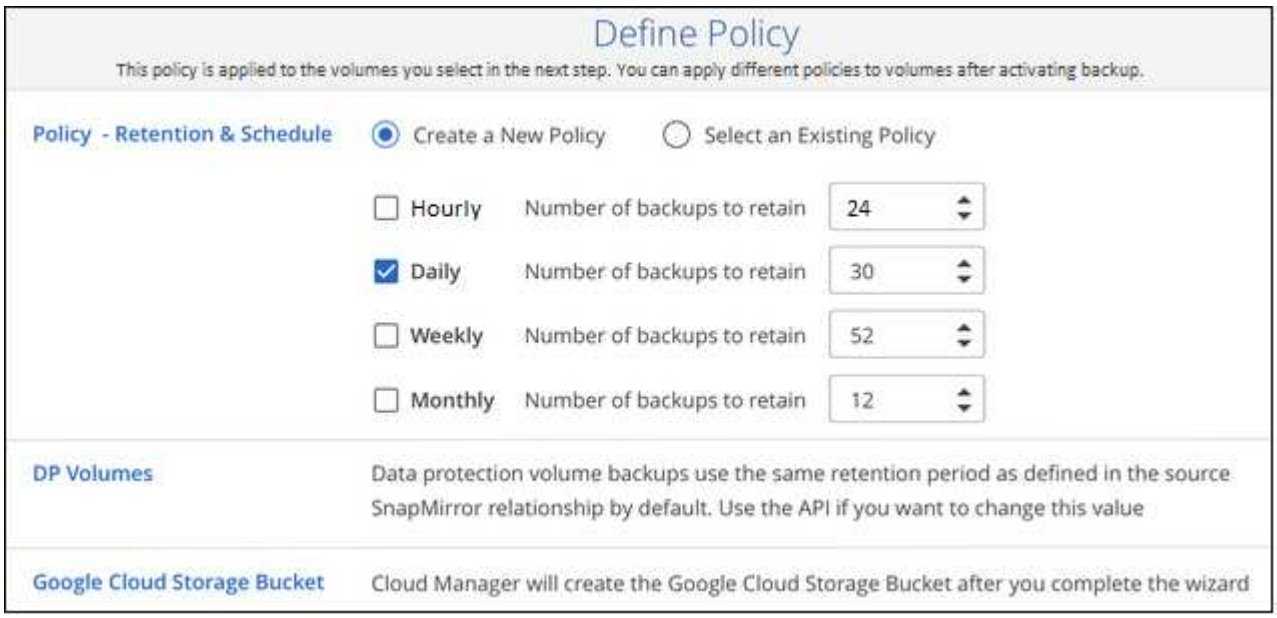
Select the working environment and click **Enable** next to the Backup & Restore service in the right-panel, and then follow the setup wizard.

### 3 Select the cloud provider and enter the provider details

Select Google Cloud as your provider and then enter the provider details. You also need to specify the IPspace in the ONTAP cluster where the volumes reside.

### 4 Define the default backup policy

The default policy backs up volumes every day and retains the most recent 30 backup copies of each volume. Change to hourly, daily, weekly, or monthly backups, or select one of the system-defined policies that provide more options. You can also change the number of backup copies you want to retain.



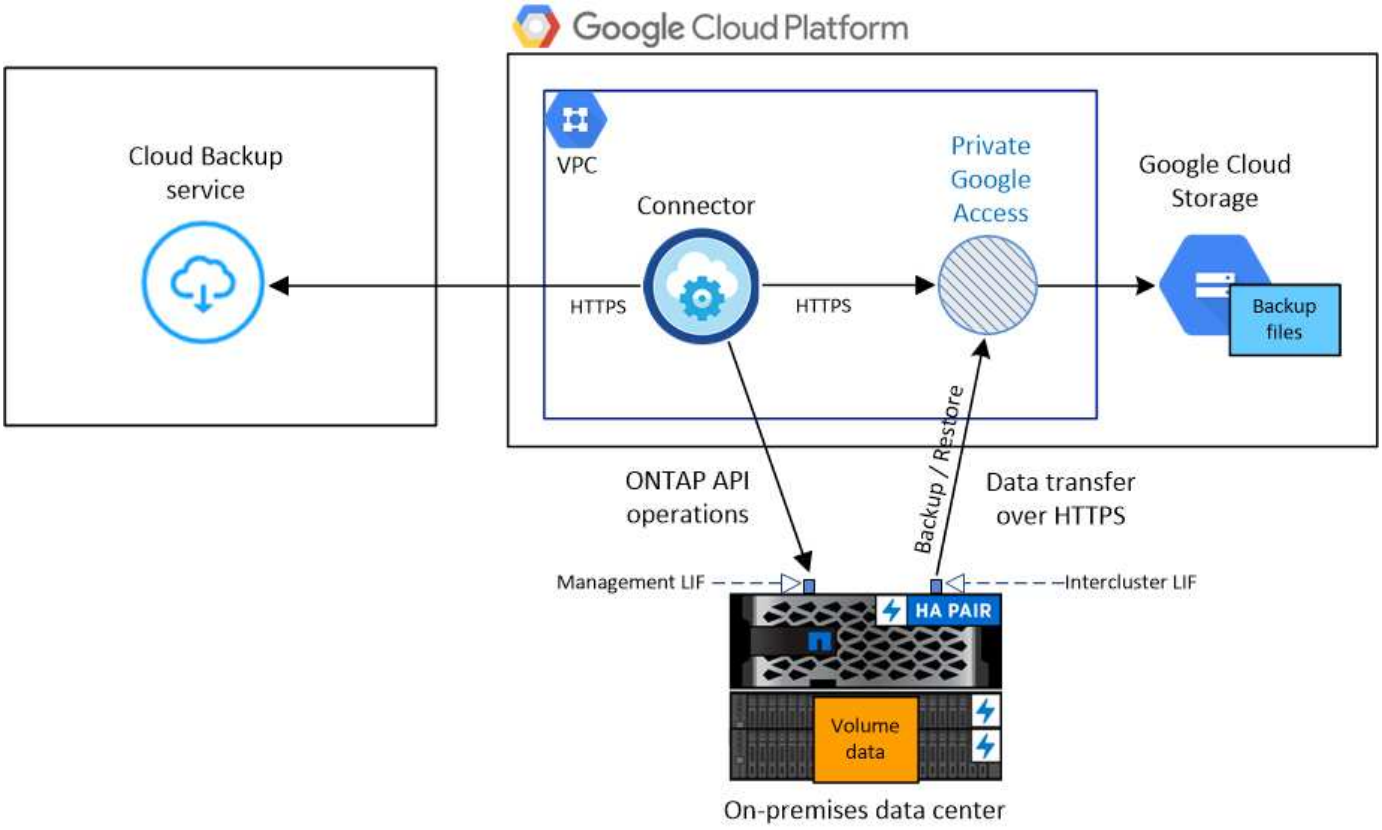

### 5 Select the volumes that you want to back up

Identify which volumes you want to back up using the default backup policy in the Select Volumes page. If you want to assign different backup policies to certain volumes, you can create additional policies and apply them to volumes later.

#### Requirements

Read the following requirements to make sure you have a supported configuration before you start backing up on-premises volumes to Google Cloud storage.

The following image shows each component and the connections that you need to prepare between them:




Note that the Cloud Restore instance is not shown in this diagram because single-file restore is not currently supported in GCP.

#### Preparing your ONTAP clusters

You need to discover your on-premises ONTAP clusters in Cloud Manager before you can start backing up volume data.

Learn how to discover a cluster.

### ONTAP requirements

- ONTAP 9.7P5 and later.
- A SnapMirror license (included as part of the Premium Bundle or Data Protection Bundle).

  **Note:** The "Hybrid Cloud Bundle" is not required when using Cloud Backup.

  See how to manage your cluster licenses.

- Time and time zone are set correctly.

  See how to configure your cluster time.

### Cluster networking requirements

- The ONTAP cluster initiates an HTTPS connection over port 443 from the intercluster LIF to Google Cloud storage for backup and restore operations.

  ONTAP reads and writes data to and from object storage. The object storage never initiates, it just responds.

- ONTAP requires an inbound connection from the Connector to the cluster management LIF. The Connector can reside in a Google Cloud Platform VPC.
- An intercluster LIF is required on each ONTAP node that hosts the volumes you want to back up. The LIF must be associated with the *IPspace* that ONTAP should use to connect to object storage. Learn more about IPspaces.

  When you set up Cloud Backup, you are prompted for the IPspace to use. You should choose the IPspace that each LIF is associated with. That might be the "Default" IPspace or a custom IPspace that you created.
- The nodes' intercluster LIFs are able to access the object store.
- DNS servers have been configured for the storage VM where the volumes are located. See how to configure DNS services for the SVM.
- Note that if you use are using a different IPspace than the Default, then you might need to create a static route to get access to the object storage.
- Update firewall rules, if necessary, to allow Cloud Backup service connections from ONTAP to object storage through port 443 and name resolution traffic from the storage VM to the DNS server over port 53 (TCP/UDP).

#### Creating or switching Connectors

A Connector is required to back up data to the cloud, and the Connector must be in a Google Cloud Platform VPC when backing up data to Google Cloud storage. You can't use a Connector that's deployed on-premises. You'll either need to create a new Connector or make sure that the currently selected Connector resides in the correct provider.

- Learn about Connectors
- Creating a Connector in GCP
- Switching between Connectors

#### Preparing networking for the Connector

Ensure that the Connector has the required networking connections.

**Steps**

1. Ensure that the network where the Connector is installed enables the following connections:
   - An outbound internet connection to the Cloud Backup service over port 443 (HTTPS)
   - An HTTPS connection over port 443 to your Google Cloud storage
   - An HTTPS connection over port 443 to your ONTAP clusters
2. Enable Private Google Access on the subnet where you plan to deploy the Connector. Private Google Access is needed if you have a direct connection from your ONTAP cluster to the VPC and you want communication between the Connector and Google Cloud Storage to stay in your virtual private network.

   Note that Private Google Access works with VM instances that have only internal (private) IP addresses (no external IP addresses).

#### Supported regions

You can create backups from on-premises systems to Google Cloud storage in all regions where Cloud Volumes ONTAP is supported. You specify the region where the backups will be stored when you set up the

service.

#### License requirements

Before your 30-day free trial of Cloud Backup expires, you need to subscribe to a pay-as-you-go (PAYGO) Cloud Manager Marketplace offering from Google, or purchase and activate a Cloud Backup BYOL license from NetApp. These licenses are for the account and can be used across multiple systems.

- For Cloud Backup PAYGO licensing, you'll need a subscription to the Google Cloud Manager Marketplace offering to continue using Cloud Backup. Billing for Cloud Backup is done through this subscription.
- For Cloud Backup BYOL licensing, you don't need a subscription. You need the serial number from NetApp that enables you to use the service for the duration and capacity of the license. Learn how to manage your BYOL licenses.

You need to have a Google subscription for the object storage space where your backups will be located.

A SnapMirror license is required on the cluster. Note that the "Hybrid Cloud Bundle" is not required when using Cloud Backup.

#### Preparing Google Cloud Storage for backups

When you set up backup, you need to provide storage access keys for a service account that has Storage Admin permissions. A service account enables Cloud Backup to authenticate and access Cloud Storage buckets used to store backups. The keys are required so that Google Cloud Storage knows who is making the request.

**Steps**

1. Create a service account that has the predefined Storage Admin role.
2. Go to GCP Storage Settings and create access keys for the service account:
   a. Select a project, and click **Interoperability**. If you haven't already done so, click **Enable interoperability access**.
   b. Under **Access keys for service accounts**, click **Create a key for a service account**, select the service account that you just created, and click **Create Key**.

      You'll need to enter the keys in Cloud Backup later when you configure the backup service.

### Enabling Cloud Backup

Enable Cloud Backup at any time directly from the on-premises working environment.

**Steps**

1. From the Canvas, select the working environment and click **Enable** next to the Backup & Restore service in the right-panel.

2. Select Google Cloud as your provider and click **Next**.
3. Enter the provider details and click **Next**.

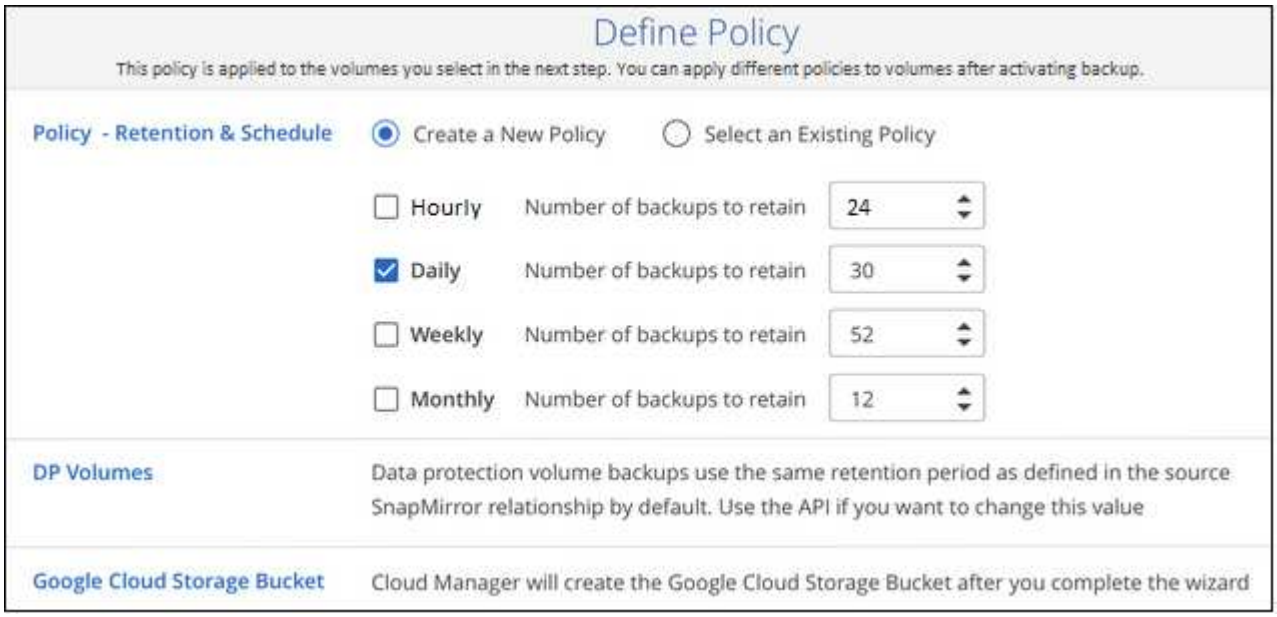
a. The Google Cloud Project where you want the Google Cloud Storage bucket to be created for backups. (The Project must have a Service Account that has the predefined Storage Admin role.)

b. The Google Access Key and Secret Key used to store the backups.

c. The Google region where the backups will be stored.

d. The IPspace in the ONTAP cluster where the volumes you want to back up reside. The intercluster LIFs for this IPspace must have outbound internet access.

4. In the *Define Policy* page, select an existing backup schedule and retention value, or define a new default backup policy, and click **Next**.



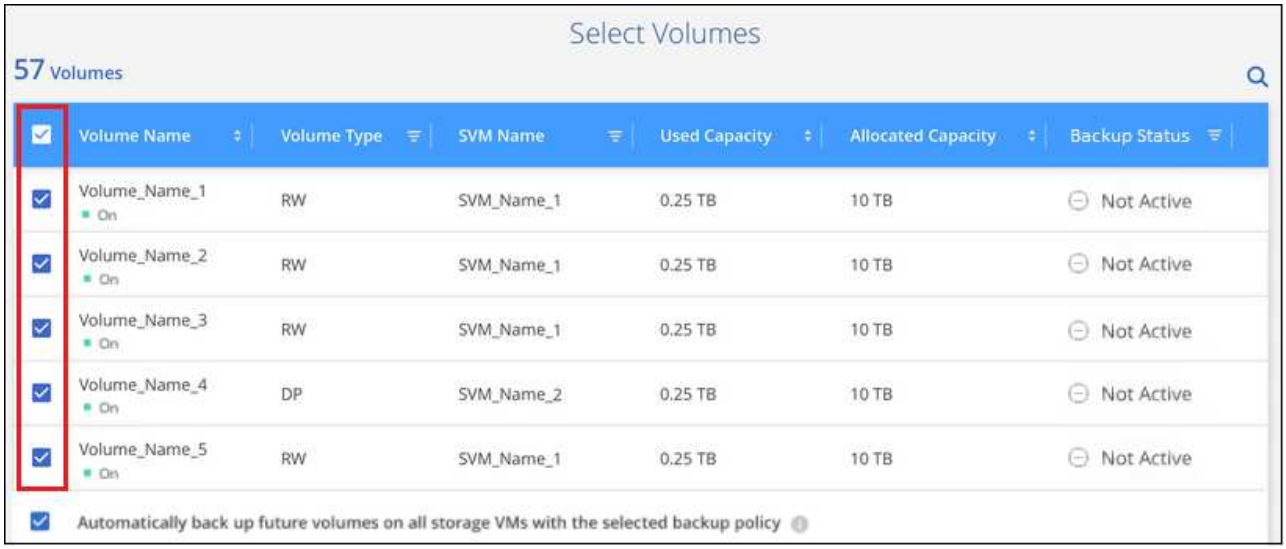

See the list of existing policies.

5. Select the volumes that you want to back up using the default backup policy in the Select Volumes page. If you want to assign different backup policies to certain volumes, you can create additional policies and apply them to those volumes later.

   ◦ To back up all volumes, check the box in the title row (

).

- To back up individual volumes, check the box for each volume ( Volume_1 ).




If you want all volumes added in the future to have backup enabled, just leave the checkbox for "Automatically back up future volumes…" checked. If you disable this setting, you'll need to manually enable backups for future volumes.

6. Click **Activate Backup** and Cloud Backup starts taking the initial backups of your volumes.

**Result**

Cloud Backup starts taking the initial backups of each selected volume and the Volume Backup Dashboard is displayed so you can monitor the state of the backups.

**What's next?**

You can start and stop backups for volumes or change the backup schedule.
You can also restore entire volumes from a backup file to a Cloud Volumes ONTAP system in Google, or to an on-premises ONTAP system.

## Backing up on-premises ONTAP data to StorageGRID

Complete a few steps to get started backing up data from your on-premises ONTAP systems to object storage in your NetApp StorageGRID systems.

### Quick start

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

### 1 Verify support for your configuration

- You have discovered the on-premises cluster and added it to a working environment in Cloud Manager. See Discovering ONTAP clusters for details.
  - The cluster is running ONTAP 9.7P5 or later.
  - The cluster has a SnapMirror license — it is included as part of the Premium Bundle or Data Protection Bundle.
  - The cluster must have the required network connections to StorageGRID and to the Connector.

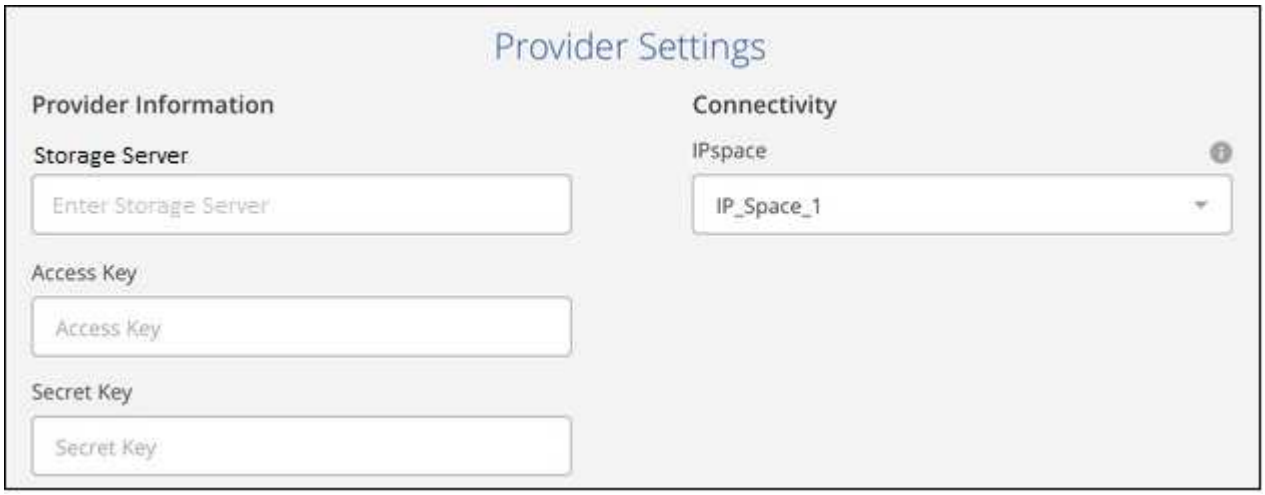
- You have a Connector installed on your premises.
  - Networking for the Connector enables an outbound HTTPS connection to the ONTAP cluster and to StorageGRID.
- You have purchased and activated a Cloud Backup BYOL license from NetApp.
- Your StorageGRID has version 10.3 or later with access keys that have S3 permissions.

### 2 Enable Cloud Backup on the system

Select the working environment and click **Enable** next to the Backup & Restore service in the right-panel, and then follow the setup wizard.

### 3 Enter the StorageGRID details

Select StorageGRID as the provider, and then enter the StorageGRID server and service account details. You also need to specify the IPspace in the ONTAP cluster where the volumes reside.




### 4 Define the default backup policy

The default policy backs up volumes every day and retains the most recent 30 backup copies of each volume. Change to hourly, daily, weekly, or monthly backups, or select one of the system-defined policies that provide more options. You can also change the number of backup copies you want to retain.

### 5 Select the volumes that you want to back up

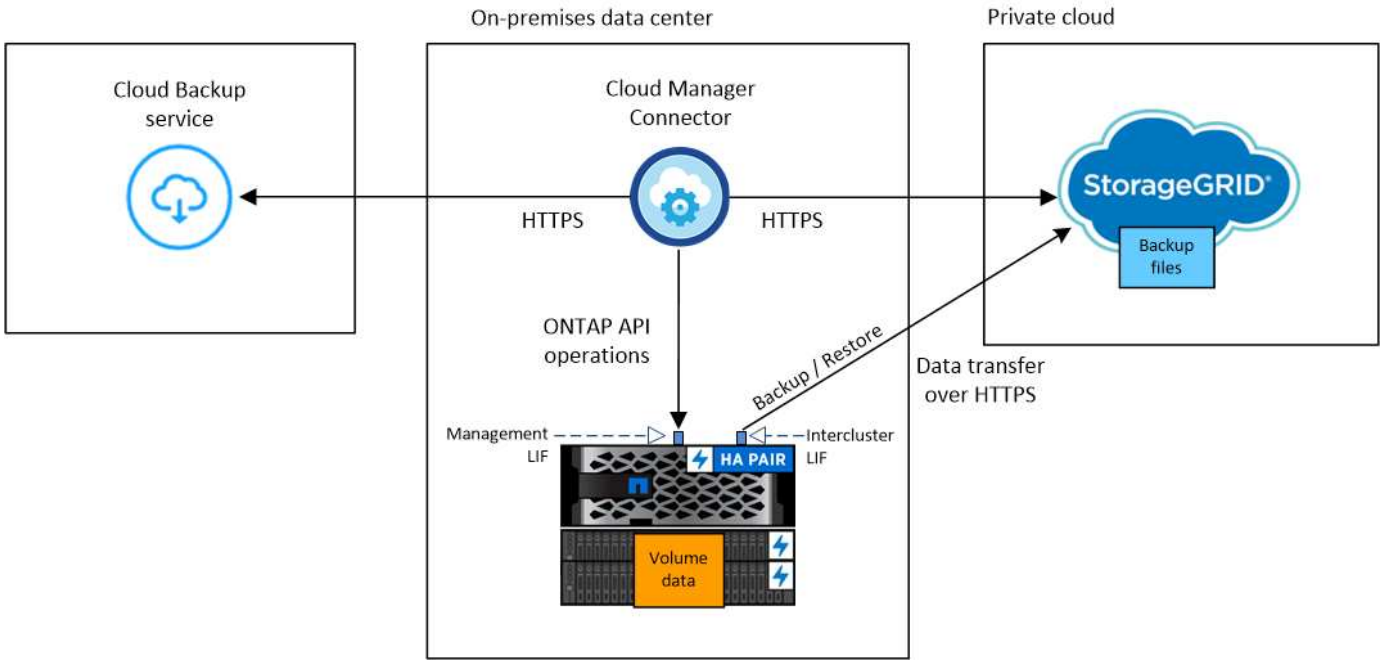
Identify which volumes you want to back up using the default backup policy in the Select Volumes page. If you want to assign different backup policies to certain volumes, you can create additional policies and apply them to volumes later.

An S3 bucket is created automatically in the service account indicated by the S3 access key and secret key you entered, and the backup files are stored there.

### Requirements

Read the following requirements to make sure you have a supported configuration before you start backing up on-premises volumes to StorageGRID.

The following image shows each component when backing up an on-prem ONTAP system to StorageGRID and the connections that you need to prepare between them:




Note that the Cloud Restore instance is not shown in this diagram because single-file restore is not currently supported when using StorageGRID.

#### Preparing your ONTAP clusters

You need to discover your on-premises ONTAP clusters in Cloud Manager before you can start backing up volume data.

Learn how to discover a cluster.

**ONTAP requirements**

- ONTAP 9.7P5 and later.
- A SnapMirror license (included as part of the Premium Bundle or Data Protection Bundle).

  **Note:** The "Hybrid Cloud Bundle" is not required when using Cloud Backup.

  See how to manage your cluster licenses.

- Time and time zone are set correctly.

  See how to configure your cluster time.

**Cluster networking requirements**

- The ONTAP cluster initiates an HTTPS connection over a user-specified port from the intercluster LIF to StorageGRID for backup and restore operations. The port is configurable during backup setup.

  ONTAP reads and writes data to and from object storage. The object storage never initiates, it just responds.

- ONTAP requires an inbound connection from the Connector to the cluster management LIF. The Connector must reside on your premises.
- An intercluster LIF is required on each ONTAP node that hosts the volumes you want to back up. The LIF must be associated with the *IPspace* that ONTAP should use to connect to object storage. Learn more about IPspaces.

  When you set up Cloud Backup, you are prompted for the IPspace to use. You should choose the IPspace that each LIF is associated with. That might be the "Default" IPspace or a custom IPspace that you created.

- The nodes' intercluster LIFs are able to access the object store.
- DNS servers have been configured for the storage VM where the volumes are located. See how to configure DNS services for the SVM.
- Note that if you use are using a different IPspace than the Default, then you might need to create a static route to get access to the object storage.
- Update firewall rules, if necessary, to allow Cloud Backup service connections from ONTAP to object storage through the port you specified (typically port 443) and name resolution traffic from the storage VM to the DNS server over port 53 (TCP/UDP).

#### Preparing StorageGRID

StorageGRID must meet the following requirements. See the StorageGRID documentation for more information.

### Supported StorageGRID versions

StorageGRID 10.3 and later is supported.

### S3 credentials

When you set up backup to StorageGRID, the backup wizard prompts you for an S3 access key and secret key for a service account. A service account enables Cloud Backup to authenticate and access the StorageGRID buckets used to store backups. The keys are required so that StorageGRID knows who is making the request.

These access keys must be associated with a user who has the following permissions:

```
"s3:ListAllMyBuckets",
"s3:ListBucket",
"s3:GetObject",
"s3:PutObject",
"s3:DeleteObject",
"s3:CreateBucket"
```

### Object versioning

You must not enable StorageGRID object versioning on the object store bucket.

#### Creating or switching Connectors

When backing up data to StorageGRID, a Connector must be available on your premises. You'll either need to install a new Connector or make sure that the currently selected Connector resides on-prem.

- Learn about Connectors
- Installing the Connector on a Linux host with internet access
- Switching between Connectors

#### Preparing networking for the Connector

Ensure that the Connector has the required networking connections.

### Steps

1. Ensure that the network where the Connector is installed enables the following connections:
    - An HTTPS connection over port 443 to StorageGRID
    - An HTTPS connection over port 443 to your ONTAP clusters
    - An outbound internet connection over port 443 to Cloud Backup

#### License requirements

Before your 30-day free trial of Cloud Backup expires, you need to purchase and activate a Cloud Backup BYOL license from NetApp. This license is for the account and can be used across multiple systems.

You'll need the serial number from NetApp that enables you to use the service for the duration and capacity of the license. Learn how to manage your BYOL licenses.

PAYGO licensing is not supported when backing up files to StorageGRID.

A SnapMirror license is required on the cluster. Note that the "Hybrid Cloud Bundle" is not required when using Cloud Backup.

### Enabling Cloud Backup to StorageGRID

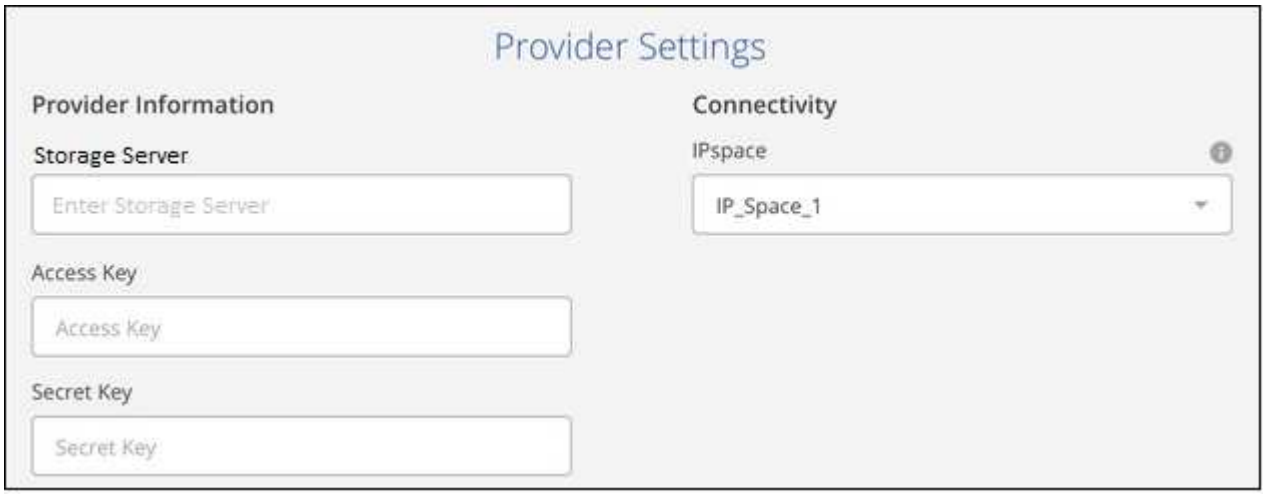
Enable Cloud Backup at any time directly from the on-premises working environment.

#### Steps

1. From the Canvas, select the on-premises working environment and click **Enable** next to the Backup & Restore service in the right-panel.

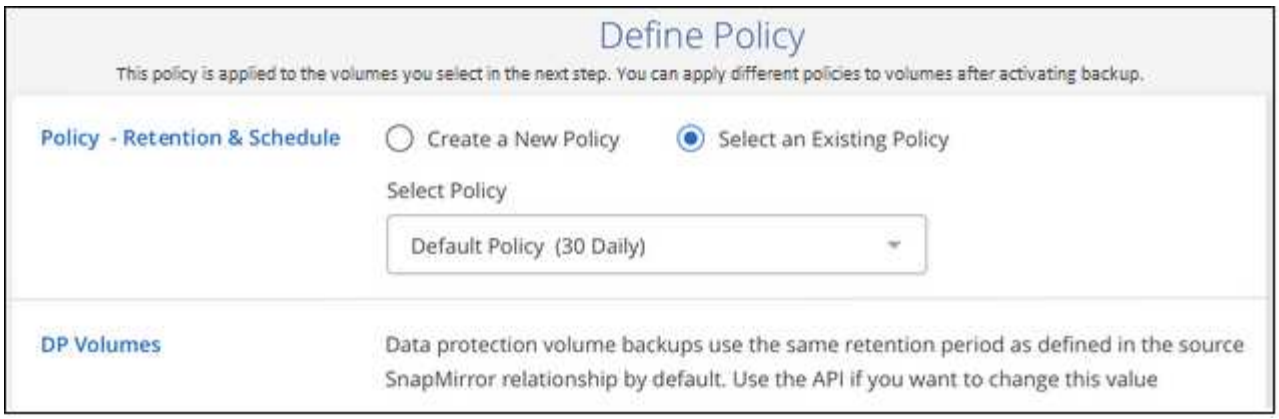
2. Select **StorageGRID** as the provider, click **Next**, and then enter the provider details:
   a. The FQDN of the StorageGRID server and the port that ONTAP should use for HTTPS communication with StorageGRID; for example: `s3.eng.company.com:8082`
   b. The Access Key and the Secret Key used to access the bucket to store backups.
   c. The IPspace in the ONTAP cluster where the volumes you want to back up reside. The intercluster LIFs for this IPspace must have outbound internet access.

      Selecting the correct IPspace ensures that Cloud Backup can set up a connection from ONTAP to your StorageGRID object storage.




      Note that you cannot change this information after the service has started.

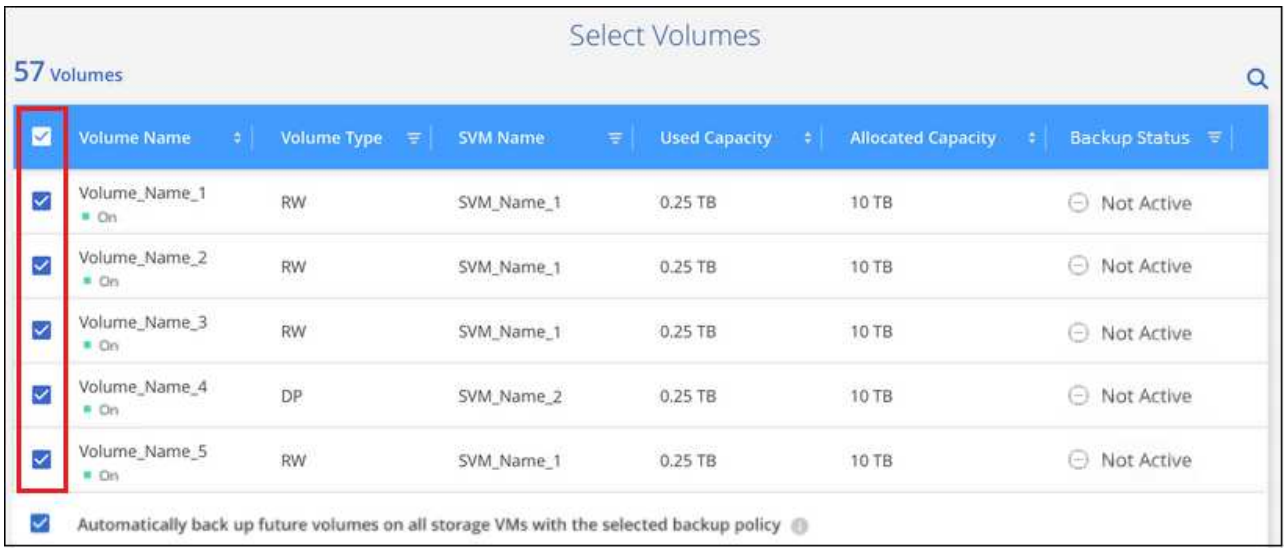
3. In the *Define Policy* page, select the default backup schedule and retention value and click **Next**.




See the list of existing policies.

4. Select the volumes that you want to back up using the default backup policy in the Select Volumes page. If you want to assign different backup policies to certain volumes, you can create additional policies and apply them to those volumes later.

   - To back up all volumes, check the box in the title row ( Volume Name ).
   - To back up individual volumes, check the box for each volume ( Volume_1 ).




   If you want all volumes added in the future to this cluster to have backup enabled, just leave the checkbox for "Automatically back up future volumes…" checked. If you disable this setting, you'll need to manually enable backups for future volumes.

5. Click **Activate Backup** and Cloud Backup starts taking the initial backups of each selected volume.

**Result**

An S3 bucket is created automatically in the service account indicated by the S3 access key and secret key you entered, and the backup files are stored there. The Volume Backup Dashboard is displayed so you can monitor the state of the backups.

**What's next?**

You can start and stop backups for volumes or change the backup schedule.
You can also restore entire volumes from a backup file to a new volume on an on-premises ONTAP system.

# Back up Kubernetes cluster data

## Backing up Kubernetes persistent volume data to Amazon S3

Complete a few steps to get started backing up data from your persistent volumes on EKS Kubernetes clusters to Amazon S3 storage.

### Quick start

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

**1** **Review prerequisites**

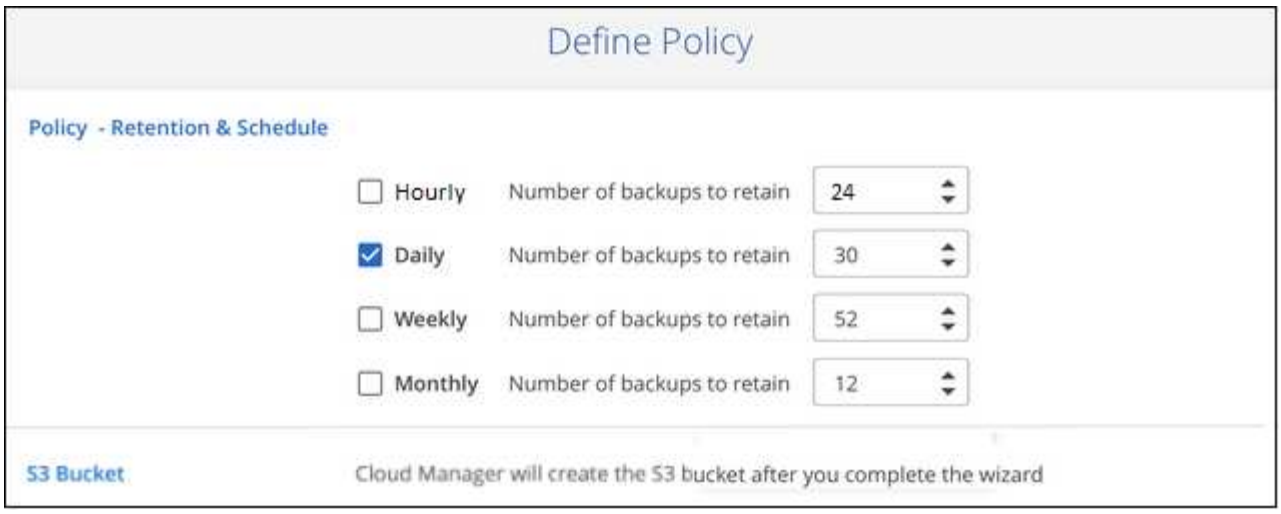
- You have discovered the Kubernetes cluster as a Cloud Manager working environment.
  - Trident must be installed on the cluster, and the Trident version must be 21.1 or greater.
  - All PVCs that will be used to create persistent volumes that you want to back up must have "snapshotPolicy" set to "default".
  - The cluster must be using Cloud Volumes ONTAP on AWS for its' backend storage.
  - The Cloud Volumes ONTAP system must be running ONTAP 9.7P5 or later.
- You have a valid cloud provider subscription for the storage space where your backups will be located.
- You have subscribed to the Cloud Manager Marketplace Backup offering, an AWS annual contract, or you have purchased and activated a Cloud Backup BYOL license from NetApp.
- The IAM role that provides the Cloud Manager Connector with permissions includes S3 permissions from the latest Cloud Manager policy.

**2** **Enable Cloud Backup on your existing Kubernetes cluster**

Select the working environment and click **Enable** next to the Backup & Restore service in the right-panel, and then follow the setup wizard.

**3** **Define the backup policy**

The default policy backs up volumes every day and retains the most recent 30 backup copies of each volume. Change to hourly, daily, weekly, or monthly backups, or select one of the system-defined policies that provide more options. You can also change the number of backup copies you want to retain.



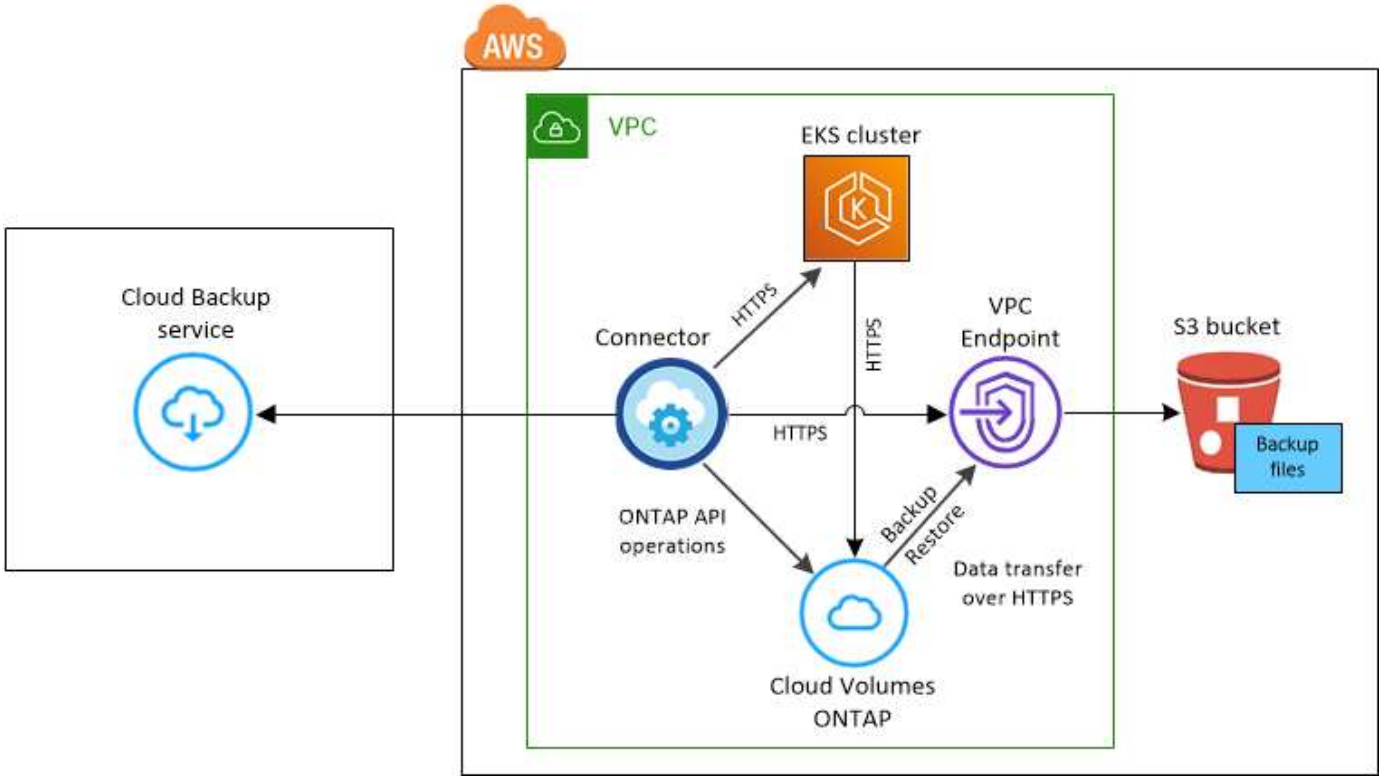

4 **Select the volumes that you want to back up**

Identify which volumes you want to back up in the Select Volumes page. An S3 bucket is created automatically in the same AWS account and Region as the Cloud Volumes ONTAP system, and the backup files are stored there.

### Requirements

Read the following requirements to make sure that you have a supported configuration before you start backing up Kubernetes persistent volumes to S3.

The following image shows each component and the connections that you need to prepare between them:




Note that the VPC Endpoint is optional.

**Kubernetes cluster requirements**

- You have discovered the Kubernetes cluster as a Cloud Manager working environment. See how to discover the Kubernetes cluster.
- Trident must be installed on the cluster, and the Trident version must be a minimum of 21.1. See how to install Trident or how to upgrade the Trident version.
- The cluster must be using Cloud Volumes ONTAP on AWS for its' backend storage.
- The Cloud Volumes ONTAP system must be in the same AWS region as the Kubernetes cluster, and it must be running ONTAP 9.7P5 or later.

  Note that Kubernetes clusters in on-premises locations are not supported. Only Kubernetes clusters in cloud deployments that are using Cloud Volumes ONTAP systems are supported.

- All Persistent Volume Claim objects that will be used to create the persistent volumes that you want to back up must have "snapshotPolicy" set to "default".

  You can do this for individual PVCs by adding `snapshotPolicy` under annotations:

```
kind: PersistentVolumeClaim
apiVersion: v1
metadata:
  name: full
  annotations:
    trident.netapp.io/snapshotPolicy: "default"
spec:
  accessModes:
    - ReadWriteMany
  resources:
    requests:
      storage: 1000Mi
  storageClassName: silver
```

  You can do this for all PVCs associated with a particular backend storage by adding the `snapshotPolicy` field under defaults in the `backend.json` file:

```
apiVersion: trident.netapp.io/v1
kind: TridentBackendConfig
metadata:
  name: backend-tbc-ontap-nas-advanced
spec:
  version: 1
  storageDriverName: ontap-nas
  managementLIF: 10.0.0.1
  dataLIF: 10.0.0.2
  backendName: tbc-ontap-nas-advanced
  svm: trident_svm
  credentials:
    name: backend-tbc-ontap-nas-advanced-secret
  limitAggregateUsage: 80%
  limitVolumeSize: 50Gi
  nfsMountOptions: nfsvers=4
  defaults:
    spaceReserve: volume
    exportPolicy: myk8scluster
    snapshotPolicy: default
    snapshotReserve: '10'
  deletionPolicy: retain
```

**License requirements**

For Cloud Backup PAYGO licensing, a Cloud Manager subscription is available in the AWS Marketplace that enables deployments of Cloud Volumes ONTAP and Cloud Backup. You need to subscribe to this Cloud Manager subscription before you enable Cloud Backup. Billing for Cloud Backup is done through this subscription.

For an annual contract that enables you to back up both Cloud Volumes ONTAP data and on-premises ONTAP data, you need to subscribe from the AWS Marketplace page and then associate the subscription with your AWS credentials.

For an annual contract that enables you to bundle Cloud Volumes ONTAP and Cloud Backup, you must set up the annual contract when you create a Cloud Volumes ONTAP working environment. This option doesn't enable you to back up on-prem data.

For Cloud Backup BYOL licensing, you need the serial number from NetApp that enables you to use the service for the duration and capacity of the license. Learn how to manage your BYOL licenses.

And you need to have an AWS account for the storage space where your backups will be located.

**Supported AWS regions**

Cloud Backup is supported in all AWS regions where Cloud Volumes ONTAP is supported.

**AWS Backup permissions required**

The IAM role that provides Cloud Manager with permissions must include S3 permissions from the latest Cloud Manager policy.

Here are the specific S3 permissions from the policy:

```
{
            "Sid": "backupPolicy",
            "Effect": "Allow",
            "Action": [
                "s3:DeleteBucket",
                "s3:GetLifecycleConfiguration",
                "s3:PutLifecycleConfiguration",
                "s3:PutBucketTagging",
                "s3:ListBucketVersions",
                "s3:GetObject",
                "s3:DeleteObject",
                "s3:ListBucket",
                "s3:ListAllMyBuckets",
                "s3:GetBucketTagging",
                "s3:GetBucketLocation",
                "s3:GetBucketPolicyStatus",
                "s3:GetBucketPublicAccessBlock",
                "s3:GetBucketAcl",
                "s3:GetBucketPolicy",
                "s3:PutBucketPublicAccessBlock"
            ],
            "Resource": [
                "arn:aws:s3:::netapp-backup-*"
            ]
        },
```

### Enabling Cloud Backup on an existing system

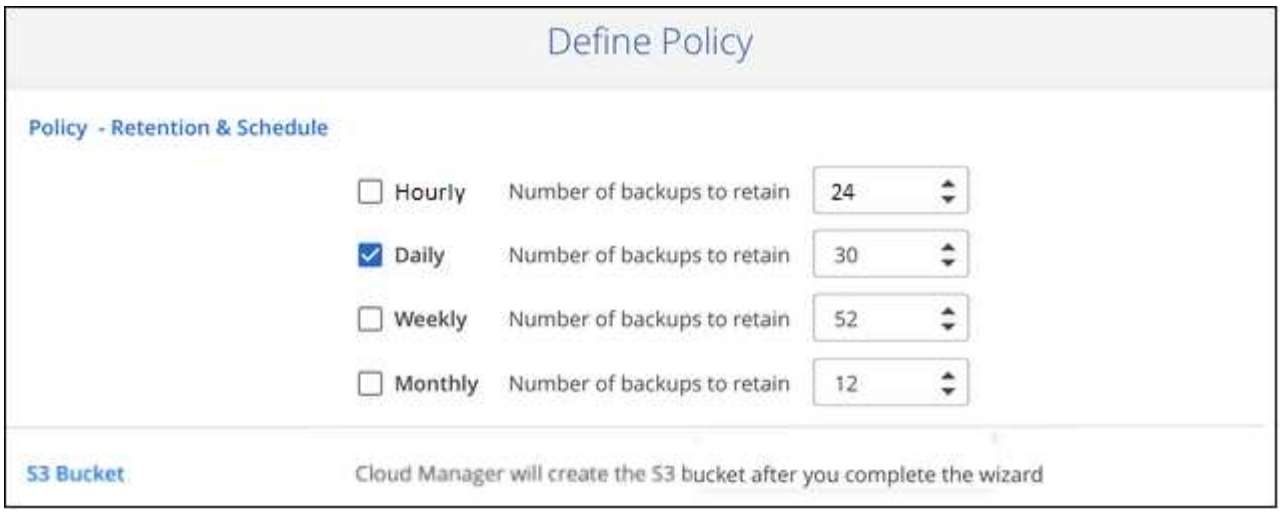
Enable Cloud Backup at any time directly from the working environment.

#### Steps

1. Select the working environment and click **Enable** next to the Backup & Restore service in the right-panel.

2. Enter the backup policy details and click **Next**.

   You can define the backup schedule and choose the number of backups to retain.




3. Select the persistent volumes that you want to back up.
   - To back up all volumes, check the box in the title row ( Volume Name ).
   - To back up individual volumes, check the box for each volume ( Volume_1 ).

4. Click **Activate Backup** and Cloud Backup starts taking the initial backups of each selected volume.

**Result**

An S3 bucket is created automatically in the same AWS account and Region as the Cloud Volumes ONTAP system, and the backup files are stored there.

The Kubernetes Dashboard is displayed so you can monitor the state of the backups.

**What's next?**

You can start and stop backups for volumes or change the backup schedule.
You can also restore entire volumes from a backup file as a new volume on the same or different Kubernetes cluster in AWS (in the same region).

## Backing up Kubernetes persistent volume data to Azure Blob storage

Complete a few steps to get started backing up data from your persistent volumes on AKS Kubernetes clusters to Azure Blob storage.

### Quick start

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

**Review prerequisites**

- You have discovered the Kubernetes cluster as a Cloud Manager working environment.
  - Trident must be installed on the cluster, and the Trident version must be 21.1 or greater.
  - All PVCs that will be used to create persistent volumes that you want to back up must have "snapshotPolicy" set to "default".
  - The cluster must be using Cloud Volumes ONTAP on Azure for its' backend storage.
  - The Cloud Volumes ONTAP system must be running ONTAP 9.7P5 or later.
- You have a valid cloud provider subscription for the storage space where your backups will be located.
- You have subscribed to the Cloud Manager Marketplace Backup offering, or you have purchased and activated a Cloud Backup BYOL license from NetApp.

**Enable Cloud Backup on your existing Kubernetes cluster**

Select the working environment and click **Enable** next to the Backup & Restore service in the right-panel, and then follow the setup wizard.

**Define the backup policy**

The default policy backs up volumes every day and retains the most recent 30 backup copies of each volume. Change to hourly, daily, weekly, or monthly backups, or select one of the system-defined policies that provide more options. You can also change the number of backup copies you want to retain.

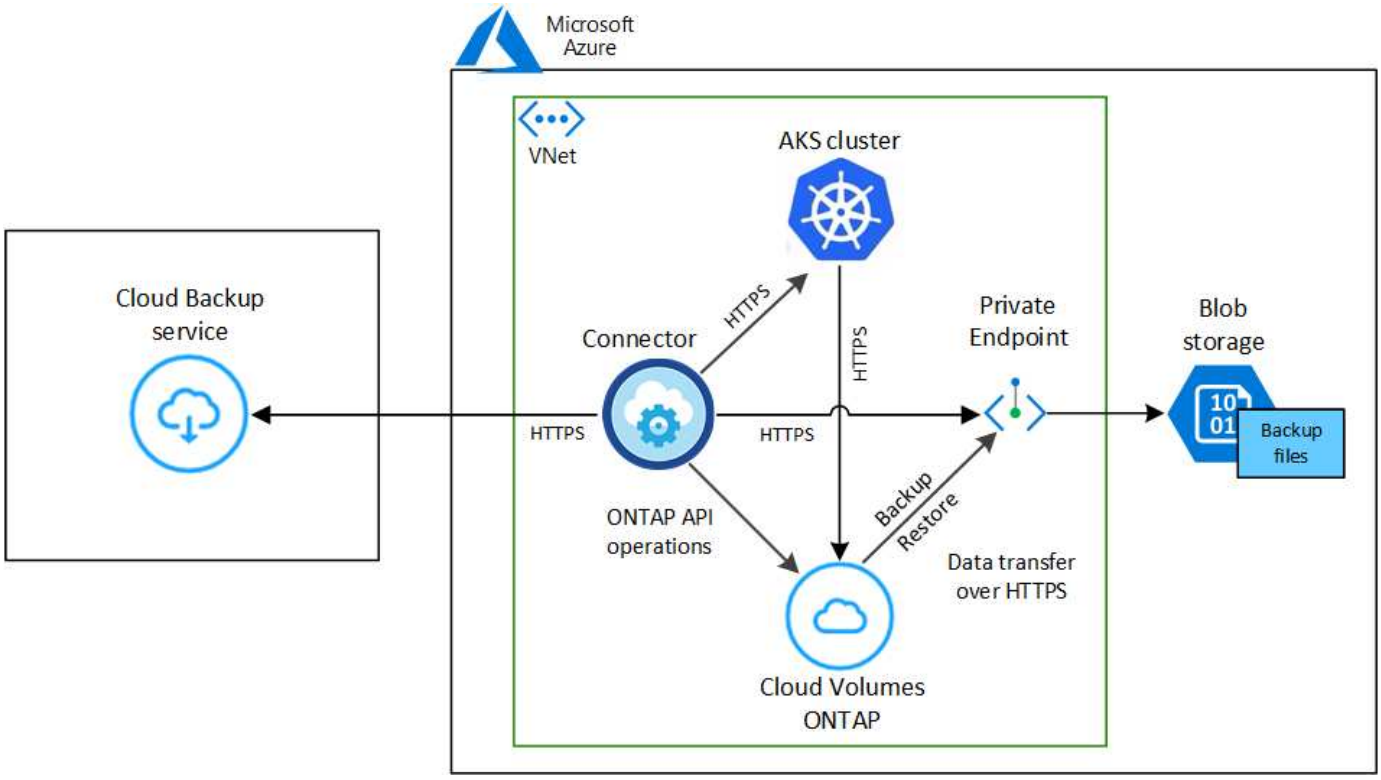
### 4 Select the volumes that you want to back up

Identify which volumes you want to back up in the Select Volumes page. The backup files are stored in a Blob container using the same Azure subscription and Region as the Cloud Volumes ONTAP system.

#### Requirements

Read the following requirements to make sure that you have a supported configuration before you start backing up Kubernetes persistent volumes to Blob storage.

The following image shows each component and the connections that you need to prepare between them:




Note that the Private Endpoint is optional.

**Kubernetes cluster requirements**

- You have discovered the Kubernetes cluster as a Cloud Manager working environment. See how to discover the Kubernetes cluster.
- Trident must be installed on the cluster, and the Trident version must be a minimum of 21.1. See how to install Trident or how to upgrade the Trident version.
- The cluster must be using Cloud Volumes ONTAP on Azure for its' backend storage.
- The Cloud Volumes ONTAP system must be in the same Azure region as the Kubernetes cluster, and it must be running ONTAP 9.7P5 or later.

  Note that Kubernetes clusters in on-premises locations are not supported. Only Kubernetes clusters in cloud deployments that are using Cloud Volumes ONTAP systems are supported.

- All Persistent Volume Claim objects that will be used to create the persistent volumes that you want to back up must have "snapshotPolicy" set to "default".

  You can do this for individual PVCs by adding `snapshotPolicy` under annotations:

```
kind: PersistentVolumeClaim
apiVersion: v1
metadata:
  name: full
  annotations:
    trident.netapp.io/snapshotPolicy: "default"
spec:
  accessModes:
    - ReadWriteMany
  resources:
    requests:
      storage: 1000Mi
  storageClassName: silver
```

  You can do this for all PVCs associated with a particular backend storage by adding the `snapshotPolicy` field under defaults in the `backend.json` file:

```
apiVersion: trident.netapp.io/v1
kind: TridentBackendConfig
metadata:
  name: backend-tbc-ontap-nas-advanced
spec:
  version: 1
  storageDriverName: ontap-nas
  managementLIF: 10.0.0.1
  dataLIF: 10.0.0.2
  backendName: tbc-ontap-nas-advanced
  svm: trident_svm
  credentials:
    name: backend-tbc-ontap-nas-advanced-secret
  limitAggregateUsage: 80%
  limitVolumeSize: 50Gi
  nfsMountOptions: nfsvers=4
  defaults:
    spaceReserve: volume
    exportPolicy: myk8scluster
    snapshotPolicy: default
    snapshotReserve: '10'
  deletionPolicy: retain
```

### License requirements

For Cloud Backup PAYGO licensing, a subscription through the Azure Marketplace is required before you enable Cloud Backup. Billing for Cloud Backup is done through this subscription. You can subscribe from the Details & Credentials page of the working environment wizard.

For Cloud Backup BYOL licensing, you need the serial number from NetApp that enables you to use the service for the duration and capacity of the license. Learn how to manage your BYOL licenses.

And you need to have a Microsoft Azure subscription for the storage space where your backups will be located.

### Supported Azure regions

Cloud Backup is supported in all Azure regions where Cloud Volumes ONTAP is supported.

### Enabling Cloud Backup on an existing system

Enable Cloud Backup at any time directly from the working environment.

#### Steps

1. Select the working environment and click **Enable** next to the Backup & Restore service in the right-panel.

2. Enter the backup policy details and click **Next**.

   You can define the backup schedule and choose the number of backups to retain.

3. Select the persistent volumes that you want to back up.

   - To back up all volumes, check the box in the title row ( Volume Name ).
   - To back up individual volumes, check the box for each volume ( Volume_1 ).

4. Click **Activate Backup** and Cloud Backup starts taking the initial backups of each selected volume.

**Result**

The backup files are stored in a Blob container using the same Azure subscription and Region as the Cloud Volumes ONTAP system.

The Kubernetes Dashboard is displayed so you can monitor the state of the backups.

**What's next?**

You can start and stop backups for volumes or change the backup schedule.
You can also restore entire volumes from a backup file as a new volume on the same or different Kubernetes cluster in Azure (in the same region).

## Backing up Kubernetes persistent volume data to Google Cloud storage

Complete a few steps to get started backing up data from your persistent volumes on GKE Kubernetes clusters to Google Cloud storage.

### Quick start

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

### 1 Review prerequisites

- You have discovered the Kubernetes cluster as a Cloud Manager working environment.
  - Trident must be installed on the cluster, and the Trident version must be 21.1 or greater.
  - All PVCs that will be used to create persistent volumes that you want to back up must have "snapshotPolicy" set to "default".
  - The cluster must be using Cloud Volumes ONTAP on GCP for its' backend storage.
  - The Cloud Volumes ONTAP system must be running ONTAP 9.7P5 or later.
- You have a valid GCP subscription for the storage space where your backups will be located.
- You have a service account in your Google Cloud Project that has the predefined Storage Admin role.
- You have subscribed to the Cloud Manager Marketplace Backup offering, or you have purchased and activated a Cloud Backup BYOL license from NetApp.

### 2 Enable Cloud Backup on your existing Kubernetes cluster

Select the working environment and click **Enable** next to the Backup & Restore service in the right-panel, and then follow the setup wizard.

### 3 Define the backup policy

The default policy backs up volumes every day and retains the most recent 30 backup copies of each volume. Change to hourly, daily, weekly, or monthly backups, or select one of the system-defined policies that provide more options. You can also change the number of backup copies you want to retain.

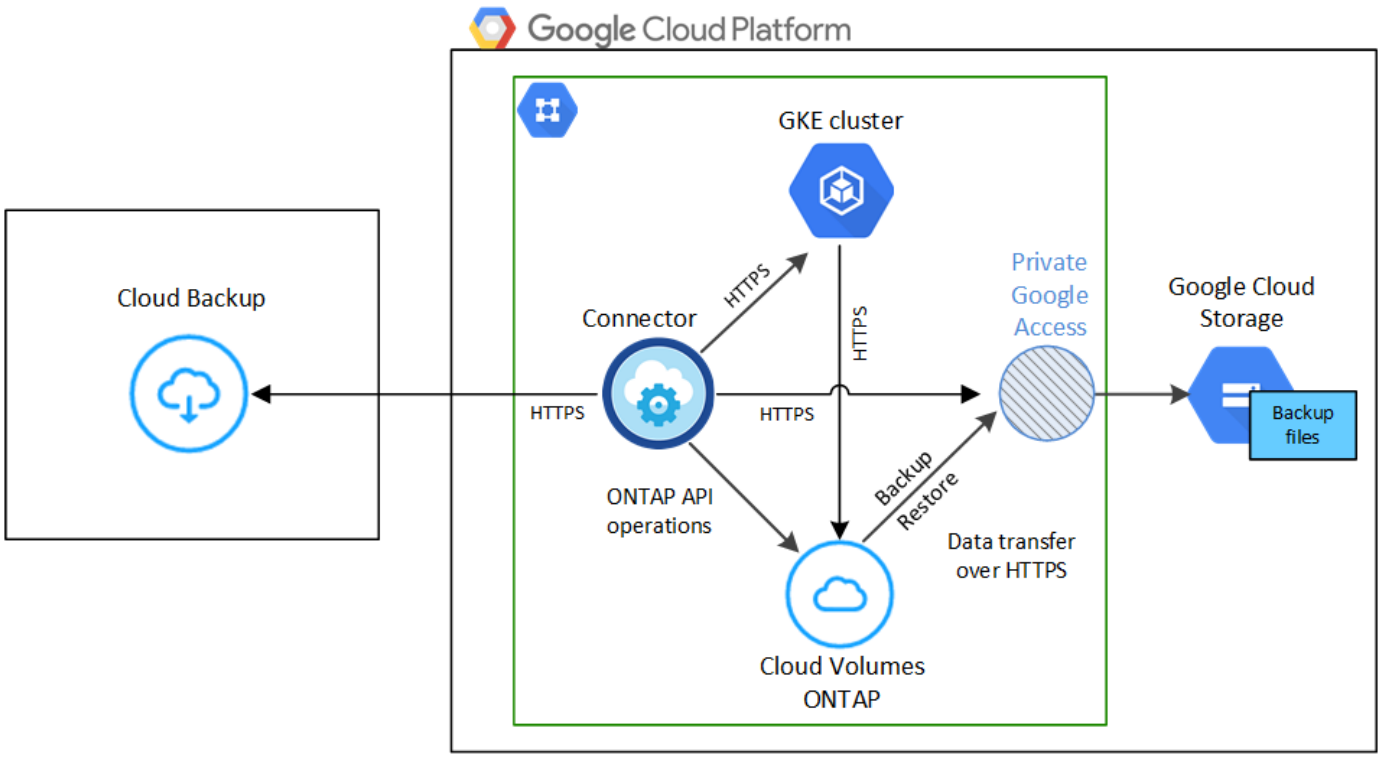
### 4 Select the volumes that you want to back up

Identify which volumes you want to back up in the Select Volumes page. The backup files are stored in a Google Cloud Storage bucket using the same GCP subscription and Region as the Cloud Volumes ONTAP system.

#### Requirements

Read the following requirements to make sure that you have a supported configuration before you start backing up Kubernetes persistent volumes to Google Cloud storage.

The following image shows each component and the connections that you need to prepare between them:




Note that the Private Endpoint is optional.

**Kubernetes cluster requirements**

- You have discovered the Kubernetes cluster as a Cloud Manager working environment. See how to discover the Kubernetes cluster.
- Trident must be installed on the cluster, and the Trident version must be a minimum of 21.1. See how to install Trident or how to upgrade the Trident version.
- The cluster must be using Cloud Volumes ONTAP on GCP for its' backend storage.
- The Cloud Volumes ONTAP system must be in the same GCP region as the Kubernetes cluster, and it must be running ONTAP 9.7P5 or later.

  Note that Kubernetes clusters in on-premises locations are not supported. Only Kubernetes clusters in cloud deployments that are using Cloud Volumes ONTAP systems are supported.

- All Persistent Volume Claim objects that will be used to create the persistent volumes that you want to back up must have "snapshotPolicy" set to "default".

  You can do this for individual PVCs by adding `snapshotPolicy` under annotations:

```
kind: PersistentVolumeClaim
apiVersion: v1
metadata:
  name: full
  annotations:
    trident.netapp.io/snapshotPolicy: "default"
spec:
  accessModes:
    - ReadWriteMany
  resources:
    requests:
      storage: 1000Mi
  storageClassName: silver
```

  You can do this for all PVCs associated with a particular backend storage by adding the `snapshotPolicy` field under defaults in the `backend.json` file:

```
apiVersion: trident.netapp.io/v1
kind: TridentBackendConfig
metadata:
  name: backend-tbc-ontap-nas-advanced
spec:
  version: 1
  storageDriverName: ontap-nas
  managementLIF: 10.0.0.1
  dataLIF: 10.0.0.2
  backendName: tbc-ontap-nas-advanced
  svm: trident_svm
  credentials:
    name: backend-tbc-ontap-nas-advanced-secret
  limitAggregateUsage: 80%
  limitVolumeSize: 50Gi
  nfsMountOptions: nfsvers=4
  defaults:
    spaceReserve: volume
    exportPolicy: myk8scluster
    snapshotPolicy: default
    snapshotReserve: '10'
  deletionPolicy: retain
```

#### Supported GCP regions

Cloud Backup is supported in all GCP regions where Cloud Volumes ONTAP is supported.

#### License requirements

For Cloud Backup PAYGO licensing, a subscription through the GCP Marketplace is required before you enable Cloud Backup. Billing for Cloud Backup is done through this subscription. You can subscribe from the Details & Credentials page of the working environment wizard.

For Cloud Backup BYOL licensing, you need the serial number from NetApp that enables you to use the service for the duration and capacity of the license. Learn how to manage your BYOL licenses.

And you need to have a Google subscription for the storage space where your backups will be located.

#### GCP Service Account

You need to have a service account in your Google Cloud Project that has the predefined Storage Admin role. Learn how to create a service account.

### Enabling Cloud Backup on an existing system

Enable Cloud Backup at any time directly from the working environment.

#### Steps

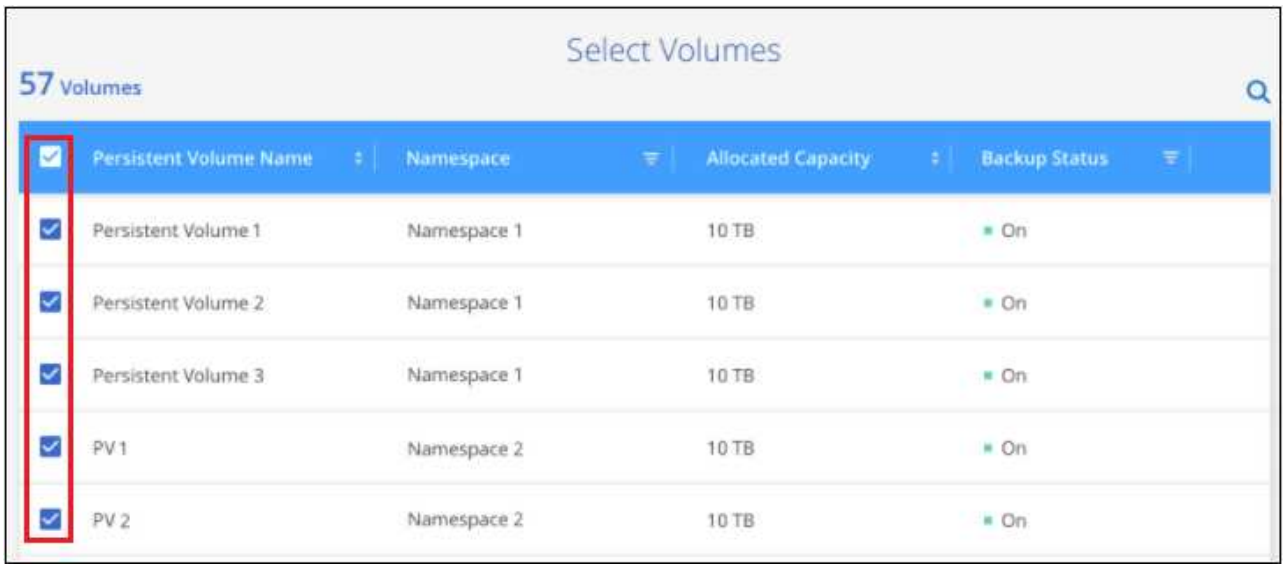
1. Select the working environment and click **Enable** next to the Backup & Restore service in the right-panel.

2. Enter the backup policy details and click **Next**.

   You can define the backup schedule and choose the number of backups to retain.

3. Select the persistent volumes that you want to back up.

   - To back up all volumes, check the box in the title row ( Volume Name ).
   - To back up individual volumes, check the box for each volume ( Volume_1 ).




4. Click **Activate Backup** and Cloud Backup starts taking the initial backups of each selected volume.

**Result**

The backup files are stored in a Google Cloud Storage bucket using the same GCP subscription and Region as the Cloud Volumes ONTAP system.

The Kubernetes Dashboard is displayed so you can monitor the state of the backups.

**What's next?**

You can start and stop backups for volumes or change the backup schedule.
You can also restore entire volumes from a backup file as a new volume on the same or different Kubernetes cluster in GCP (in the same region).

# Set up licensing for Cloud Backup

A 30-day free trial of Cloud Backup starts when you enable the Cloud Backup service. When the free trial ends, you'll need to pay for Cloud Backup using a pay-as-you-go (PAYGO) subscription through your cloud provider, an annual contract through AWS, or a bring-your-own license (BYOL) from NetApp.

A few notes before you read any further:

- If you've already subscribed to the Cloud Manager pay-as-you-go (PAYGO) subscription in your cloud provider's marketplace, then you're automatically subscribed to Cloud Backup as well. You won't need to subscribe again.
- The Cloud Backup bring-your-own-license (BYOL) is a floating license that you can use across all Cloud Volumes ONTAP and on-premises ONTAP systems associated with your Cloud Manager account.
- Backup to StorageGRID requires a BYOL license, but there's no cost for cloud provider storage space in this case.

Learn more about the licensing and costs related to Cloud Backup.

## Use a Cloud Backup PAYGO subscription

For pay-as-you-go you'll pay your cloud provider for object storage costs and for NetApp backup licensing costs. Use these links to subscribe to Cloud Backup from your cloud provider marketplace:

- AWS: Go to the Cloud Manager Marketplace offering for pricing details.
- Azure: Go to the Cloud Manager Marketplace offering for pricing details.
- GCP: Go to the Cloud Manager Marketplace offering for pricing details.

## Subscribe to yearly contracts through AWS

There are two annual contracts available from the AWS Marketplace:

- An annual contract that enables you to back up Cloud Volumes ONTAP data and on-premises ONTAP data.

  Go to the AWS Marketplace page to view pricing details.

  If you want to use this option, set up your subscription from the Marketplace page and then associate the subscription with your AWS credentials. Note that you'll also need to pay for your Cloud Volumes ONTAP systems using this annual contract subscription since you can assign only one active subscription to your AWS credentials in Cloud Manager.

- A Professional Package that enables you to bundle Cloud Volumes ONTAP and Cloud Backup by using an annual contract for 1, 2, or 3 years. Payment is per TiB. This option doesn't enable you to back up on-premises ONTAP data.

  Go to the AWS Marketplace page to view pricing details and go to the Cloud Volumes ONTAP Release

Notes to learn more about this licensing option.

If you want to use this option, you can set up the annual contract when you create a Cloud Volumes ONTAP working environment and Cloud Manager prompts you to subscribe to the AWS Marketplace.

## Use a Cloud Backup BYOL license

Bring-your-own licenses from NetApp provide 1-, 2-, or 3-year terms. You pay only for the data that you protect, calculated by the logical used capacity (*before* ONTAP efficiencies) of the source ONTAP volumes which are being backed up. This capacity is also known as Front-End Terabytes (FETB).

The BYOL Cloud Backup license is a floating license where the total capacity is shared across all Cloud Volumes ONTAP and on-premises ONTAP systems associated with your Cloud Manager account. You can get a rough estimate of the capacity you'll need by running the ONTAP command `volume show-space -logical-used` for the volumes you plan to back up.

If you don't have a Cloud Backup BYOL license, click the chat icon in the lower-right of Cloud Manager to purchase one.

Optionally, if you have an unassigned node-based license for Cloud Volumes ONTAP that you won't be using, you can convert it to a Cloud Backup license with the same dollar-equivalence and the same expiration date. Go here for details.

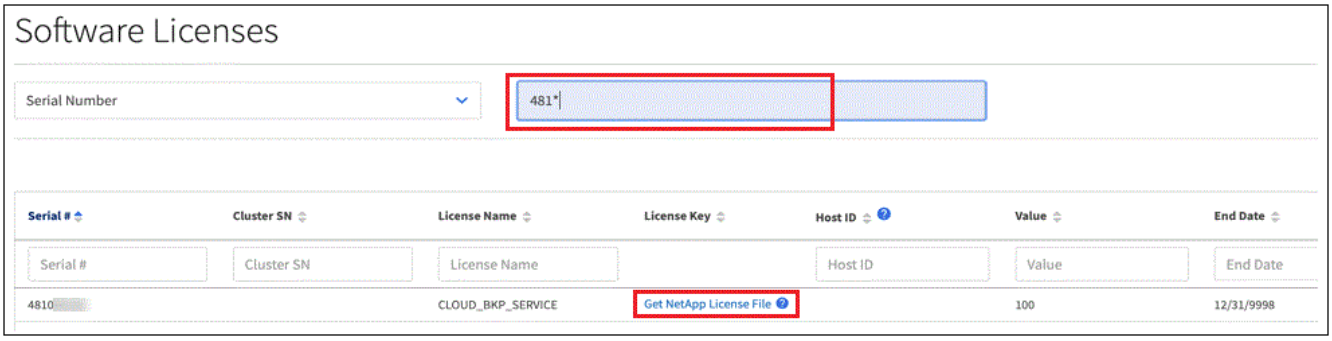
You use the Digital Wallet page in Cloud Manager to manage BYOL licenses for Cloud Backup. You can add new licenses and update existing licenses.

### Obtain your Cloud Backup license file

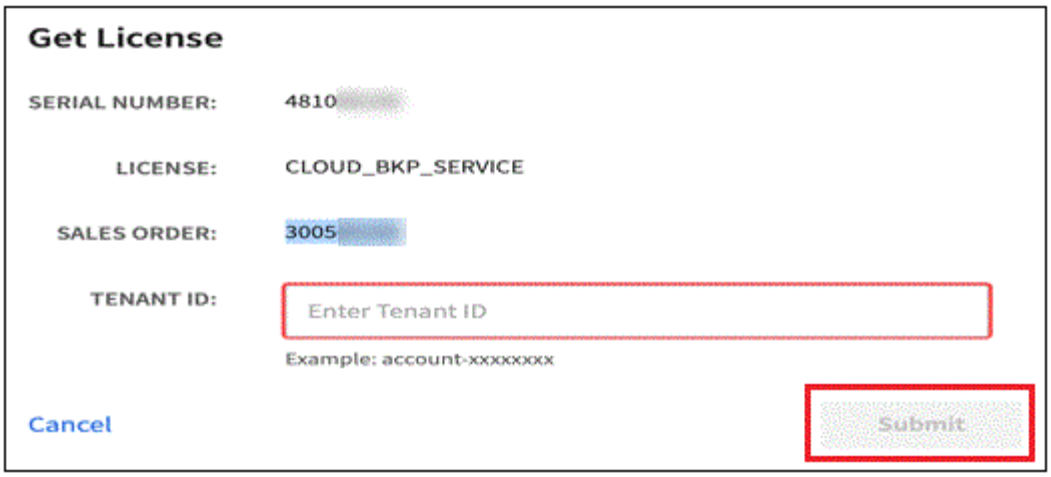
After you've purchased your Cloud Backup license, you activate the license in Cloud Manager by entering the Cloud Backup serial number and NSS account, or by uploading the NLF license file. The steps below show how to get the NLF license file if you plan to use that method.

#### Steps

1. Sign in to the NetApp Support Site and click **Systems > Software Licenses**.
2. Enter your Cloud Backup license serial number.




3. In the **License Key** column, click **Get NetApp License File**.
4. Enter your Cloud Manager Account ID (this is called a Tenant ID on the support site) and click **Submit** to download the license file.




You can find your Cloud Manager Account ID by selecting the **Account** drop-down from the top of Cloud Manager, and then clicking **Manage Account** next to your account. Your Account ID is in the Overview tab.

### Add Cloud Backup BYOL licenses to your account

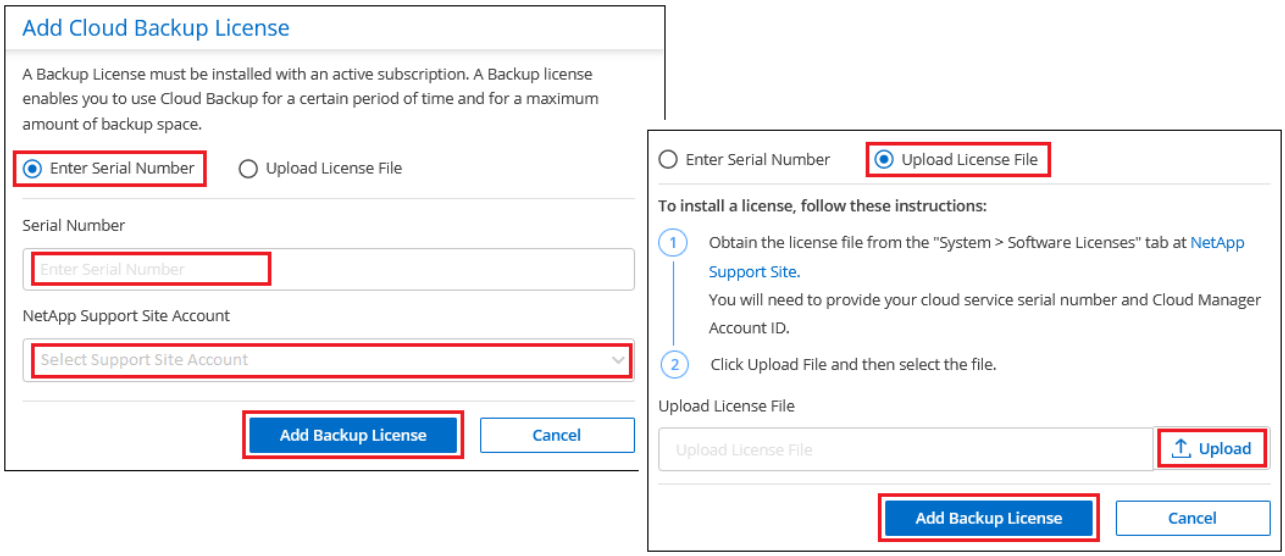
After you purchase a Cloud Backup license for your NetApp account, you need to add the license to Cloud Manager.

#### Steps

1. Click **All Services > Digital Wallet > Data Services Licenses**.
2. Click **Add License**.
3. In the *Add License* dialog, enter the license information and click **Add License**:
   - If you have the backup license serial number and know your NSS account, select the **Enter Serial Number** option and enter that information.

     If your NetApp Support Site account isn't available from the drop-down list, add the NSS account to Cloud Manager.

   - If you have the backup license file, select the **Upload License File** option and follow the prompts to attach the file.

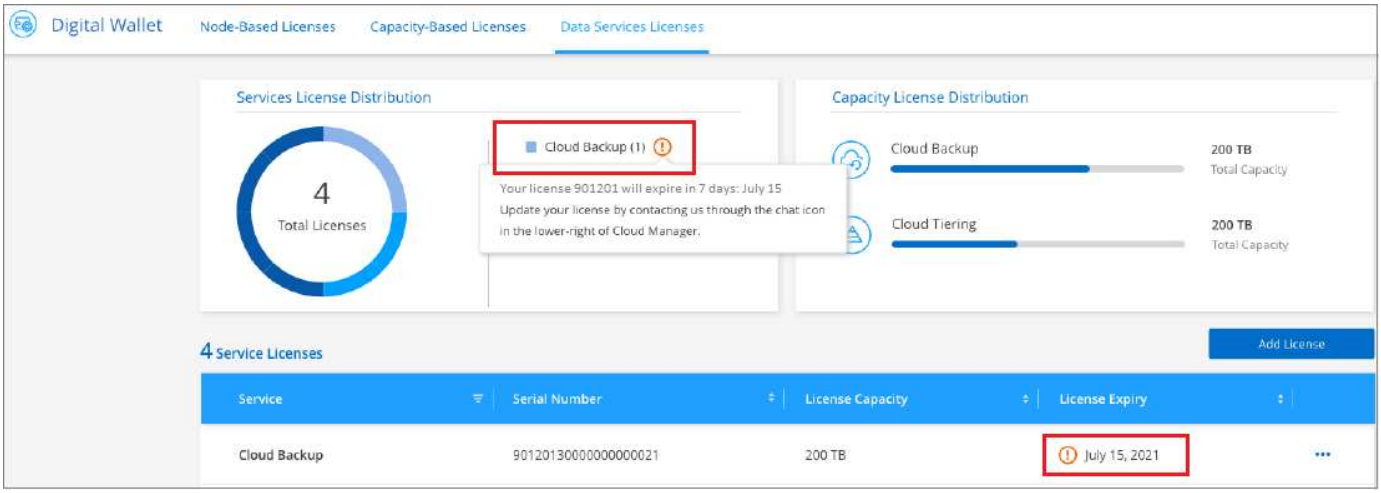


### Result

Cloud Manager adds the license so that Cloud Backup is active.

### Update a Cloud Backup BYOL license

If your licensed term is nearing the expiration date, or if your licensed capacity is reaching the limit, you'll be notified in the Backup UI. This status also appears in the Digital Wallet page and in Notifications.




You can update your Cloud Backup license before it expires so that there is no interruption in your ability to back up and restore your data.

### Steps

1. Click the chat icon in the lower-right of Cloud Manager, or contact Support, to request an extension to your term or additional capacity to your Cloud Backup license for the particular serial number.

   After you pay for the license and it is registered with the NetApp Support Site, Cloud Manager automatically updates the license in the Digital Wallet and the Data Services Licenses page will reflect the change in 5 to 10 minutes.

1. If Cloud Manager can't automatically update the license, then you'll need to manually upload the license file.
   a. You can obtain the license file from the NetApp Support Site.
   b. On the Digital Wallet page *Data Services Licenses* tab, click ••• for the service serial number you are updating, and click **Update License**.

   c. In the *Update License* page, upload the license file and click **Update License**.

**Result**

Cloud Manager updates the license so that Cloud Backup continues to be active.

# Managing backups for your ONTAP and Kubernetes systems

You can manage backups for your Cloud Volumes ONTAP, on-premises ONTAP, and Kubernetes systems by changing the backup schedule, enabling/disabling volume backups, deleting backups, and more.

Note that the following tasks are performed the same way for ONTAP clusters (Cloud Volumes ONTAP and on-premises ONTAP) and for Kubernetes clusters, but the text on the UI pages is slightly different. ONTAP cluster UI pages are shown in the examples.

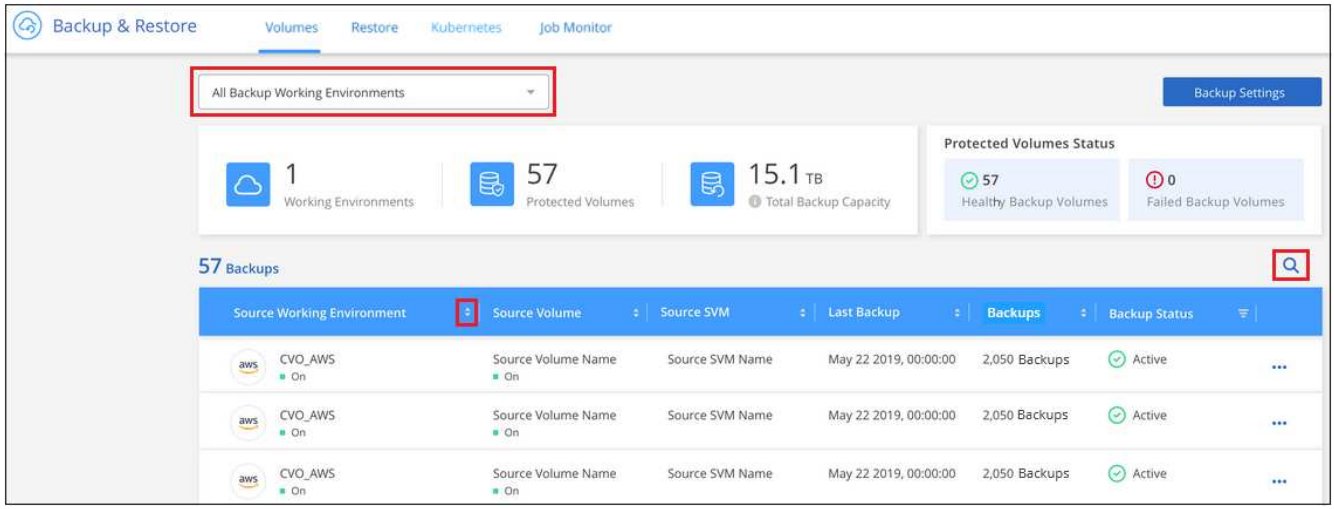
Do not manage or change backup files directly from your cloud provider environment. This may corrupt the files and will result in an unsupported configuration.

## Viewing the volumes that are being backed up

You can view a list of all the volumes that are currently being backed up in the Backup Dashboard.

**Steps**

1. Click the **Backup & Restore** tab.
2. Click the **Volumes** tab to view the list of volumes for Cloud Volumes ONTAP and on-premises ONTAP systems, or click the **Kubernetes** tab to view the list of persistent volumes for Kubernetes systems.



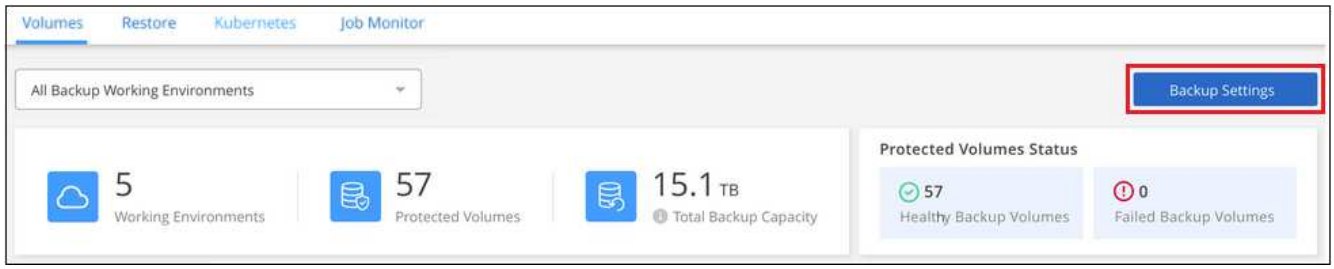

If you are looking for specific volumes in certain working environments, you can refine the list by working environment and volume, or you can use the search filter.

## Editing an existing backup policy

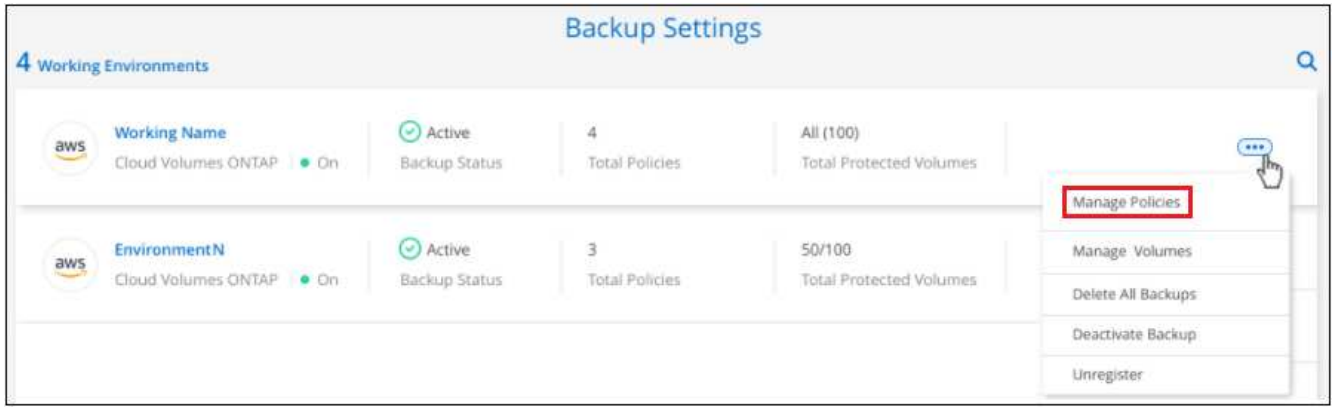
You can change the attributes for a backup policy that is currently applied to volumes in a working environment. Changing the backup policy affects all existing volumes that are using the policy.

**Steps**

1. From the **Volumes** tab, select **Backup Settings**.



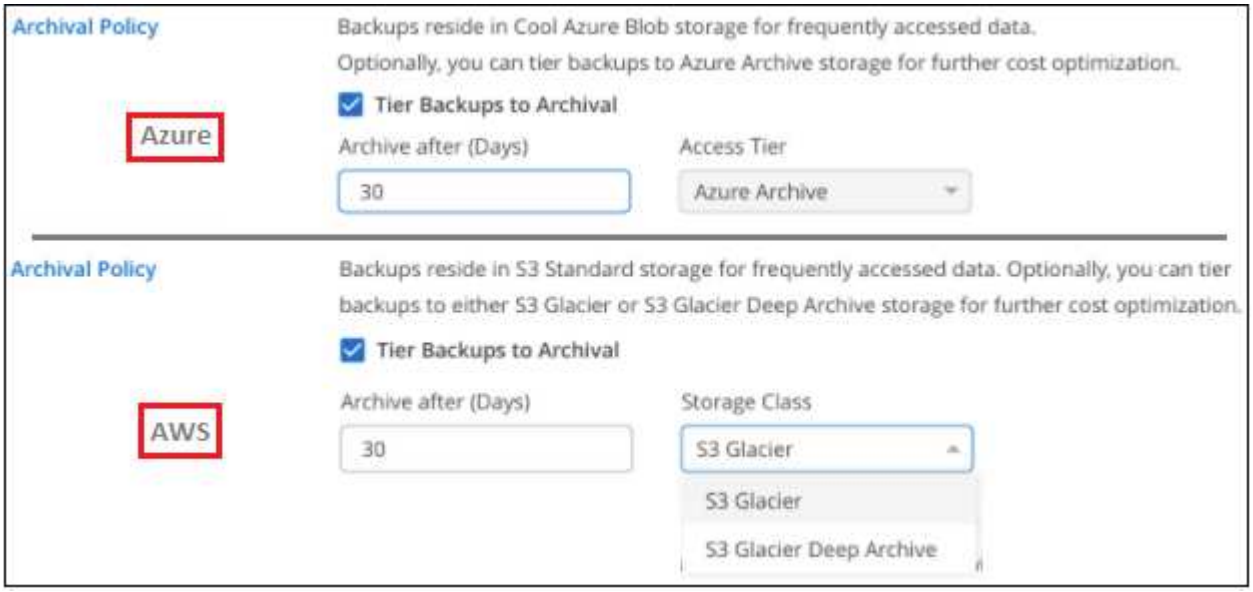

2. From the *Backup Settings* page, click ••• for the working environment where you want to change the settings, and select **Manage Policies**.




3. From the *Manage Policies* page, click **Edit Policy** for the backup policy you want to change in that working environment.

4. From the *Edit Policy* page, change the schedule and backup retention and click **Save**.

If your cluster is running ONTAP 9.10.1 or greater, and you are using AWS or Azure for your cloud storage, you also have the option to enable or disable tiering of backups to archival storage after a certain number of days.
Learn more about using Azure archival storage.
Learn more about using AWS archival storage.



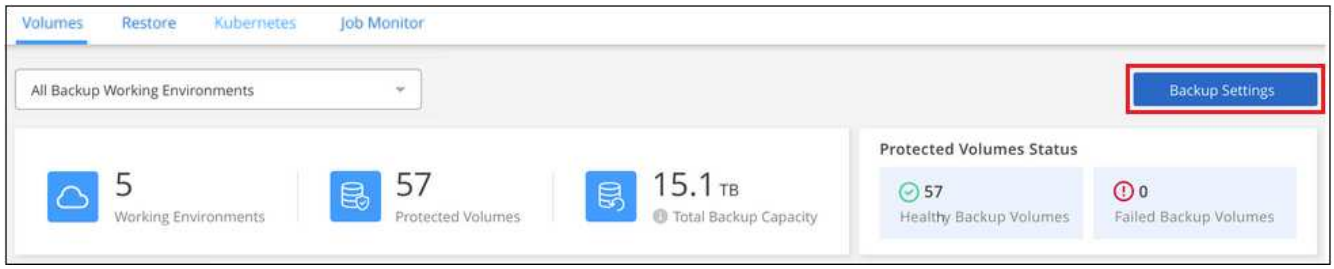

Note that any backup files that have been tiered to archival storage are left in that tier if you stop tiering backups to archive - they are not automatically moved back to the standard tier.

## Enabling and disabling backups of volumes

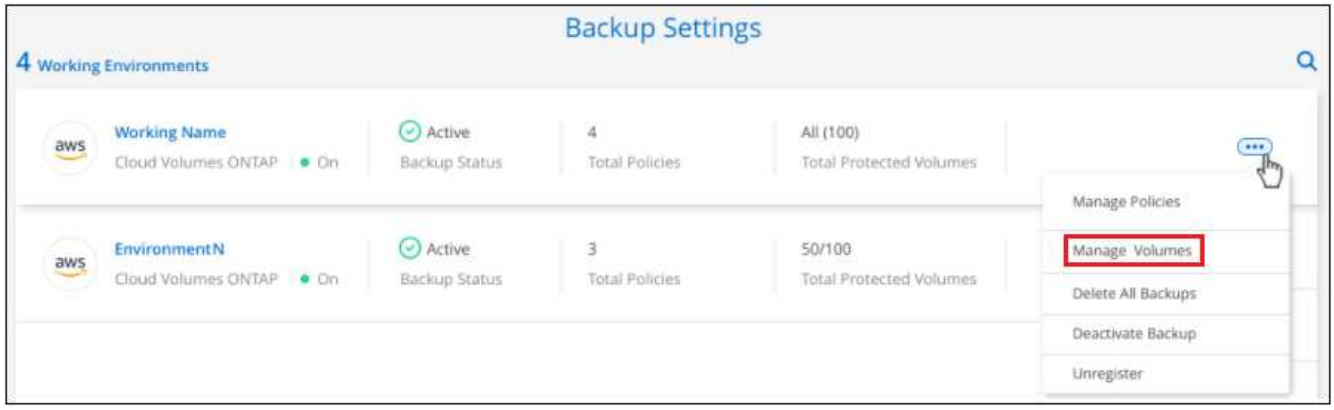
You can stop backing up a volume if you do not need backup copies of that volume and you do not want to pay for the cost to store the backups. You can also add a new volume to the backup list if it is not currently being backed up.

**Steps**

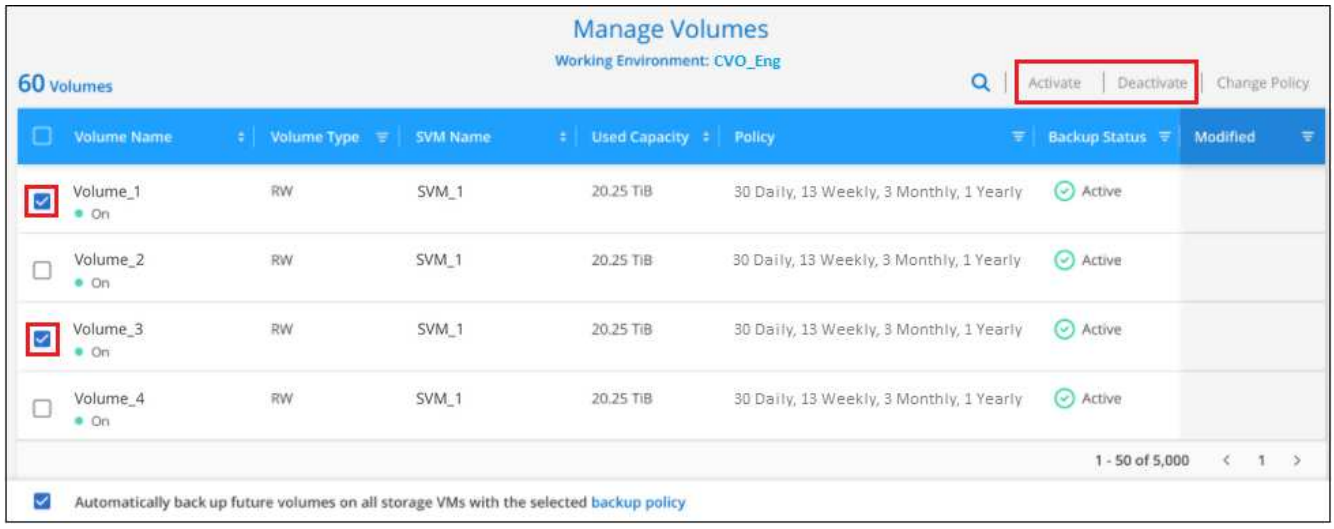
1. From the **Volumes** tab or the **Kubernetes** tab, select **Backup Settings**.




2. From the *Backup Settings page*, click ••• for the working environment, or the Kubernetes cluster, and select **Manage Volumes**.




3. Select the checkbox for a volume, or volumes, that you want to change, and then click **Activate** or **Deactivate** depending on whether you want to start or stop backups for the volume.




You can choose to have all volumes added in the future to have backup enabled, or not, by using the checkbox for "Automatically back up future volumes…". If you disable this setting, you'll need to manually enable backups for volumes added in the future.

4. Click **Save** to commit your changes.

**Note:** When stopping a volume from being backed up you'll continue to be charged by your cloud provider for object storage costs for the capacity that the backups use unless you delete the backups.

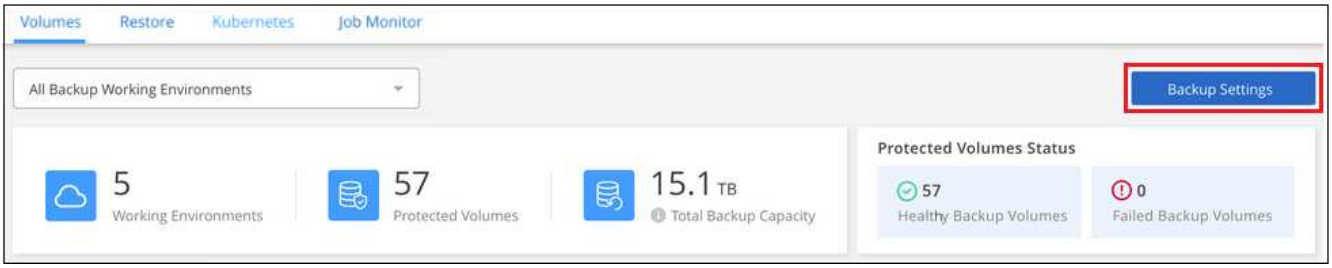
## Adding a new backup policy

When you enable Cloud Backup for a working environment, all the volumes you initially select are backed up using the default backup policy that you defined. If you want to assign different backup policies to certain volumes that have different recovery point objectives (RPO), you can create additional policies for that cluster and assign those policies to other volumes.

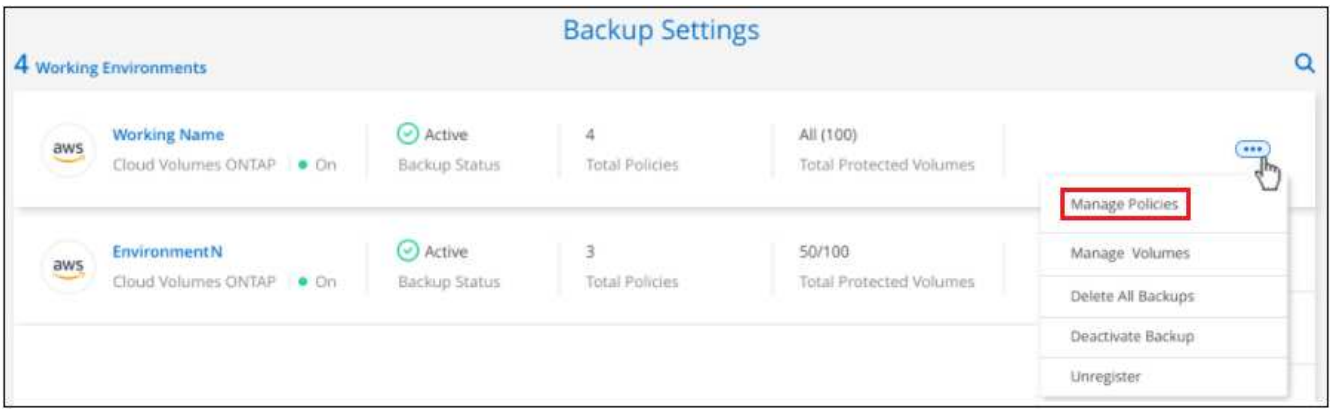
If you want to apply a new backup policy to certain volumes in a working environment, you first need to add the backup policy to the working environment. Then you can apply the policy to volumes in that working environment.

### Steps

1. From the **Volumes** tab, select **Backup Settings**.

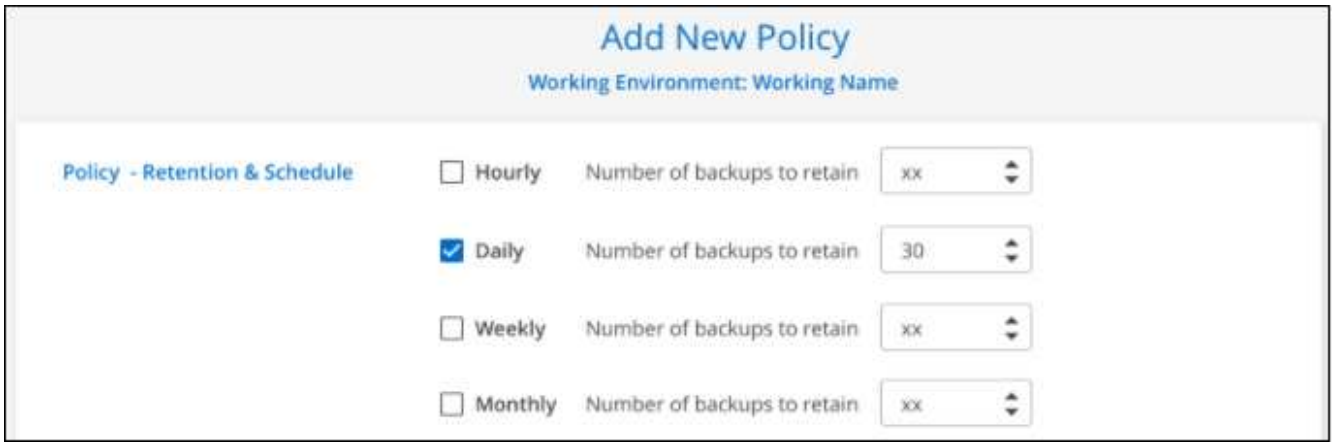



2. From the *Backup Settings* page, click ••• for the working environment where you want to add the new policy, and select **Manage Policies**.

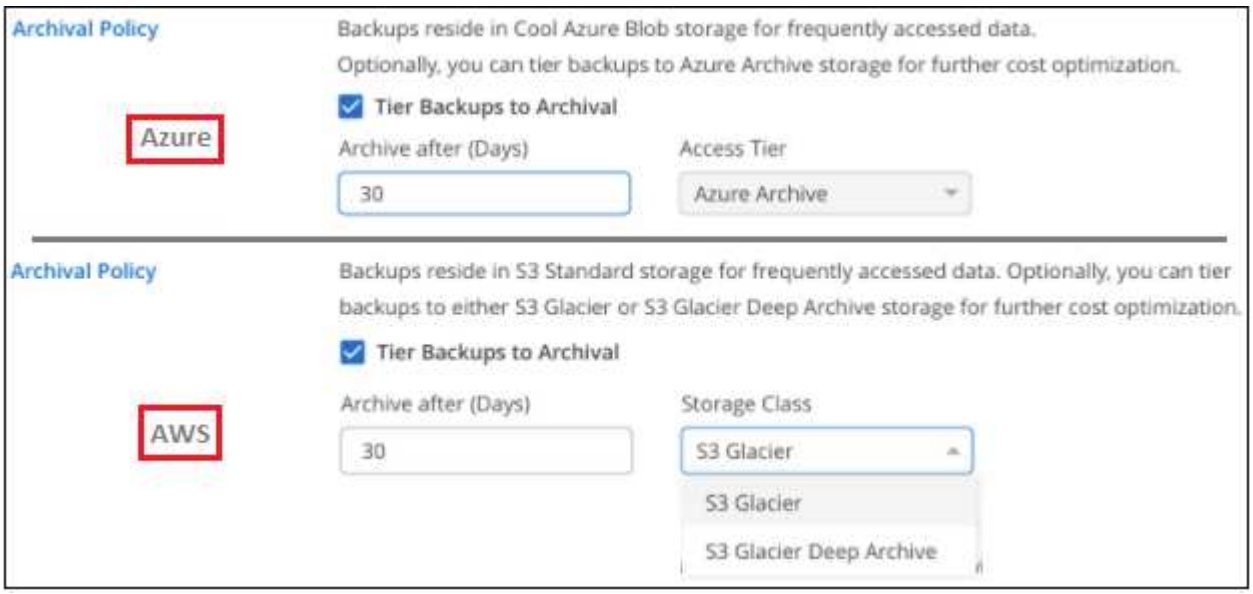



3. From the *Manage Policies* page, click **Add New Policy**.

4. From the *Add New Policy* page, define the schedule and backup retention and click **Save**.




If your cluster is running ONTAP 9.10.1 or greater, and you are using AWS or Azure for your cloud storage, you also have the option to enable or disable tiering of backups to archival storage after a certain number of days.
Learn more about using Azure archival storage.
Learn more about using AWS archival storage.



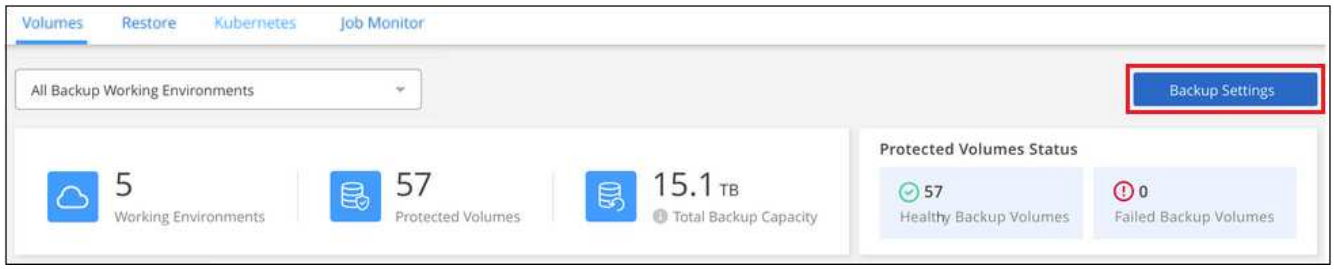

## Changing the policy assigned to existing volumes

You can change the backup policy assigned to your existing volumes if you want to change the frequency of taking backups, or if you want to change the retention value.

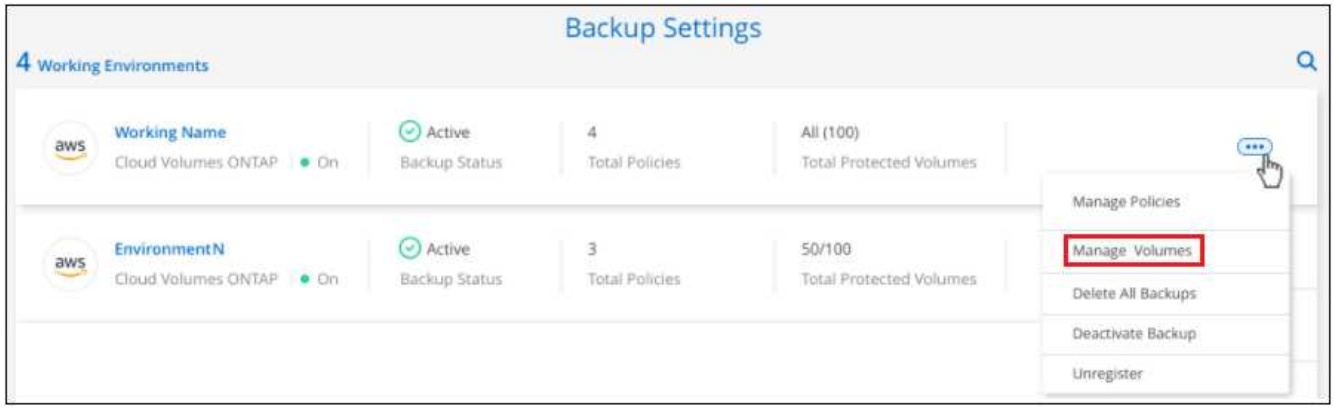
Note that the policy that you want to apply to the volumes must already exist. See how to add a new backup policy for a working environment.

**Steps**

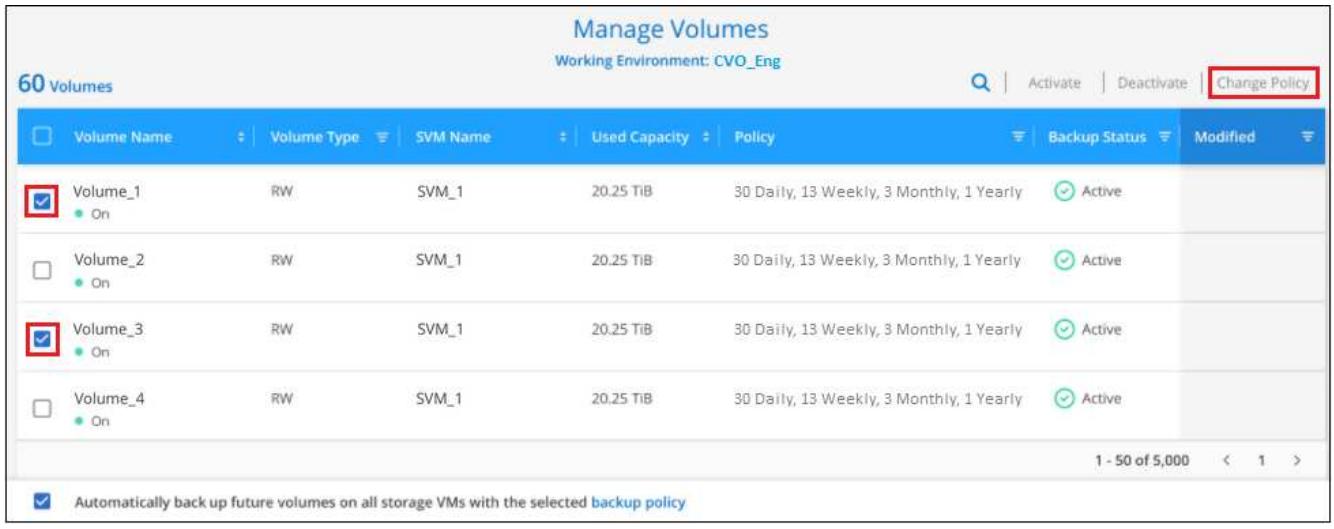
1. From the **Volumes** tab, select **Backup Settings**.



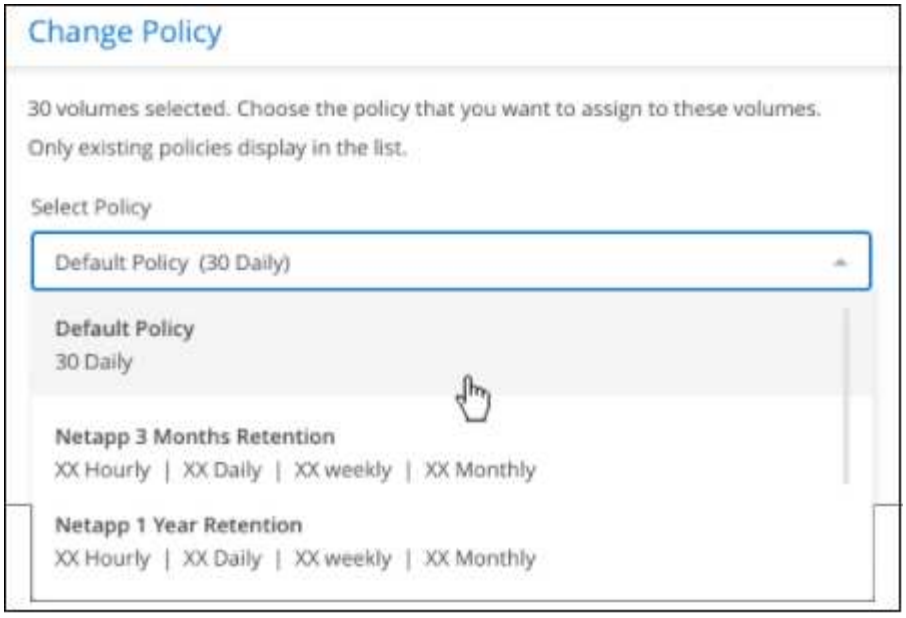

2. From the *Backup Settings page*, click ••• for the working environment where the volumes exist, and select **Manage Volumes**.




3. Select the checkbox for a volume, or volumes, that you want to change the policy for, and then click **Change Policy**.




4. In the *Change Policy* page, select the policy that you want to apply to the volumes, and click **Change Policy**.




5. Click **Save** to commit your changes.

## Creating a manual volume backup at any time

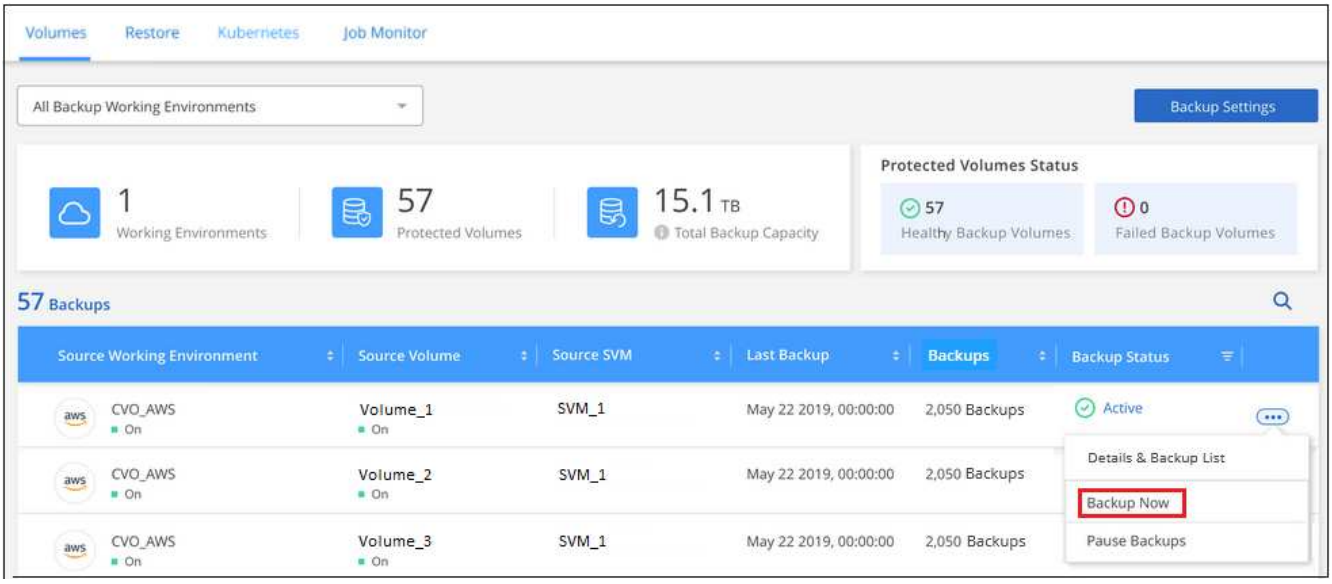
You can create an on-demand backup at any time to capture the current state of the volume. This can be useful if very important changes have been made to a volume and you don't want to wait for the next scheduled backup to protect that data, or if the volume is not currently being backed up and you want to capture its current state.

The backup name includes the timestamp so you can identify your on-demand backup from other scheduled backups.

On-demand volume backup isn't supported on data protection volumes or on Kubernetes persistent volumes.

**Steps**

1. From the **Volumes** tab, click ••• for the volume and select **Backup Now**.



The Backup Status column for that volume displays "In Progress" until the backup is created.

## Viewing the list of backups for each volume

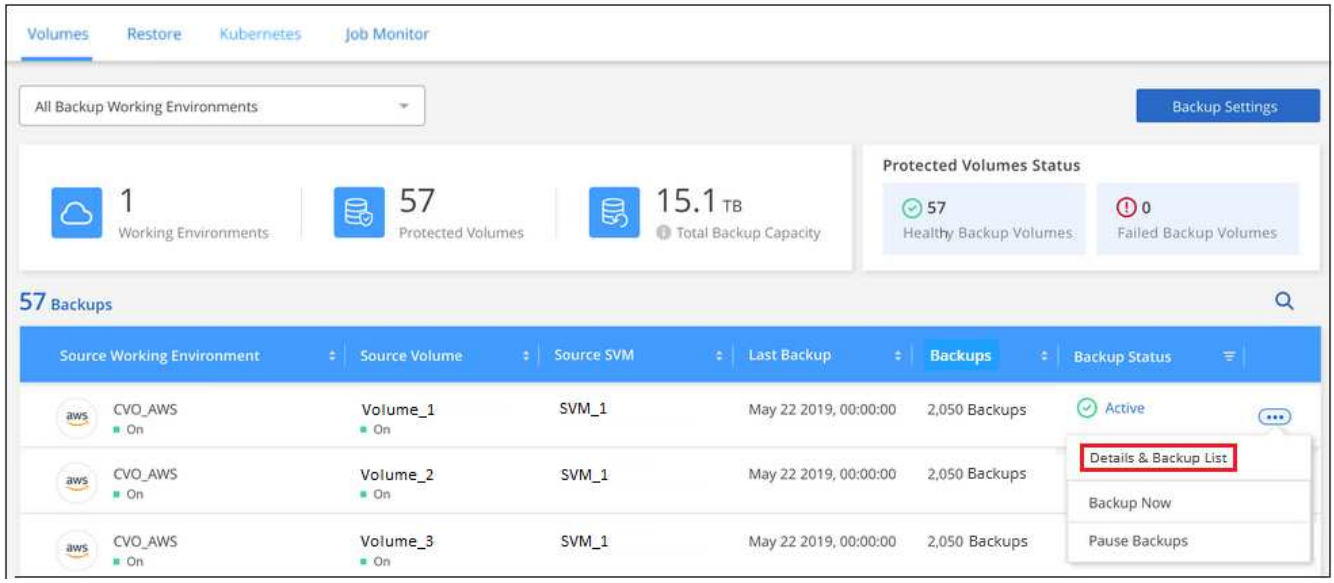
You can view the list of all backup files that exist for each volume. This page displays details about the source volume, destination location, and backup details such as last backup taken, the current backup policy, backup file size, and more.

This page also enables you perform the following tasks:

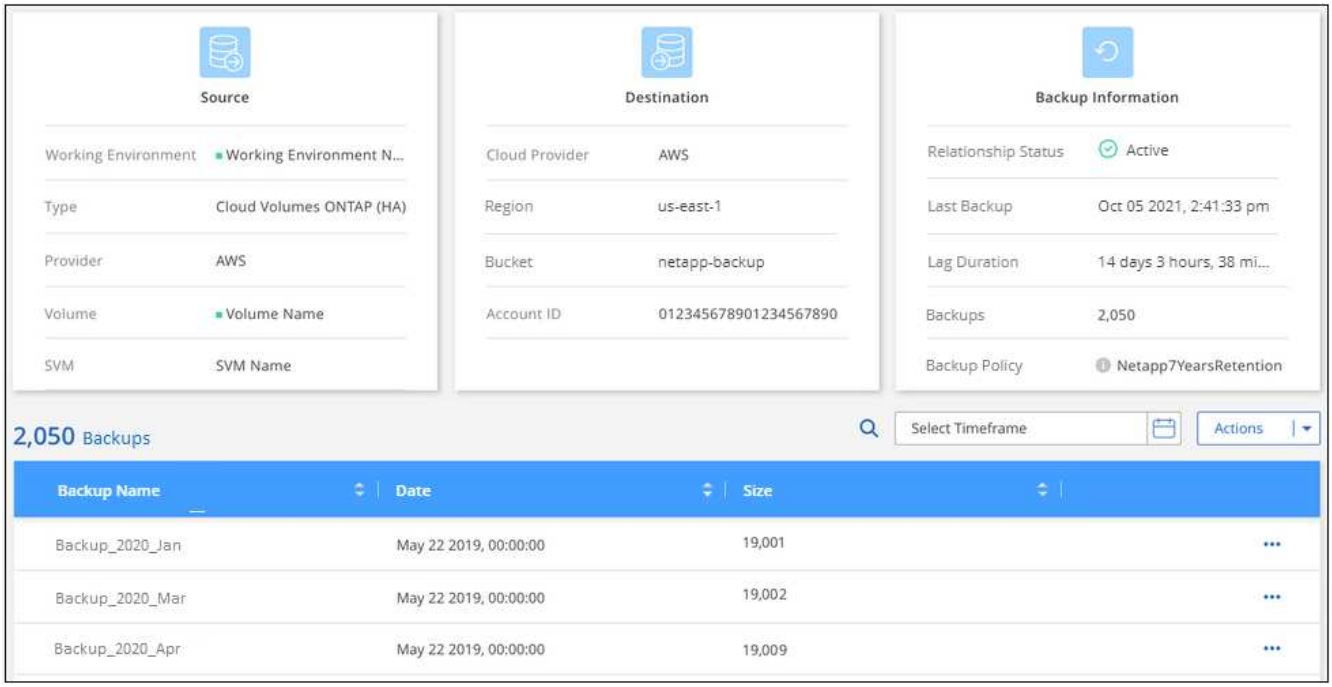
- Delete all backup files for the volume
- Delete individual backup files for the volume
- Download a backup report for the volume

**Steps**

1. From the **Volumes** tab or the **Kubernetes** tab, click ••• for the source volume and select **Details & Backup List**.




The list of all backup files is displayed along with details about the source volume, destination location, and backup details.




## Deleting backups

Cloud Backup enables you to delete a single backup file, delete all backups for a volume, or delete all backups of all volumes in a working environment or Kubernetes cluster. You might want to delete all backups if you no longer need the backups or if you deleted the source volume and want to remove all backups.

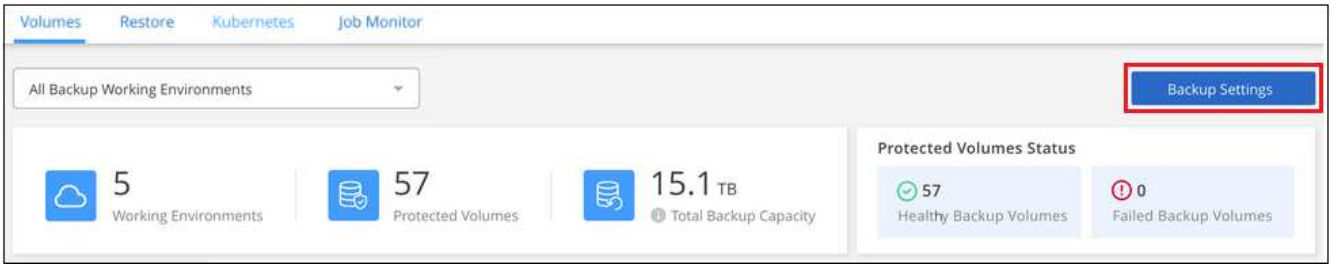
If you plan to delete a working environment or cluster that has backups, you must delete the backups **before** deleting the system. Cloud Backup doesn't automatically delete backups when you delete a system, and there is no current support in the UI to delete the backups after the system has been deleted. You'll continue to be charged for object storage costs for any remaining backups.

### Deleting all backup files for a working environment

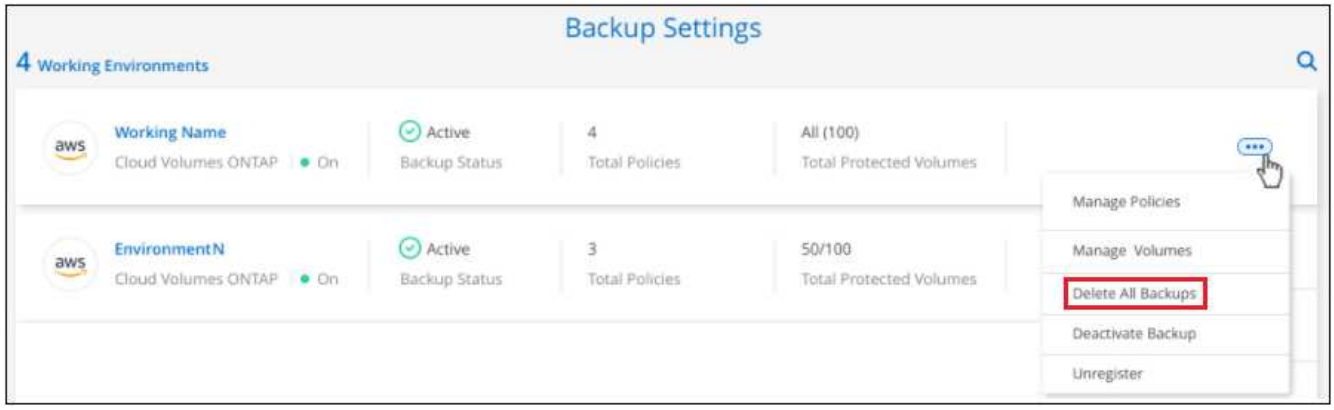
Deleting all backups for a working environment does not disable future backups of volumes in this working environment. If you want to stop creating backups of all volumes in a working environment, you can deactivate backups as described here.

#### Steps

1. From the **Volumes** tab or the **Kubernetes** tab, select **Backup Settings**.




2. Click ••• for the working environment, or the Kubernetes cluster, where you want to delete all backups and select **Delete All Backups**.




3. In the confirmation dialog box, enter the name of the working environment and click **Delete**.

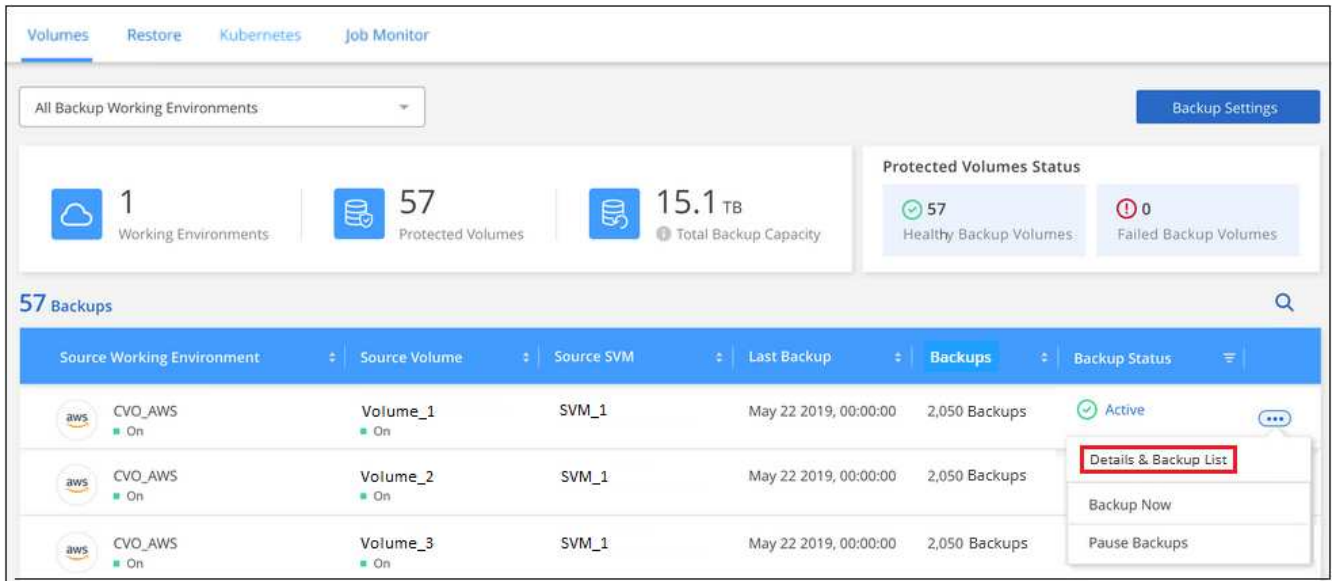
### Deleting all backup files for a volume

Deleting all backups for a volume also disables future backups for that volume.

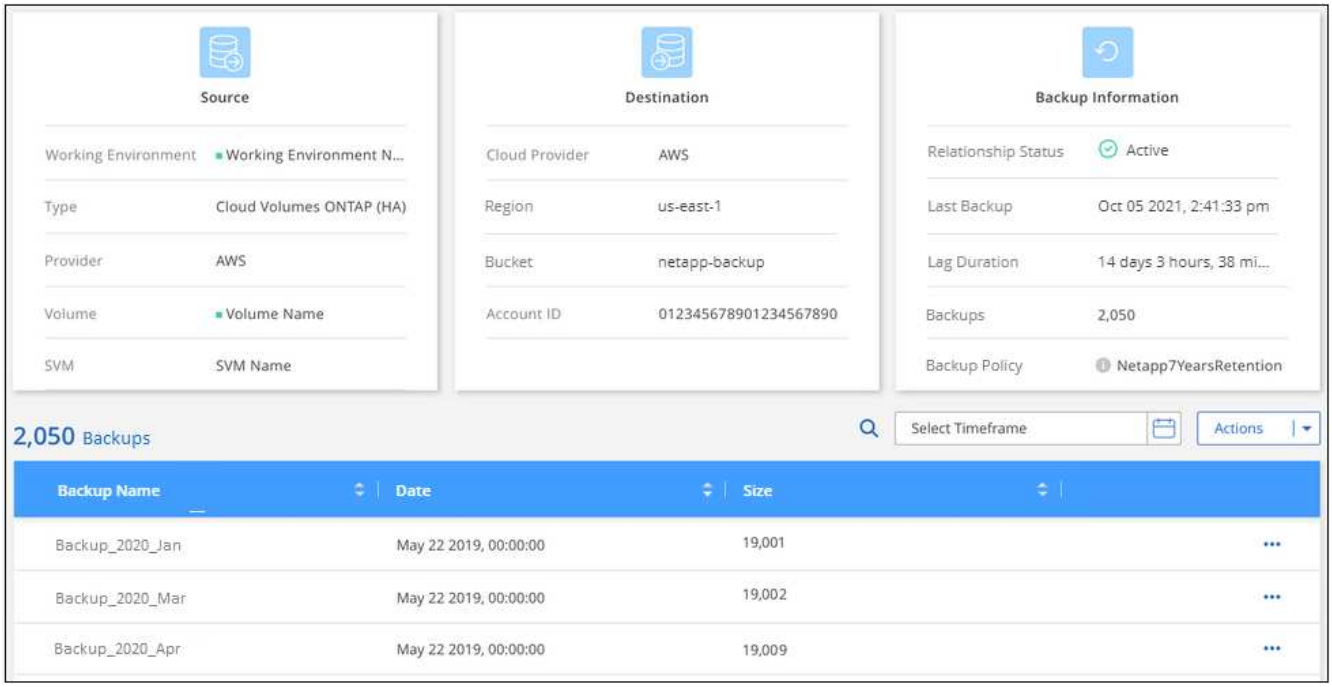
You can restart making backups for the volume at any time from the Manage Backups page.

### Steps

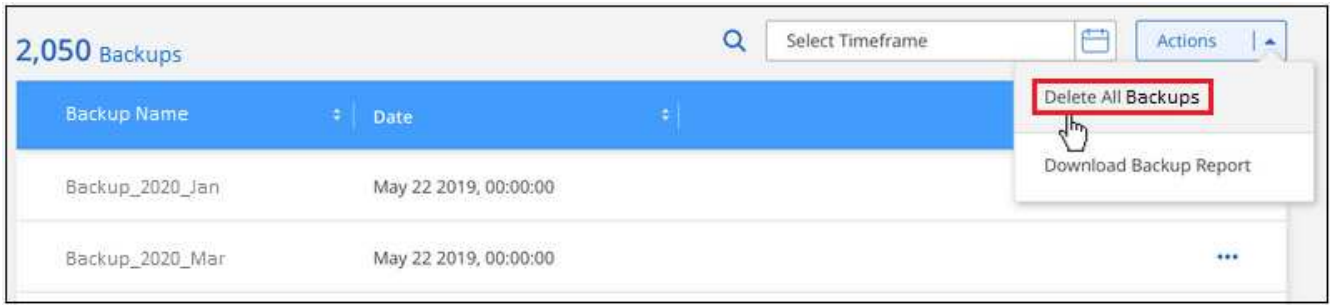
1. From the **Volumes** tab or the **Kubernetes** tab, click ••• for the source volume and select **Details & Backup List**.




The list of all backup files is displayed.




2. Click **Actions** > **Delete all Backups**.



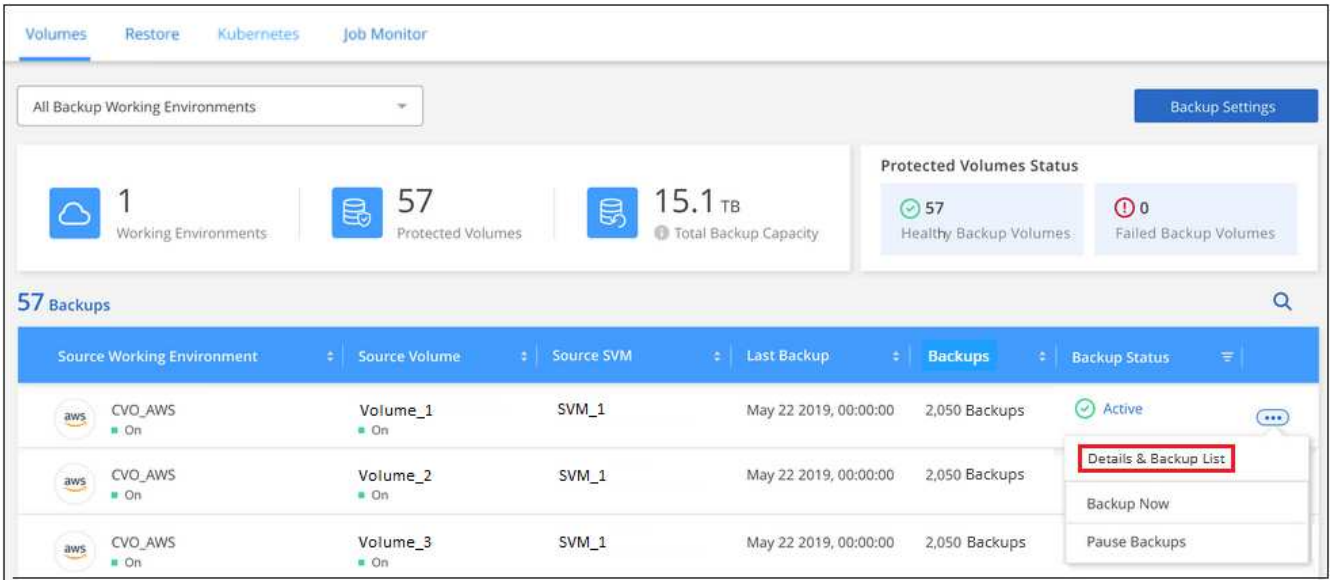

3. In the confirmation dialog box, enter the volume name and click **Delete**.

### Deleting a single backup file for a volume

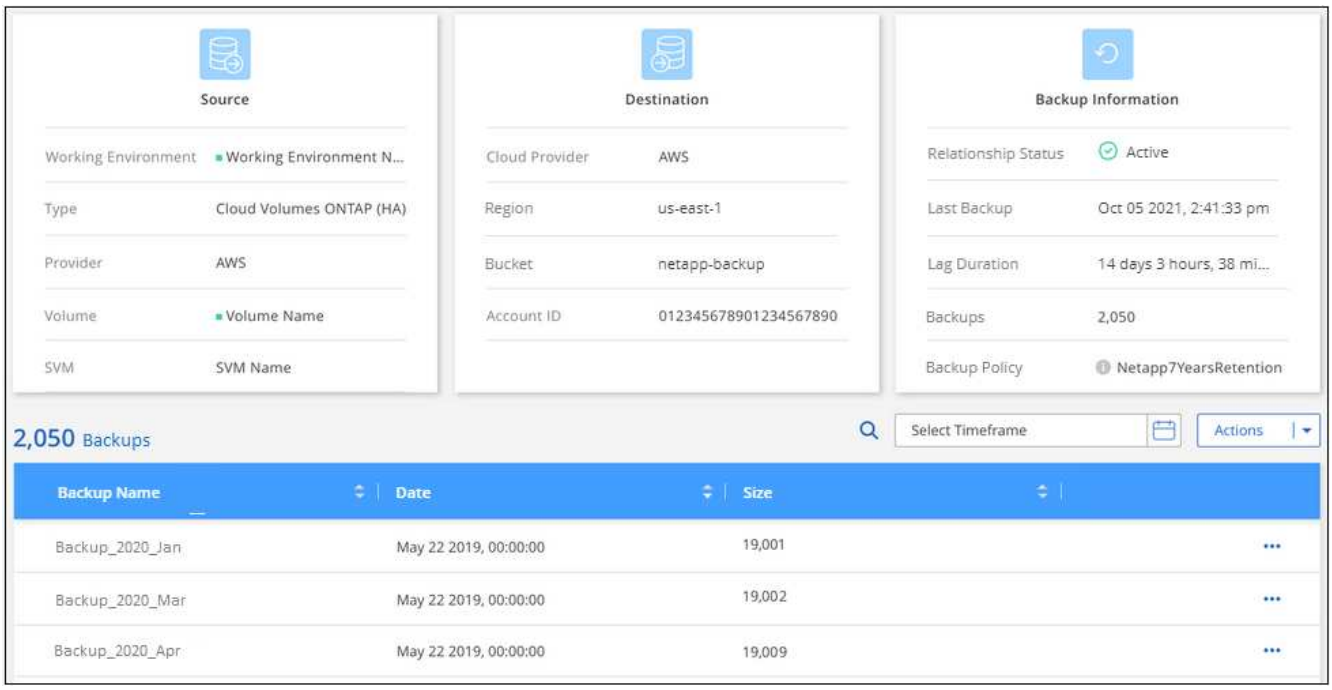
You can delete a single backup file. This feature is available only if the volume backup was created from a system with ONTAP 9.8 or greater.

#### Steps

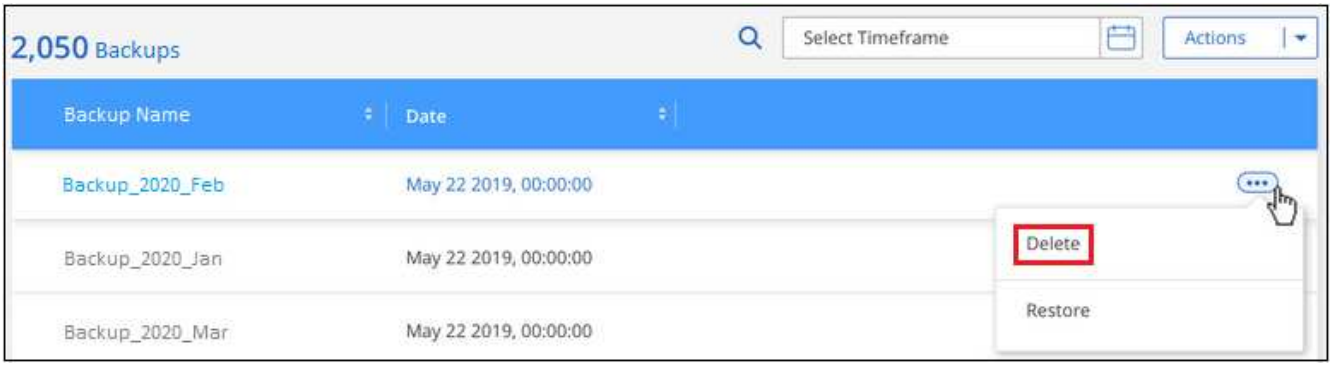
1. From the **Volumes** tab or the **Kubernetes** tab, click ••• for the source volume and select **Details & Backup List**.




The list of all backup files is displayed.




2. Click ••• for the volume backup file you want to delete and click **Delete**.



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

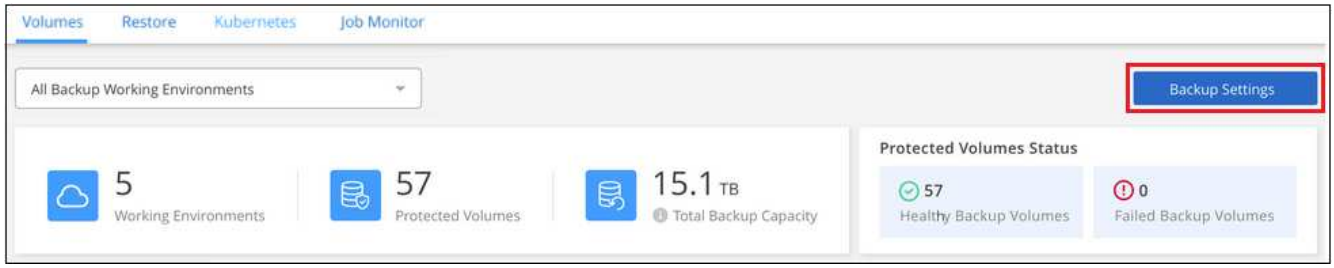
## Disabling Cloud Backup for a working environment

Disabling Cloud Backup for a working environment disables backups of each volume on the system, and it also disables the ability to restore a volume. Any existing backups will not be deleted. This does not unregister the backup service from this working environment - it basically allows you to pause all backup and restore activity for a period of time.

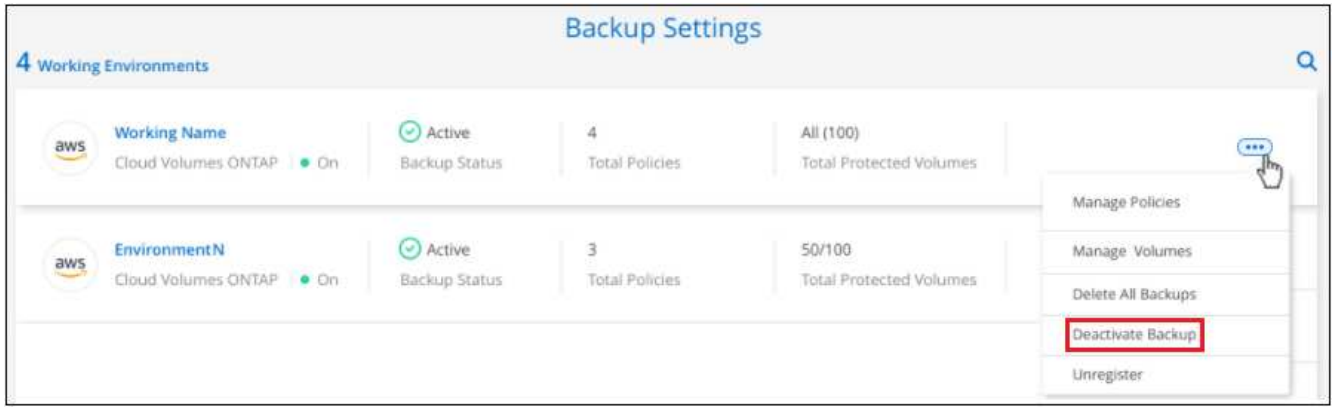
Note that you'll continue to be charged by your cloud provider for object storage costs for the capacity that your backups use unless you delete the backups.

**Steps**

1. From the **Volumes** tab or the **Kubernetes** tab, select **Backup Settings**.




2. From the *Backup Settings page*, click ••• for the working environment, or the Kubernetes cluster, where you want to disable backups and select **Deactivate Backup**.




3. In the confirmation dialog box, click **Deactivate**.

An **Activate Backup** button appears for that working environment while backup is disabled. You can click this button when you want to re-enable backup functionality for that working environment.

## Unregistering Cloud Backup for a working environment

You can unregister Cloud Backup for a working environment if you no longer want to use backup functionality and you want to stop being charged for backups in that working environment. Typically this feature is used when you're planning to delete a working environment, or a Kubernetes cluster, and you want to cancel the backup service.

You can also use this feature if you want to change the destination object store where your cluster backups are

being stored. After you unregister Cloud Backup for the working environment, then you can enable Cloud Backup for that cluster using the new cloud provider information.

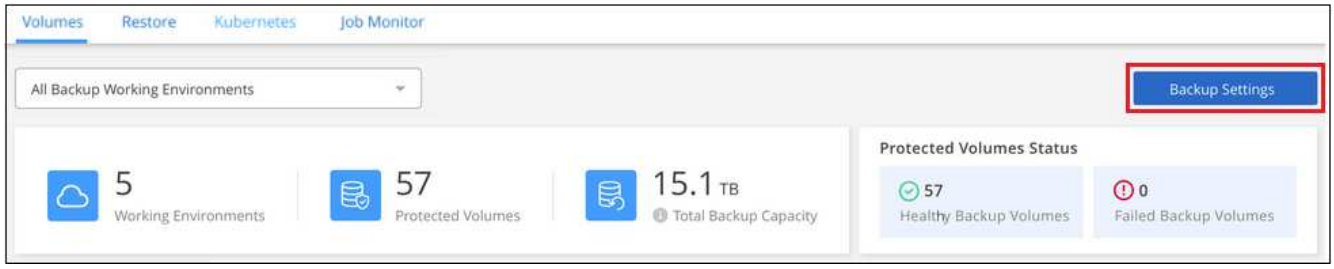
Before you can unregister Cloud Backup, you must perform the following steps, in this order:

- Deactivate Cloud Backup for the working environment
- Delete all backups for that working environment

The unregister option is not available until these two actions are complete.

**Steps**

1. From the **Volumes** tab or the **Kubernetes** tab, select **Backup Settings**.




2. From the *Backup Settings page*, click ••• for the working environment, or the Kubernetes cluster, where you want to unregister the backup service and select **Unregister**.

3. In the confirmation dialog box, click **Unregister**.

# Restoring data from backup files

Backups are stored in an object store in your cloud account so that you can restore data from a specific point in time. You can restore an entire volume from a saved backup file, or if you only need to restore a few files, you can restore individual files from a saved backup file.

You can restore an entire volume to the same working environment, to a different working environment that's using the same cloud account. For Cloud Volumes ONTAP and on-premises ONTAP volumes, see Restoring an ONTAP volume. For Kubernetes backups, see Restoring a Kubernetes volume.

You can restore files to a volume in the same working environment, to a volume in a different working environment that's using the same cloud account, or to a volume on an on-premises ONTAP system. See Restoring files from a backup.

## Supported working environments and object storage providers

For backups of Cloud Volumes ONTAP and on-prem ONTAP volumes, you can restore a volume, or individual files, from a backup file to the following working environments:

| Backup File Location | Destination Working Environment | |
|---|---|---|
| | **Volume Restore** | **File Restore** |
| Amazon S3 | Cloud Volumes ONTAP in AWS<br>On-premises ONTAP system | Cloud Volumes ONTAP in AWS<br>On-premises ONTAP system |
| Azure Blob | Cloud Volumes ONTAP in Azure<br>On-premises ONTAP system | Cloud Volumes ONTAP in Azure<br>On-premises ONTAP system |
| Google Cloud Storage | Cloud Volumes ONTAP in Google<br>On-premises ONTAP system | |
| NetApp StorageGRID | On-premises ONTAP system | |

**Note:** If the backup file resides in archival storage, only volume restore is supported. File restore is not currently supported from archival storage.

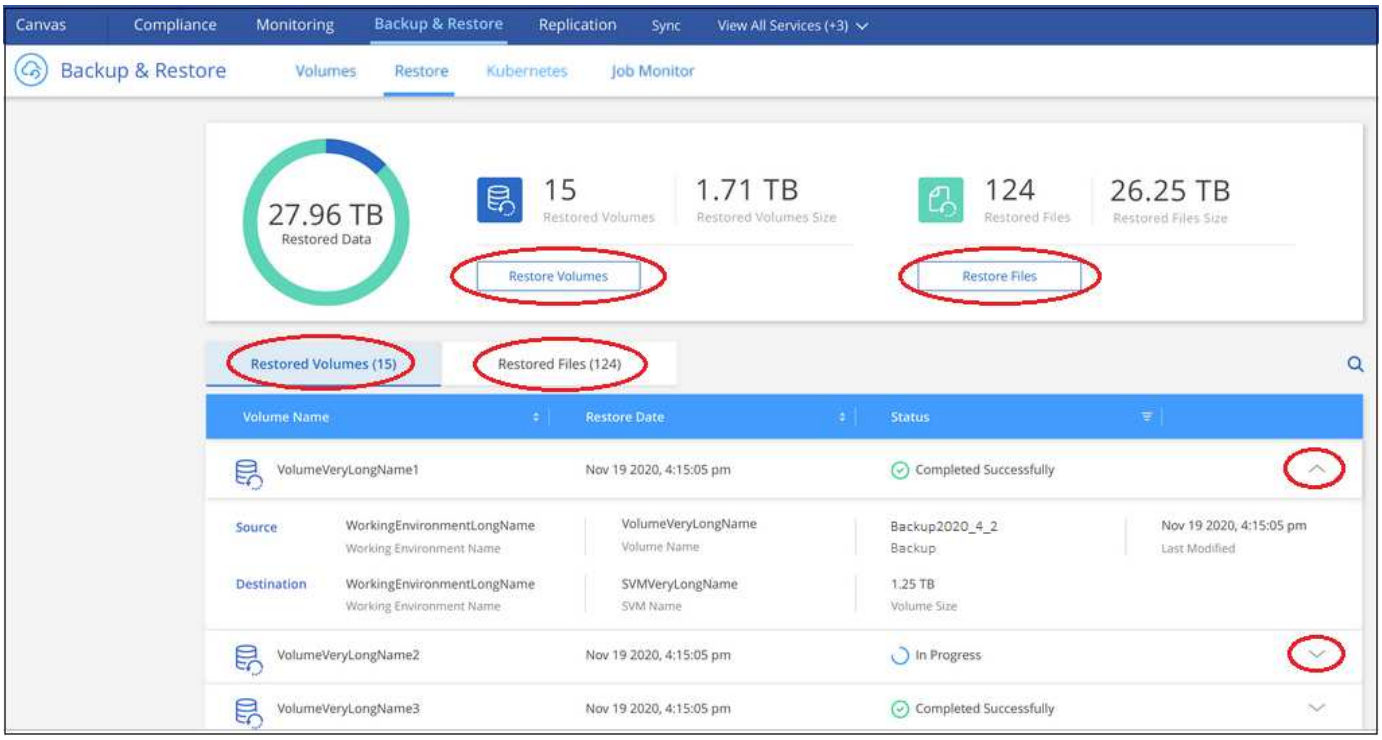
For backups of Kubernetes volumes, you can restore a volume from a backup file to the following working environments:

| Backup File Location | Destination Working Environment | |
|---|---|---|
| | **Volume Restore** | **File Restore** |
| Amazon S3 | Kubernetes cluster in AWS | |
| Azure Blob | Kubernetes cluster in Azure | |
| Google Cloud Storage | Kubernetes cluster in GCP | |

## The Restore Dashboard

You access the Restore Dashboard by clicking the **Backup & Restore** tab from the top of Cloud Manager, or you can click  > **View Restore Dashboard** from the Backup & Restore service from the Services panel.

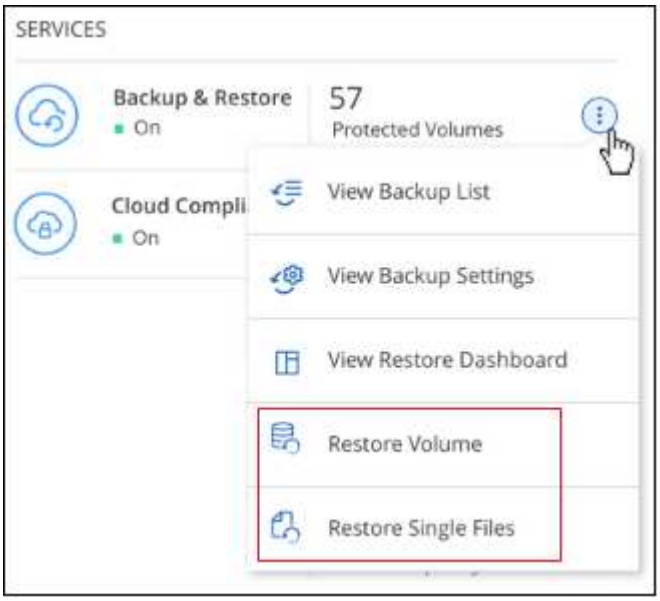
The Cloud Backup service must already be activated for at least one working environment.




The Restore Dashboard provides buttons for you to restore volumes and files. Clicking the *Restore Volumes* or *Restore Files* buttons starts a wizard that walks you through the steps to restore that data.

The dashboard also provides a list of all the volumes and all the files you have restored in case you need a history of previous restore actions. You can expand the row for each restored volume or file to view the details about the source and destination locations for the volume or file.

Note that you can also initiate a volume or file restore operation from a working environment in the Services panel. When started from this location the source working environment selection is automatically filled with the name of the current working environment.



## Restoring volumes from an ONTAP backup file

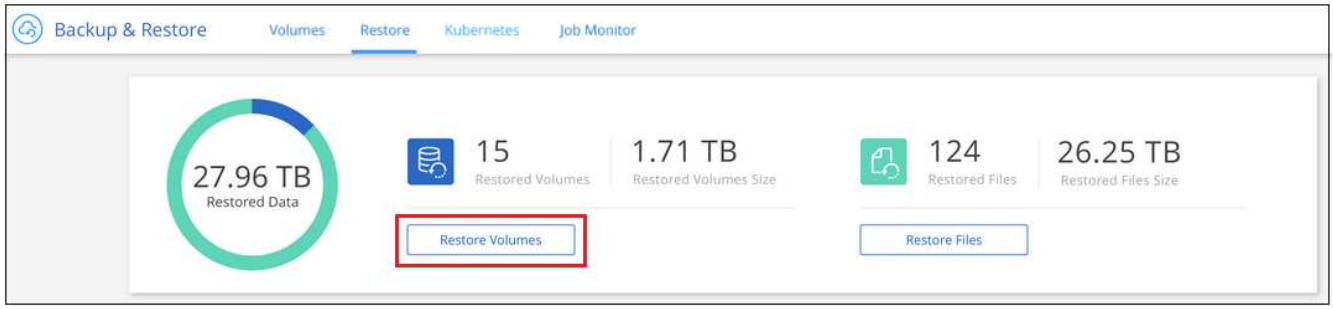
When you restore a volume from a backup file, Cloud Manager creates a *new* volume using the data from the backup. You can restore the data to a volume in the same working environment or to a different working environment that's located in the same cloud account as the source working environment. You can also restore volumes to an on-premises ONTAP system.

If the backup file for the volume that you want to restore resides in archival storage (available for AWS and Azure starting with ONTAP 9.10.1), the restore operation will take a longer amount of time and will cost more. Additionally, the destination cluster must also be running ONTAP 9.10.1 or greater.
Learn more about restoring from Azure archival storage.
Learn more about restoring from AWS archival storage.

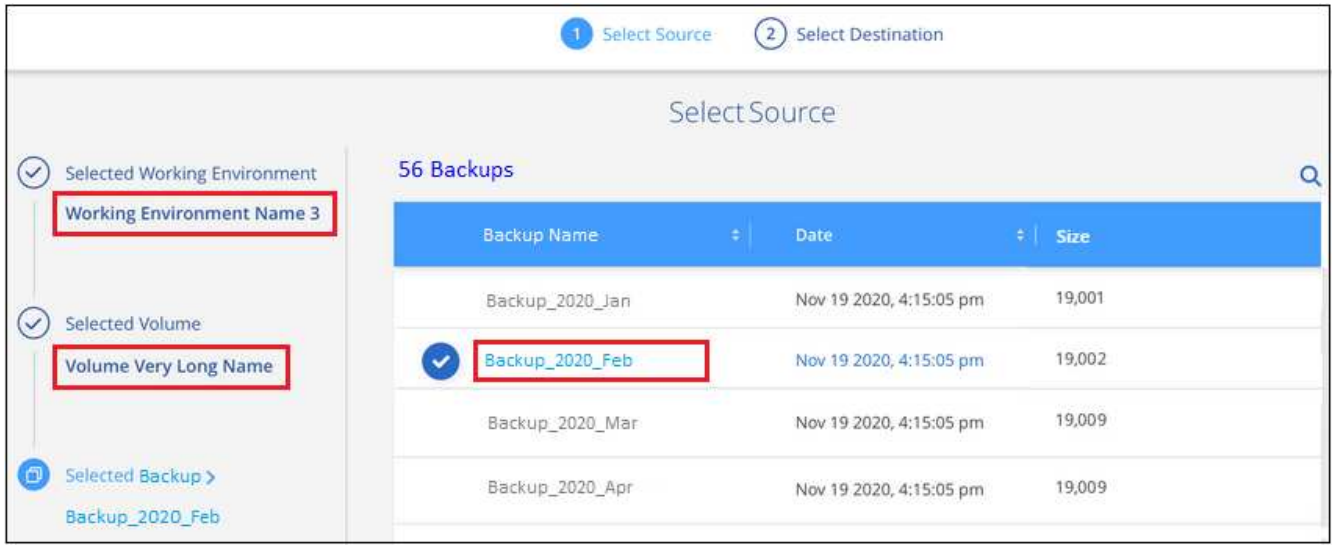
Before you start, you should know the name of the volume you want to restore and the date of the backup file you want to use to create the newly restored volume.

**Steps**

1. Select the **Backup & Restore** tab.
2. Click the **Restore** tab and the Restore Dashboard is displayed.
3. Click **Restore Volumes**.

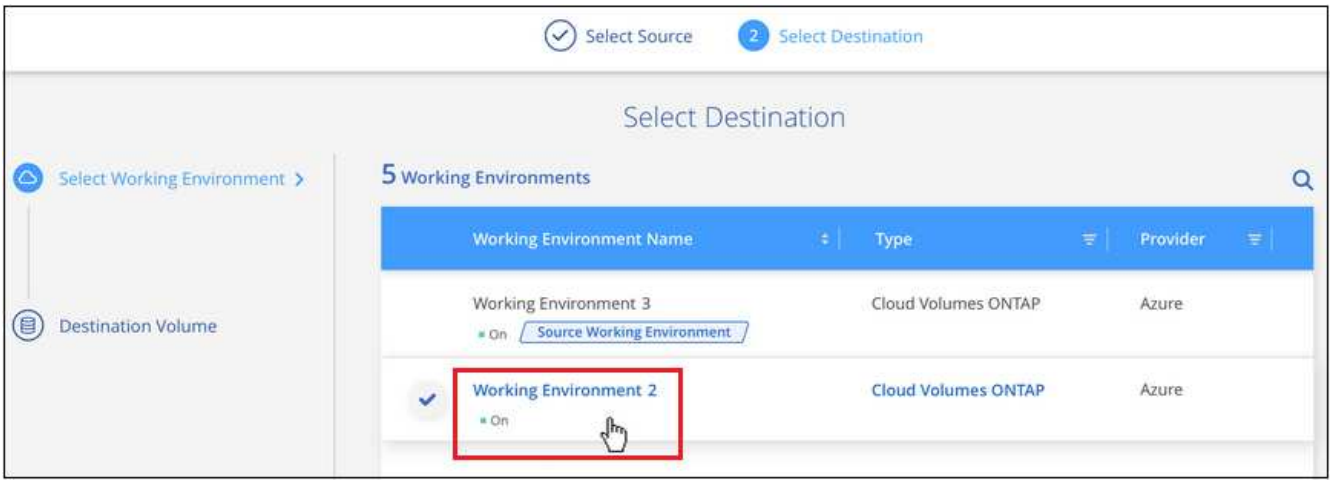



4. In the *Select Source* page, navigate to the backup file for the volume you want to restore. Select the **Working Environment**, the **Volume**, and the **Backup** that has the date/time stamp that you want to restore.

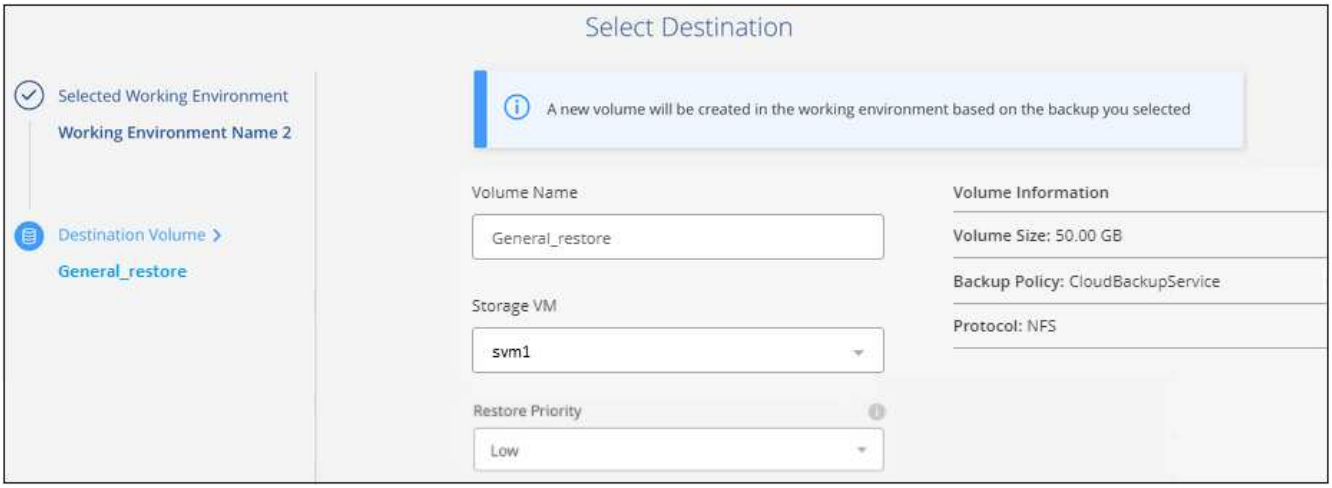



5. Click **Continue**.

6. In the *Select Destination* page, select the **Working Environment** where you want to restore the volume.




7. If you select an on-premises ONTAP system and you haven't already configured the cluster connection to the object storage, you are prompted for additional information:
   - When restoring from Amazon S3, select the IPspace in the ONTAP cluster where the destination volume will reside, enter the access key and secret key for the user you created to give the ONTAP cluster access to the S3 bucket, and optionally choose a private VPC endpoint for secure data transfer.
   - When restoring from Azure Blob, select the IPspace in the ONTAP cluster where the destination volume will reside, select the Azure Subscription to access the object storage, and optionally choose a private endpoint for secure data transfer by selecting the VNet and Subnet.
   - When restoring from Google Cloud Storage, select the Google Cloud Project and the Access Key and Secret Key to access the object storage, the region where the backups are stored, and the IPspace in the ONTAP cluster where the destination volume will reside.
   - When restoring from StorageGRID, select the Access Key and Secret Key needed to access the object storage, and the IPspace in the ONTAP cluster where the destination volume will reside.
8. Enter the name you want to use for the restored volume, and select the Storage VM where the volume will reside. By default, **<source_volume_name>_restore** is used as the volume name.




You can select the Aggregate that the volume will use for its' capacity only when restoring a volume to an on-premises ONTAP system.

And if you are restoring the volume from a backup file that resides in an archival storage tier (available

starting with ONTAP 9.10.1), then you can select the Restore Priority.
Learn more about restoring from Azure archival storage.
Learn more about restoring from AWS archival storage.

9. Click **Restore** and you are returned to the Restore Dashboard so you can review the progress of the restore operation.

**Result**

Cloud Manager creates a new volume based on the backup you selected. You can manage this new volume as required.

Note that restoring a volume from a backup file that resides in archival storage can take many minutes or hours depending on the archive tier and the restore priority.

## Restoring files from an ONTAP backup file

If you only need to restore a few files from a volume, you can choose to restore individual files instead of restoring the entire volume. You can restore files to a volume in the same working environment, or to a different working environment that's using the same cloud account. You can also restore files to an on-premises ONTAP system.

All the files are restored to the same destination volume that you choose. If you want to restore files to different volumes, you need run the restore process a second time.

You can't restore individual files if the backup file resides in archival storage (available starting with ONTAP 9.10.1). In this case, you can either restore files from a backup file that has not been archived, or you can restore the entire volume from the archived backup.

**Prerequisites**

- The ONTAP version must be 9.6 or greater in your Cloud Volumes ONTAP or on-premises ONTAP systems to perform file restore operations.
- Restoring individual files from a backup file uses a separate Restore instance/virtual machine. See the AWS Requirements or Azure Requirements to make sure your environment is ready.
- Restoring files also requires that specific EC2 permissions are added to the user role that provides Cloud Manager with permissions. Make sure all the permissions are configured correctly.
- AWS cross-account restore requires manual action in the cloud provider console. See the AWS topic granting cross-account bucket permissions for details.

**File Restore process**

The process goes like this:

1. When you want to restore one or more files from a volume, click the **Restore** tab, click **Restore Files**, and select the backup file in which the file (or files) reside.
2. The Restore instance starts up and displays the folders and files that exist within the backup file.

   **Note:** The Restore instance is deployed in your cloud providers' environment the first time you restore a file.

3. Choose the file (or files) that you want to restore from that backup.

4. Select the location where you want the file(s) to be restored (the working environment, volume, and folder), and click **Restore**.
5. The file(s) are restored, and then the Restore instance is shut down to save costs after a period of inactivity.

### Restoring files from a backup file

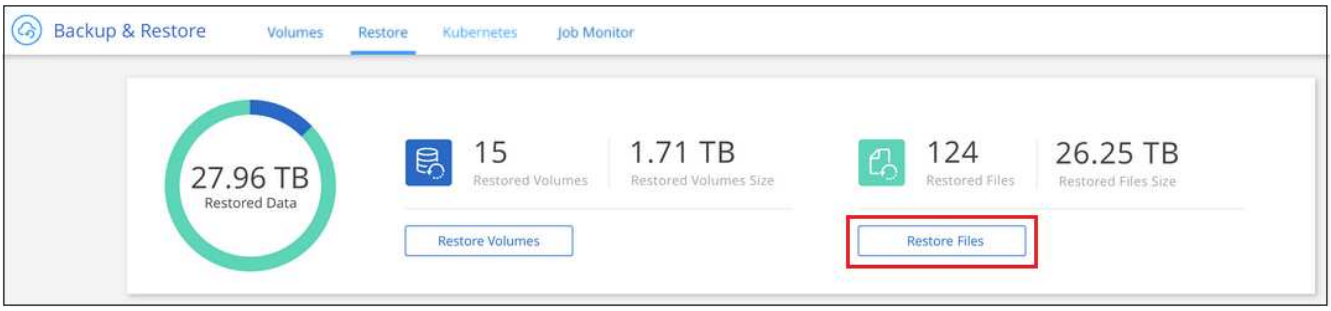
Follow these steps to restore files from a volume backup to a volume. You should know the name of the volume and the date of the backup file that you want to use to restore the file, or files. This functionality uses Live Browsing so that you can view the list of directories and files within the backup file.

The following video shows a quick walkthrough of restoring a single file:

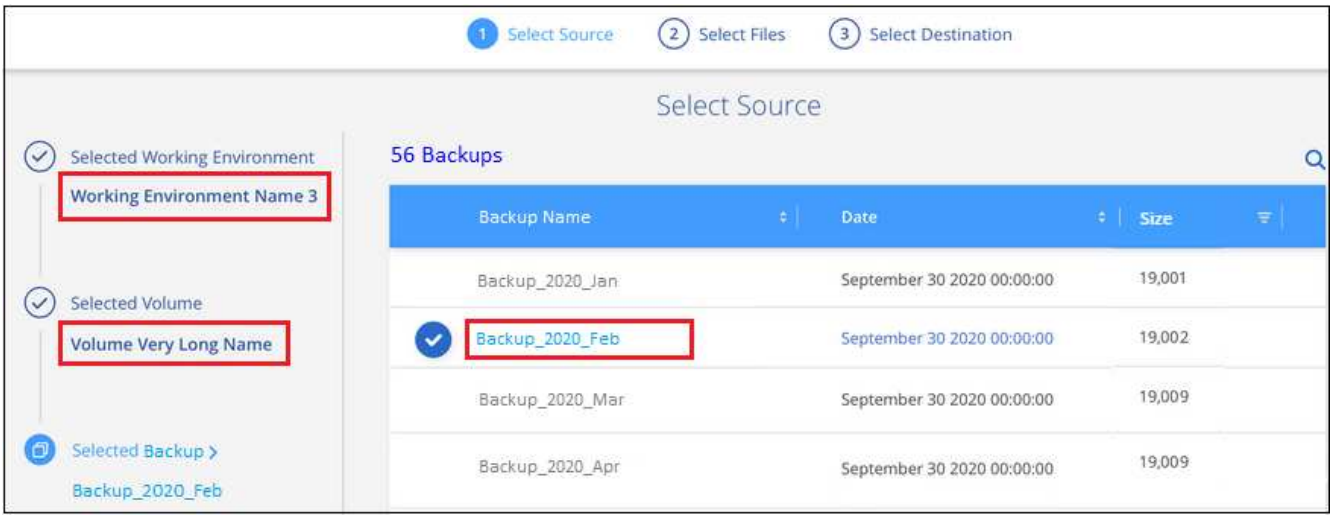
[] | *https://img.youtube.com/vi/ROAY6gPL9N0/maxresdefault.jpg*

#### Steps

1. Select the **Backup & Restore** tab.
2. Click the **Restore** tab and the Restore Dashboard is displayed.
3. Click the **Restore Files** button.

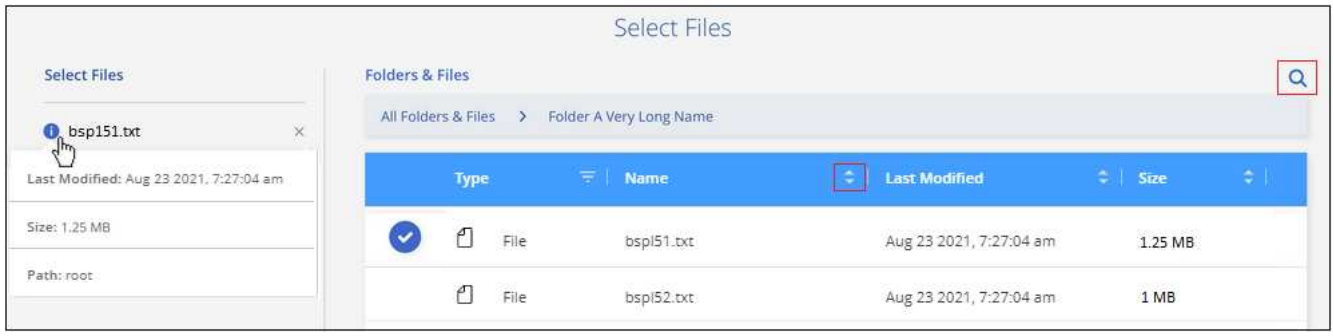



4. In the *Select Source* page, navigate to the backup file for the volume that contains the files you want to restore. Select the **Working Environment**, the **Volume**, and the **Backup** that has the date/time stamp from which you want to restore files.




5. Click **Continue** and the Restore instance is started. After a few minutes the Restore instance displays the list of folders and files from the volume backup.

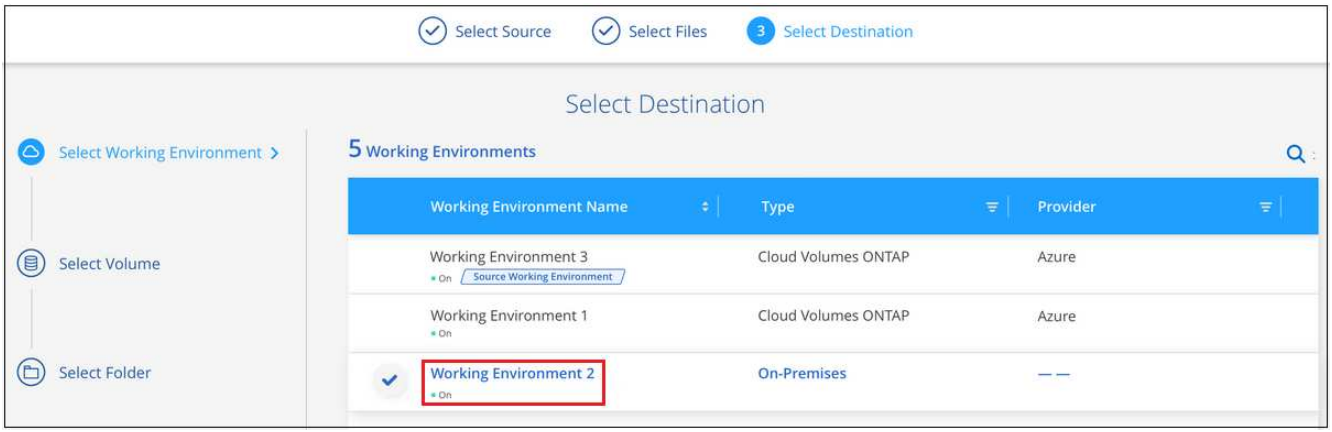
**Note:** The Restore instance is deployed in your cloud providers' environment the first time you restore a file, so this step could take a few minutes longer the first time.




6. In the *Select Files* page, select the file or files that you want to restore and click **Continue**.
   - You can click the search icon and enter the name of the file to navigate directly to the file.
   - You can click the file name if you see it.
   - You can navigate down levels in folders using the › button at the end of the row to find the file.

     As you select files they are added to the left side of the page so you can see the files that you have already chosen. You can remove a file from this list if needed by clicking the **x** next to the file name.

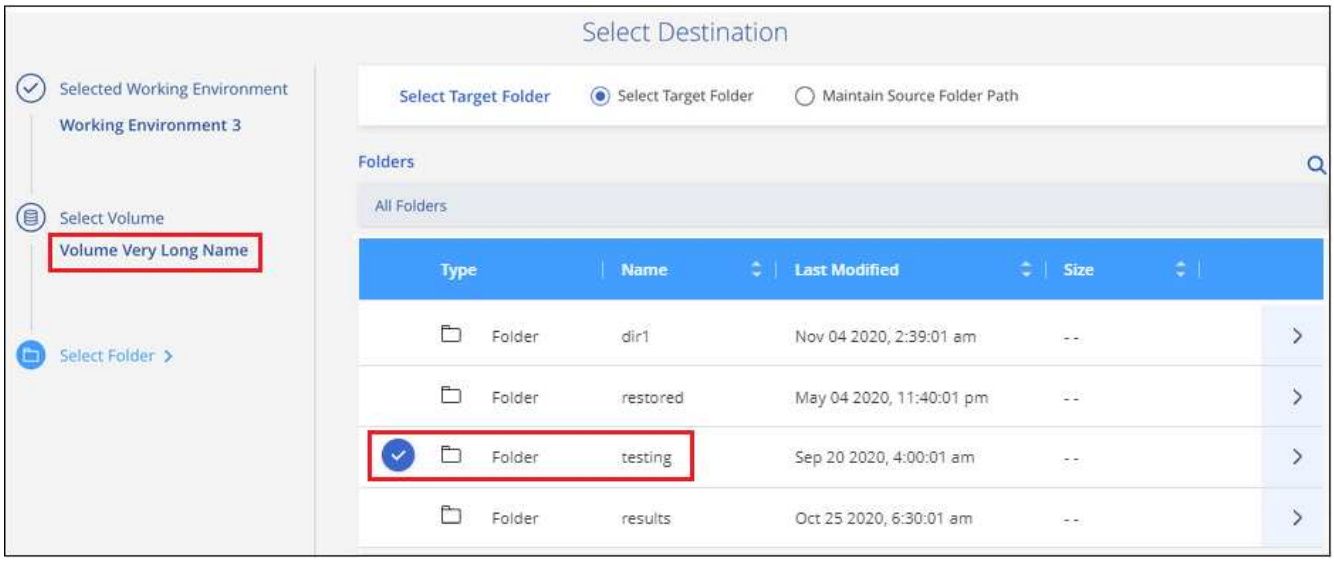
7. In the *Select Destination* page, select the **Working Environment** where you want to restore the files.




If you select an on-premises cluster and you haven't already configured the cluster connection to the object storage, you are prompted for additional information:

   - When restoring from Amazon S3, enter the IPspace in the ONTAP cluster where the destination volumes reside, and the AWS Access Key and Secret Key needed to access the object storage.
   - When restoring from Azure Blob, enter the IPspace in the ONTAP cluster where the destination volumes reside.

8. Then select the **Volume** and the **Folder** where you want to restore the files.




You have a few options for the location when restoring files.

- When you have chosen **Select Target Folder**, as shown above:
  - You can select any folder.
  - You can hover over a folder and click ❯ at the end of the row to drill down into subfolders, and then select a folder.
- If you have selected the same destination Working Environment and Volume as where the source file was located, you can select **Maintain Source Folder Path** to restore the file, or all files, to the same folder where they existed in the source structure. All the same folders and sub-folders must already exist; folders are not created.

9. Click **Restore** and you are returned to the Restore Dashboard so you can review the progress of the restore operation.

The Restore instance is shut down after a certain period of inactivity to save you money so that you incur costs only when it is active.

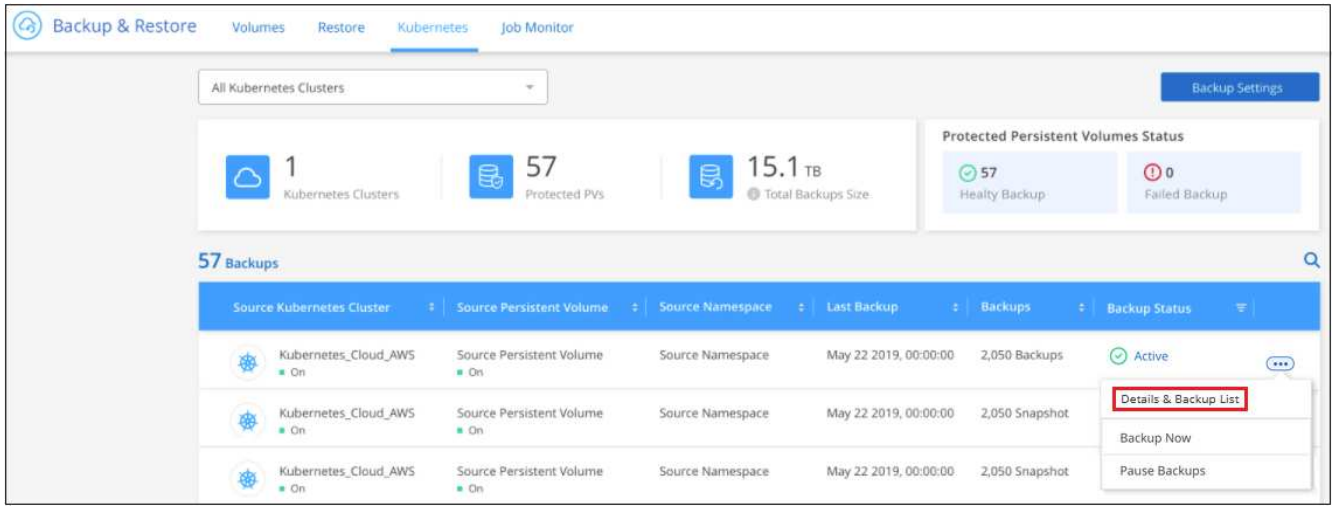
## Restoring volumes from a Kubernetes backup file

When you restore a persistent volume from a backup file, Cloud Manager creates a *new* volume using the data from the backup. You can restore the data to a volume in the same Kubernetes cluster or to a different Kubernetes cluster that's located in the same cloud account as the source Kubernetes cluster.

Before you start, you should know the name of the volume you want to restore and the date of the backup file you want to use to create the newly restored volume.

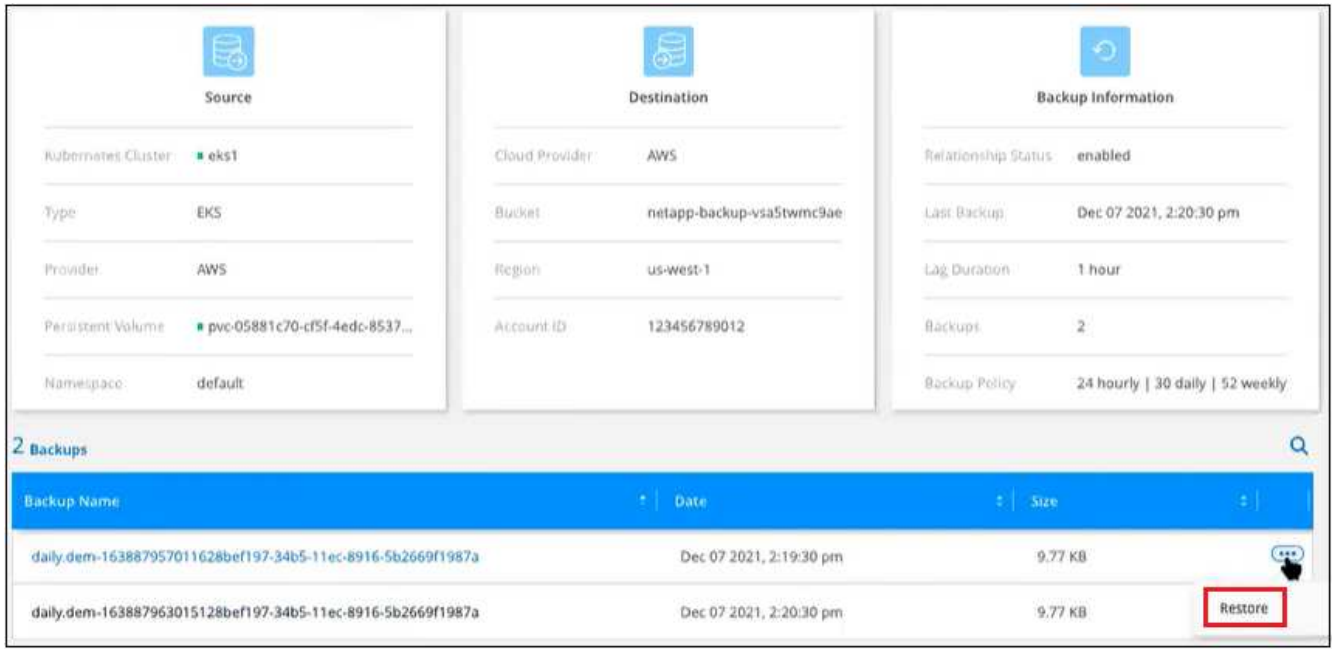
**Steps**

1. Select the **Backup & Restore** tab.
2. Click the **Kubernetes** tab and the Kubernetes Dashboard is displayed.




3. Locate the volume you want to restore, click •••, and then **Volume Details**.

   The list of all backup files for that volume is displayed along with details about the source volume, destination location, and backup details.




4. Locate the specific backup file that you want to restore based on the date/time stamp, click •••, and then **Restore**.
5. In the *Select Destination* page, select the *Kubernetes cluster* where you want to restore the volume, the *Namespace*, the *Storage Class*, and the new *Persistent volume name*.

6. Click **Restore** and you are returned to the Kubernetes Dashboard so you can review the progress of the restore operation.

**Result**

Cloud Manager creates a new volume in the Kubernetes cluster based on the backup you selected.

# Reference

## AWS S3 archival storage classes and restore retrieval times

Cloud Backup supports two S3 archival storage classes and most regions.

### Supported S3 archival storage classes for Cloud Backup

When backup files are initially created they're stored in S3 *Standard* storage. This tier is optimized for storing data that's infrequently accessed; but that also allows you to access it immediately. After 30 days the backups transition to the S3 *Standard-Infrequent Access* storage class to save on costs.

If your source clusters are running ONTAP 9.10.1 or greater, you can choose to tier backups to either *S3 Glacier* or *S3 Glacier Deep Archive* storage after a certain number of days (typically more than 30 days) for further cost optimization. Data in these tiers can't be accessed immediately when needed, and will require a higher retrieval cost, so you need to consider how often you may need to restore data from these archived backup files. See the section about restoring data from archival storage.

Note that when you configure Cloud Backup with this type of lifecycle rule, you must not configure any lifecycle rules when setting up the bucket in your AWS account.

Learn about S3 storage classes.

### Restoring data from archival storage

While storing older backup files in archival storage is much less expensive than Standard or Standard-IA

storage, accessing data from a backup file in archive storage for restore operations will take a longer amount of time and will cost more money.

**How much does it cost to restore data from Amazon S3 Glacier and Amazon S3 Glacier Deep Archive?**

There are 3 restore priorities you can choose when retrieving data from Amazon S3 Glacier, and 2 restore priorities when retrieving data from Amazon S3 Glacier Deep Archive. S3 Glacier Deep Archive costs less than S3 Glacier:

| Archive Tier | Restore Priority & Cost | | |
|---|---|---|---|
| | **High** | **Standard** | **Low** |
| **S3 Glacier** | Fastest retrieval, highest cost | Slower retrieval, lower cost | Slowest retrieval, lowest cost |
| **S3 Glacier Deep Archive** | | Faster retrieval, higher cost | Slower retrieval, lowest cost |

Each method has a different per-GB retrieval fee and per-request fee. For detailed S3 Glacier pricing by AWS Region, visit the Amazon S3 pricing page.

**How long will it take to restore my objects archived in Amazon S3 Glacier?**

There are 2 parts that make up the total restore time:

- **Retrieval time**: The time to retrieve the backup file from archive and place it in Standard storage. This is sometimes called the "rehydration" time. The retrieval time is different depending on the restore priority you choose.

| Archive Tier | Restore Priority & Retrieval Time | | |
|---|---|---|---|
| | **High** | **Standard** | **Low** |
| **S3 Glacier** | 3-5 minutes | 3-5 hours | 5-12 hours |
| **S3 Glacier Deep Archive** | | 12 hours | 48 hours |

- **Restore time**: The time to restore the data from the backup file in Standard storage. This time is no different than the typical restore operation directly from Standard storage - when not using an archival tier.

For more information about Amazon S3 Glacier and S3 Glacier Deep Archive retrieval options, refer to the Amazon FAQ about these storage classes.

## Azure archival tiers and restore retrieval times

Cloud Backup supports one Azure archival access tier and most regions.

### Supported Azure Blob access tiers for Cloud Backup

When backup files are initially created they're stored in the *Cool* access tier. This tier is optimized for storing data that's infrequently accessed; but when needed, can be accessed immediately.

If your source clusters are running ONTAP 9.10.1 or greater, you can choose to tier backups from *Cool* to *Azure Archive* storage after a certain number of days (typically more than 30 days) for further cost optimization. Data in this tier can't be accessed immediately when needed, and will require a higher retrieval cost, so you need to consider how often you may need to restore data from these archived backup files. See the next

section about restoring data from archival storage.

Note that when you configure Cloud Backup with this type of lifecycle rule, you must not configure any lifecycle rules when setting up the container in your Azure account.

Learn about Azure Blob access tiers.

#### Restoring data from archival storage

While storing older backup files in archival storage is much less expensive than Cool storage, accessing data from a backup file in Azure Archive for restore operations will take a longer amount of time and will cost more money.

**How much does it cost to restore data from Azure Archive?**

There are two restore priorities you can choose when retrieving data from Azure Archive:

- **High**: Fastest retrieval, higher cost
- **Standard**: Slower retrieval, lower cost

Each method has a different per-GB retrieval fee and per-request fee. For detailed Azure Archive pricing by Azure Region, visit the Azure pricing page.

**How long will it take to restore my data archived in Azure Archive?**

There are 2 parts that make up the restore time:

- **Retrieval time**: The time to retrieve the archived backup file from Azure Archive and place it in Cool storage. This is sometimes called the "rehydration" time. The retrieval time is different depending on the restore priority you choose:
  - **High**: < 1 hour
  - **Standard**: < 15 hours
- **Restore time**: The time to restore the data from the backup file in Cool storage. This time is no different than the typical restore operation directly from Cool storage - when not using an archival tier.

For more information about Azure Archive retrieval options, refer to this Azure FAQ.

## Cross-account and cross-region configurations

These topics describe how to configure Cloud Backup for cross account configurations when using different cloud providers.

- Configure Cloud Backup for multi-account access in AWS
- Configure Cloud Backup for multi-account access in Azure

#### Configure backup for multi-account access in AWS

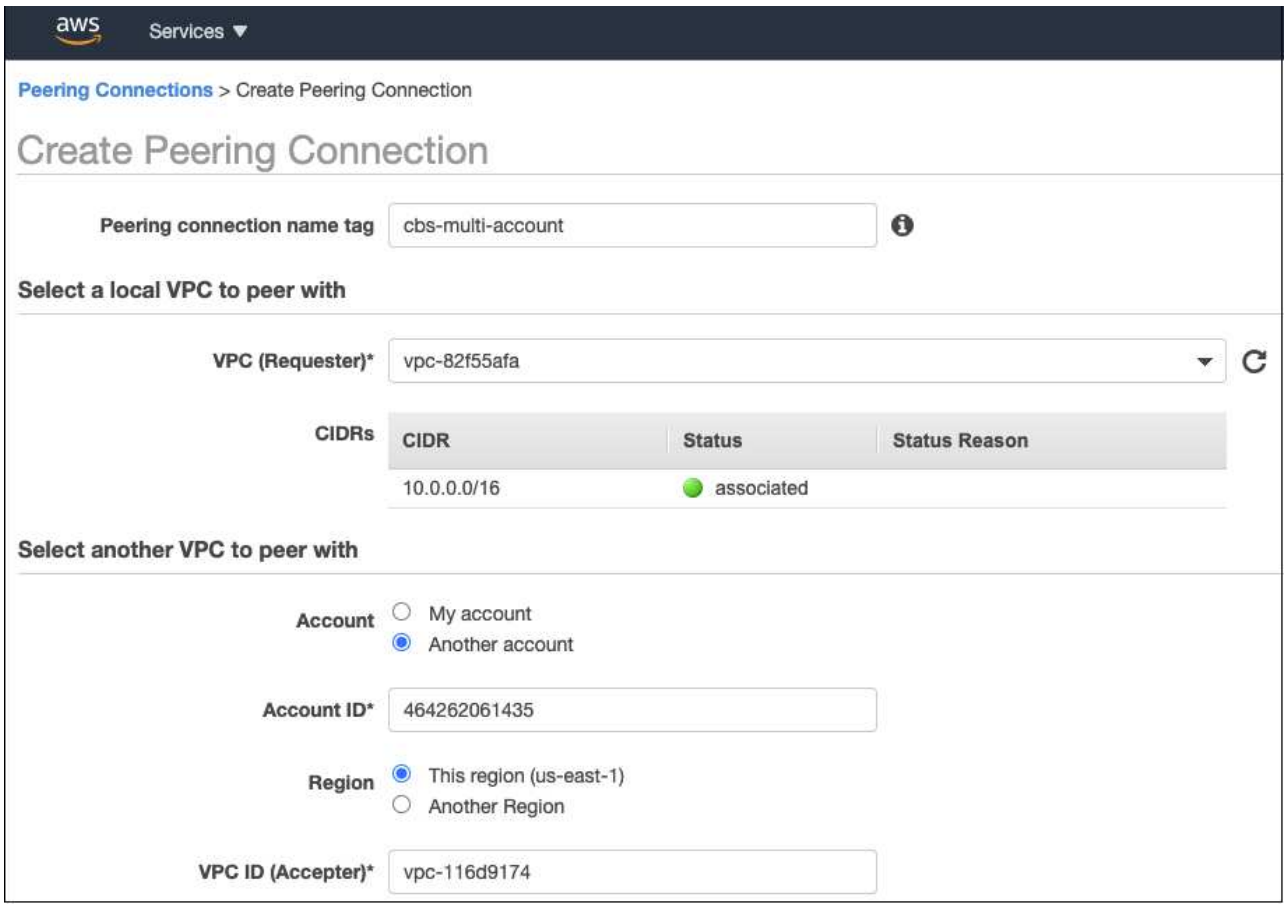
Cloud Backup enables you to create backup files in an AWS account that is different than where your source Cloud Volumes ONTAP volumes reside. And both of those accounts can be different than the account where the Cloud Manager Connector resides.

These steps are required only when you are backing up Cloud Volumes ONTAP data to Amazon S3.

Follow the steps below to set up your configuration in this manner.

#### Set up VPC peering between accounts

1. Log in to second account and Create Peering Connection:
   a. Select a local VPC: Select the VPC of the second account.
   b. Select another VPC: Enter the account ID of the first account.
   c. Select the Region where the Cloud Manager Connector is running. In this test setup both accounts are running in same region.
   d. VPC ID: Log into first account and enter the acceptor VPC ID. This is the VPC ID of the Cloud Manager Connector.




A Success dialog displays.

The status of the peering connection shows as Pending Acceptance.

2. Log into the first account and accept the peering request:

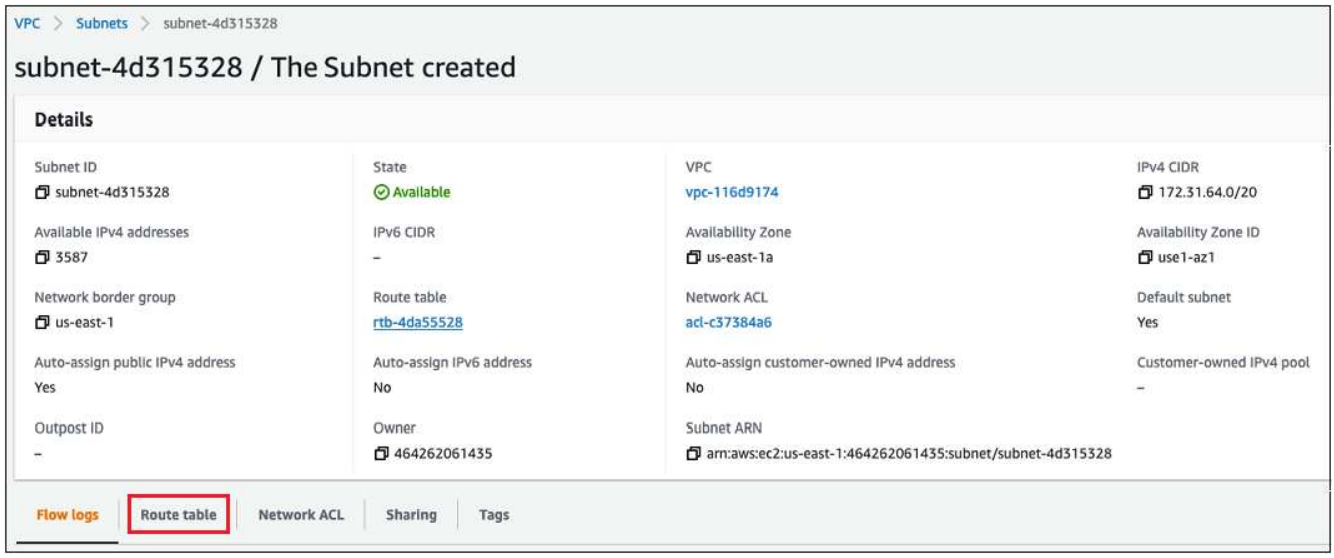
a. Click **Yes**.

The connection now shows as Active. We have also added a Name tag to identify the peering connection called `cbs-multi-account`.

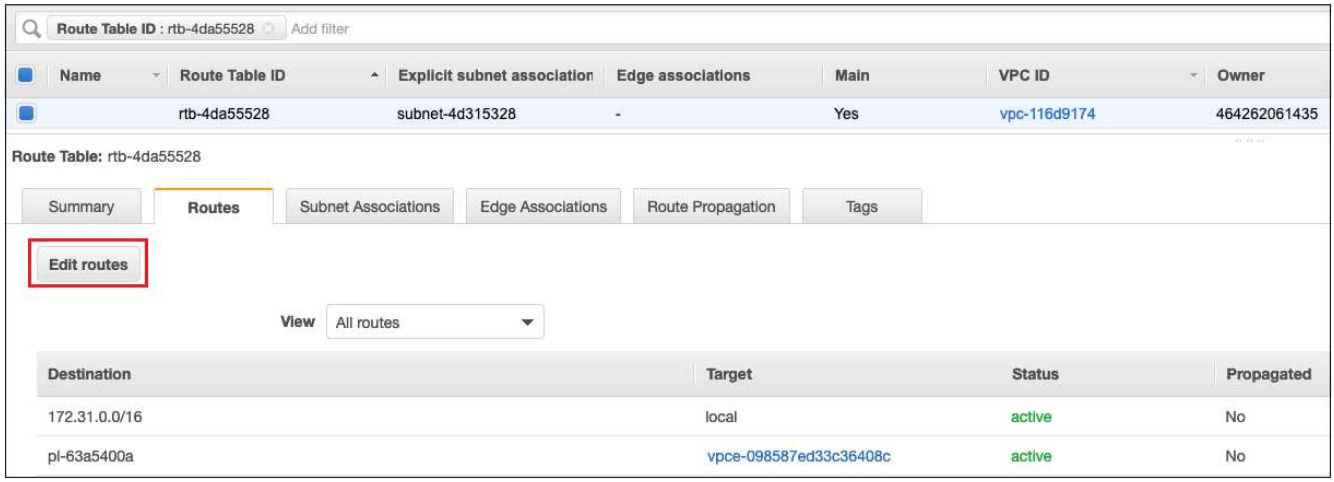
b. Refresh the peering connection in the second account and notice that the status changes to Active.

**Add a route to the route tables in both accounts**

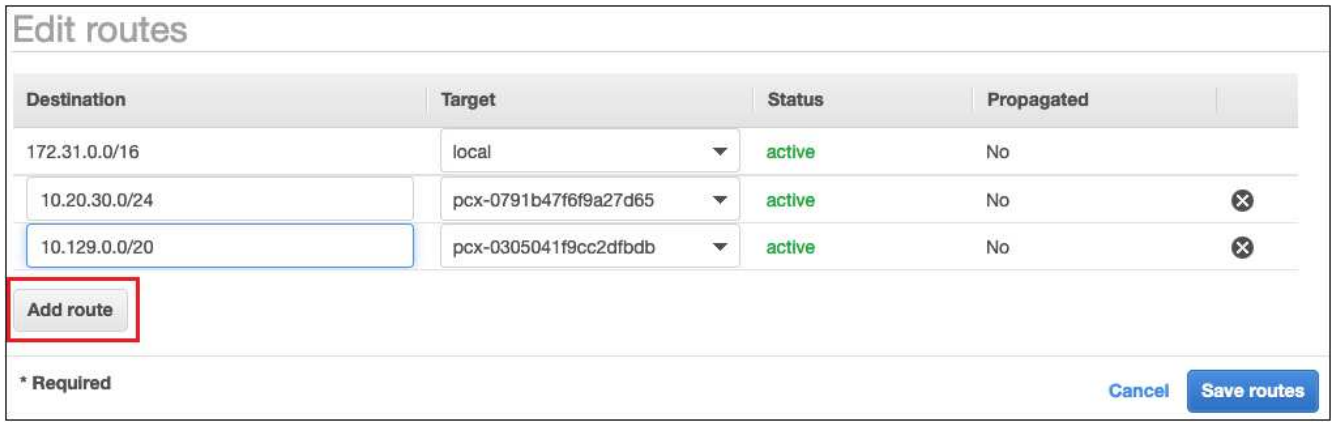
1. Go to VPC > Subnet > Route table.




2. Click on the Routes tab.

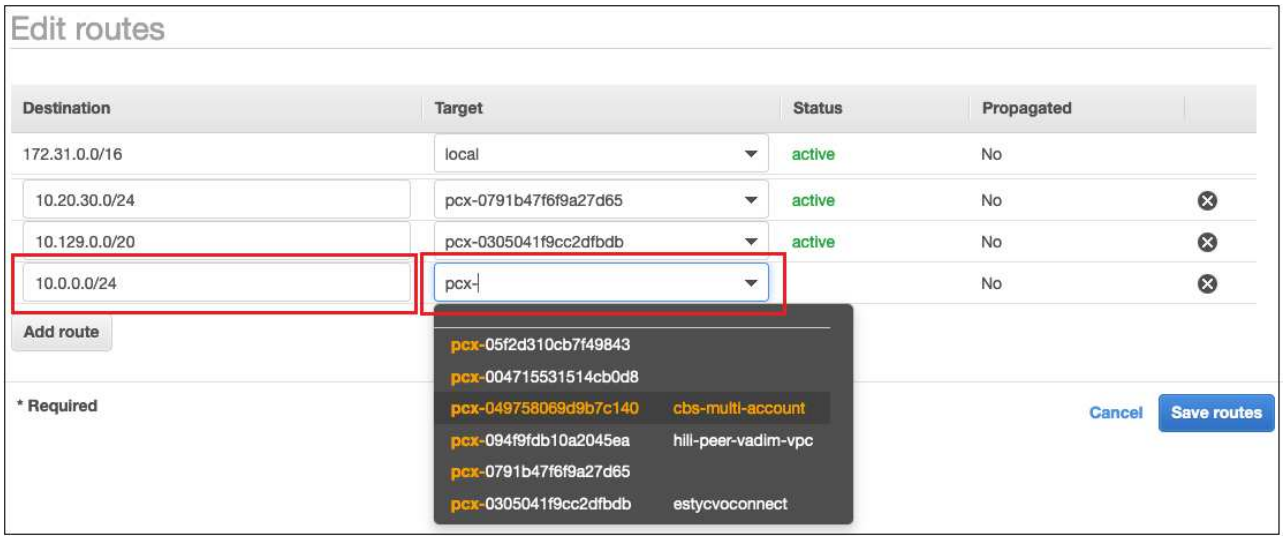



3. Click **Edit routes**.

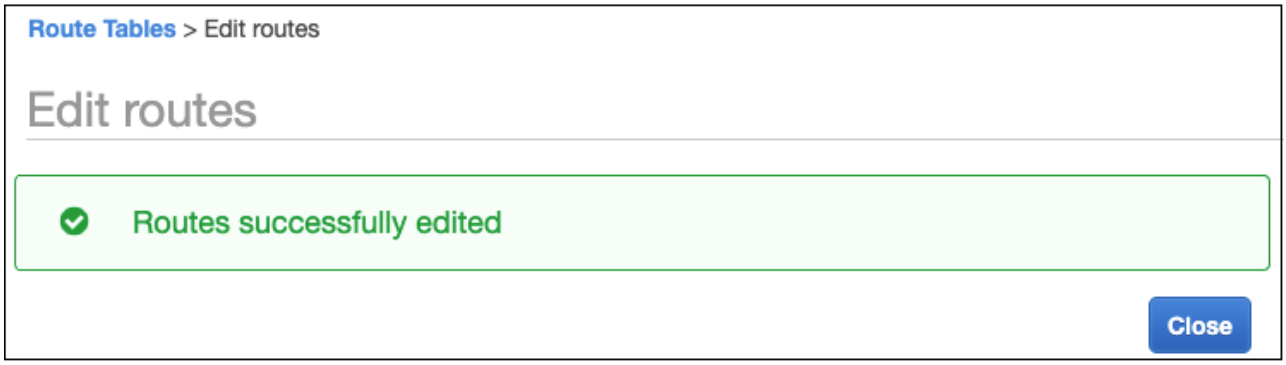



4. Click **Add route**, and from the Target drop-down list select **Peering Connection**, and then select the peering connection that you created.

a. In the Destination, enter the other account's subnet CIDR.

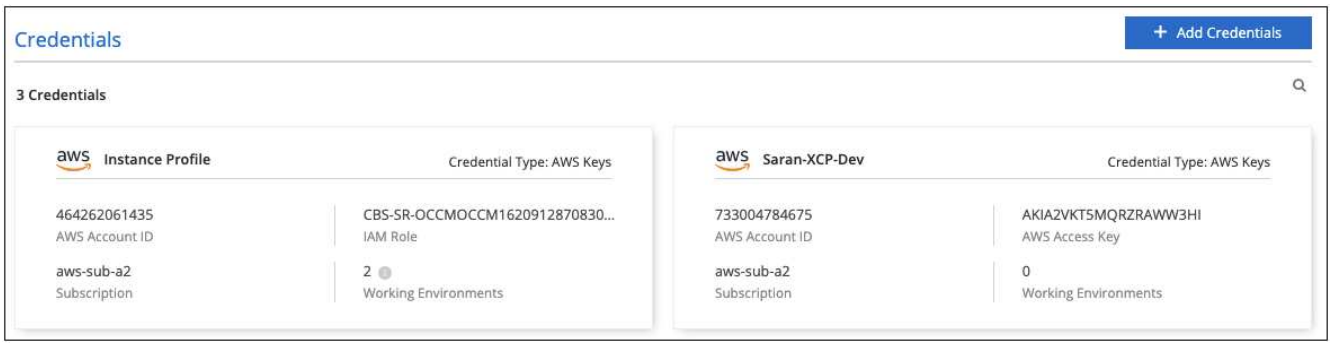



b. Click **Save routes** and a Success dialog displays.

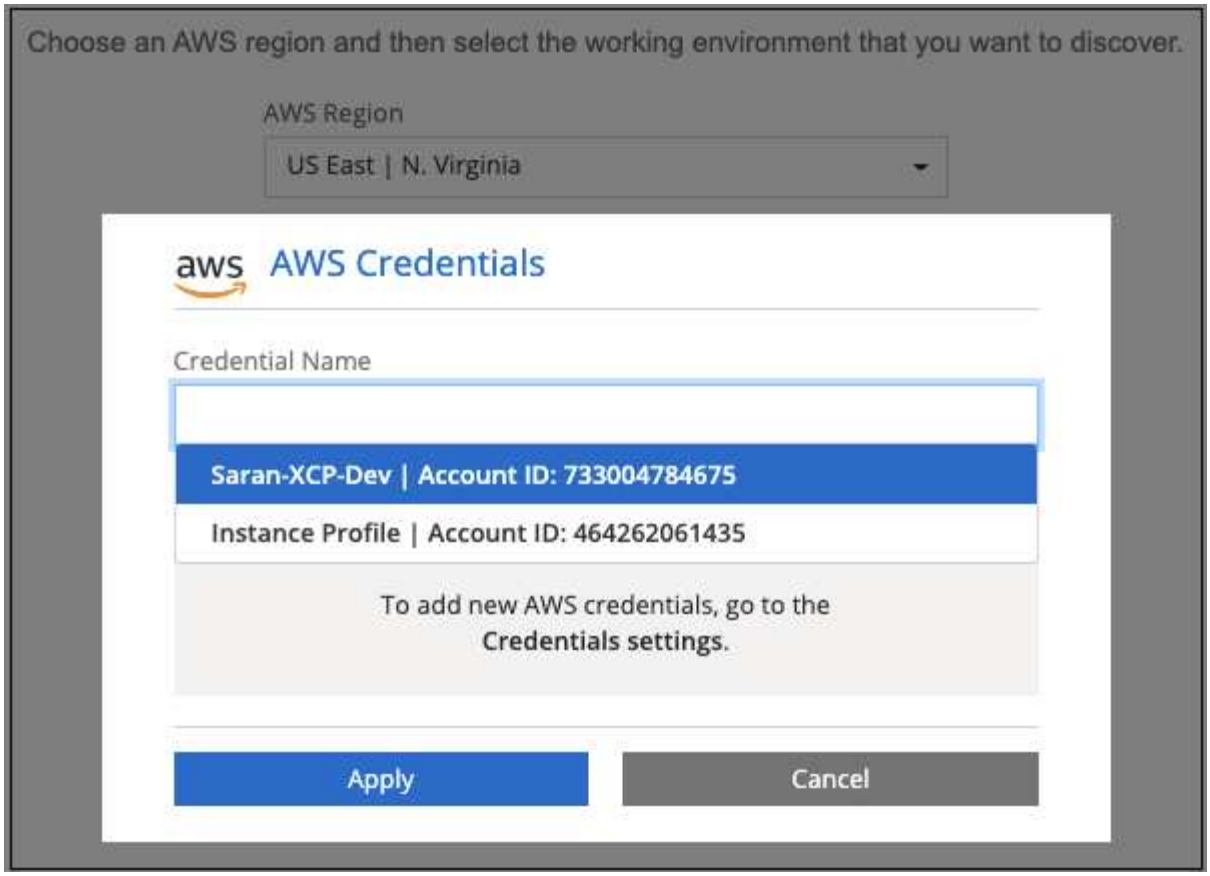



**Add the second AWS account credentials in Cloud Manager**

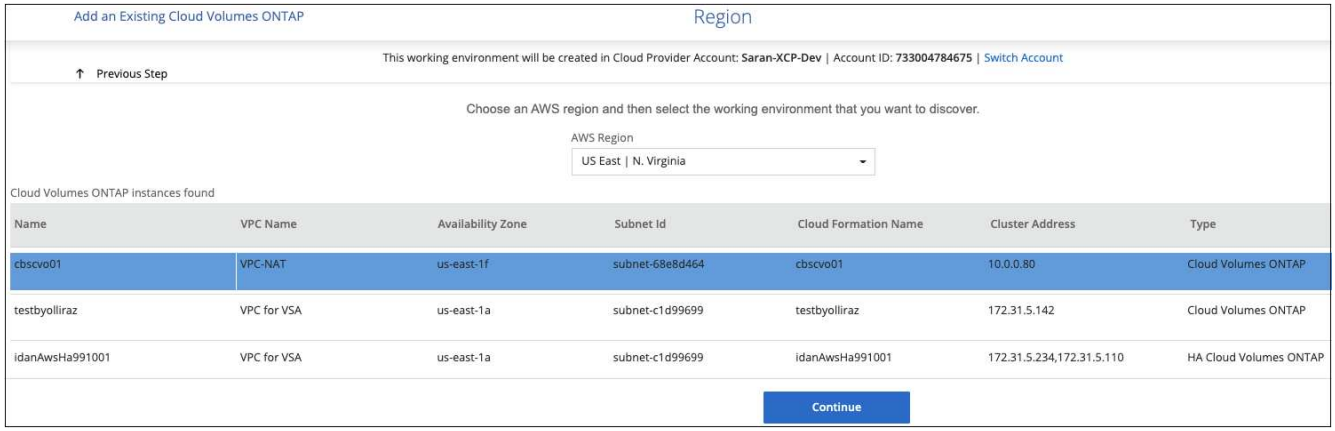
1. Add the second AWS account, for example, *Saran-XCP-Dev*.



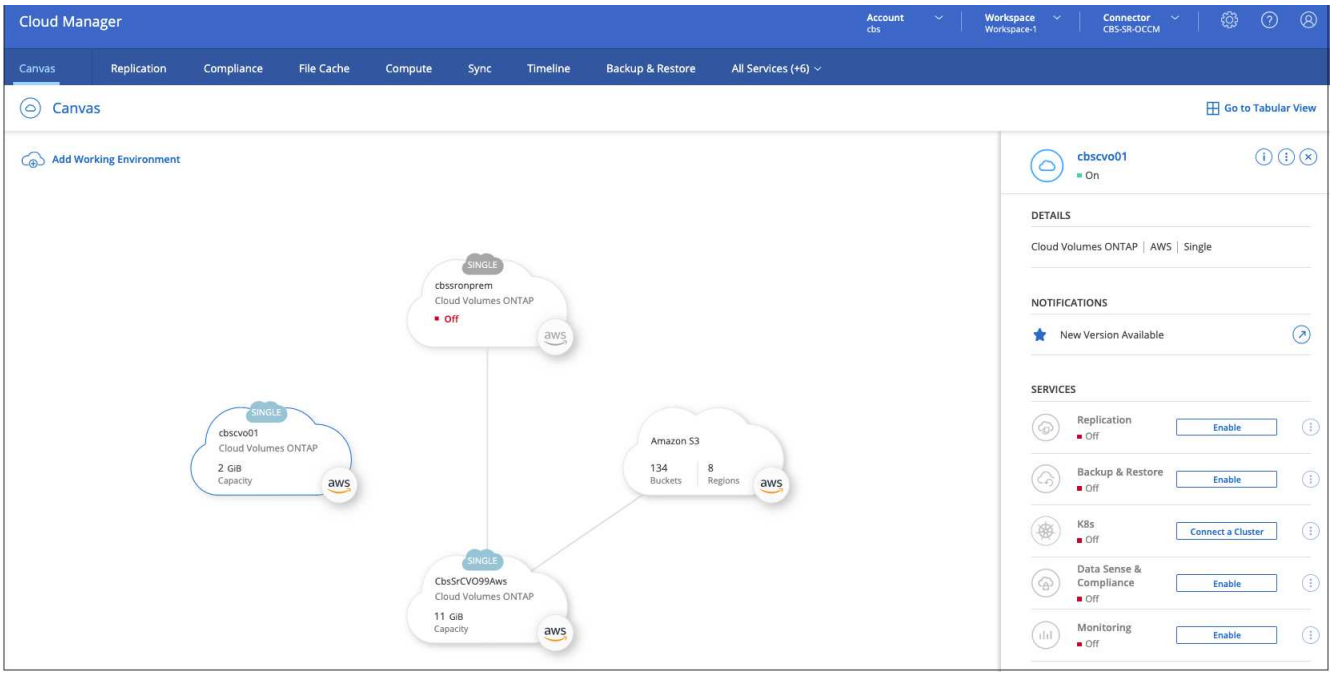

2. In the Discover Cloud Volumes ONTAP page, select the newly added credentials.




3. Select the Cloud Volumes ONTAP system you want to discover from second account. You can also deploy a new Cloud Volumes ONTAP system in the second account.

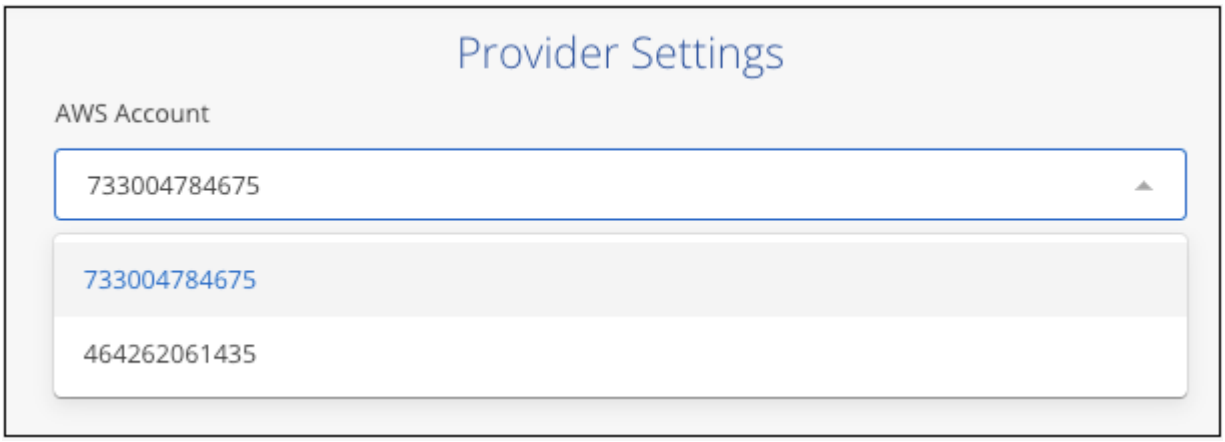



The Cloud Volumes ONTAP system from the second account is now added to Cloud Manager which is running in a different account.




**Enable backup in the other AWS account**

1. In Cloud Manager, enable backup for the Cloud Volumes ONTAP system running in the first account, but select the second account as the location for creating the backup files.



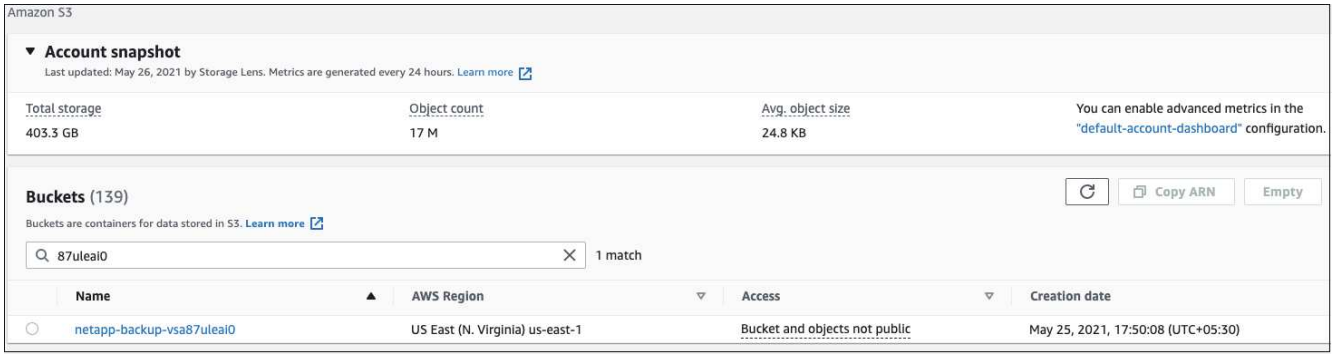

2. Then select a backup policy and the volumes you want to back up, and Cloud Backup attempts to create a new bucket in the selected account.

   However, adding the bucket to the Cloud Volumes ONTAP system will fail because Cloud Backup uses the instance profile to add the bucket and the Cloud Manager instance profile doesn't have access to the resources in the second account.

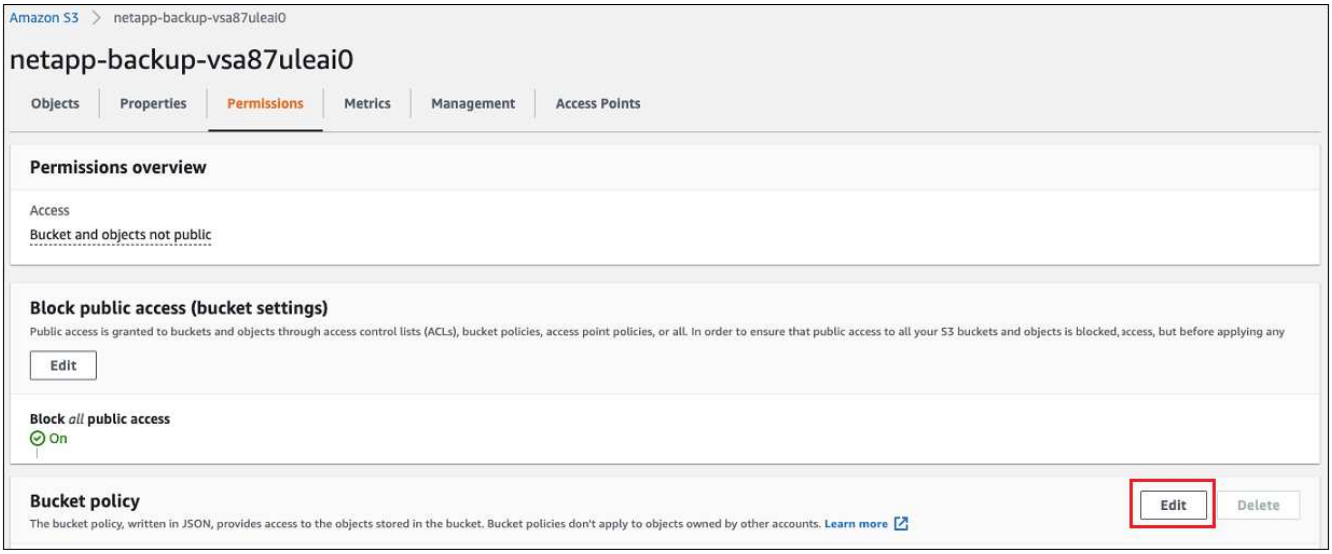
3. Get the working environment ID for the Cloud Volumes ONTAP system.

Cloud Backup creates every bucket with the prefix `Netapp-backup-` and will include the working environment ID; for example: `87ULeA10`

4. In the EC2 portal, go to S3 and search for the bucket with name ending with `87uLeA10` and you'll see the bucket name displayed as `Netapp-backup-vsa87uLeA10`.




5. Click on the bucket, then click the Permissions tab, and then click **Edit** in the Bucket policy section.




6. Add a bucket policy for the newly created bucket to provide access to the Cloud Manager's AWS account, and then Save the changes.

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Sid": "PublicRead",
      "Effect": "Allow",
      "Principal": {
        "AWS": "arn:aws:iam::464262061435:root"
      },
      "Action": [
        "s3:ListBucket",
        "s3:GetBucketLocation",
        "s3:GetObject",
        "s3:PutObject",
        "s3:DeleteObject"
      ],
      "Resource": [
        "arn:aws:s3:::netapp-backup-vsa87uleai0",
        "arn:aws:s3:::netapp-backup-vsa87uleai0/*"
      ]
    }
  ]
}
```

Note that "AWS": "arn:aws:iam::464262061435:root" gives complete access this bucket for all resources in account 464262061435. If you want to reduce it to specific role, level, you can update the policy with specific role(s). If you are adding individual roles, ensure that occm role also added, otherwise backups will not get updated in the Cloud Backup UI.

For example: "AWS": "arn:aws:iam::464262061435:role/cvo-instance-profile-version10-d8e-IamInstanceRole-IKJPJ1HC2E7R"

7. Retry enabling Cloud Backup on the Cloud Volumes ONTAP system and this time it should be successful.

#### Configure backup for multi-account access in Azure

Cloud Backup enables you to create backup files in an Azure account that is different than where your source Cloud Volumes ONTAP volumes reside. And both of those accounts can be different than the account where the Cloud Manager Connector resides.

These steps are required only when you are backing up Cloud Volumes ONTAP data to Azure Blob storage.

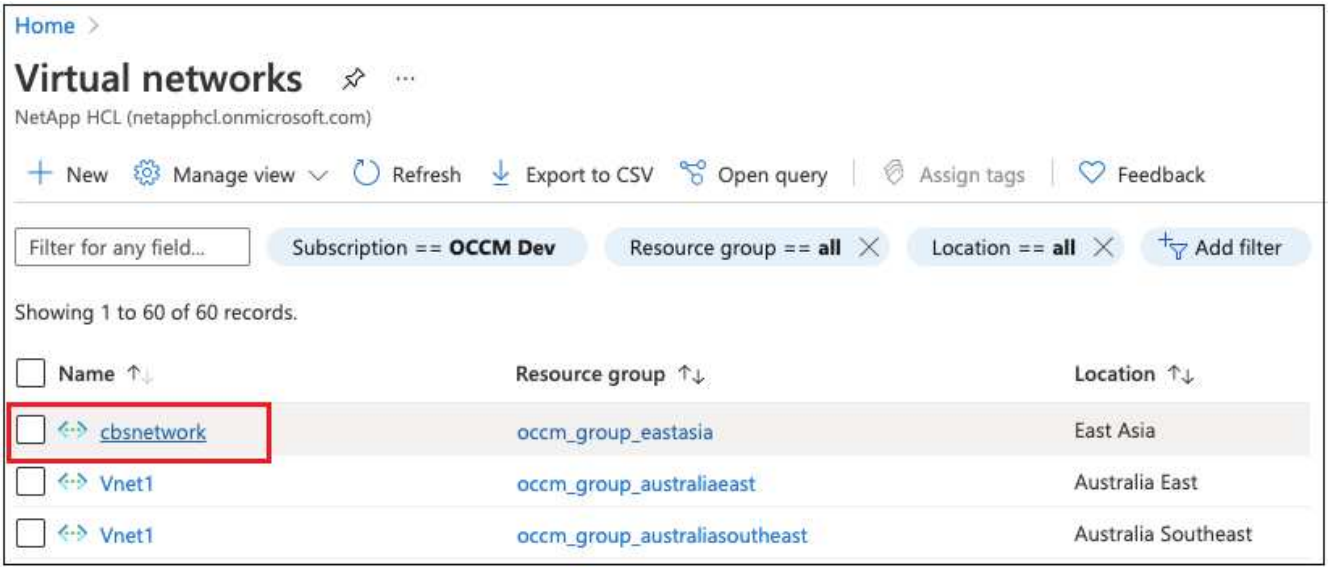
Follow the steps below to set up your configuration in this manner.

##### Set up VNet peering between accounts

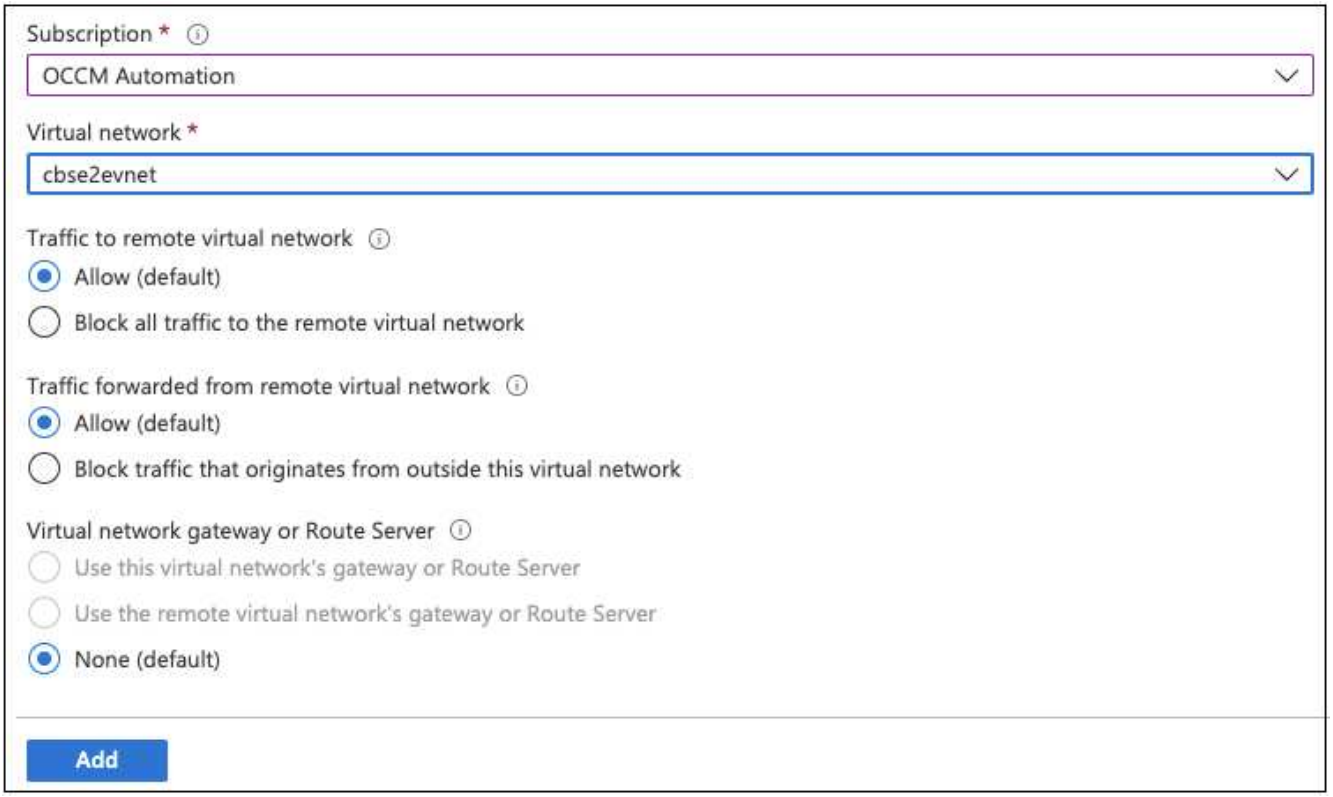
Note that if you want Cloud Manager to manage your Cloud Volumes ONTAP system in a different account/region, then you need to setup VNet peering. VNet peering is not required for storage account

connectivity.

1. Log in to the Azure portal and from home, select Virtual Networks.
2. Select the subscription you are using as subscription 1 and click on the VNet where you want to set up peering.

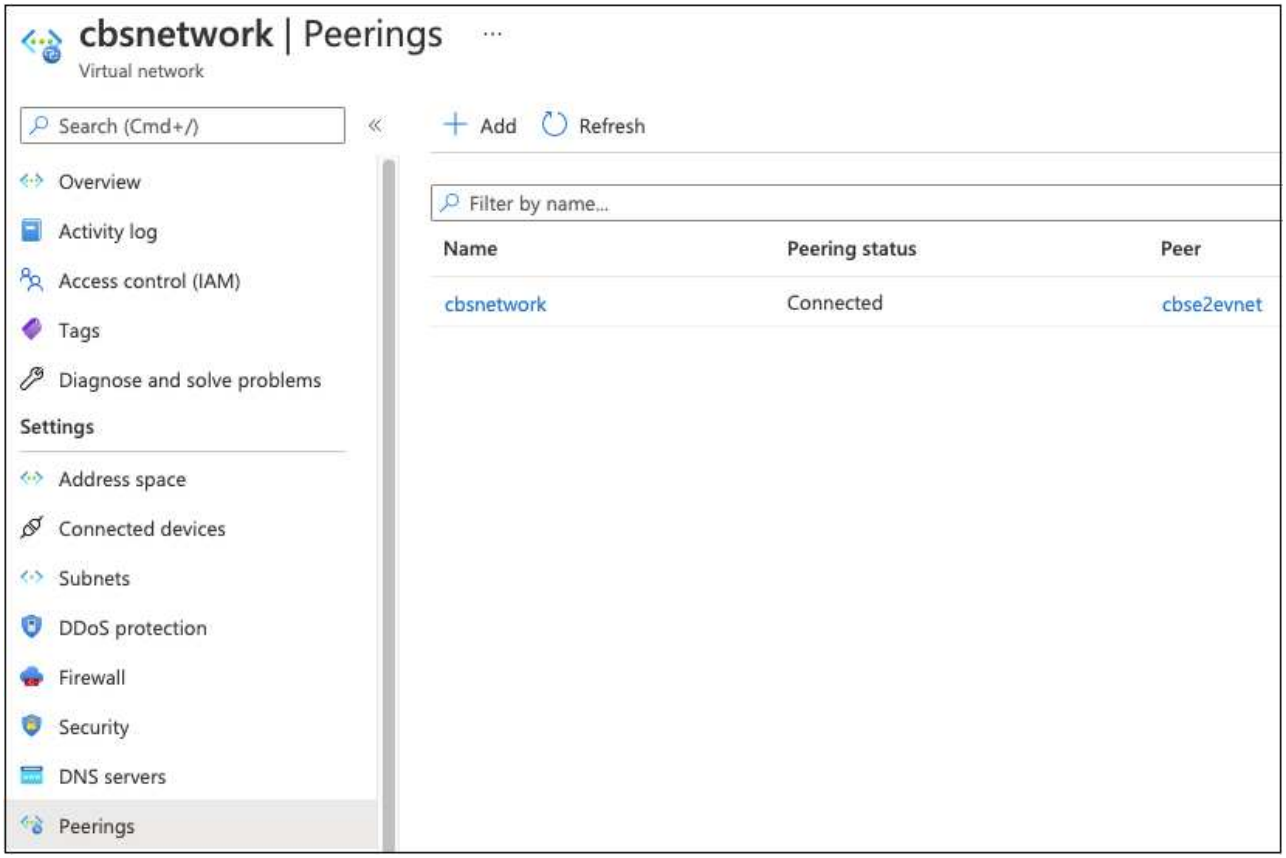



3. Select **cbsnetwork** and from the left panel, click on **Peerings**, and then click **Add**.

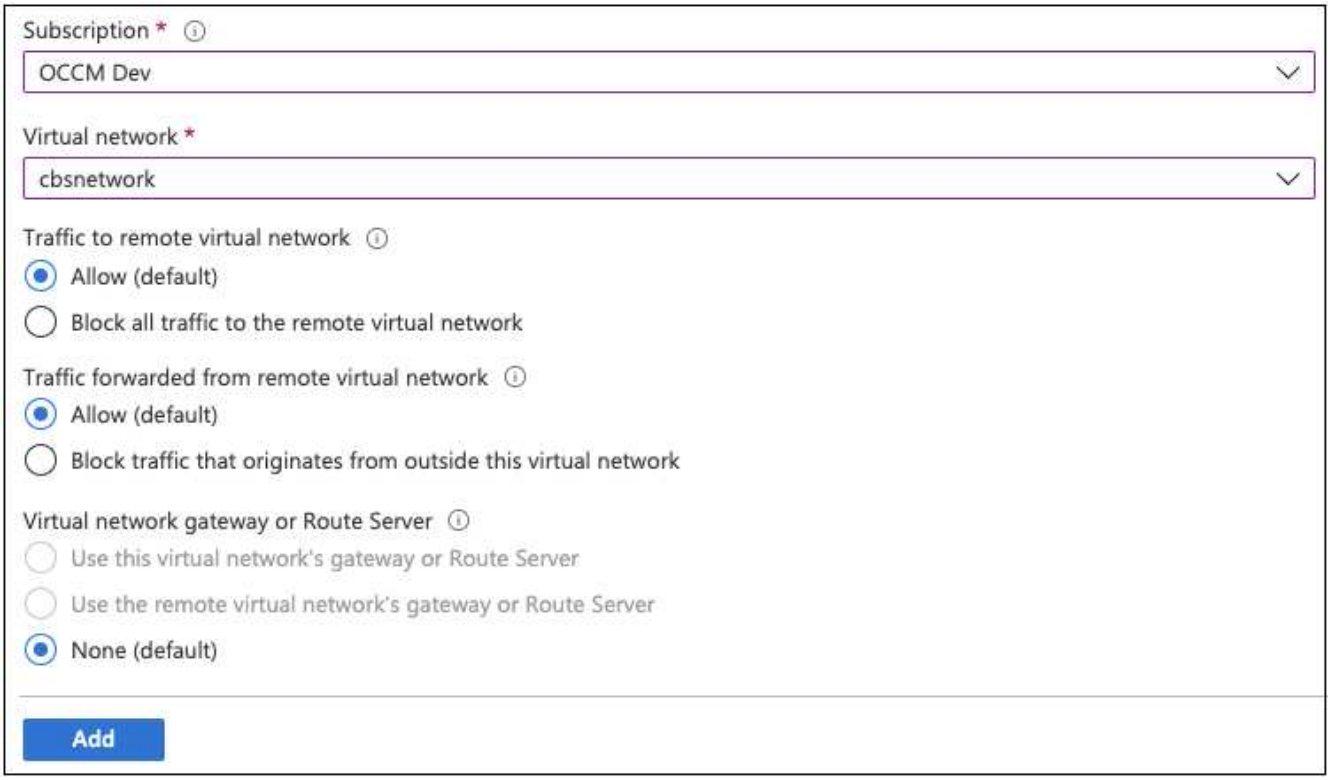



4. Enter the following information on the Peering page and then click **Add**.
   - Peering link name for this network: you can give any name to identify the peering connection.
   - Remote virtual network peering link name: enter a name to identify the remote VNet.

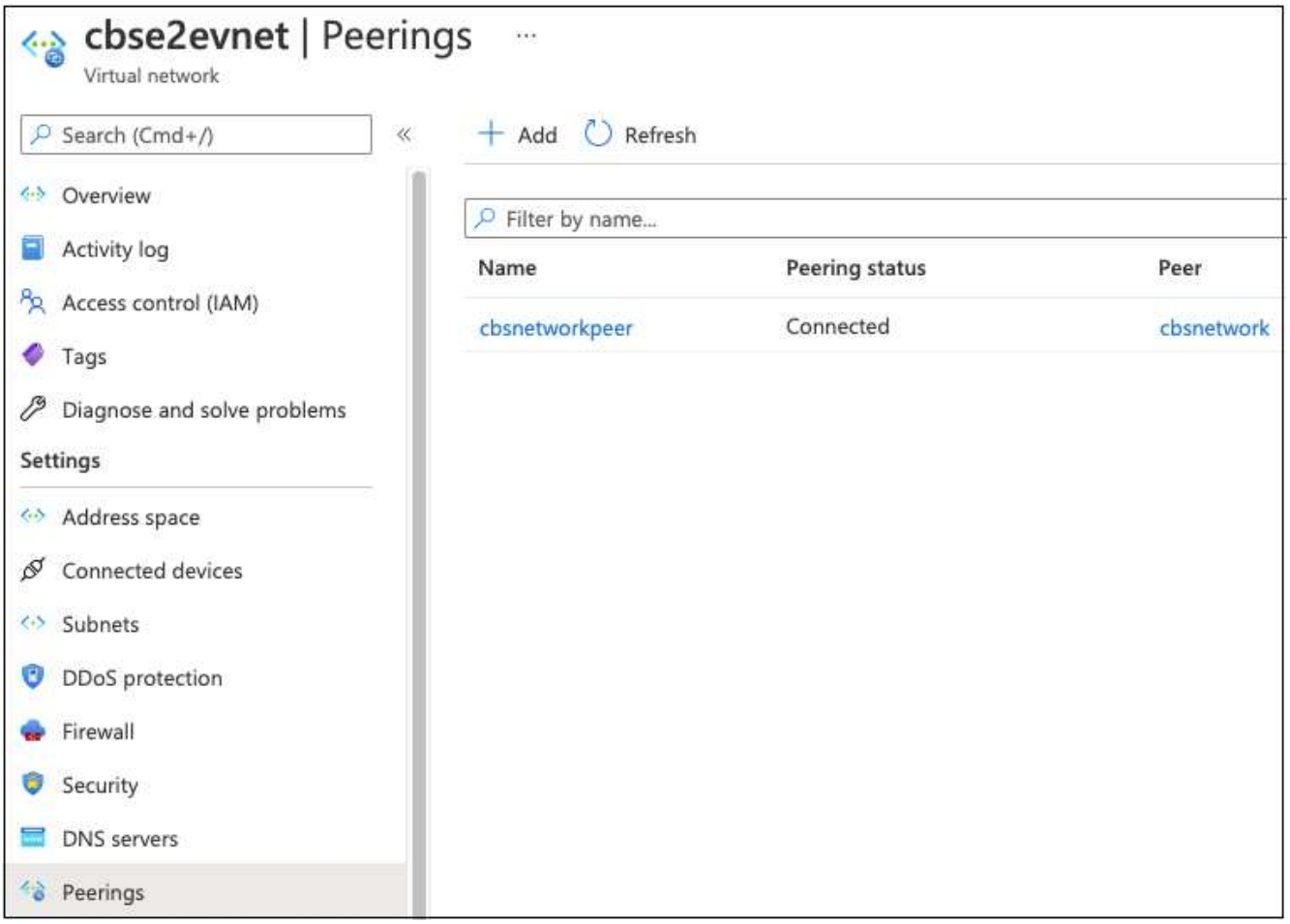
- Keep all the selections as default values.
- Under subscription, select the subscription 2.
- Virtual network, select the virtual network in subscription 2 to which you want to set up the peering.




5. Perform the same steps in subscription 2 VNet and specify the subscription and remote VNet details of subscription 1.




The peering settings are added.



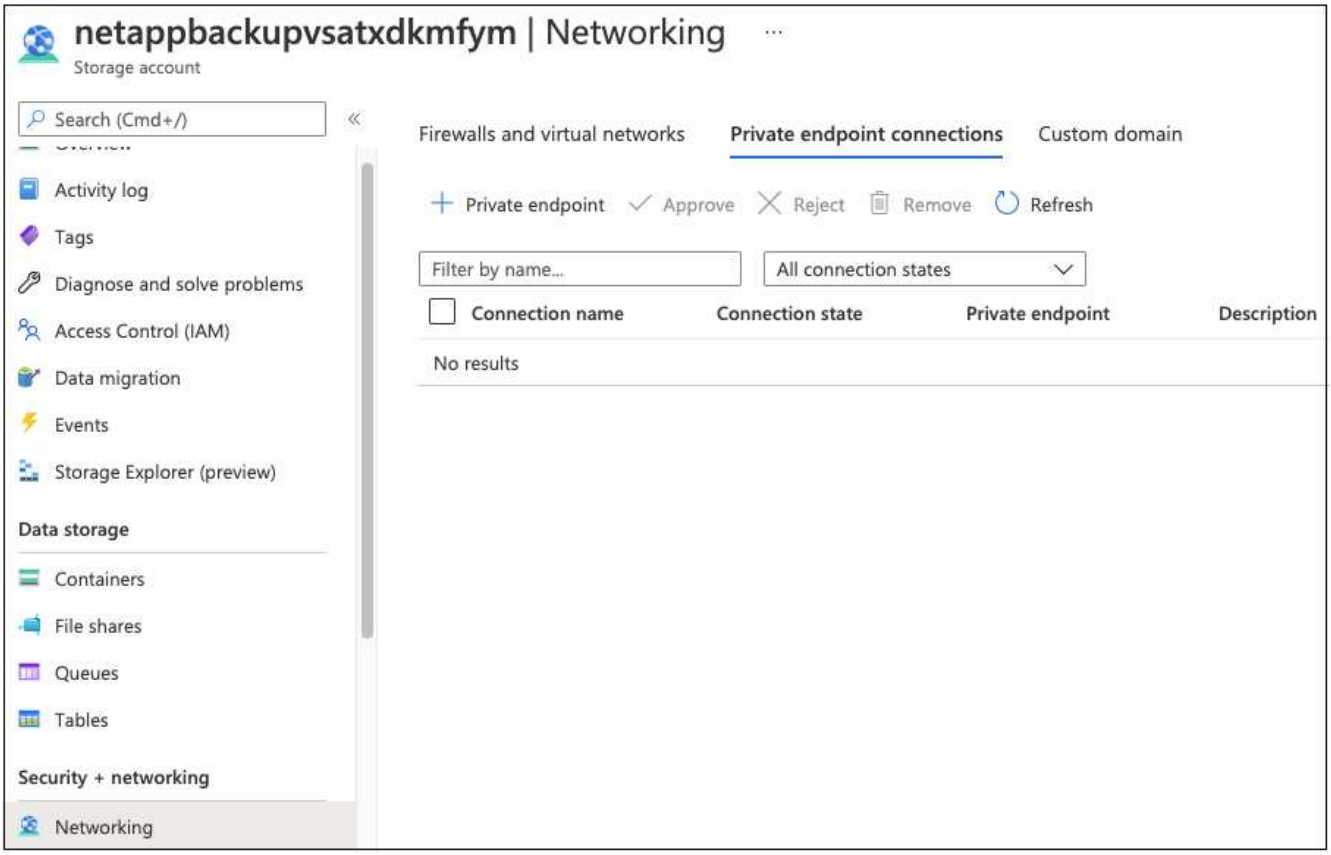
#### Create a private endpoint for the storage account

Now you need to create a private endpoint for the storage account. In this example, the storage account is created in subscription 1 and the Cloud Volumes ONTAP system is running in subscription 2.

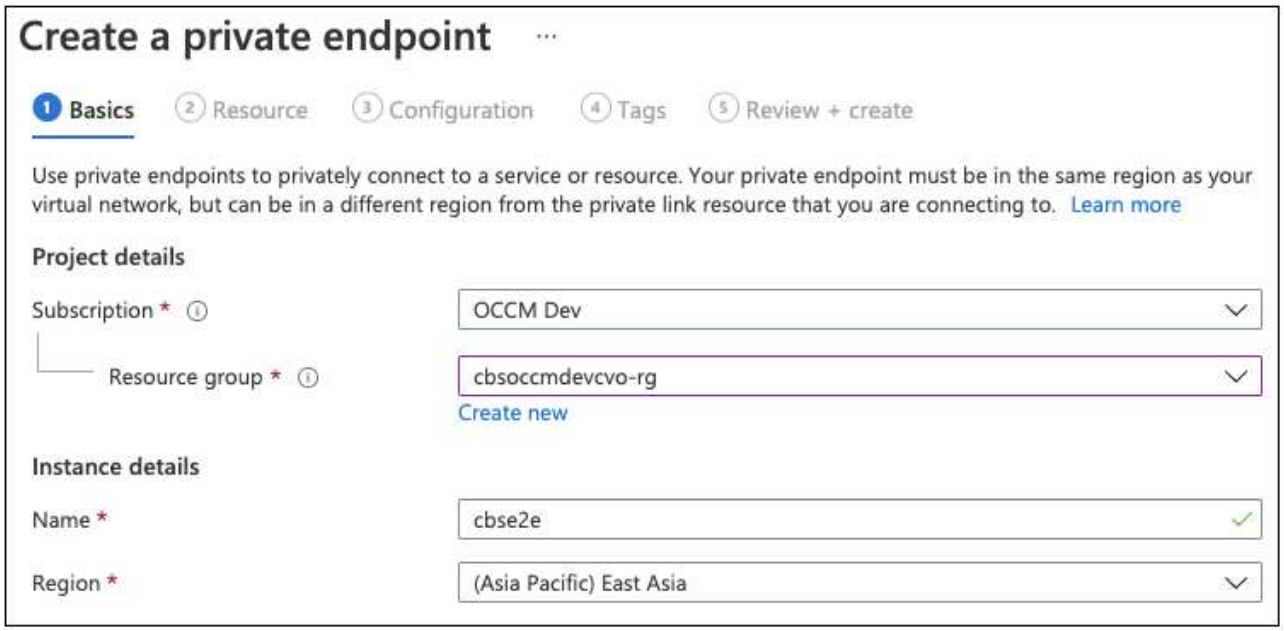
You need network contributor permission to perform the following action.

```
{
  "id": "/subscriptions/d333af45-0d07-4154-
943dc25fbbce1b18/providers/Microsoft.Authorization/roleDefinitions/4d97b98
b-1d4f-4787-a291-c67834d212e7",
  "properties": {
    "roleName": "Network Contributor",
    "description": "Lets you manage networks, but not access to them.",
    "assignableScopes": [
      "/"
    ],
    "permissions": [
      {
        "actions": [
          "Microsoft.Authorization/*/read",
          "Microsoft.Insights/alertRules/*",
          "Microsoft.Network/*",
          "Microsoft.ResourceHealth/availabilityStatuses/read",
          "Microsoft.Resources/deployments/*",
          "Microsoft.Resources/subscriptions/resourceGroups/read",
          "Microsoft.Support/*"
        ],
        "notActions": [],
        "dataActions": [],
        "notDataActions": []
      }
    ]
  }
}
```

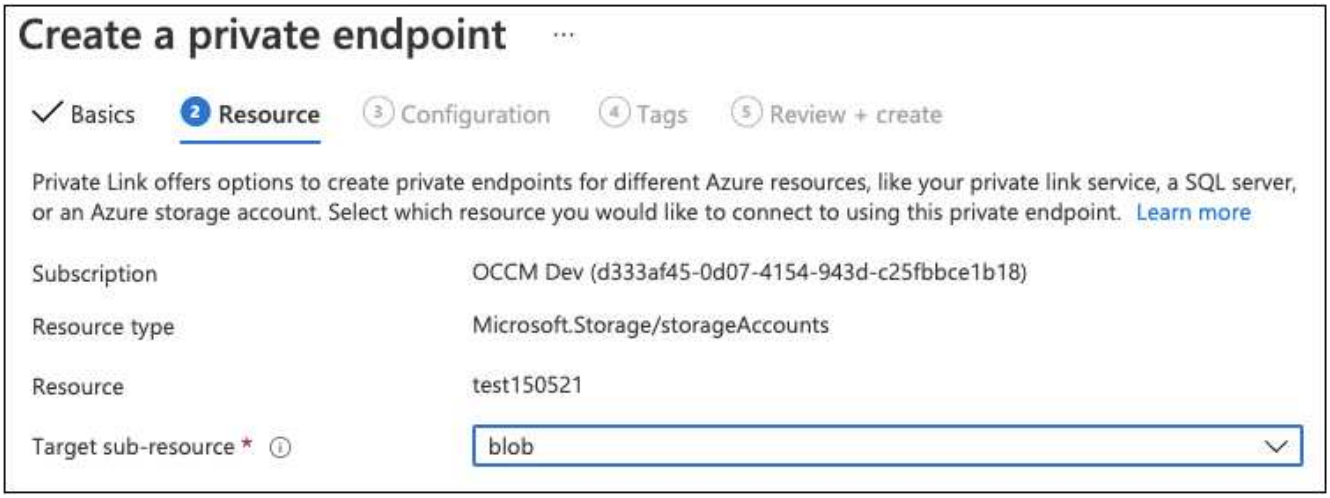
1. Go to the storage account > Networking > Private endpoint connections and click **+ Private endpoint**.



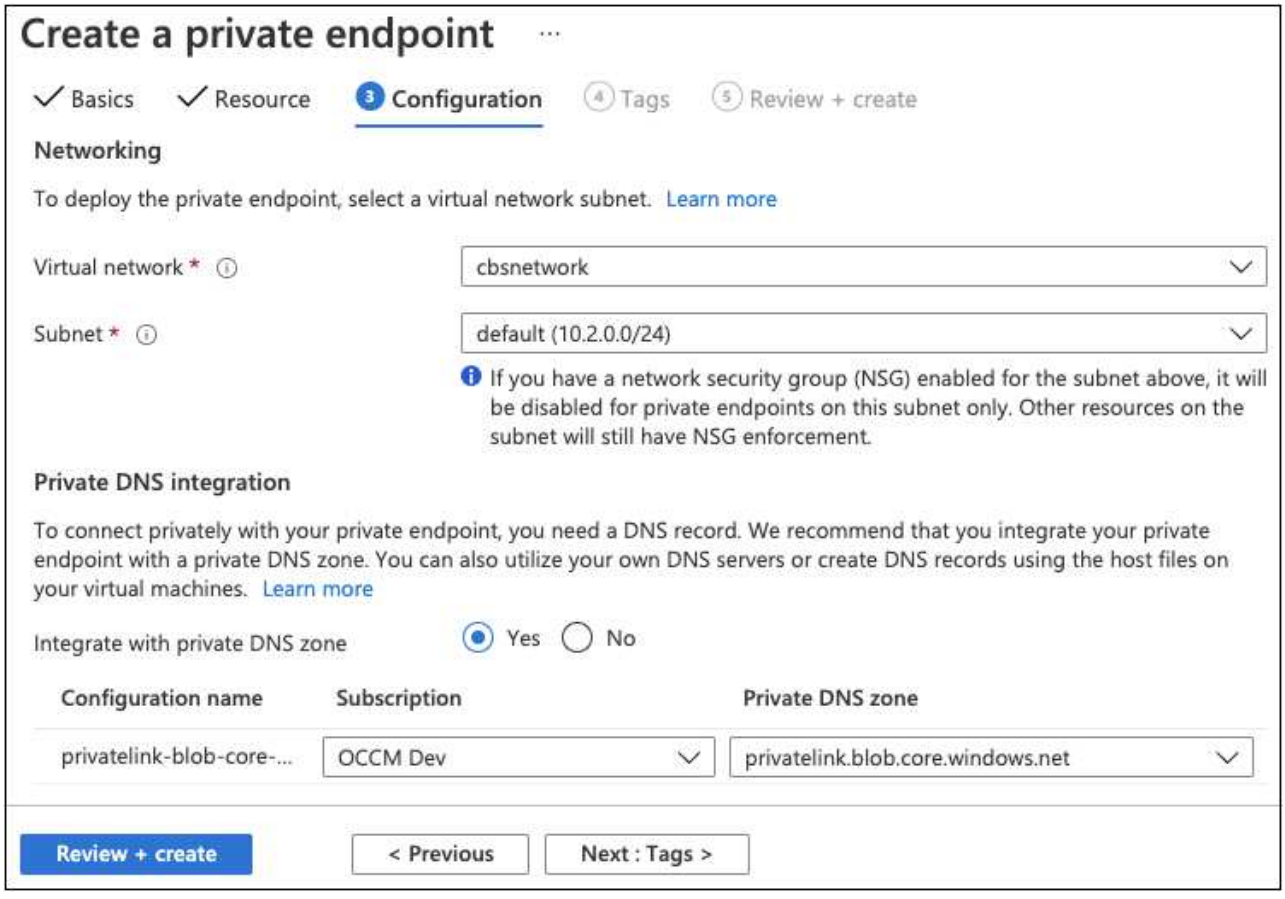

2. In the Private Endpoint *Basics* page:
   - Select subscription 2 (where the Cloud Manager Connector and Cloud Volumes ONTAP system are deployed) and the resource group.
   - Enter an endpoint name.
   - Select the region.



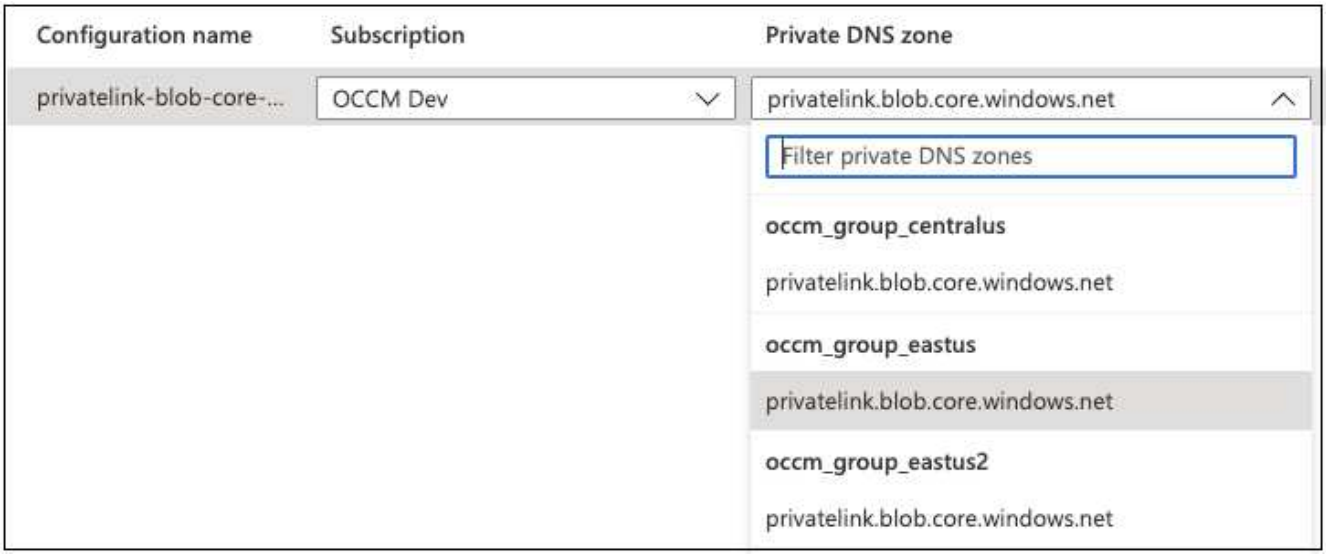

3. In the *Resource* page, select Target sub-resource as **blob**.




4. In the Configuration page:
   - Select the virtual network and subnet.
   - Click the **Yes** radio button to "Integrate with private DNS zone".




5. In the Private DNS zone list, ensure that the Private Zone is selected from the correct Region, and click **Review + Create**.




Now the storage account (in subscription 1) has access to the Cloud Volumes ONTAP system which is running in subscription 2.

6. Retry enabling Cloud Backup on the Cloud Volumes ONTAP system and this time it should be successful.

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