



Back up and restore ONTAP data

Cloud Backup

NetApp
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Table of Contents

- Back up and restore ONTAP data 1
 - Protect your ONTAP cluster data using Cloud Backup 1
 - Backing up Cloud Volumes ONTAP data to Amazon S3 8
 - Backing up Cloud Volumes ONTAP data to Azure Blob storage 15
 - Backing up Cloud Volumes ONTAP data to Google Cloud Storage 21
 - Backing up on-premises ONTAP data to Amazon S3 27
 - Backing up on-premises ONTAP data to Azure Blob storage 39
 - Backing up on-premises ONTAP data to Google Cloud Storage 48
 - Backing up on-premises ONTAP data to StorageGRID 55
 - Managing backups for your ONTAP systems 62
 - Restoring ONTAP data from backup files 76

Back up and restore ONTAP data

Protect your ONTAP cluster data using Cloud Backup

Cloud Backup provides backup and restore capabilities for protection and long-term archive of your ONTAP cluster 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.

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.
- Name your backup policies so it is easy to see what each policy is used for.
- Tier older backup files to archival storage to save costs (supported 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 and searchable file catalogs for selecting individual files for single file restore.

Supported ONTAP working environments and object storage providers

Cloud Backup enables you to back up ONTAP 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

Source Working Environment	Backup File Destination
Cloud Volumes ONTAP in Azure	Azure Blob
Cloud Volumes ONTAP in Google	Google Cloud Storage
On-premises ONTAP system	Amazon S3 Azure Blob Google Cloud Storage NetApp StorageGRID

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

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

Note that references to "on-premises ONTAP systems" includes FAS, AFF, and ONTAP Select systems.

Support for sites with no internet connectivity

Cloud Backup can be used in a site with no internet connectivity (also known as an "offline" or "dark" site) to back up volume data from local on-premises ONTAP systems to local NetApp StorageGRID systems. Both volume and file restore are also supported in this configuration. In this case, you'll need to deploy the Cloud Manager Connector (minimum version 3.9.20) in the dark site. See [Backing up on-premises ONTAP data to StorageGRID](#) for details.

Cost

There are two types of costs associated with using Cloud Backup with ONTAP systems: 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 Volume or File Restore using Search & Restore, certain resources are provisioned by your cloud

provider and there is per-TiB cost associated with the amount of data that is scanned by your search requests.

- In AWS, [Amazon Athena](#) and [AWS Glue](#) resources are deployed in a new S3 bucket.
- In Google, a new bucket is deployed, and the [Google Cloud BigQuery services](#) are provisioned on an account/project level.
- If you need to restore volume data from a backup file that has been moved to archival storage, then there's an additional per-GiB 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. The third option is to purchase licenses directly from NetApp. Read the [Licensing](#) section for details.

Licensing

Cloud Backup is available with the following consumption models:

- **BYOL:** A license purchased from NetApp that can be used with any cloud provider.
- **PAYGO:** An hourly subscription from your cloud provider's marketplace.
- **Annual:** An annual contract from your cloud provider's marketplace.

If you purchase a BYOL license from NetApp, you also need to subscribe to the PAYGO offering from your cloud provider's marketplace. Your license is always charged first, but you'll be charged from the hourly rate in the marketplace in these cases:



- If you exceed your licensed capacity
- If the term of your license expires

If you have an annual contract from a marketplace, all Cloud Backup consumption is charged against that contract. You can't mix and match an annual marketplace contract with a BYOL.

Bring your own license

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

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 source systems associated with your [Cloud Manager account](#).

[Learn how to manage your BYOL licenses.](#)

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 GiB for data that's backed up—there's no up-front payment. You are

billed by your cloud provider through your monthly bill.

[Learn how to set up a pay-as-you-go subscription.](#)

Note that a 30-day free trial is available when you initially sign up with a PAYGO subscription.

Annual contract

When using AWS, two annual contracts are available for 12, 24, or 36 month terms:

- A "Cloud Backup" plan that enables you to back up Cloud Volumes ONTAP data and on-premises ONTAP data.
- A "CVO Professional" plan that enables you to bundle Cloud Volumes ONTAP and Cloud Backup. This includes unlimited backups for Cloud Volumes ONTAP volumes charged against this license (backup capacity is not counted against the license).
- When using Azure, you can request a private offer from NetApp, and then select the plan when you subscribe from the Azure Marketplace during Cloud Backup activation.
- When using GCP, you can request a private offer from NetApp, and then select the plan when you subscribe from the Google Cloud Marketplace during Cloud Backup activation.

[Learn how to set up annual contracts.](#)

How Cloud Backup works

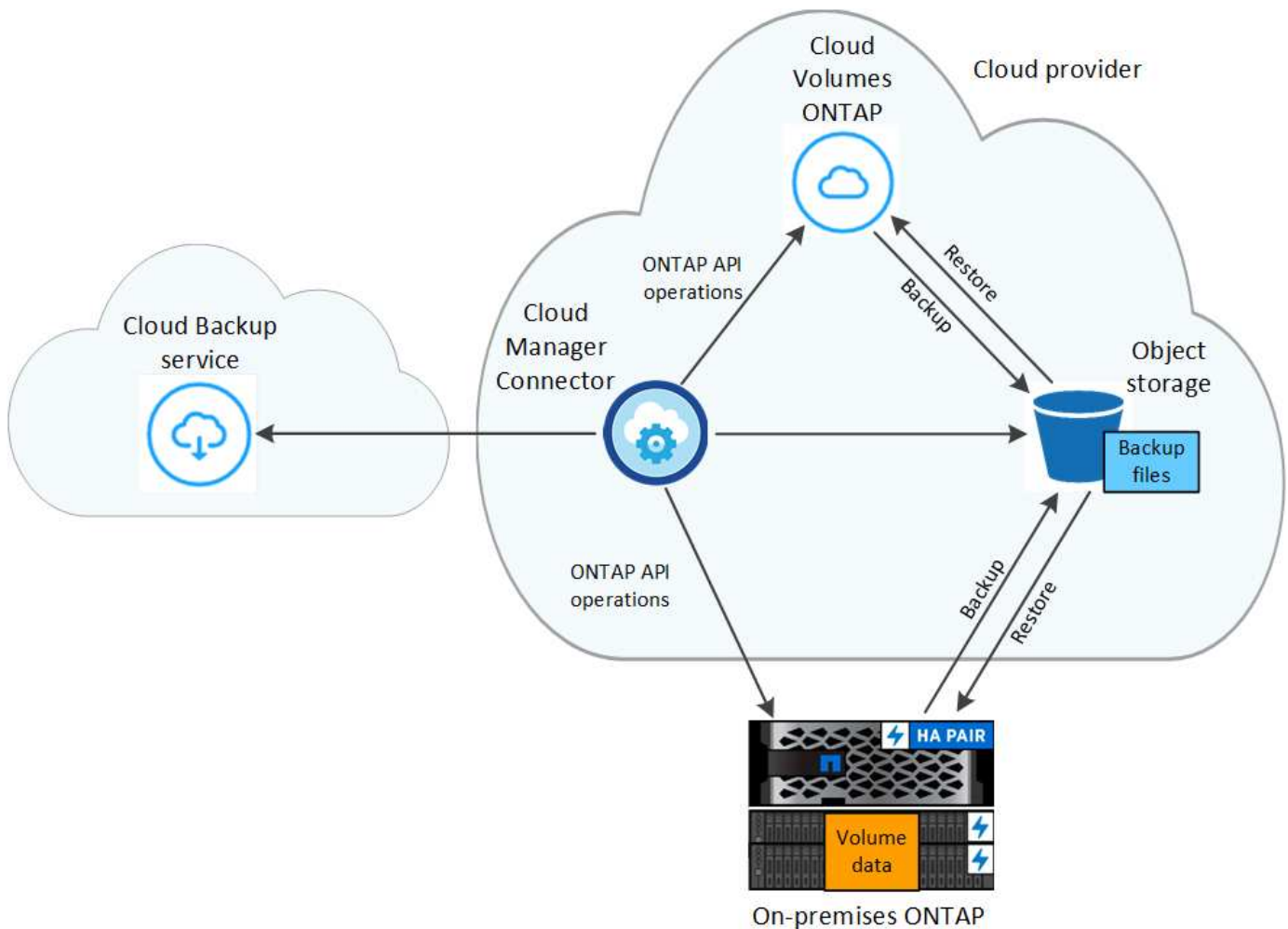
When you enable Cloud Backup on a Cloud Volumes ONTAP or on-premises ONTAP system, the service performs a full backup of your data. Volume snapshots are not included in the backup image. After the initial backup, all additional backups are incremental, which means that only changed blocks and new blocks 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 the other volumes after Backup is activated.

You can choose a combination of hourly, daily, weekly, monthly, and yearly 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 (and so obsolete backups don't continue to take up space in the cloud).

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.

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 the following types of volumes:

- FlexVol read-write volumes
- SnapMirror data protection (DP) destination volumes
- SnapLock Enterprise volumes (requires ONTAP 9.11.1 or later)

FlexGroup volumes and SnapLock Compliance 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. 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

These limitations apply to both the Search & Restore and the Browse & Restore methods of restoring files; unless called out specifically.

- Browse & Restore can restore up to 100 individual files at a time.
- Search & Restore can restore 1 file 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.
- You can't restore individual files if the backup file resides in archival storage.
- File level restore using Search & Restore is not supported when the Connector is installed on a site without internet access (dark site).

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.

1

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](#).

2

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, monthly, or yearly 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

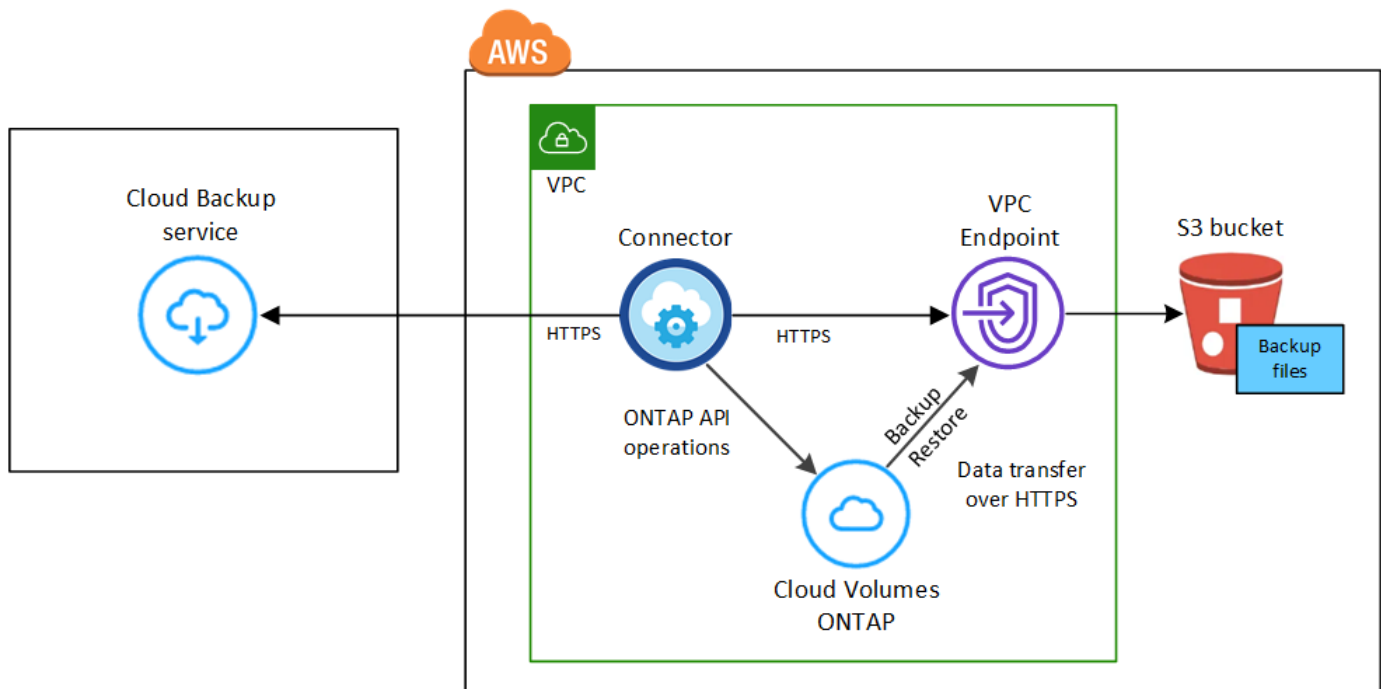
Select the volumes that you want to back up

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:



Supported ONTAP versions

Minimum of ONTAP 9.6; ONTAP 9.8P11 and later is recommended.

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](#); including AWS GovCloud regions.

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 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:PutObject",
        "s3:ListBucket",
        "s3:ListAllMyBuckets",
        "s3:GetBucketTagging",
        "s3:GetBucketLocation",
        "s3:GetBucketPolicyStatus",
        "s3:GetBucketPublicAccessBlock",
        "s3:GetBucketAcl",
        "s3:GetBucketPolicy",
        "s3:PutBucketPublicAccessBlock",
        "s3:PutEncryptionConfiguration",
        "athena:StartQueryExecution",
        "athena:GetQueryResults",
        "athena:GetQueryExecution",
        "glue:GetDatabase",
        "glue:GetTable",
        "glue:CreateTable",
        "glue:CreateDatabase",
        "glue:GetPartitions",
        "glue:BatchCreatePartition",
        "glue:BatchDeletePartition"
    ],
    "Resource": [
        "arn:aws:s3:::netapp-backup-*"
    ]
},

```

If you deployed the Connector using version 3.9.15 or greater, these permissions should be part of the IAM role already. Otherwise you'll need to add the missing permissions. Specifically the "athena" and "glue" permissions, as they are required for Search & Restore.

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.

If the Amazon S3 destination for your backups exists as a working environment on the Canvas, you can drag the cluster onto the Amazon S3 working environment to initiate the setup wizard.



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](#)).

Provider Settings

Provider Information

AWS Account
AWS_Account_1

AWS Access Key
Enter AWS Access Key

AWS Secret Key
Enter AWS Secret Key

Location & Connectivity

Region
us-east-2

Encryption

Encryption Key Type: AWS SSE-S3 [Change Key](#)

3. Enter the backup policy details that will be used for your default policy and click **Next**. You can select an existing policy, or you can create a new policy by entering your selections in each section:
- Enter the name for the default policy. You don't need to change the name.
 - Define the backup schedule and choose the number of backups to retain. [See the list of existing policies you can choose](#).
 - 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](#).

Define Policy

This policy is applied to the volumes you select in the next step. You can apply different policies to volumes after activating backup.

i Cloud Backup will create the S3 bucket after you complete the wizard

Policy Type

☒ Create a new Policy ☐ Select an existing Policy

Name Default_Policy_Name

Labels & Retention 30 Daily

Archival Policy

Backups reside in S3 Standard storage for frequently accessed data. Optionally, you can tier backups to either S3 Glacier or S3 Glacier Deep Archive storage for further cost optimization.

☒ Tier Backups to Archive

Archive After (Days) 30

Storage Class S3 Glacier

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.

Select Volumes						
57 Volumes						
<input checked="" type="checkbox"/>	Volume Name	Volume Type	SVM Name	Used Capacity	Allocated Capacity	Backup Status
<input checked="" type="checkbox"/>	Volume_Name_1 On	RW	SVM_Name_1	0.25 TB	10 TB	Not Active
<input checked="" type="checkbox"/>	Volume_Name_2 On	RW	SVM_Name_1	0.25 TB	10 TB	Not Active
<input checked="" type="checkbox"/>	Volume_Name_3 On	RW	SVM_Name_1	0.25 TB	10 TB	Not Active
<input checked="" type="checkbox"/>	Volume_Name_4 On	DP	SVM_Name_2	0.25 TB	10 TB	Not Active
<input checked="" type="checkbox"/>	Volume_Name_5 On	RW	SVM_Name_1	0.25 TB	10 TB	Not Active
<input checked="" type="checkbox"/> Automatically back up future volumes on all storage VMs with the selected backup policy						

◦ 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.

1

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.

2

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 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, monthly, or yearly 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.

Define Policy

This policy is applied to the volumes you select in the next step. You can apply different policies to volumes after activating backup.

i Cloud Backup will create the Storage account after you complete the wizard

Policy Type

☒ Create a new Policy
 ☐ Select an existing Policy

Name	Default_Policy_Name	▼
Labels & Retention	30 Daily	▼
Archival Policy	<p style="font-size: x-small;">Backups reside in Cool Azure Blob storage for frequently accessed data. Optionally, you can tier backups to Azure Archive storage for further cost optimization.</p> <div style="display: flex; align-items: flex-start;"> <div style="margin-right: 20px;"> <input checked="" type="checkbox"/> Tier Backups to Archive </div> <div> <div style="display: flex; justify-content: space-between; font-size: x-small;"> Archive After (Days) Access Tier </div> <div style="display: flex; align-items: center;"> <input style="width: 150px;" type="text" value="30"/> <div style="border: 1px solid #ccc; padding: 2px 5px; margin-left: 20px;"> Azure Archive ▼ </div> </div> </div> </div>	

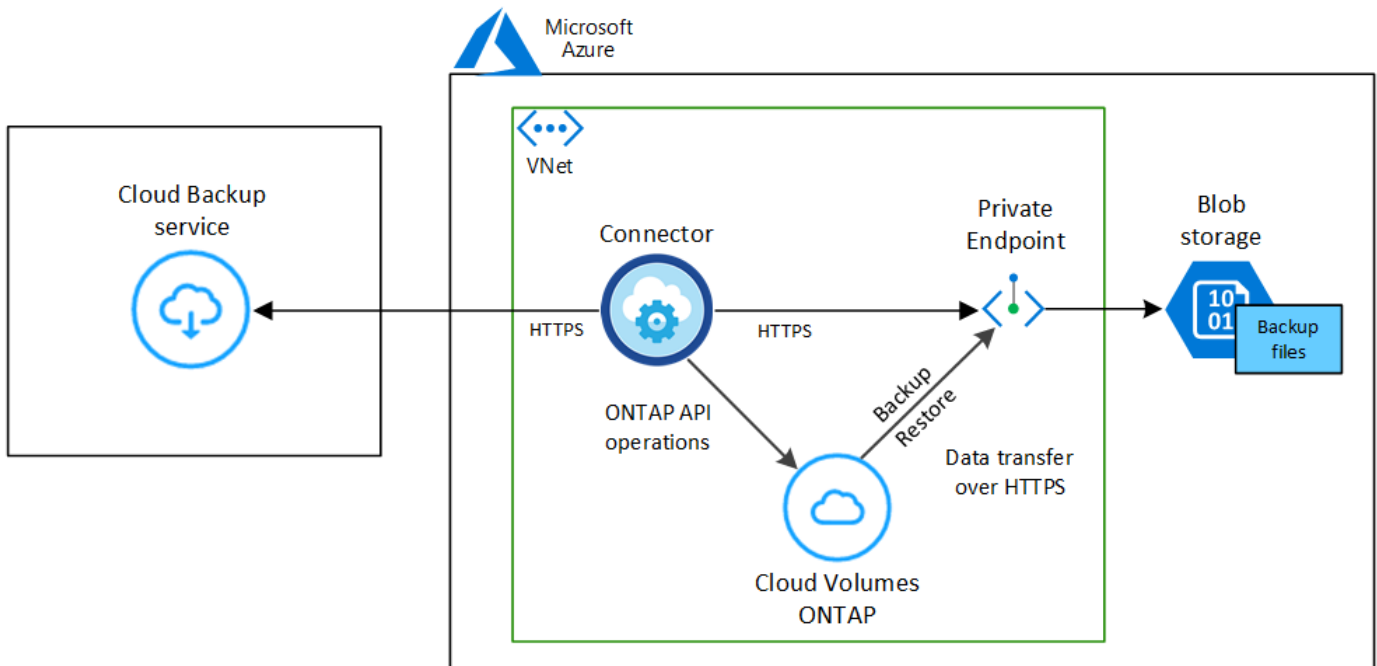
5 Select the volumes that you want to back up

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:



Supported ONTAP versions

Minimum of ONTAP 9.7P5; ONTAP 9.8P11 and later is recommended.

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](#); including Azure Government regions.

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.](#)

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

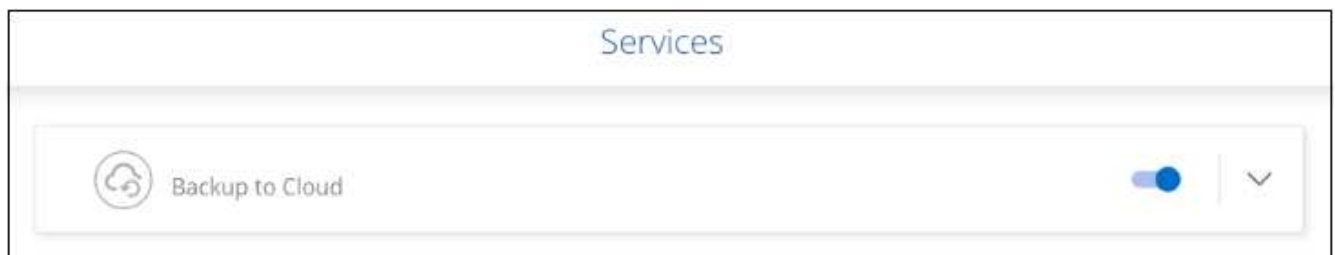
ONTAP system.



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](#)).

The screenshot shows the 'Provider Settings' page with the following fields and options:

- Azure Subscription:** A dropdown menu with 'Azure_Subscription_1' selected.
- Region:** A dropdown menu with 'Default_CM_Region' selected.
- Resource Group:** A section with two radio buttons: 'Create a new' (selected) and 'Use an existing'.
- Resource Group Name:** An empty text input field.
- Encryption Managed Keys:** A section with two radio buttons: 'Microsoft-managed' (selected) and 'Customer-managed'.

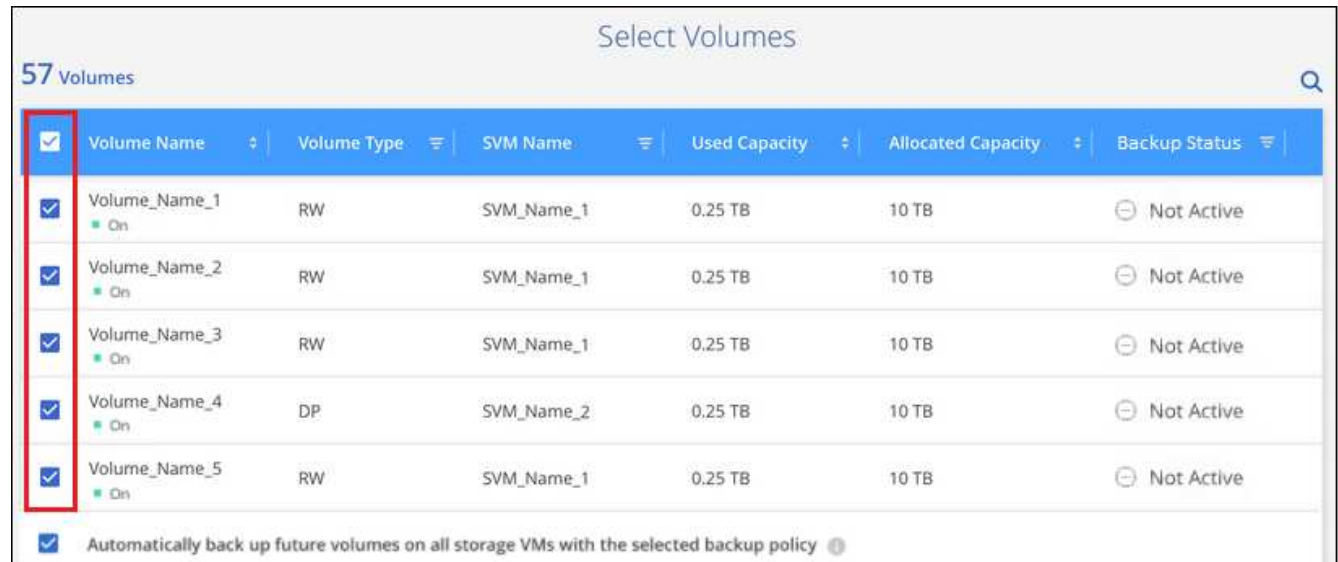
3. Enter the backup policy details that will be used for your default policy and click **Next**. You can select an existing policy, or you can create a new policy by entering your selections in each section:
- a. Enter the name for the default policy. You don't need to change the name.
 - b. Define the backup schedule and choose the number of backups to retain. [See the list of existing policies you can choose](#).
 - c. 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](#).

The screenshot shows the 'Define Policy' page with the following sections and options:

- Policy Type:** Two radio buttons: 'Create a new Policy' (selected) and 'Select an existing Policy'.
- Name:** A text input field with 'Default_Policy_Name' and a dropdown arrow.
- Labels & Retention:** A text input field with '30 Daily' and a dropdown arrow.
- Archival Policy:** A section with a checkbox 'Tier Backups to Archive' (checked). Below it, there are two fields: 'Archive After (Days)' with a text input '30' and 'Access Tier' with a dropdown menu showing 'Azure Archive'.

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.



<input checked="" type="checkbox"/>	Volume Name	Volume Type	SVM Name	Used Capacity	Allocated Capacity	Backup Status
<input checked="" type="checkbox"/>	Volume_Name_1 On	RW	SVM_Name_1	0.25 TB	10 TB	Not Active
<input checked="" type="checkbox"/>	Volume_Name_2 On	RW	SVM_Name_1	0.25 TB	10 TB	Not Active
<input checked="" type="checkbox"/>	Volume_Name_3 On	RW	SVM_Name_1	0.25 TB	10 TB	Not Active
<input checked="" type="checkbox"/>	Volume_Name_4 On	DP	SVM_Name_2	0.25 TB	10 TB	Not Active
<input checked="" type="checkbox"/>	Volume_Name_5 On	RW	SVM_Name_1	0.25 TB	10 TB	Not Active
<input checked="" type="checkbox"/>	Automatically back up future volumes on all storage VMs with the selected backup policy					

- 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.

Provider Settings

Google Cloud Project

Default Project

Region

us-east-2

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, monthly, or yearly 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.

Define Policy

This policy is applied to the volumes you select in the next step. You can apply different policies to volumes after activating backup.

i Cloud Backup will create the Google Cloud Storage bucket after you complete the wizard

Policy Type

☒ Create a new Policy ☐ Select an existing Policy

Name	Default_Policy_Name	▼
Labels & Retention	30 Daily	▼

5

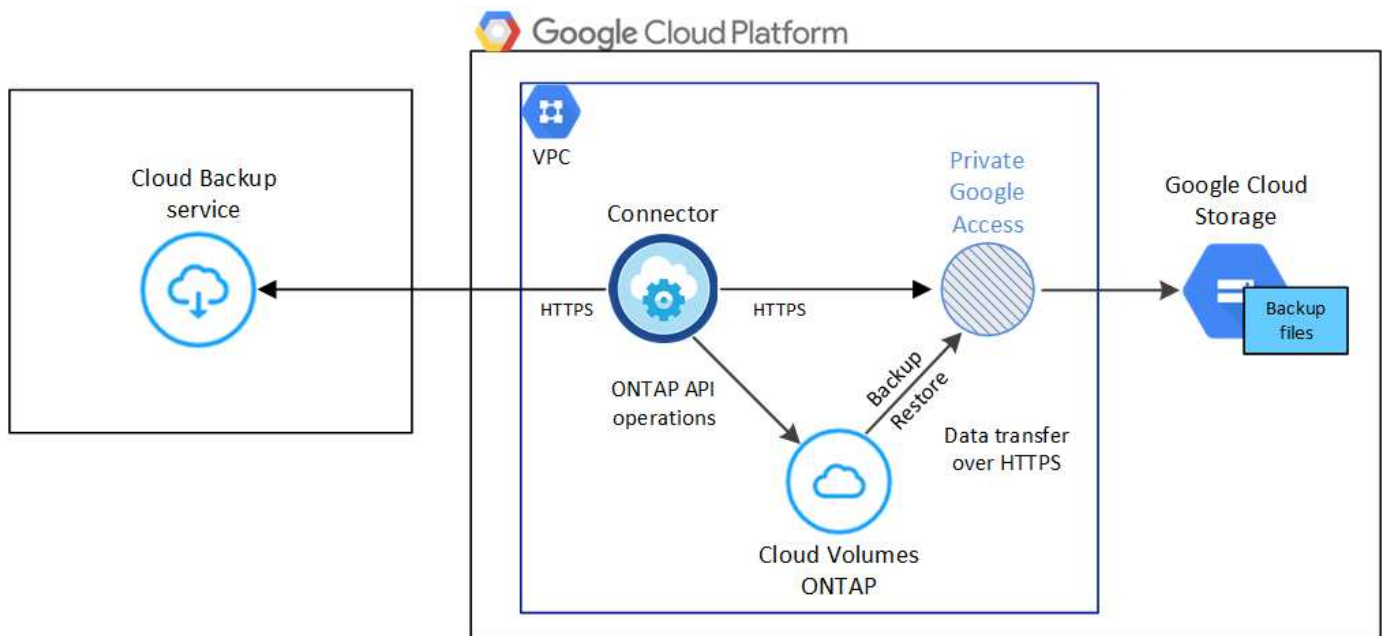
Select the volumes that you want to back up

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**

Minimum of ONTAP 9.7P5; ONTAP 9.8P11 and later is recommended.

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](#).

Verify or add permissions to the Connector

To use the Cloud Backup Search & Restore functionality, you need to have specific permissions in the role for the Connector so that it can access the Google Cloud BigQuery service. See the permissions below, and follow the steps if you need to modify the policy.

1. In [Cloud Console](#), go to the **Roles** page.
2. Using the drop-down list at the top of the page, select the project or organization that contains the role that you want to edit.
3. Click a custom role.
4. Click **Edit Role** to update the role's permissions.
5. Click **Add Permissions** to add the following new permissions to the role.

```
bigquery.jobs.get  
bigquery.jobs.list  
bigquery.jobs.listAll  
bigquery.datasets.create  
bigquery.datasets.get  
bigquery.jobs.create  
bigquery.tables.get  
bigquery.tables.getData  
bigquery.tables.list  
bigquery.tables.create
```

6. Click **Update** to save the edited role.

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.

Details & Credentials

Project1
Google Cloud Project

MPAWSSubscription1222
Marketplace Subscription

Edit Project

Details

Working Environment Name (Cluster Name)
TamiVSA

Service Account

Service Account Name
ServiceAccount1

+ Add Labels Optional Field | Up to four labels

Credentials

User Name
admin

Password

Confirm Password

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

Services

Backup to Cloud

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. Enter the backup policy details that will be used for your default policy and click **Next**. You can select an existing policy, or you can create a new policy by entering your selections in each section:
 - a. Enter the name for the default policy. You don't need to change the name.
 - b. Define the backup schedule and choose the number of backups to retain. [See the list of existing policies you can choose.](#)

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.

Select Volumes						
57 Volumes						
<input checked="" type="checkbox"/>	Volume Name	Volume Type	SVM Name	Used Capacity	Allocated Capacity	Backup Status
<input checked="" type="checkbox"/>	Volume_Name_1 On	RW	SVM_Name_1	0.25 TB	10 TB	Not Active
<input checked="" type="checkbox"/>	Volume_Name_2 On	RW	SVM_Name_1	0.25 TB	10 TB	Not Active
<input checked="" type="checkbox"/>	Volume_Name_3 On	RW	SVM_Name_1	0.25 TB	10 TB	Not Active
<input checked="" type="checkbox"/>	Volume_Name_4 On	DP	SVM_Name_2	0.25 TB	10 TB	Not Active
<input checked="" type="checkbox"/>	Volume_Name_5 On	RW	SVM_Name_1	0.25 TB	10 TB	Not Active
<input checked="" type="checkbox"/> Automatically back up future volumes on all storage VMs with the selected backup policy						

- 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.
 - 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 volumes or files 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 Amazon S3

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

Note that "on-premises ONTAP systems" includes FAS, AFF, and ONTAP Select systems.

Quick start

Get started quickly by following these steps. Details for each step are provided in the following sections in this topic.

1

Identify the configuration method you'll use

Choose whether you'll connect your on-premises ONTAP cluster directly to AWS S3 over the public internet, or whether you'll use a VPN or AWS Direct Connect and route traffic through a private VPC Endpoint interface to

AWS S3.

[See the available connection methods.](#)

2

Prepare your Cloud Manager Connector

If you already have a Connector deployed in your AWS VPC or on your premises, then you're all set. If not, then you'll need to create a Connector to back up ONTAP data to AWS S3 storage. You'll also need to customize network settings for the Connector so that it can connect to AWS S3.

[See how to create a Connector and how to define required network settings.](#)

3

Prepare your on-premises ONTAP cluster

Discover your ONTAP cluster in Cloud Manager, verify that the cluster meets minimum requirements, and customize network settings so the cluster can connect to AWS S3.

[See how to get your on-premises ONTAP cluster ready.](#)

4

Prepare Amazon S3 as your backup target

Set up permissions for the Connector to create and manage the S3 bucket. You'll also need to set up permissions for the on-premises ONTAP cluster so it can read and write data to the S3 bucket.

Optionally, you can set up your own custom-managed keys for data encryption instead of using the default Amazon S3 encryption keys. [See how to get your AWS S3 environment ready to receive ONTAP backups.](#)

5

Enable Cloud Backup on the system

Select the working environment and click **Enable > Backup Volumes** next to the Backup & Restore service in the right-panel. Then follow the setup wizard to define the default backup policy and number of backups to retain, and select the volumes you want to back up.

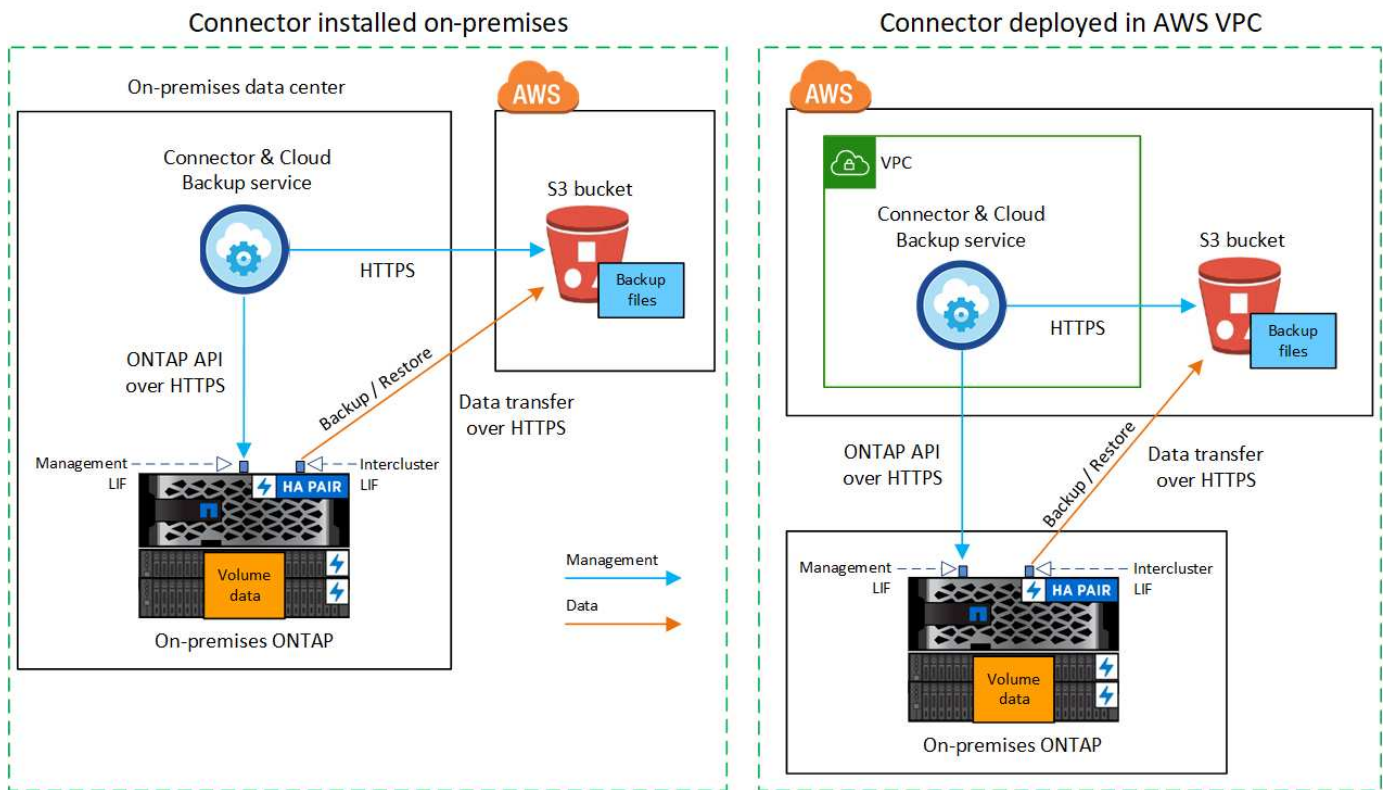
[See how to activate Cloud Backup on your volumes.](#)

Network diagrams for connection options

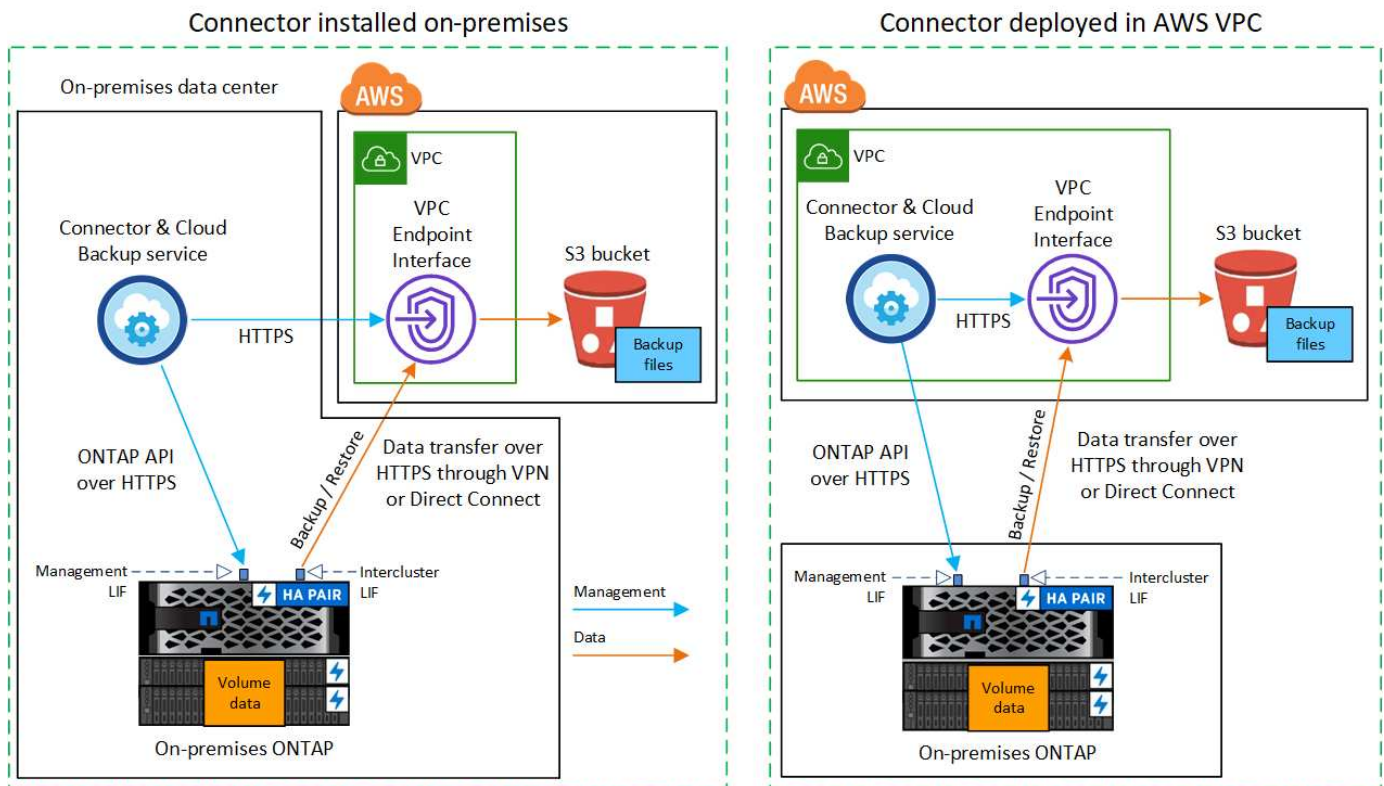
There are two connection methods you can use when configuring backups from on-premises ONTAP systems to AWS S3.

- Public connection - Directly connect the ONTAP system to AWS S3 using a public S3 endpoint.
- Private connection - Use a VPN or AWS Direct Connect and route traffic through a VPC Endpoint interface that uses a private IP address.

The following diagram shows the **public connection** method and the connections that you need to prepare between the components. You can use a Connector that you've installed on your premises, or a Connector that you've deployed in the AWS VPC.



The following diagram shows the **private connection** method and the connections that you need to prepare between the components. You can use a Connector that you've installed on your premises, or a Connector that you've deployed in the AWS VPC.



Prepare your Connector

The Cloud Manager Connector is the main software for Cloud Manager functionality. A Connector is required to back up and restore your ONTAP data.

Creating or switching Connectors

If you already have a Connector deployed in your AWS VPC or on your premises, then you're all set. If not, then you'll need to create a Connector in either of those locations to back up ONTAP data to AWS S3 storage. You can't use a Connector that's deployed in another cloud provider.

- [Learn about Connectors](#)
- [Getting started with Connectors](#)
- [Installing a Connector in AWS](#)
- [Installing a Connector in your premises](#)

Connector networking requirements

- Ensure that the network where the Connector is installed enables the following connections:
 - An HTTPS connection over port 443 to the Cloud Backup service and to your S3 object storage ([see the list of endpoints](#))
 - An HTTPS connection over port 443 to your ONTAP cluster management LIF
- [Ensure that the Connector has permissions to manage the S3 bucket.](#)
- 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 (a **private** connection), you'll need to enable a VPC Endpoint interface to S3. [See how to set up a VPC endpoint interface.](#)

Prepare your ONTAP cluster

Discover your ONTAP cluster in Cloud Manager

You need to discover your on-premises ONTAP cluster in Cloud Manager before you can start backing up volume data. You'll need to know the cluster management IP address and the password for the admin user account to add the cluster.

[Learn how to discover a cluster.](#)

ONTAP requirements

- Minimum of ONTAP 9.7P5; ONTAP 9.8P11 and later is recommended.
- 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 cluster requires an inbound HTTPS connection from the Connector to the cluster management LIF.
- An intercluster LIF is required on each ONTAP node that hosts the volumes you want to back up. These intercluster LIFs must be able to access the object store.

The cluster initiates an outbound HTTPS connection over port 443 from the intercluster LIFs 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.

- The intercluster LIFs 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 these LIFs are associated with. That might be the "Default" IPspace or a custom IPspace that you created.

If you are using a different IPspace than "Default", then you might need to create a static route to get access to the object storage.

All intercluster LIFs within the IPspace must have access to the object store. If you can't configure this for the current IPspace, then you'll need to create a dedicated IPspace where all intercluster LIFs have access to the object store.

- DNS servers must have been configured for the storage VM where the volumes are located. See how to [configure DNS services for the SVM](#).
- Update firewall rules, if necessary, to allow Cloud Backup 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).
- If you are using a Private VPC Interface Endpoint in AWS for the S3 connection, then in order for HTTPS/443 to be used, you'll need to load the S3 endpoint certificate into the ONTAP cluster. [See how to set up a VPC endpoint interface and load the S3 certificate.](#)
- [Ensure that your ONTAP cluster has permissions to access the S3 bucket.](#)

Verify license requirements

- Before you can activate Cloud Backup for your cluster, you'll need to either 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 your 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 use Cloud Backup. Billing for Cloud Backup is done through this subscription.
 - For Cloud Backup BYOL licensing, 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.](#)
- You need to have an AWS subscription for the object storage space where your backups will be located.

You can create backups from on-premises systems to Amazon S3 in all regions [where Cloud Volumes ONTAP is supported](#); including AWS GovCloud regions. You specify the region where backups will be stored when you set up the service.

Prepare your AWS environment

Set up S3 permissions

You'll need to configure two sets of permissions:

- Permissions for the Connector to create and manage the S3 bucket.
- Permissions for the on-premises ONTAP cluster so it can read and write data 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:DeleteObject",
        "s3:PutObject",
        "s3:ListBucket",
        "s3:ListAllMyBuckets",
        "s3:GetBucketTagging",
        "s3:GetBucketLocation",
        "s3:GetBucketPolicyStatus",
        "s3:GetBucketPublicAccessBlock",
        "s3:GetBucketAcl",
        "s3:GetBucketPolicy",
        "s3:PutBucketPublicAccessBlock",
        "s3:PutEncryptionConfiguration",
        "athena:StartQueryExecution",
        "athena:GetQueryResults",
        "athena:GetQueryExecution",
        "glue:GetDatabase",
        "glue:GetTable",
        "glue:CreateTable",
        "glue:CreateDatabase",
        "glue:GetPartitions",
        "glue:BatchCreatePartition",
        "glue:BatchDeletePartition"
    ],
    "Resource": [
        "arn:aws:s3:::netapp-backup-*"
    ]
}

```

If you deployed the Connector using version 3.9.15 or greater, these permissions should be part of the IAM role already. Otherwise you'll need to add the missing permissions. Specifically the "athena" and "glue" permissions, as they're required for Search & Restore. See the [AWS Documentation: Editing IAM policies](#).

2. When activating the service, the Backup wizard will prompt you to enter an access key and secret key. These credentials are passed to the ONTAP cluster so that ONTAP can back up and restore data to the S3 bucket. For that, you'll need to create an IAM user with the following permissions:

```

{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Action": [
        "s3:GetObject",
        "s3:PutObject",
        "s3:DeleteObject",
        "s3:ListBucket",
        "s3:ListAllMyBuckets",
        "s3:GetBucketLocation",
        "s3:PutEncryptionConfiguration"
      ],
      "Resource": "arn:aws:s3:::netapp-backup-*",
      "Effect": "Allow",
      "Sid": "backupPolicy"
    }
  ]
}

```

See the [AWS Documentation: Creating a Role to Delegate Permissions to an IAM User](#) for details.

Set up customer-managed AWS keys for data encryption

If you want to use the default Amazon S3 encryption keys to encrypt the data passed between your on-prem cluster and the S3 bucket, then you are all set because the default installation uses that type of encryption.

If you want to use your own customer-managed keys for data encryption instead of using the default keys, then you'll need to have the encryption managed keys already set up before you start the Cloud Backup wizard.

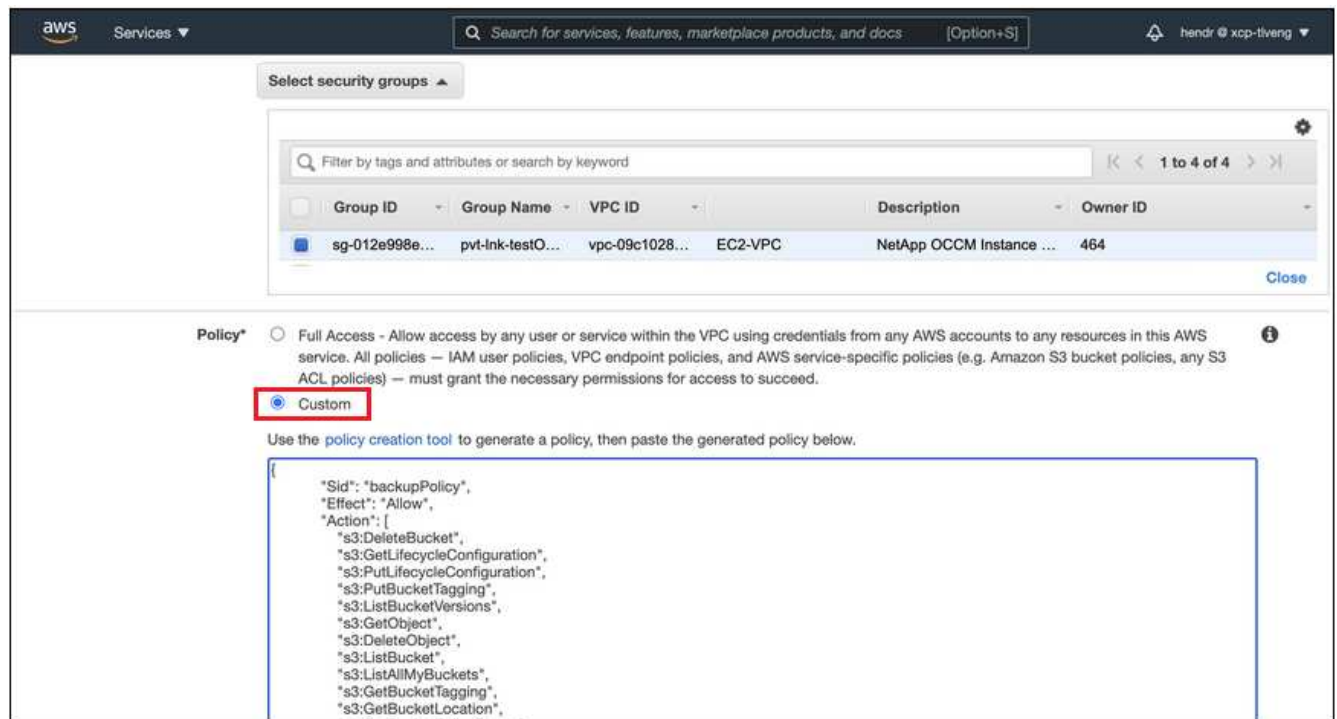
[See how to use your own keys.](#)

Configure your system for a private connection using a VPC endpoint interface

If you want to use a standard public internet connection, then all the permissions are set by the Connector and there is nothing else you need to do. This type of connection is shown in the [first diagram](#).

If you want to have a more secure connection over the internet from your on-prem data center to the VPC, there's an option to select an AWS PrivateLink connection in the Backup activation wizard. It's required if you plan to use a VPN or AWS Direct Connect to connect your on-premises system through a VPC Endpoint interface that uses a private IP address. This type of connection is shown in the [second diagram](#).

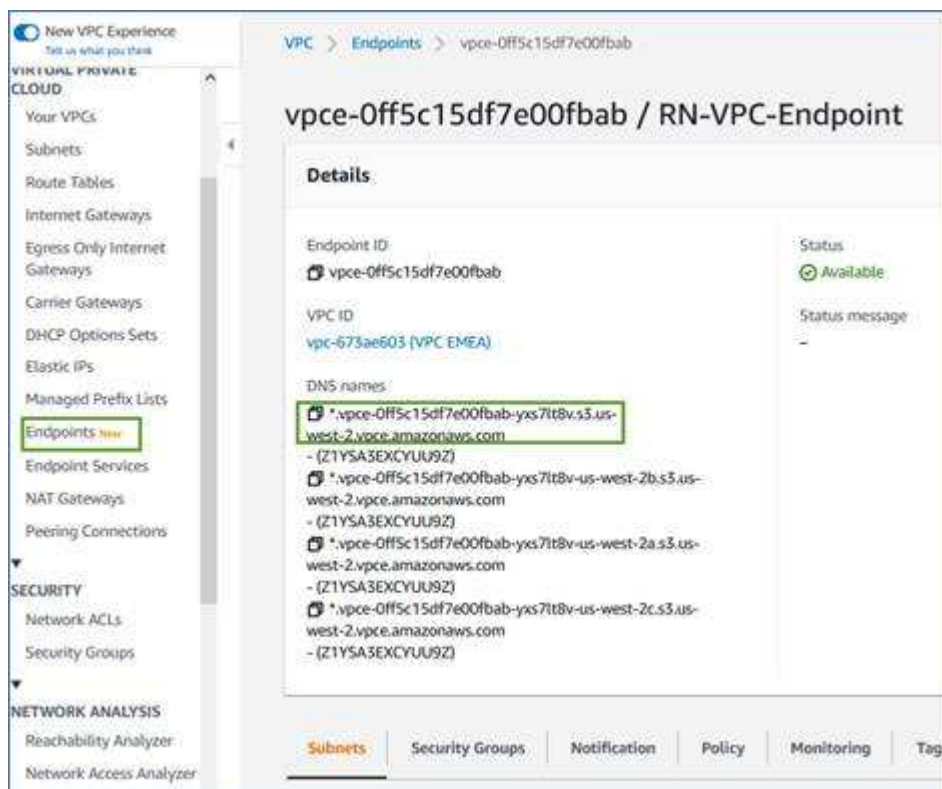
1. Create an Interface endpoint configuration using the Amazon VPC console or the command line. [See details about using AWS PrivateLink for Amazon S3.](#)
2. Modify the security group configuration that's associated with the Cloud Manager Connector. You must change the policy to "Custom" (from "Full Access"), and you must [add the S3 permissions from the backup policy](#) as shown earlier.



If you're using port 80 (HTTP) for communication to the private endpoint, you're all set. You can enable Cloud Backup on the cluster now.

If you're using port 443 (HTTPS) for communication to the private endpoint, you must copy the certificate from the VPC S3 endpoint and add it to your ONTAP cluster, as shown in the next 4 steps.

3. Obtain the DNS name of the endpoint from the AWS Console.



4. Obtain the certificate from the VPC S3 endpoint. You do this by [logging into the VM that hosts the Cloud Manager Connector](#) and running the following command. When entering the DNS name of the endpoint, add “bucket” to the beginning, replacing the “*”:

```
[ec2-user@ip-10-160-4-68 ~]$ openssl s_client -connect bucket.vpce-0ff5c15df7e00fbab-yxs7lt8v.s3.us-west-2.vpce.amazonaws.com:443 -showcerts
```

5. From the output of this command, copy the data for the S3 certificate (all data between, and including, the BEGIN / END CERTIFICATE tags):

```
Certificate chain
0 s:/CN=s3.us-west-2.amazonaws.com`
  i:/C=US/O=Amazon/OU=Server CA 1B/CN=Amazon
-----BEGIN CERTIFICATE-----
MIIM6zCCC9OgAwIBAgIQA7MGJ4FaDBR8uL0KR3oltTANBgkqhkiG9w0BAQsFADBG
...
...
GqvboZ/oo2NWLLFCqI+xmKLCmiPrZy+/6Af+HH2MLCM4EsI2b+IpBmPkriWnnxo=
-----END CERTIFICATE-----
```

6. Log into the ONTAP cluster CLI and apply the certificate you copied using the following command (substitute your own storage VM name):

```
cluster1::> security certificate install -vserver cluster1 -type server-ca
Please enter Certificate: Press <Enter> when done
```

Enable 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 > Backup Volumes** next to the Backup & Restore service in the right-panel.

If the Amazon S3 destination for your backups exists as a working environment on the Canvas, you can drag the cluster onto the Amazon S3 working environment to initiate the setup wizard.



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 IAM 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](#)).



The screenshot shows a 'Provider Settings' form with two main sections: 'Provider Information' and 'Location & Connectivity'. Under 'Provider Information', there are three fields: 'AWS Account' (a dropdown menu showing 'AWS_Account_1'), 'AWS Access Key' (a text input field with placeholder text 'Enter AWS Access Key'), and 'AWS Secret Key' (a text input field with placeholder text 'Enter AWS Secret Key'). Under 'Location & Connectivity', there is a 'Region' dropdown menu showing 'us-east-2'. Below this, there is an 'Encryption' section with a header and an information icon. It shows 'Encryption Key Type: AWS SSE-S3' and a 'Change Key' link with a pencil icon.

4. If you don't have an existing Cloud Backup license for your account, you'll be prompted at this point to select the type of charging method that you want to use. You can subscribe to a pay-as-you-go (PAYGO) Cloud Manager Marketplace offering from AWS (or if you have multiple subscriptions you'll need to select one), or purchase and activate a Cloud Backup BYOL license from NetApp. [Learn how to set up Cloud Backup licensing](#).

5. 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](#).

Networking

IPspace

IP_Space_1

☒ Private Link Configuration

Select Private Link

	Name	VPC	Endpoint ID
<input type="radio"/>	Private_Link_Name_001	vpce0-012345678901234567890 (Default)	vpce0-012345678901234567890
<input type="radio"/>	Private_Link_Name_002	vpce0-012345678901234567890 (k8s)	vpce0-012345678901234567890

6. Enter the backup policy details that will be used for your default policy and click **Next**. You can select an existing policy, or you can create a new policy by entering your selections in each section:
 - a. Enter the name for the default policy. You don't need to change the name.
 - b. Define the backup schedule and choose the number of backups to retain. [See the list of existing policies you can choose.](#)
 - c. 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.](#)

Define Policy

This policy is applied to the volumes you select in the next step. You can apply different policies to volumes after activating backup.

i Cloud Backup will create the S3 bucket after you complete the wizard

Policy Type ☒ Create a new Policy ☐ Select an existing Policy

Name	Default_Policy_Name	⌵
Labels & Retention	30 Daily	⌵
Archival Policy	<p>Backups reside in S3 Standard storage for frequently accessed data. Optionally, you can tier backups to either S3 Glacier or S3 Glacier Deep Archive storage for further cost optimization.</p> <p><input checked="" type="checkbox"/> Tier Backups to Archive</p> <p>Archive After (Days) <input type="text" value="30"/> Storage Class <input type="text" value="S3 Glacier"/></p>	

7. 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).

Select Volumes						
57 Volumes						
<input checked="" type="checkbox"/>	Volume Name	Volume Type	SVM Name	Used Capacity	Allocated Capacity	Backup Status
<input checked="" type="checkbox"/>	Volume_Name_1 On	RW	SVM_Name_1	0.25 TB	10 TB	Not Active
<input checked="" type="checkbox"/>	Volume_Name_2 On	RW	SVM_Name_1	0.25 TB	10 TB	Not Active
<input checked="" type="checkbox"/>	Volume_Name_3 On	RW	SVM_Name_1	0.25 TB	10 TB	Not Active
<input checked="" type="checkbox"/>	Volume_Name_4 On	DP	SVM_Name_2	0.25 TB	10 TB	Not Active
<input checked="" type="checkbox"/>	Volume_Name_5 On	RW	SVM_Name_1	0.25 TB	10 TB	Not Active
<input checked="" type="checkbox"/> Automatically back up future volumes on all storage VMs with the selected backup policy						

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.

8. 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.

Note that "on-premises ONTAP systems" includes FAS, AFF, and ONTAP Select 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

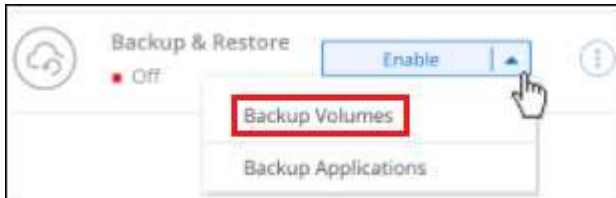
- You have discovered the on-premises cluster and added it to a working environment in Cloud Manager. See [Discovering ONTAP clusters](#) for details.
 - The cluster is running ONTAP 9.7P5 or later.
 - The cluster has a SnapMirror license — it is included as part of the Premium Bundle or Data Protection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

- The cluster must have the required network connections to 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 > Backup Volumes** 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.

Networking

IPspace
 IP_Space_1

☒ Private Endpoint Configuration

VNet
 Select VNet

Subnet
 Select Subnet

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, monthly, or yearly 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.

Define Policy

This policy is applied to the volumes you select in the next step. You can apply different policies to volumes after activating backup.

i Cloud Backup will create the Storage account after you complete the wizard

Policy Type ☒ Create a new Policy ☐ Select an existing Policy

Name	Default_Policy_Name	▼
Labels & Retention	30 Daily	▼
Archival Policy	Backups reside in Cool Azure Blob storage for frequently accessed data. Optionally, you can tier backups to Azure Archive storage for further cost optimization.	
	<input checked="" type="checkbox"/> Tier Backups to Archive	
	Archive After (Days) <input type="text" value="30"/>	Access Tier <input type="text" value="Azure Archive"/>

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.

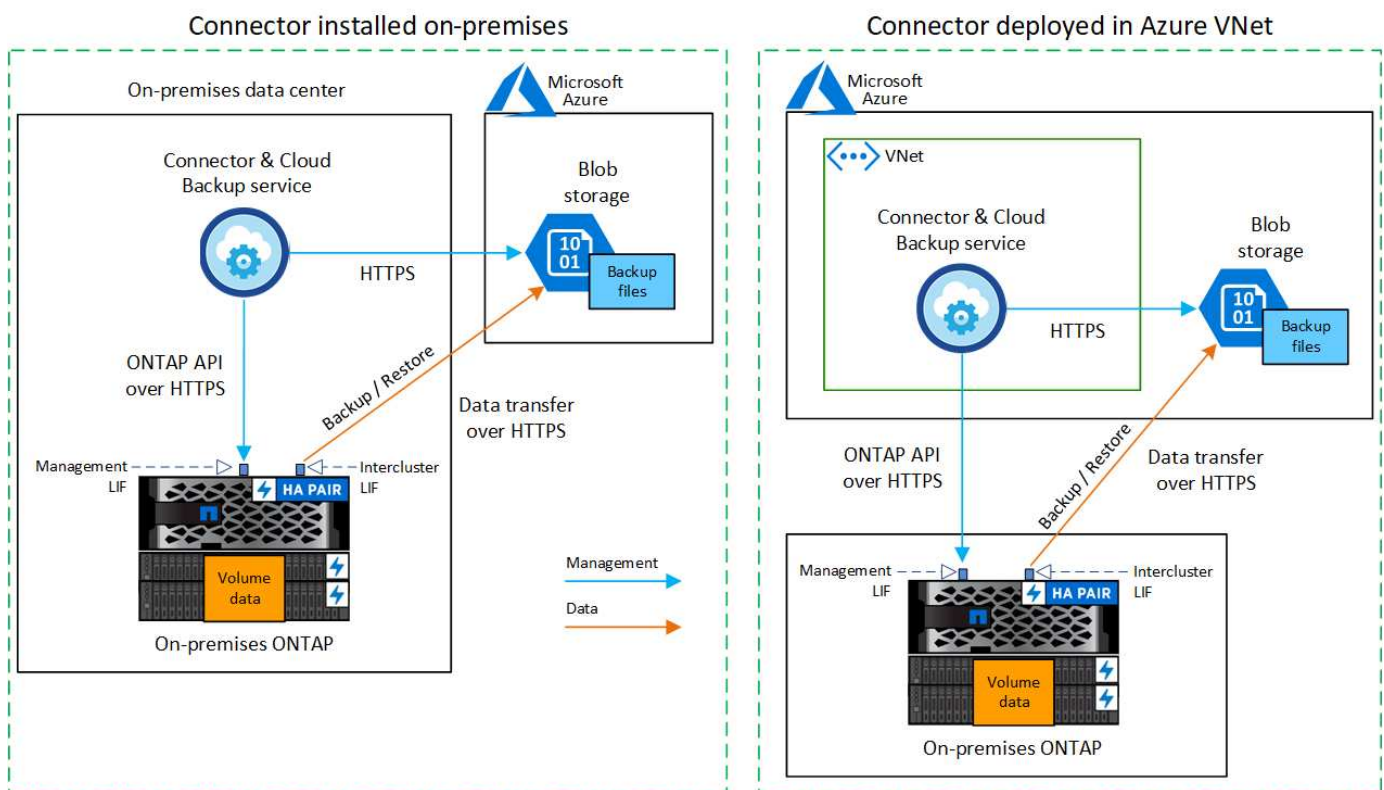
Requirements

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

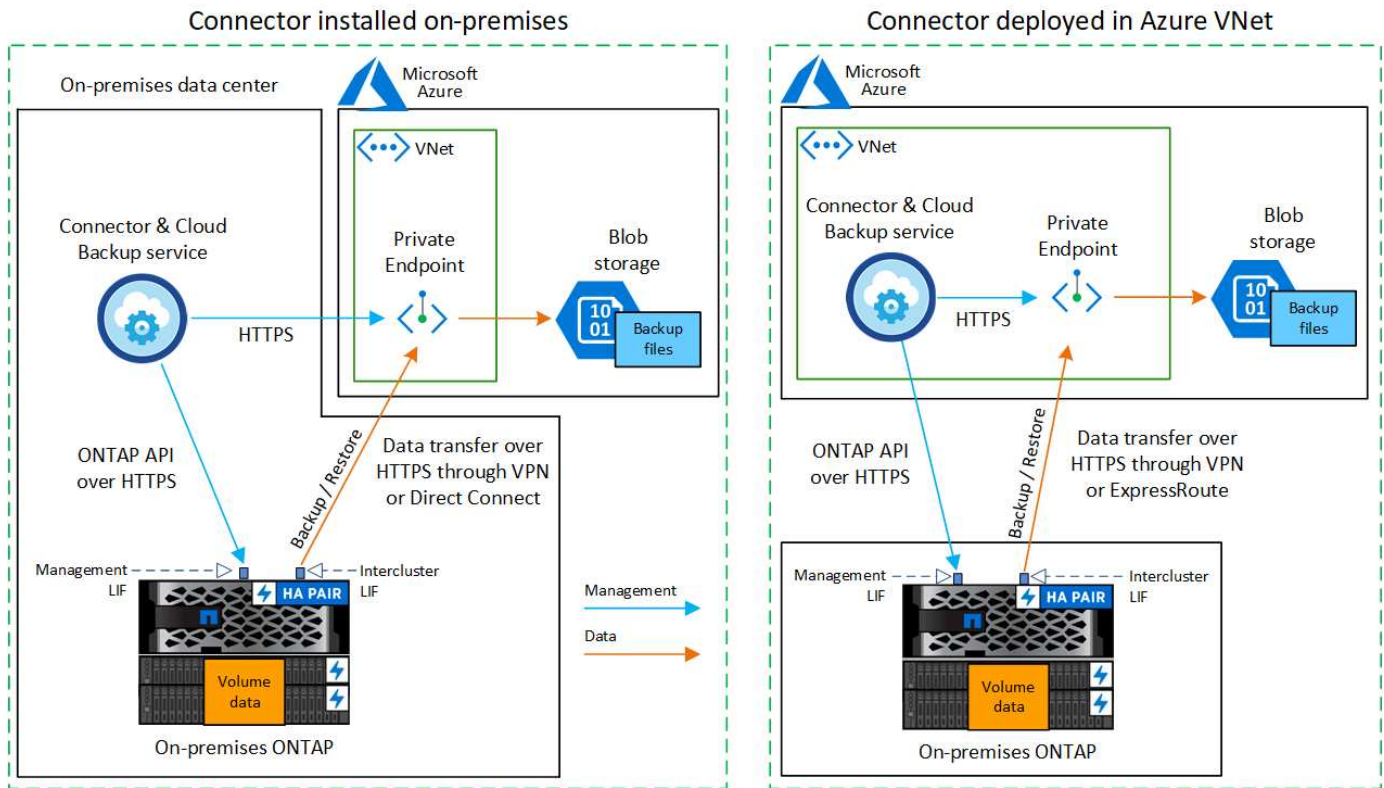
There are two connection methods you can use when configuring backups from on-premises ONTAP systems to Azure Blob.

- Public connection - Directly connect the ONTAP system to Azure Blob storage using a public Azure endpoint.
- Private connection - Use a VPN or ExpressRoute and route traffic through a VNet Private Endpoint that uses a private IP address.

The following diagram shows the **public connection** method and the connections that you need to prepare between the components. You can use a Connector that you've installed on your premises, or a Connector that you've deployed in the Azure VNet.



The following diagram shows the **private connection** method and the connections that you need to prepare between the components. You can use a Connector that you've installed on your premises, or a Connector that you've deployed in the Azure VNet.



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

- Minimum of ONTAP 9.7P5; ONTAP 9.8P11 and later is recommended.
- 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 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

If you already have a Connector deployed in your Azure VNet or on your premises, then you're all set. If not, then you'll need to create a Connector in either of those locations to back up ONTAP data to Azure Blob storage. You can't use a Connector that's deployed in another cloud provider.

- [Learn about Connectors](#)
- [Getting started with Connectors](#)
- [Installing a Connector in Azure](#)
- [Installing a Connector in your premises](#)

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 cluster management LIF
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 (a **private** connection).

Supported regions

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

Verify license requirements

- Before you can activate Cloud Backup for your cluster, you'll need to either 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 your 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 use Cloud Backup. Billing for Cloud Backup is done through this subscription.
- For Cloud Backup BYOL licensing, 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](#).
- You need to have an Azure subscription for the object storage space where your backups will be located.

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

Preparing Azure Blob storage for backups

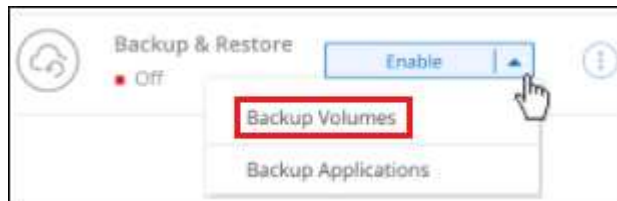
1. You can use your own custom-managed keys for data encryption in the activation wizard instead of using the default Microsoft-managed encryption keys. In this case you will need to have the Azure Subscription, Key Vault name, and the Key. [See how to use your own keys](#).
2. If you want to have a 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 > Backup Volumes** 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](#)).

Provider Settings

Azure Subscription: Azure_Subscription_1

Region: Default_CM_Region

Resource Group: ☐ Create a new ☒ Use an existing
Select an Existing Resource Group: Resource_Group_1

Encryption: ☒ Microsoft-managed ☐ Customer-managed

4. If you don't have an existing Cloud Backup license for your account, you'll be prompted at this point to select the type of charging method that you want to use. You can subscribe to a pay-as-you-go (PAYGO) Cloud Manager Marketplace offering from Azure (or if you have multiple subscriptions you'll need to select one), or purchase and activate a Cloud Backup BYOL license from NetApp. [Learn how to set up Cloud Backup licensing.](#)
5. 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.](#)

Networking

IPspace: IP_Space_1

☐ Private Endpoint Configuration

VNet: Select VNet

Subnet: Select Subnet

6. Enter the backup policy details that will be used for your default policy and click **Next**. You can select an existing policy, or you can create a new policy by entering your selections in each section:
 - a. Enter the name for the default policy. You don't need to change the name.
 - b. Define the backup schedule and choose the number of backups to retain. [See the list of existing policies you can choose.](#)
 - c. 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.](#)

Define Policy

This policy is applied to the volumes you select in the next step. You can apply different policies to volumes after activating backup.

(i) Cloud Backup will create the Storage account after you complete the wizard

Policy Type ☒ Create a new Policy ☐ Select an existing Policy

Name	Default_Policy_Name	⌵
Labels & Retention	30 Daily	⌵
Archival Policy	<p>Backups reside in Cool Azure Blob storage for frequently accessed data. Optionally, you can tier backups to Azure Archive storage for further cost optimization.</p> <p><input checked="" type="checkbox"/> Tier Backups to Archive</p> <div style="display: flex; justify-content: space-between;"> <div> <p>Archive After (Days)</p> <input type="text" value="30"/> </div> <div> <p>Access Tier</p> <div style="border: 1px solid #ccc; padding: 2px;"> Azure Archive </div> </div> </div>	

7. 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).

Select Volumes

57 Volumes 🔍

<input checked="" type="checkbox"/>	Volume Name	Volume Type	SVM Name	Used Capacity	Allocated Capacity	Backup Status
<input checked="" type="checkbox"/>	Volume_Name_1 <small>On</small>	RW	SVM_Name_1	0.25 TB	10 TB	⊖ Not Active
<input checked="" type="checkbox"/>	Volume_Name_2 <small>On</small>	RW	SVM_Name_1	0.25 TB	10 TB	⊖ Not Active
<input checked="" type="checkbox"/>	Volume_Name_3 <small>On</small>	RW	SVM_Name_1	0.25 TB	10 TB	⊖ Not Active
<input checked="" type="checkbox"/>	Volume_Name_4 <small>On</small>	DP	SVM_Name_2	0.25 TB	10 TB	⊖ Not Active
<input checked="" type="checkbox"/>	Volume_Name_5 <small>On</small>	RW	SVM_Name_1	0.25 TB	10 TB	⊖ Not Active
<input checked="" type="checkbox"/> Automatically back up future volumes on all storage VMs with the selected backup policy ⓘ						

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.

8. 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.

Note that "on-premises ONTAP systems" includes FAS, AFF, and ONTAP Select 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 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 > Backup Volumes** 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, monthly, or yearly 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.

Define Policy

This policy is applied to the volumes you select in the next step. You can apply different policies to volumes after activating backup.

(i) Cloud Backup will create the Google Cloud Storage bucket after you complete the wizard

Policy Type ☒ Create a new Policy ☐ Select an existing Policy

Name	Default_Policy_Name	▼
Labels & Retention	30 Daily	▼

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.

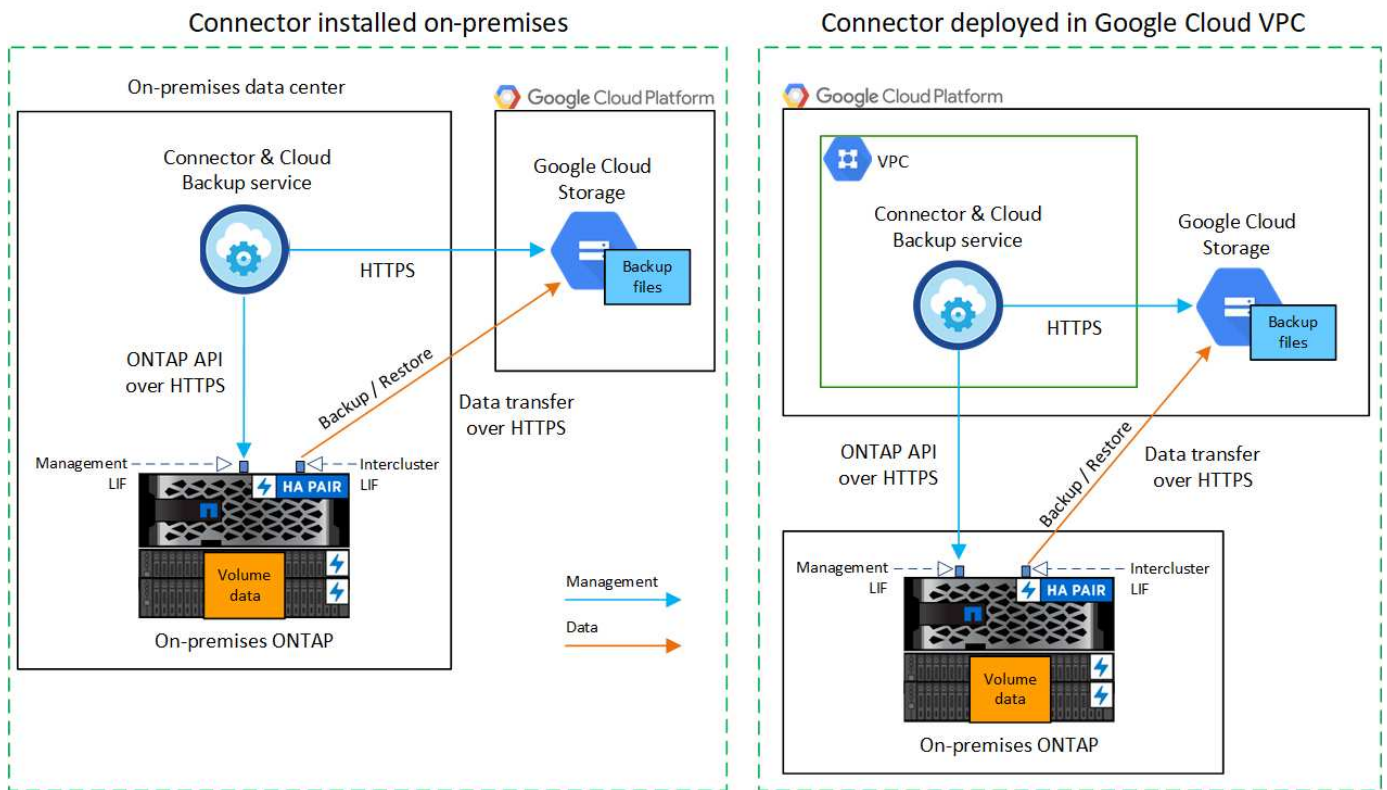
Requirements

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

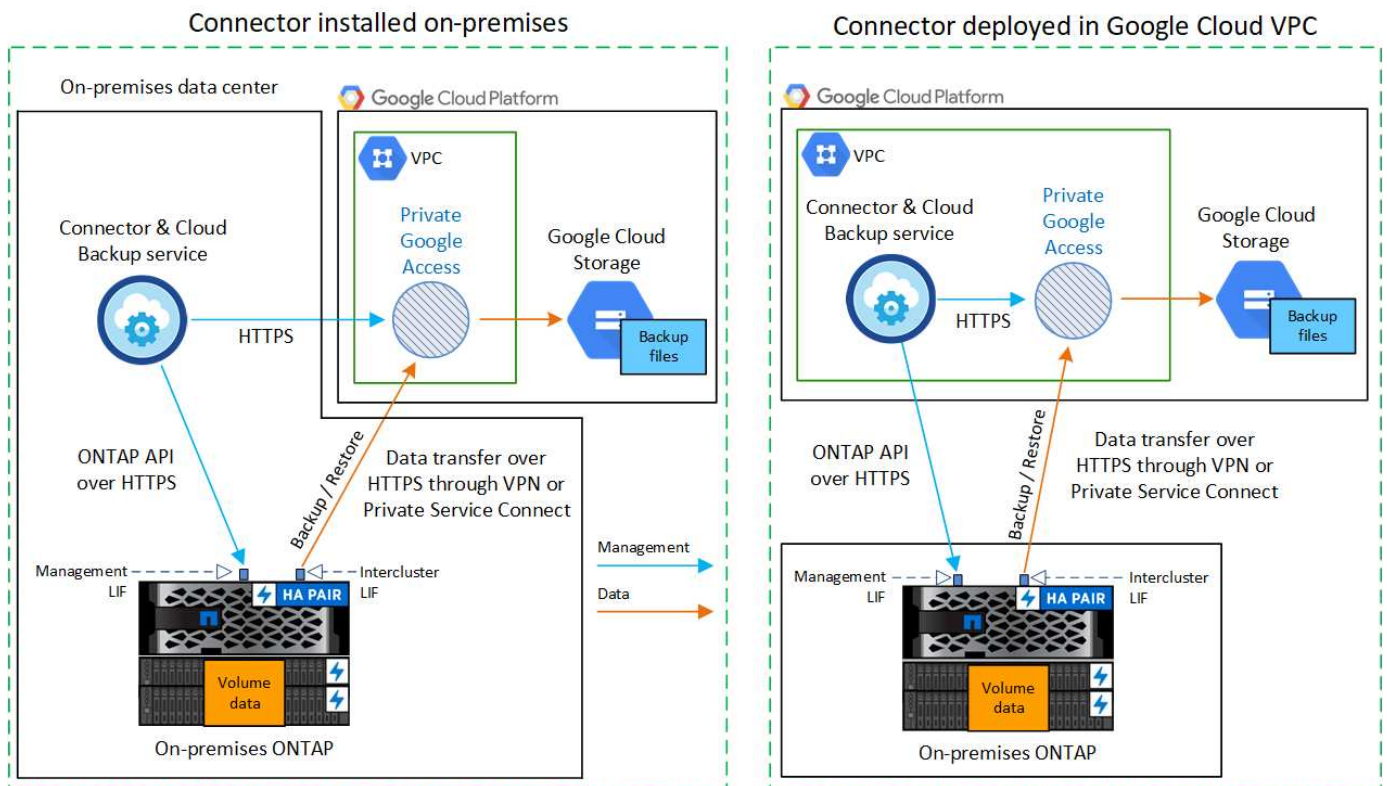
There are two connection methods you can use when configuring backups from on-premises ONTAP systems to Google Cloud Storage.

- Public connection - Directly connect the ONTAP system to Google Cloud Storage using a public Google endpoint.
- Private connection - Use a VPN or Private Service Connect and route traffic through a Private Google Access interface that uses a private IP address.

The following diagram shows the **public connection** method and the connections that you need to prepare between the components. You can use a Connector that you've installed on your premises, or a Connector that you've deployed in the Google Cloud Platform VPC.



The following diagram shows the **private connection** method and the connections that you need to prepare between the components. You can use a Connector that you've installed on your premises, or a Connector that you've deployed in the Google Cloud Platform VPC.



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

- Minimum of ONTAP 9.7P5; ONTAP 9.8P11 and later is recommended.
- 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 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

If you already have a Connector deployed in your Google Cloud Platform VPC or on your premises, then you're all set. If not, then you'll need to create a Connector in either of those locations to back up ONTAP data to Google Cloud storage. You can't use a Connector that's deployed in another cloud provider.

- [Learn about Connectors](#)

- [Getting started with Connectors](#)
- [Installing a Connector in GCP](#)
- [Installing a Connector in your premises](#)

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 cluster management LIF
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 (a **private** connection).

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

Verify or add permissions to the Connector

To use the Cloud Backup Search & Restore functionality, you need to have specific permissions in the role for the Connector so that it can access the Google Cloud BigQuery service. See the permissions below, and follow the steps if you need to modify the policy.

Steps

1. In [Cloud Console](#), go to the **Roles** page.
2. Using the drop-down list at the top of the page, select the project or organization that contains the role that you want to edit.
3. Click a custom role.
4. Click **Edit Role** to update the role's permissions.
5. Click **Add Permissions** to add the following new permissions to the role.

```
bigquery.jobs.get
bigquery.jobs.list
bigquery.jobs.listAll
bigquery.datasets.create
bigquery.datasets.get
bigquery.jobs.create
bigquery.tables.get
bigquery.tables.getData
bigquery.tables.list
bigquery.tables.create
```


6. Click **Update** to save the edited role.

Verify license requirements

- Before you can activate Cloud Backup for your cluster, you'll need to either 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 your 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 use Cloud Backup. Billing for Cloud Backup is done through this subscription.
 - For Cloud Backup BYOL licensing, 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](#).
- You need to have a Google subscription for the object storage space where your backups will be located.

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 backups will be stored when you set up the service.

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 > Backup Volumes** 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.

The screenshot shows the 'Provider Settings' form, which is divided into two main sections: 'Provider Information' and 'Location & Connectivity'. Under 'Provider Information', there are three fields: 'Google Cloud Project' (a dropdown menu showing 'Cloud Manager Default Project'), 'Google Cloud Access Key' (a text input field with placeholder text 'Enter Google Cloud Access Key'), and 'Google Cloud Secret Key' (a text input field with placeholder text 'Enter Google Cloud Secret Key'). Under 'Location & Connectivity', there are two fields: 'Region' (a dropdown menu showing 'Cloud Manager Default Region') and 'IPspace' (a dropdown menu showing 'IP_Space_1').

4. If you don't have an existing Cloud Backup license for your account, you'll be prompted at this point to select the type of charging method that you want to use. You can subscribe to a pay-as-you-go (PAYGO) Cloud Manager Marketplace offering from Google (or if you have multiple subscriptions you'll need to select one), or purchase and activate a Cloud Backup BYOL license from NetApp. [Learn how to set up Cloud Backup licensing](#).
5. Enter the backup policy details that will be used for your default policy and click **Next**. You can select an existing policy, or you can create a new policy by entering your selections in each section:
 - a. Enter the name for the default policy. You don't need to change the name.
 - b. Define the backup schedule and choose the number of backups to retain. [See the list of existing policies you can choose](#).

The screenshot shows the 'Define Policy' form. At the top, it says 'Define Policy' in blue. Below that, a message states: 'This policy is applied to the volumes you select in the next step. You can apply different policies to volumes after activating backup.' There is an information icon and a note: 'Cloud Backup will create the Google Cloud Storage bucket after you complete the wizard'. Below this, there is a 'Policy Type' section with two radio buttons: 'Create a new Policy' (which is selected) and 'Select an existing Policy'. Below the radio buttons, there are two rows of input fields. The first row has a 'Name' field and a 'Default_Policy_Name' field, both with dropdown arrows. The second row has a 'Labels & Retention' field and a '30 Daily' field, both with dropdown arrows.

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).

Select Volumes						
57 Volumes						
<input checked="" type="checkbox"/>	Volume Name	Volume Type	SVM Name	Used Capacity	Allocated Capacity	Backup Status
<input checked="" type="checkbox"/>	Volume_Name_1 On	RW	SVM_Name_1	0.25 TB	10 TB	Not Active
<input checked="" type="checkbox"/>	Volume_Name_2 On	RW	SVM_Name_1	0.25 TB	10 TB	Not Active
<input checked="" type="checkbox"/>	Volume_Name_3 On	RW	SVM_Name_1	0.25 TB	10 TB	Not Active
<input checked="" type="checkbox"/>	Volume_Name_4 On	DP	SVM_Name_2	0.25 TB	10 TB	Not Active
<input checked="" type="checkbox"/>	Volume_Name_5 On	RW	SVM_Name_1	0.25 TB	10 TB	Not Active
<input checked="" type="checkbox"/> Automatically back up future volumes on all storage VMs with the selected backup policy ⓘ						

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 volumes or files 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.

Note that "on-premises ONTAP systems" includes FAS, AFF, and ONTAP Select 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

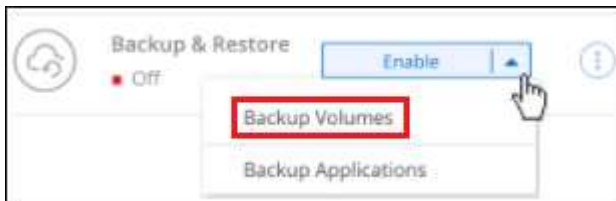
- You have discovered the on-premises cluster and added it to a working environment in Cloud Manager. See [Discovering ONTAP clusters](#) for details.

- 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.
 - The Connector can be installed in a site with or without internet access.
 - 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 > Backup Volumes** 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.

Provider Settings

Provider Information

Storage Server

Access Key

Secret Key

Connectivity

IPspace

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, monthly, or yearly 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.

Define Policy

This policy is applied to the volumes you select in the next step. You can apply different policies to volumes after activating backup.

Policy Type

☒ Create a new Policy
 ☐ Select an existing Policy

Name	Default_Policy_Name	▼
Labels & Retention	30 Daily	▼

5

Select the volumes that you want to back up

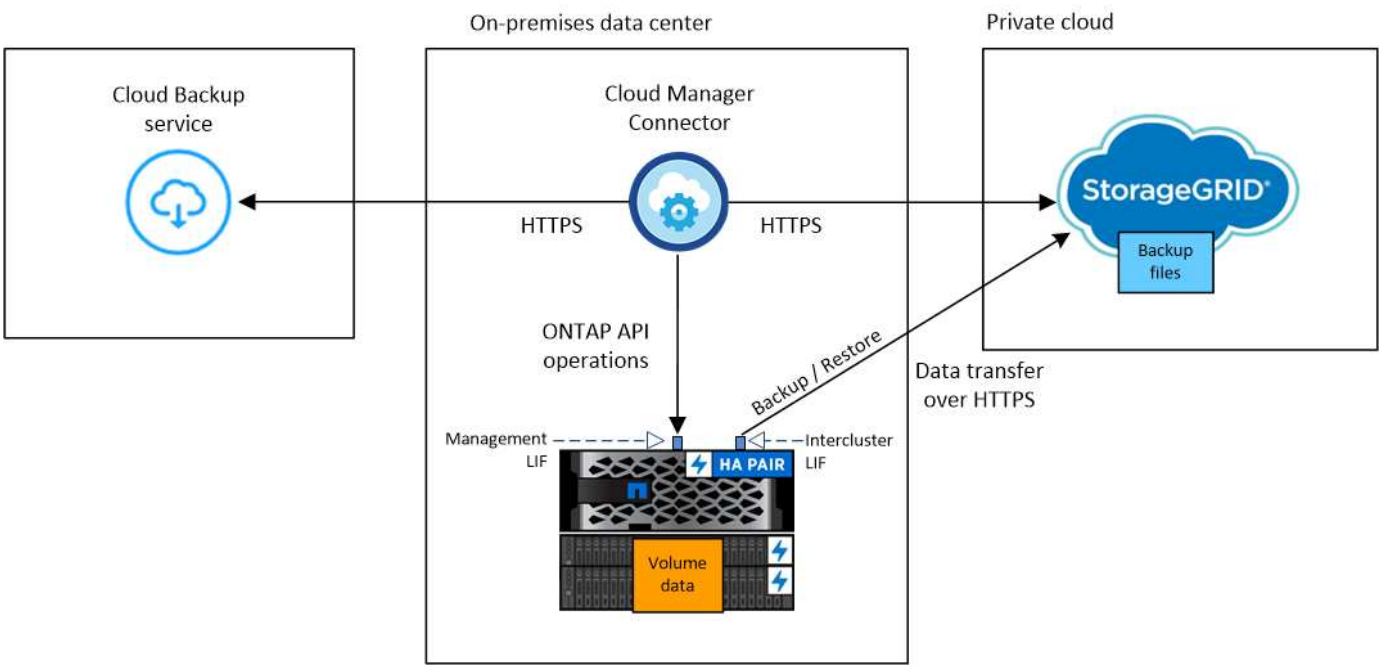
Identify which volumes you want to back up using the default backup policy in the Select Volumes page. If you want to assign different backup policies to certain volumes, you can create additional policies and apply them to volumes later.

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:



When the Connector and on-premises ONTAP system are installed in an on-prem location without internet access, the StorageGRID system must be located in the same on-prem data center.

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

- Minimum of ONTAP 9.7P5; ONTAP 9.8P11 and later is recommended.
- 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 the StorageGRID Gateway Node 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 (not required when the Connector is installed in a "dark" site).
- 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 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. The Connector can be installed in a site with or without internet access.

- [Learn about Connectors](#)
- [Installing the Connector on a Linux host with internet access](#)
- [Installing the Connector on a Linux host without internet access](#)
- [Switching between Connectors](#)



Cloud Backup functionality is built into the Cloud Manager Connector. When installed in a site with no internet connectivity, you'll need to update the Connector software periodically to get access to new features. Check the [Cloud Backup What's New](#) to see the new features in each Cloud Backup release, and then you can follow the steps to [upgrade the Connector software](#) when you want to use new features.

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 the StorageGRID Gateway Node
 - An HTTPS connection over port 443 to your ONTAP cluster management LIF
 - An outbound internet connection over port 443 to Cloud Backup (not required when the Connector is installed in a "dark" site)

License requirements

Before you can activate Cloud Backup for your cluster, you'll 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.](#)



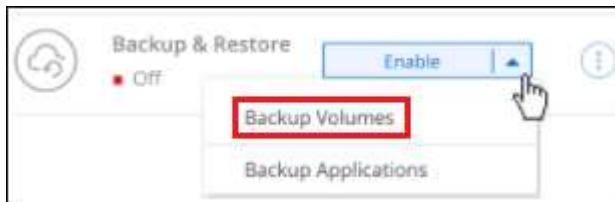
PAYGO licensing is not supported when backing up files to StorageGRID.

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 > Backup Volumes** 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 Gateway Node 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 (not required when the Connector is installed in a "dark" site).

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. Enter the backup policy details that will be used for your default policy and click **Next**. You can select an existing policy, or you can create a new policy by entering your selections in each section:
 - a. Enter the name for the default policy. You don't need to change the name.
 - b. Define the backup schedule and choose the number of backups to retain. [See the list of existing policies you can choose.](#)

Define Policy

This policy is applied to the volumes you select in the next step. You can apply different policies to volumes after activating backup.

Policy Type

☒ Create a new Policy
 ☐ Select an existing Policy

Name

Default_Policy_Name ▼

Labels & Retention

30 Daily ▼

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).

Select Volumes

57 Volumes 🔍

<input checked="" type="checkbox"/>	Volume Name	Volume Type	SVM Name	Used Capacity	Allocated Capacity	Backup Status
<input checked="" type="checkbox"/>	Volume_Name_1 <small>On</small>	RW	SVM_Name_1	0.25 TB	10 TB	⊖ Not Active
<input checked="" type="checkbox"/>	Volume_Name_2 <small>On</small>	RW	SVM_Name_1	0.25 TB	10 TB	⊖ Not Active
<input checked="" type="checkbox"/>	Volume_Name_3 <small>On</small>	RW	SVM_Name_1	0.25 TB	10 TB	⊖ Not Active
<input checked="" type="checkbox"/>	Volume_Name_4 <small>On</small>	DP	SVM_Name_2	0.25 TB	10 TB	⊖ Not Active
<input checked="" type="checkbox"/>	Volume_Name_5 <small>On</small>	RW	SVM_Name_1	0.25 TB	10 TB	⊖ Not Active

☒ Automatically back up future volumes on all storage VMs with the selected backup policy ⓘ

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 or individual files from a backup file](#) to an on-premises ONTAP system.

Managing backups for your ONTAP systems

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



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. From the Cloud Manager left navigation menu, click **Backup & Restore**.
2. Click the **Volumes** tab to view the list of volumes for Cloud Volumes ONTAP and on-premises ONTAP systems.

The screenshot shows the 'Backup & Restore' dashboard with the 'Volumes' tab selected. At the top, there's a navigation bar with tabs: Backup & Restore, Volumes, Restore, Applications, Virtual Machines, Kubernetes, and Job Monitoring. Below the navigation bar, there's a dropdown menu for 'All Working Environments'. The main content area displays summary statistics: 1 Working Environment, 57 Protected Volumes, and 15.1 TB Total Backups Size. To the right, there's a 'Protected Volumes Status' section showing 57 Healthy Backup Volumes and 0 Failed Backup Volumes. Below this, there's a table titled '57 Backups' with columns: Source Working Environment, Source Volume, Source SVM, Last Backup, Backups, and Backup Status. The table lists three entries for 'CVO_AWS' with 'On' status, each showing 'May 22 2019, 00:00:00' as the last backup, '2,050 Backups', and 'Active' status. A search filter icon is visible in the top right corner of the table area.

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.

Enabling and disabling backups of volumes

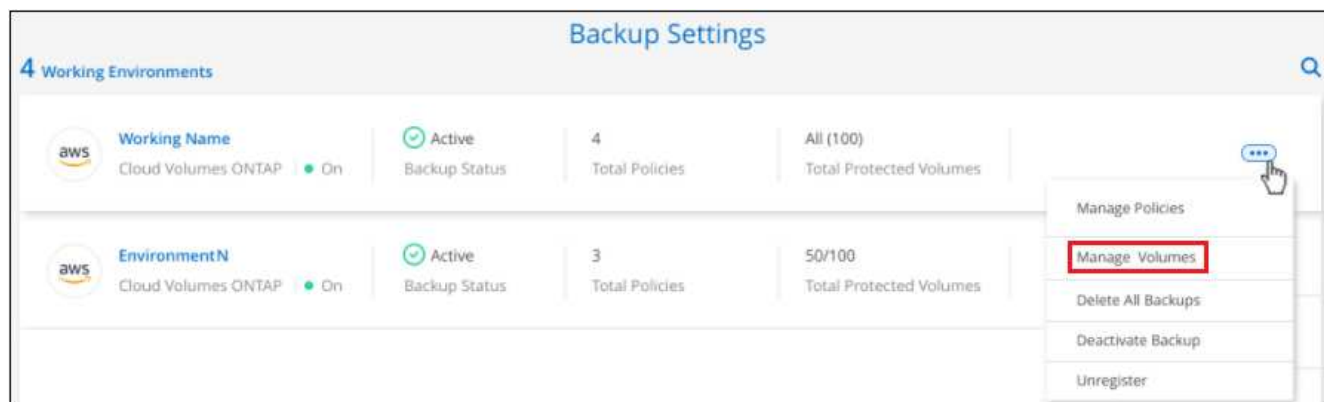
You can stop backing up a volume if you do not need backup copies of that volume and you do not want to pay for the cost to store the backups. You can also add a new volume to the backup list if it is not currently being backed up.

Steps

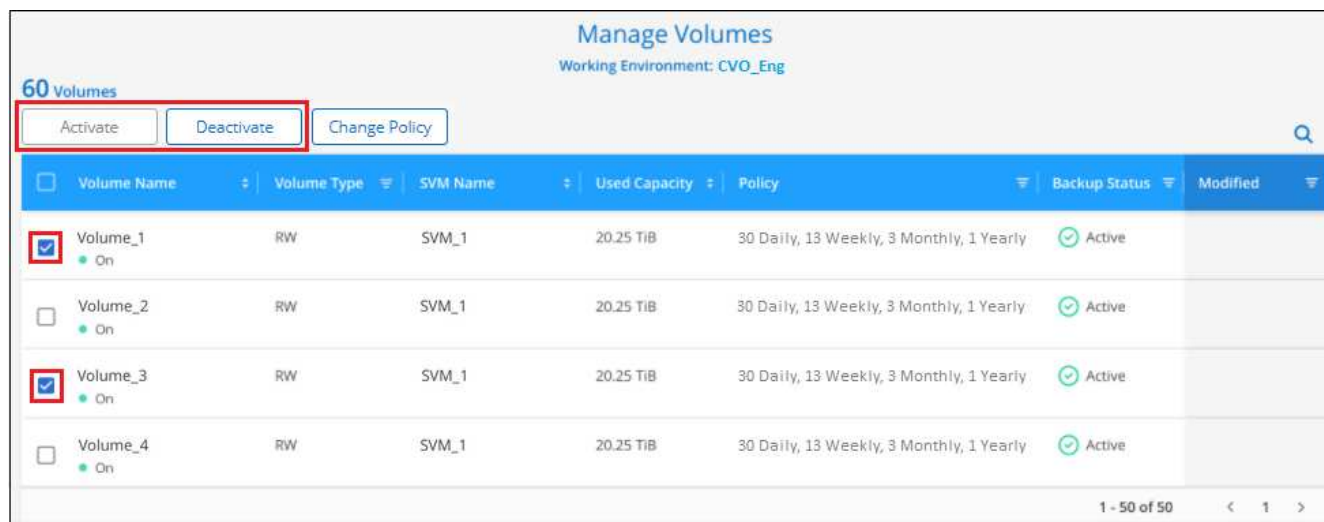
1. From the **Volumes** tab, select **Backup Settings**.



- From the *Backup Settings* page, click ... for the working environment and select **Manage Volumes**.



- 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.



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

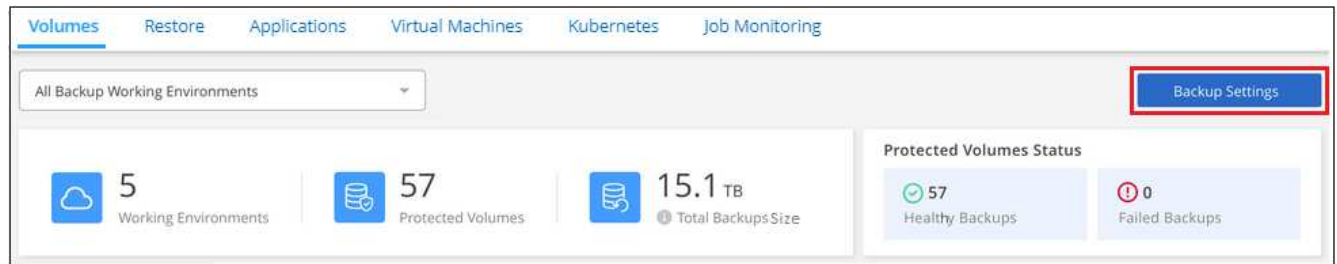
Note: When stopping a volume from being backed up you'll continue to be charged by your cloud provider for object storage costs for the capacity that the backups use unless you [delete the backups](#).

Editing an existing backup policy

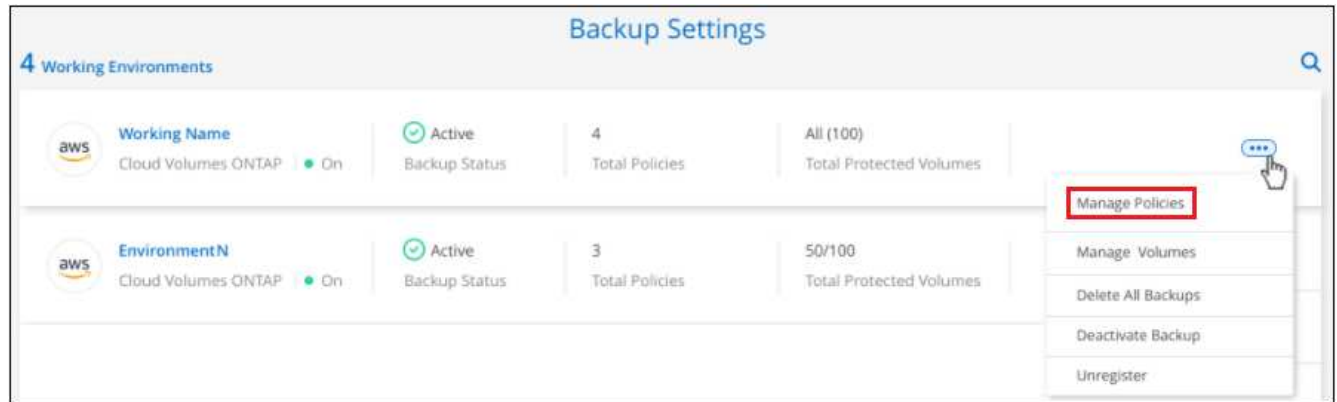
You can change the attributes for a backup policy that is currently applied to volumes in a working environment. Changing the backup policy affects all existing volumes that are using the policy.

Steps

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



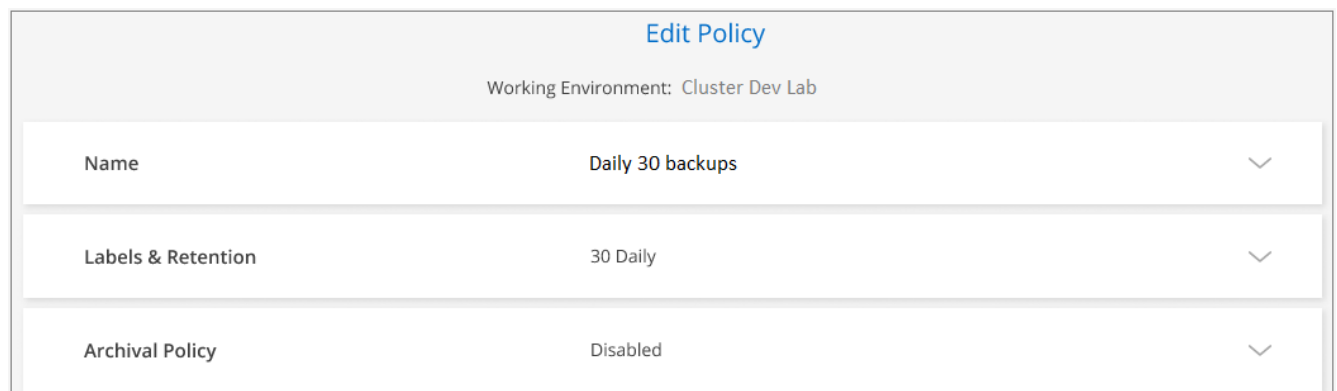
2. From the *Backup Settings* page, click ... for the working environment where you want to change the settings, and select **Manage Policies**.



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, 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 AWS archival storage.](#)

[Learn more about using Azure 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.

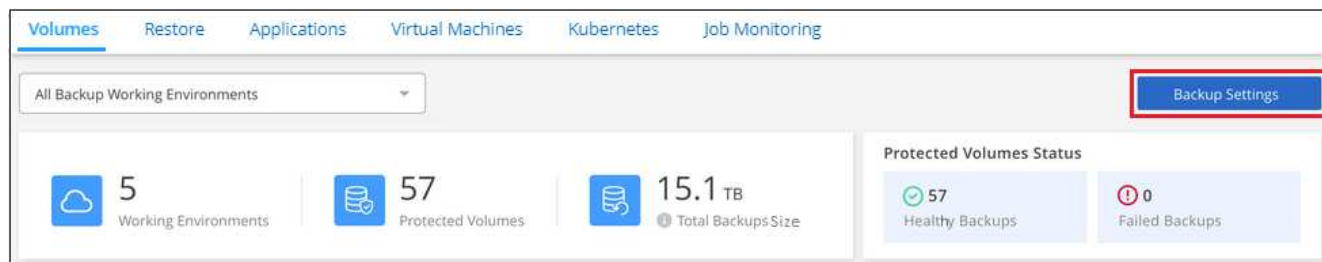
Adding a new backup policy

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.

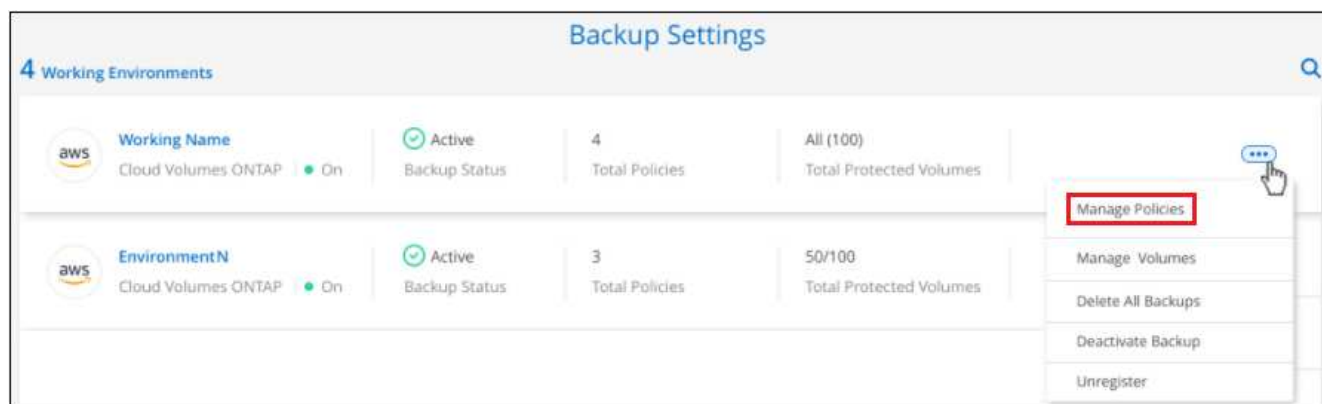
If you want to apply a new backup policy to certain volumes in a working environment, you first need to add the backup policy to the working environment. Then you can [apply the policy to volumes in that working environment](#).

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**.

Manage Policies

Working Environment: Working Name

Add New Policy

<p>7 Daily, 50 Weekly, 12 Monthly</p> <p>Policy</p>	<p>Active (Archive after 30 Days)</p> <p>Archival Policy</p>	<p>S3 Glacier</p> <p>Storage Class</p>	<p>100</p> <p>Associated Volumes</p>	
<p>NetApp 3 Months Retention</p> <p>Policy</p>	<p>Not Active</p> <p>Archival Policy</p>	<p>S3 Glacier</p> <p>Storage Class</p>	<p>0</p> <p>Associated Volumes</p>	

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

Add New Policy

Working Environment: Working Name

Policy - Retention & Schedule

☐ Hourly
 Number of backups to retain

☒ Daily
 Number of backups to retain

☐ Weekly
 Number of backups to retain

☐ Monthly
 Number of backups to retain

If your cluster is running ONTAP 9.10.1 or greater, 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 AWS archival storage.](#)

[Learn more about using Azure archival storage.](#)

Archival Policy

Backups reside in Cool Azure Blob storage for frequently accessed data. Optionally, you can tier backups to Azure Archive storage for further cost optimization.

Azure

☒ Tier Backups to Archival

Archive after (Days)

Access Tier

Archival Policy

Backups reside in S3 Standard storage for frequently accessed data. Optionally, you can tier backups to either S3 Glacier or S3 Glacier Deep Archive storage for further cost optimization.

AWS

☒ Tier Backups to Archival

Archive after (Days)

Storage Class

S3 Glacier

S3 Glacier Deep Archive

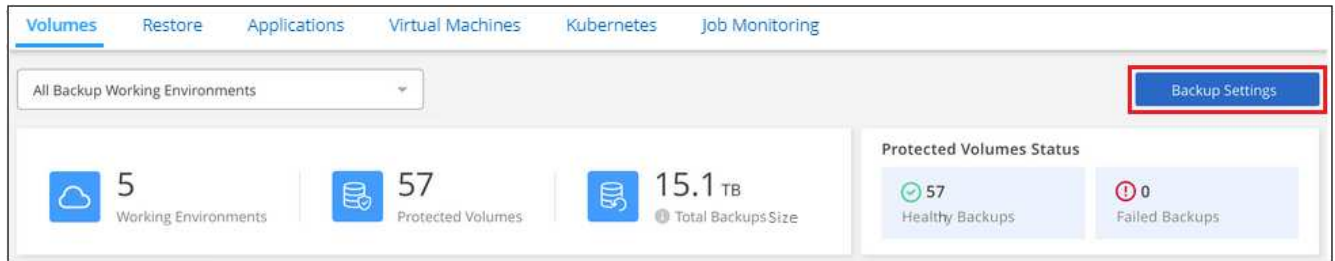
Changing the policy assigned to existing volumes

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.

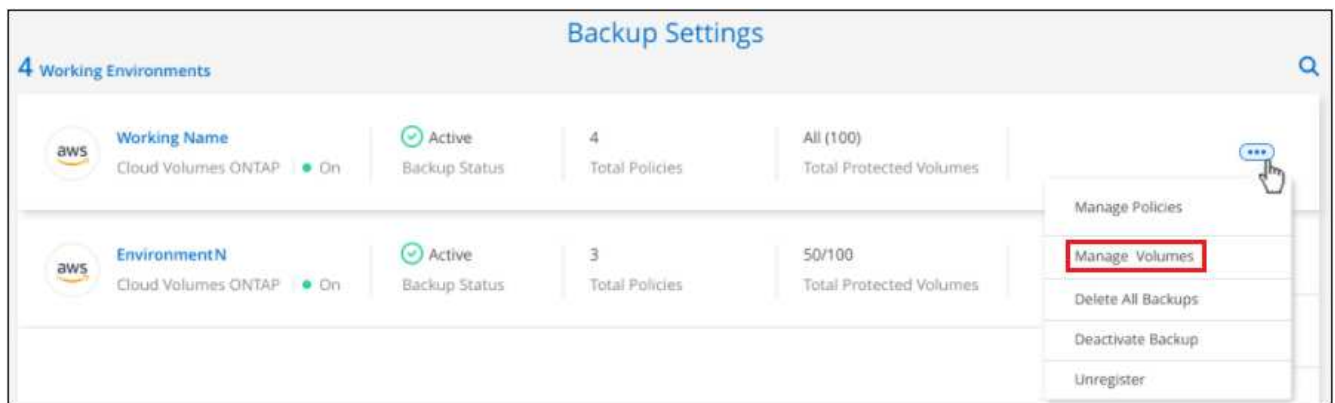
Note that the policy that you want to apply to the volumes must already exist. [See how to add a new backup policy for a working environment.](#)

Steps

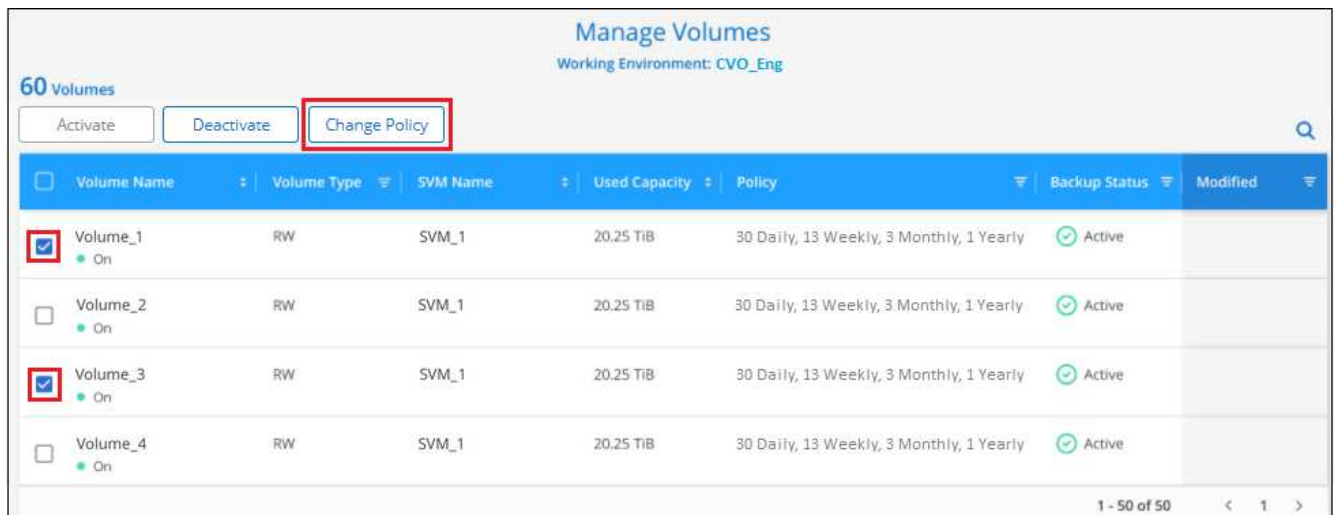
1. From the **Volumes** tab, select **Backup Settings**.



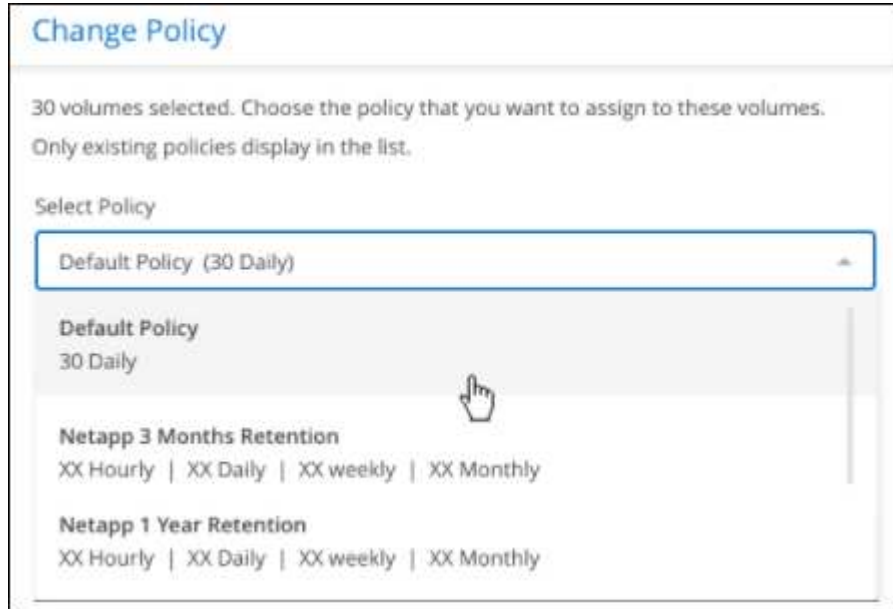
2. From the *Backup Settings* page, click ... for the working environment where the volumes exist, and select **Manage Volumes**.



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.

Setting a backup policy to be assigned to new volumes

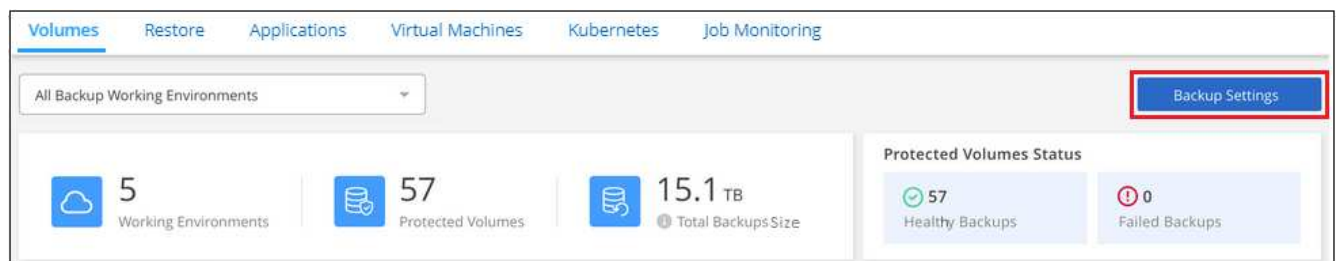
If you did not select the option to automatically assign a backup policy to newly created volumes when you first activated Cloud Backup on your ONTAP cluster, you can choose this option in the *Backup Settings* page later. Having a backup policy assigned to newly created volumes ensures that all your data is protected.

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](#).

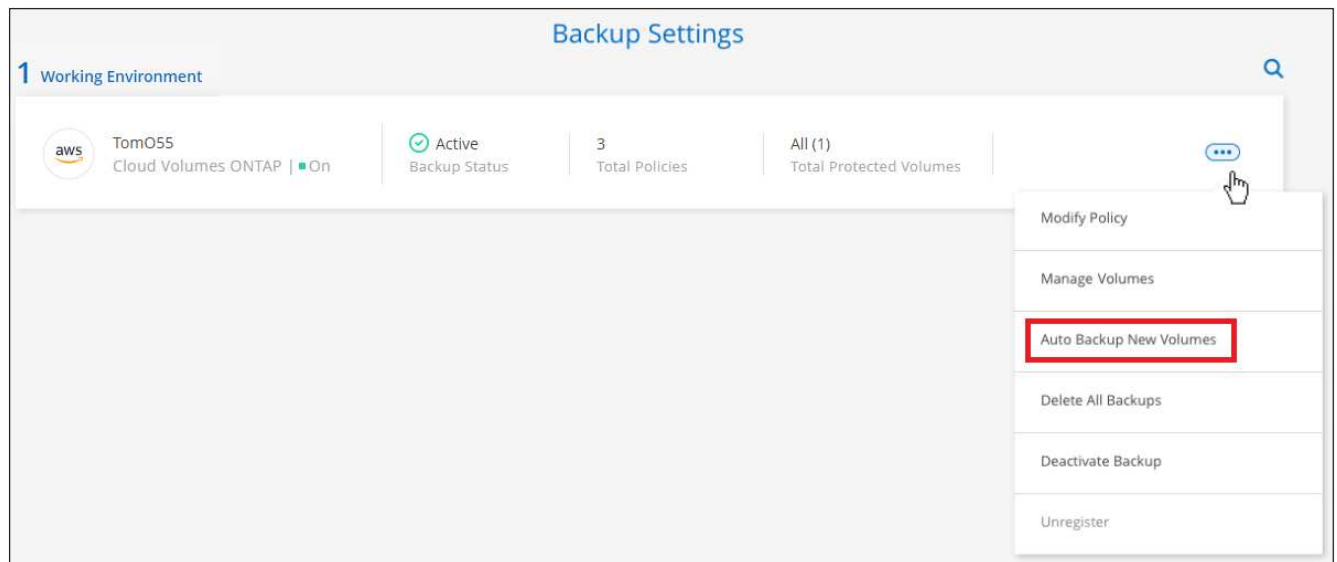
You can also disable this setting so that newly created volumes do not get backed up automatically. In that case you'll need to manually enable backups for any specific volumes that you do want to back up in the future.

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 **Auto Backup New Volumes**.



3. Select the checkbox "Automatically back up new volumes...", choose the backup policy that you want to apply to new volumes, and click **Save**.

Auto Backup New Volumes

☒ Automatically back up new volumes on all SVMs for Working Environment TomO55

Choose the policy that will be assigned to new volumes. Only existing policies are shown in the list.

Select Backup Policy

CloudBackupService-1611307085985_V2 (30 Daily)

Save

Cancel

Result

Now this backup policy will be applied to any new volume created in this working environment using Cloud Manager, System Manager, or the ONTAP CLI.

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.

Note that when creating an ad-hoc backup, a Snapshot is created on the source volume. Since this Snapshot is not part of a normal Snapshot schedule, it will not rotate off. You may want to manually delete this Snapshot from the source volume once the backup is complete. This will allow blocks related to this Snapshot to be freed up. The name of the Snapshot will begin with `cbs-snapshot-adhoc-`. [See how to delete a Snapshot using the ONTAP CLI.](#)



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

Steps

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

The screenshot displays the 'Volumes' tab in a backup management console. At the top, there are tabs for 'Volumes', 'Restore', 'Applications', 'Virtual Machines', 'Kubernetes', and 'Job Monitoring'. Below these, a dropdown menu shows 'All Backup Working Environments'. A summary section shows '1 Working Environments', '57 Protected Volumes', and '15.1 TB Total Backup Capacity'. To the right, a 'Protected Volumes Status' box shows '57 Healthy Backup Volumes' and '0 Failed Backup Volumes'. Below this, a table lists 57 backups. The table has columns: Source Working Environment, Source Volume, Source SVM, Last Backup, Backups, and Backup Status. The first row is selected, and a dropdown menu is open, showing 'Details & Backup List', 'Backup Now' (highlighted with a red box), and 'Pause Backups'. The 'Backup Status' column for the first row shows 'Active'.

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, click **...** for the source volume and select **Details & Backup List**.

Cloud Backup interface showing backup status and details.

Navigation: Volumes | Restore | Applications | Virtual Machines | Kubernetes | Job Monitoring

Dropdown: All Backup Working Environments

Backup Settings

Summary:

- 1 Working Environments
- 57 Protected Volumes
- 15.1 TB Total Backup Capacity

Protected Volumes Status:

- 57 Healthy Backup Volumes
- 0 Failed Backup Volumes

57 Backups

Source Working Environment	Source Volume	Source SVM	Last Backup	Backups	Backup Status	
CVO_AWS On	Volume_1 On	SVM_1	May 22 2019, 00:00:00	2,050 Backups	Active	...
CVO_AWS On	Volume_2 On	SVM_1	May 22 2019, 00:00:00	2,050 Backups		Details & Backup List Backup Now Pause Backups
CVO_AWS On	Volume_3 On	SVM_1	May 22 2019, 00:00:00	2,050 Backups		

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

Cloud Backup interface showing backup details.

Source:

- Working Environment: Working Environment N...
- Type: Cloud Volumes ONTAP (HA)
- Provider: AWS
- Volume: Volume Name
- SVM: SVM Name

Destination:

- Cloud Provider: AWS
- Region: us-east-1
- Bucket: netapp-backup
- Account ID: 012345678901234567890

Backup Information:

- Relationship Status: Active
- Last Backup: Oct 05 2021, 2:41:33 pm
- Lag Duration: 14 days 3 hours, 38 mi...
- Backups: 2,050
- Backup Policy: Netapp7YearsRetention

2,050 Backups

Select Timeframe [Calendar Icon] Actions

Backup Name	Date	Size	
Backup_2020_Jan	May 22 2019, 00:00:00	19,001	...
Backup_2020_Mar	May 22 2019, 00:00:00	19,002	...
Backup_2020_Apr	May 22 2019, 00:00:00	19,009	...

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. 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.



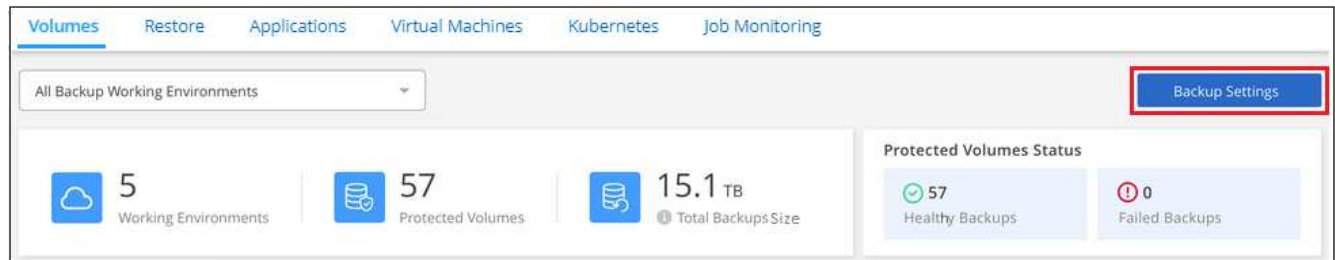
If you plan to delete a working environment or cluster that has backups, you must delete the backups **before** deleting the system. Cloud Backup doesn't automatically delete backups when you delete a system, and there is no current support in the UI to delete the backups after the system has been deleted.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

Deleting all backup files for a working environment

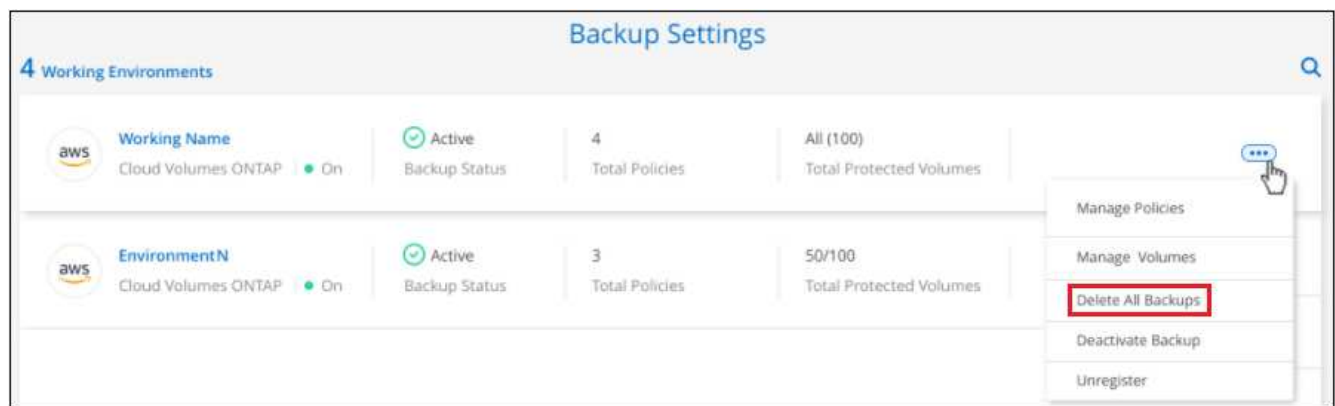
Deleting all backups for a working environment does not disable future backups of volumes in this working environment. If you want to stop creating backups of all volumes in a working environment, you can deactivate backups [as described here](#).

Steps

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



2. Click ... for the working environment 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, click ... for the source volume and select **Details & Backup List**.

The screenshot shows the NetApp Cloud Manager interface. At the top, there are tabs for Volumes, Restore, Applications, Virtual Machines, Kubernetes, and Job Monitoring. Below the tabs, there's a dropdown menu for "All Backup Working Environments" and a "Backup Settings" button. The main dashboard displays three metrics: 1 Working Environment, 57 Protected Volumes, and 15.1 TB Total Backup Capacity. To the right, a "Protected Volumes Status" section shows 57 Healthy Backup Volumes and 0 Failed Backup Volumes. Below this, a section titled "57 Backups" contains a table with columns: Source Working Environment, Source Volume, Source SVM, Last Backup, Backups, and Backup Status. The table lists three backup entries for CVO_AWS. A context menu is open for the first entry, showing options: "Details & Backup List" (highlighted with a red box), "Backup Now", and "Pause Backups".

The list of all backup files is displayed.

The screenshot shows the NetApp Cloud Manager interface with backup details. It is divided into three main sections: Source, Destination, and Backup Information. The Source section shows Working Environment (Working Environment N...), Type (Cloud Volumes ONTAP (HA)), Provider (AWS), Volume (Volume Name), and SVM (SVM Name). The Destination section shows Cloud Provider (AWS), Region (us-east-1), Bucket (netapp-backup), and Account ID (012345678901234567890). The Backup Information section shows Relationship Status (Active), Last Backup (Oct 05 2021, 2:41:33 pm), Lag Duration (14 days 3 hours, 38 mi...), Backups (2,050), and Backup Policy (Netapp7YearsRetention). Below these sections, a section titled "2,050 Backups" contains a table with columns: Backup Name, Date, and Size. The table lists three backup entries: Backup_2020_Jan, Backup_2020_Mar, and Backup_2020_Apr. An "Actions" button is visible in the top right of the backup list section.

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

The screenshot shows the NetApp Cloud Manager interface with the backup list. The "Actions" button is clicked, and a dropdown menu is displayed. The menu contains two options: "Delete All Backups" (highlighted with a red box and a mouse cursor) and "Download Backup Report". The backup list table is visible in the background, showing Backup Name, Date, and Size columns.

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, click **...** for the source volume and select **Details & Backup List**.

Source Working Environment	Source Volume	Source SVM	Last Backup	Backups	Backup Status
CVO_AWS	Volume_1	SVM_1	May 22 2019, 00:00:00	2,050 Backups	Active
CVO_AWS	Volume_2	SVM_1	May 22 2019, 00:00:00	2,050 Backups	Active
CVO_AWS	Volume_3	SVM_1	May 22 2019, 00:00:00	2,050 Backups	Active

The list of all backup files is displayed.

Backup Name	Date	Size
Backup_2020_Jan	May 22 2019, 00:00:00	19,001
Backup_2020_Mar	May 22 2019, 00:00:00	19,002
Backup_2020_Apr	May 22 2019, 00:00:00	19,009

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



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

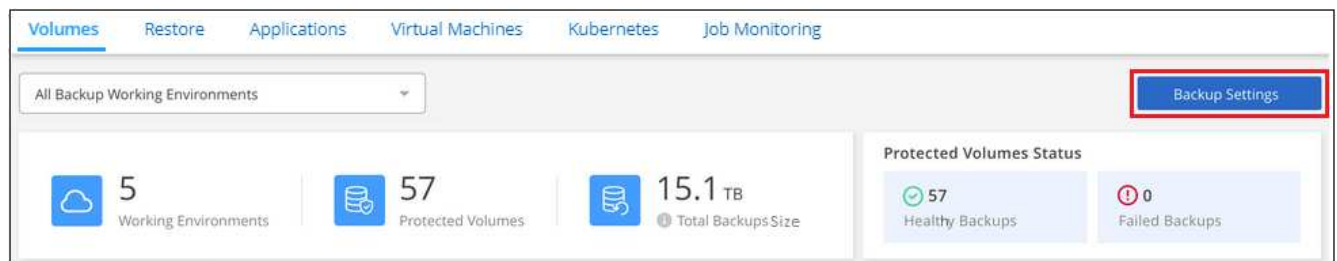
Disabling Cloud Backup for a working environment

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.

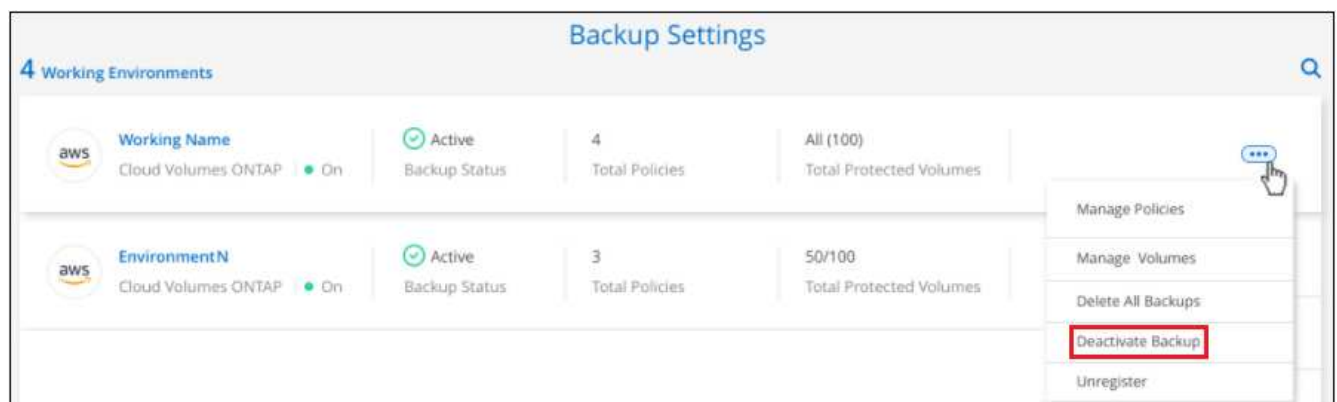
Note that you'll continue to be charged by your cloud provider for object storage costs for the capacity that your backups use unless you [delete the backups](#).

Steps

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



2. From the *Backup Settings* page, click ... for the working environment 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, 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.

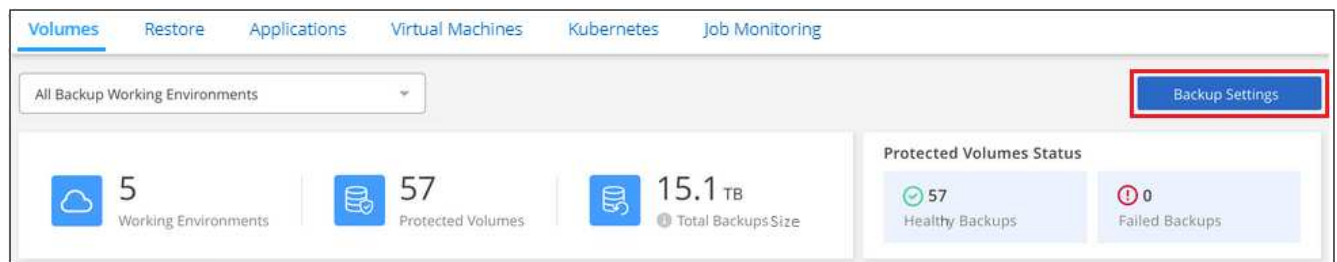
Before you can unregister Cloud Backup, you must perform the following steps, in this order:

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

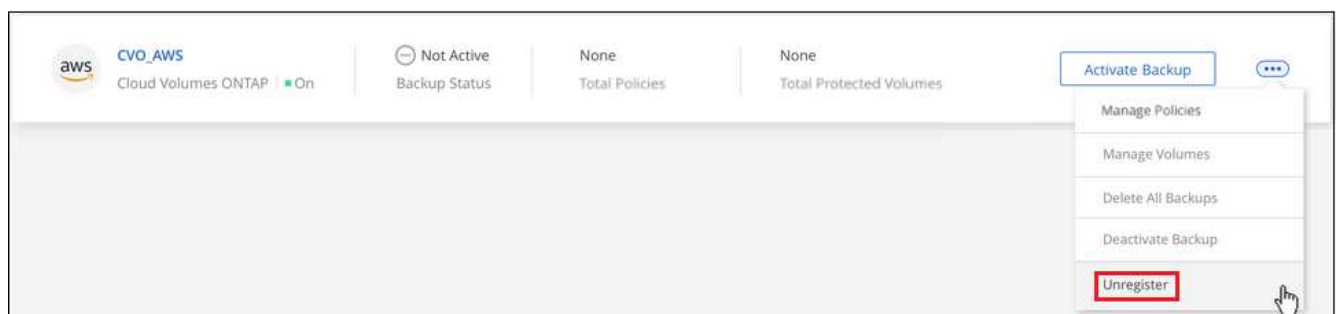
The unregister option is not available until these two actions are complete.

Steps

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



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



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

Restoring ONTAP 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 ONTAP volume from a backup file,


or if you only need to restore a few files, you can restore individual files from a backup file.

You can restore a **volume** (as a new volume) to the original working environment, to a different working environment that's using the same cloud account, or to an on-premises ONTAP system.

You can restore **files** to a volume in the original 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.

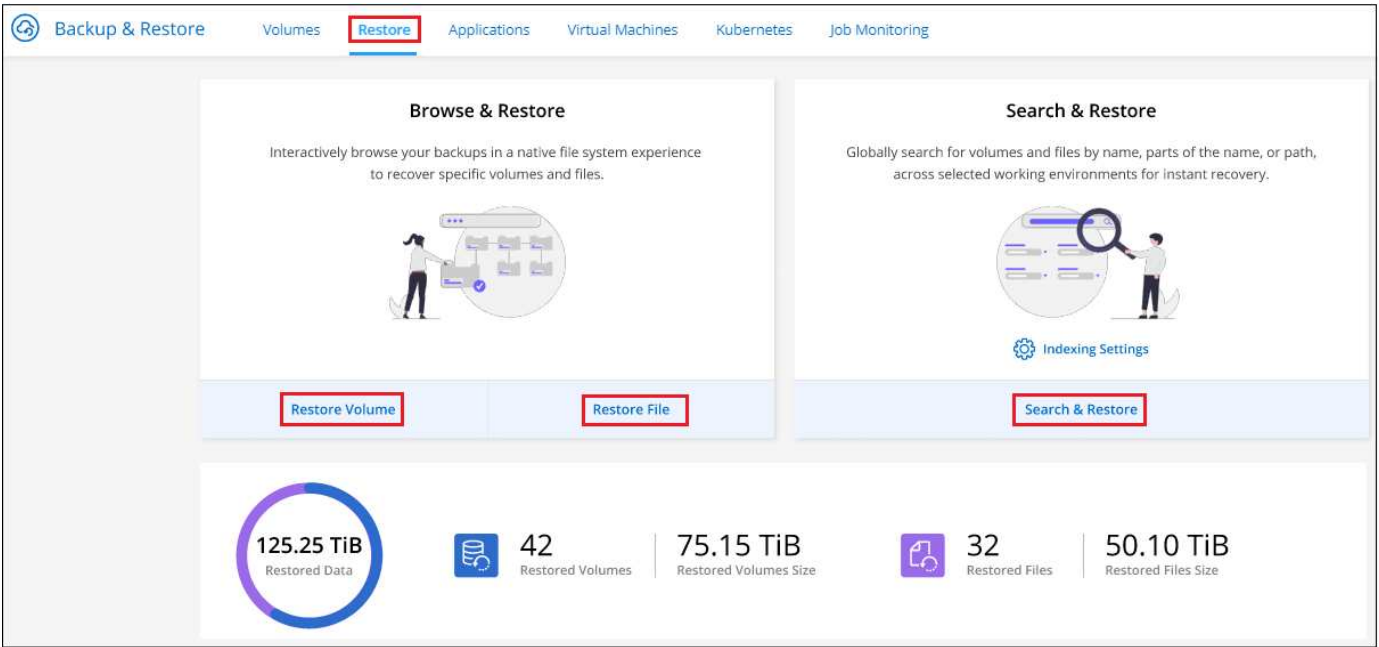
A valid Cloud Backup license is required to restore data from backup files to a production system.

The Restore Dashboard

You use the Restore Dashboard to perform volume and file restore operations. You access the Restore Dashboard by clicking **Backup & Restore** from the Cloud Manager left navigation menu, and then clicking the **Restore** tab. You can also click  > **View Restore Dashboard** from the Backup & Restore service from the Services panel.



Cloud Backup must already be activated for at least one working environment and initial backup files must exist.



As you can see, the Restore Dashboard provides 2 different ways to restore data from backup files: **Browse & Restore** and **Search & Restore**.

Comparing Browse & Restore and Search & Restore

In broad terms, *Browse & Restore* is typically better when you need to restore a specific volume or file from the last week or month — and you know the name and location of the file, and the date when it was last in good shape. *Search & Restore* is typically better when you need to restore a volume or file, but you don't remember the exact name, or the volume in which it resides, or the date when it was last in good shape.

This table provides a comparison of the 2 methods.

Browse & Restore	Search & Restore
Browse through a folder-style structure to find the volume or file within a single backup file	Search for a volume or file across all backup files by partial or full volume name, partial or full file name, size range, and additional search filters
Volume and file restore works with backup files stored in Amazon S3, Azure Blob, Google Cloud, and NetApp StorageGRID.	Volume and file restore works with backup files stored in Amazon S3 and Google Cloud
Restore volumes and files from StorageGRID in sites with no internet access	Not supported in dark sites
Does not handle files that have been renamed or deleted	Handles newly created/deleted/renamed directories and newly created/deleted/renamed files
Browse for results across public and private clouds	Browse for results across public clouds and local Snapshots copies
No additional cloud provider resources required	Additional bucket and public cloud provider resources required per account
No additional cloud provider costs required	Cost associated with public cloud provider resources when scanning your backups and volumes for search results

Before you can use either restore method, make sure you have configured your environment for the unique resource requirements. Those requirements are described in the sections below.

See the requirements and restore steps for the type of restore operation you want to use:

- [Restore volumes using Browse & Restore](#)
- [Restore files using Browse & Restore](#)
- [Restore volumes and files using Search & Restore](#)

Restoring ONTAP data using Browse & Restore

Before you start restoring a volume or file, you should know the name of the volume or file you want to restore, the name of the working environment where the volume resides, and the approximate date of the backup file that you want to restore from.

Note: If the backup file for the volume that you want to restore resides in archival storage (starting with ONTAP 9.10.1), the restore operation will take a longer amount of time and will incur a cost. Additionally, the destination cluster must also be running ONTAP 9.10.1 or greater.

[Learn more about restoring from AWS archival storage.](#)
[Learn more about restoring from Azure archival storage.](#)

Browse & Restore supported working environments and object storage providers

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

Backup File Location	Destination Working Environment	
	Volume Restore	File Restore

Backup File Location	Destination Working Environment	
Amazon S3	Cloud Volumes ONTAP in AWS On-premises ONTAP system	Cloud Volumes ONTAP in AWS On-premises ONTAP system
Azure Blob	Cloud Volumes ONTAP in Azure On-premises ONTAP system	Cloud Volumes ONTAP in Azure On-premises ONTAP system
Google Cloud Storage	Cloud Volumes ONTAP in Google On-premises ONTAP system	Cloud Volumes ONTAP in Google (¹) On-premises ONTAP system (¹)
NetApp StorageGRID	On-premises ONTAP system	On-premises ONTAP system

(¹) The Connector must be deployed in your Google Cloud Platform VPC for this support.

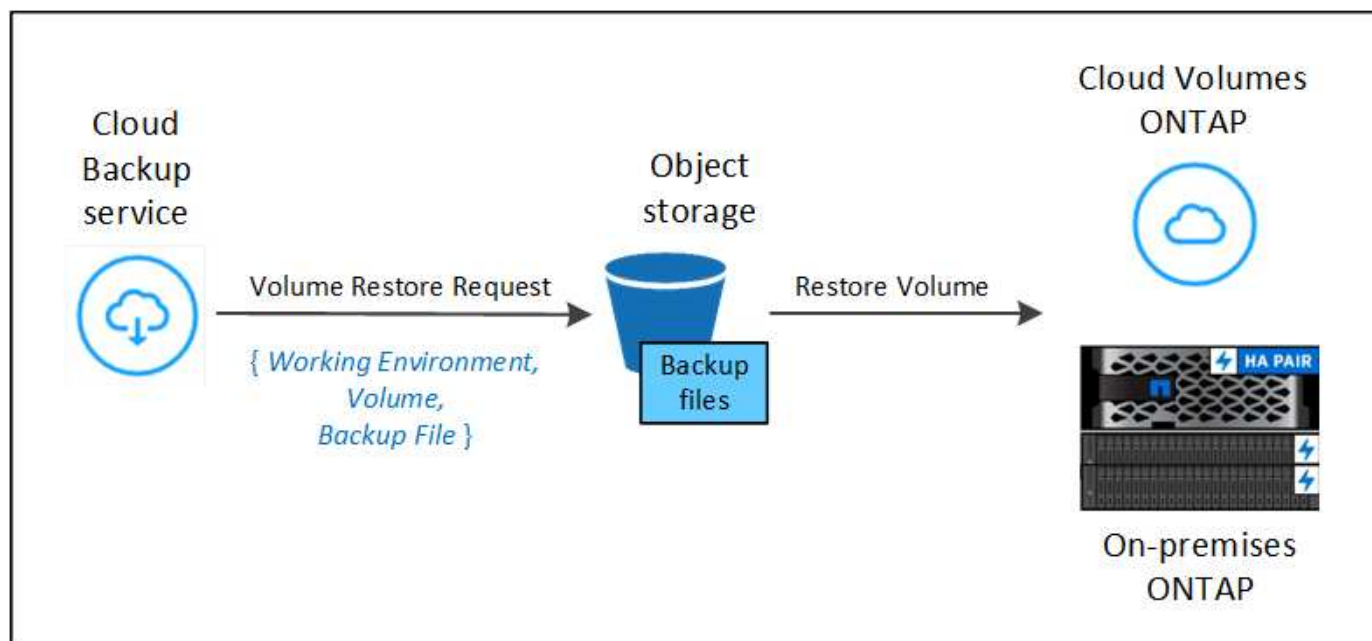
Note that references to "on-premises ONTAP systems" includes FAS, AFF, and ONTAP Select systems.



If the backup file resides in archival storage, only volume restore is supported. File restore is not currently supported from archival storage when using Browse & Restore.

Restoring volumes using Browse & Restore

When you restore a volume from a backup file, Cloud Backup creates a *new* volume using the data from the backup. You can restore the data to a volume in the original 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.



As you can see, you need to know the working environment name, volume name, and backup file date to perform a volume restore.

The following video shows a quick walkthrough of restoring a volume:

Cloud Backup Service: Restore Demo

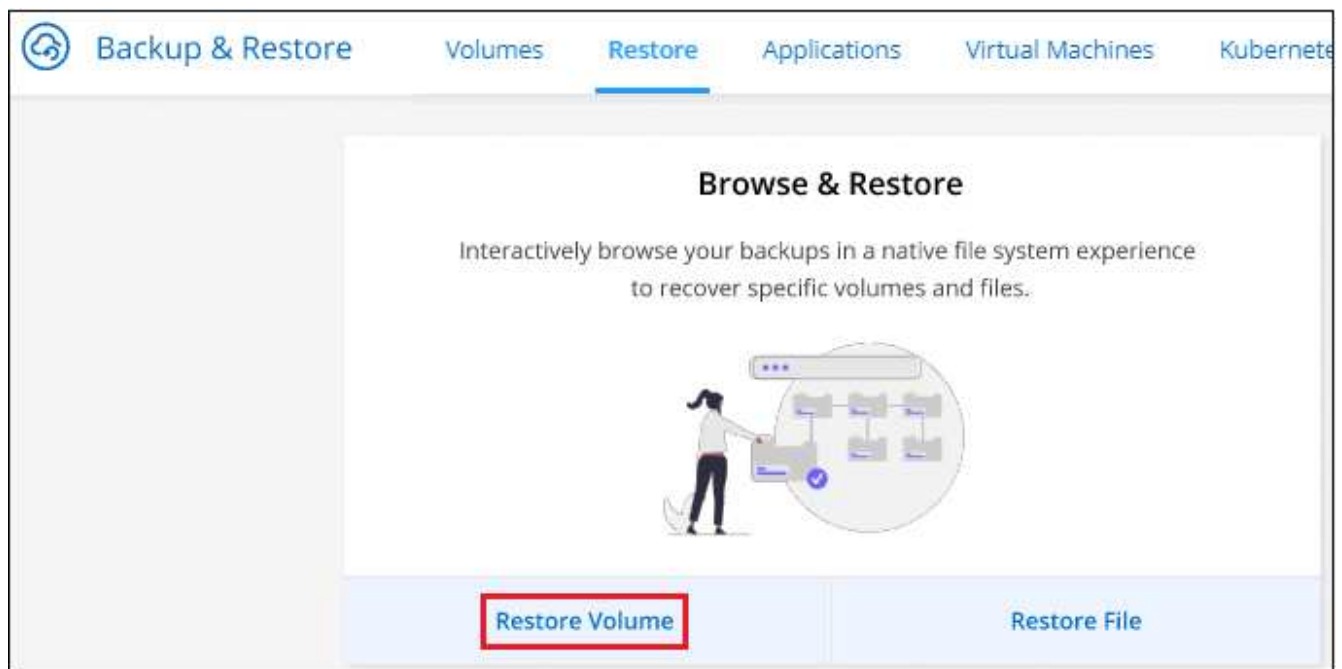
Powered by Cloud Manager

January 2022

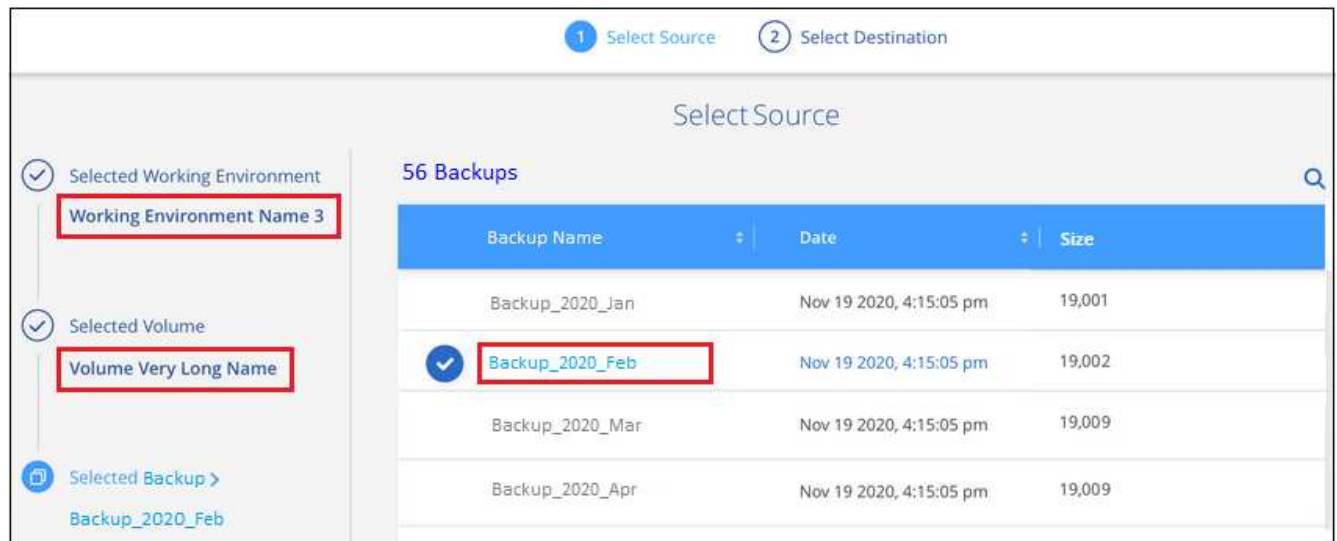


Steps

1. Select the **Backup & Restore** service.
2. Click the **Restore** tab and the Restore Dashboard is displayed.
3. From the *Browse & Restore* section, click **Restore Volume**.

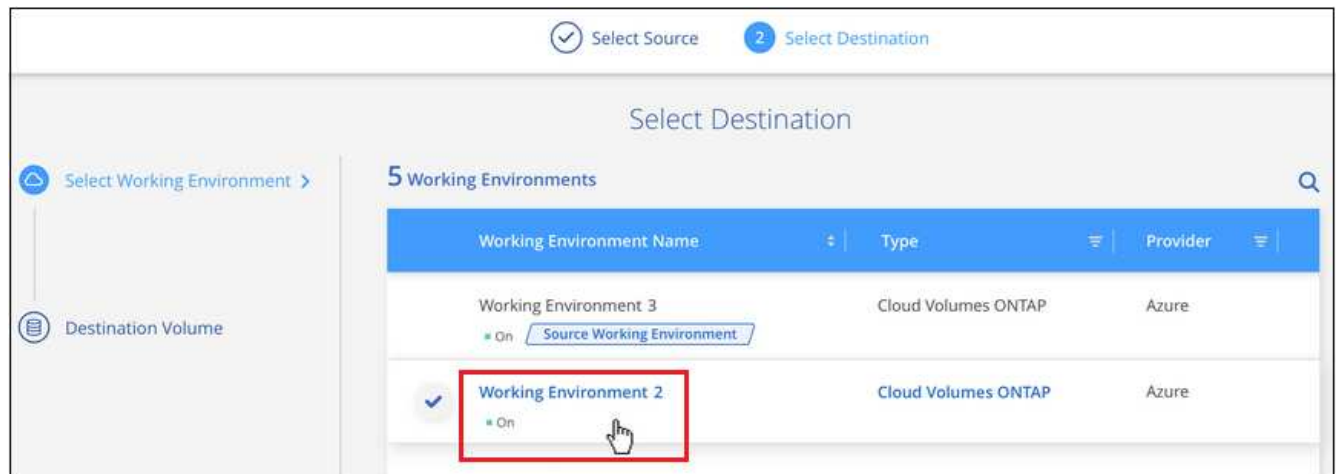


4. In the *Select Source* page, navigate to the backup file for the volume you want to restore. Select the **Working Environment**, the **Volume**, and the **Backup** file that has the date/time stamp from which you want to restore.



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, enter the FQDN of the StorageGRID server and the port that ONTAP should use for HTTPS communication with 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.

Select Destination

✓ Selected Working Environment
Working Environment Name 2

Destination Volume >
General_restore

i A new volume will be created in the working environment based on the backup you selected

Volume Name

Storage VM

Restore Priority

Volume Information

Volume Size: 50.00 GB

Backup Policy: CloudBackupService

Protocol: NFS

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 AWS archival storage.](#)
[Learn more about restoring from Azure archival storage.](#)

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

Result

Cloud Backup creates a new volume based on the backup you selected. You can [manage the backup settings for 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. You can click the **Job Monitor** tab to see the restore progress.

Restoring ONTAP files using Browse & Restore

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

If you select multiple files, all the files are restored to the same destination volume that you choose. So if you want to restore files to different volumes, you'll need to run the restore process multiple times.



You can't restore individual files if the backup file resides in archival storage. In this case, you can restore files from a newer backup file that has not been archived, or you can restore the entire volume from the archived backup and then access the files you need, or you can restore files using Search & Restore.

Prerequisites

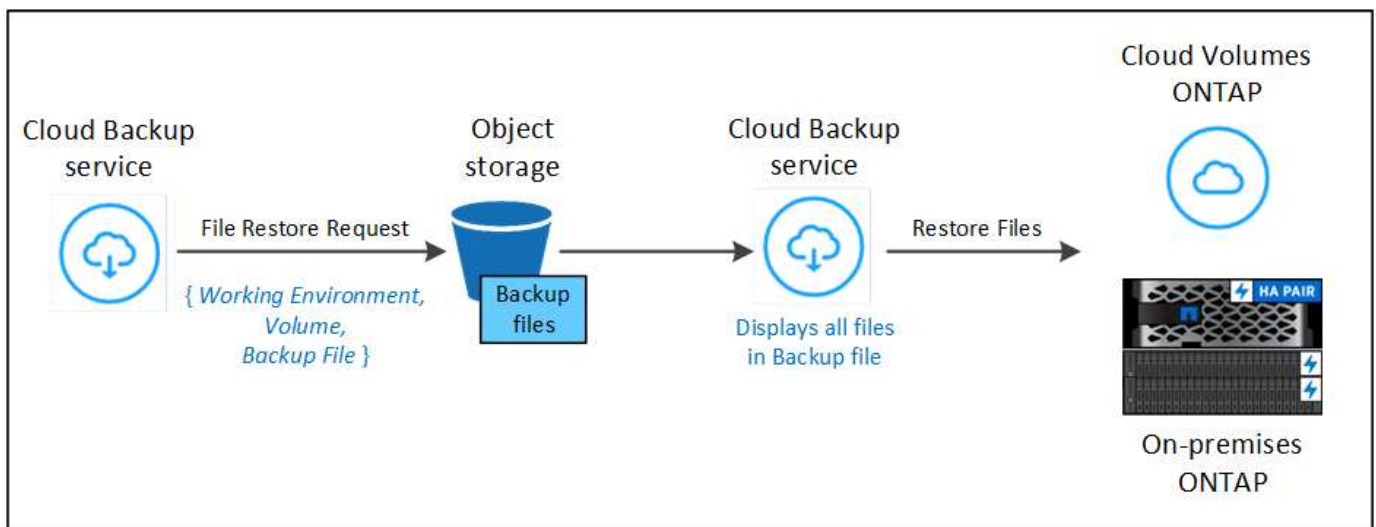
- The ONTAP version must be 9.6 or greater in your Cloud Volumes ONTAP or on-premises ONTAP systems to perform file restore operations.

- AWS cross-account restore requires manual action in the AWS 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 backup, click the **Restore** tab, click **Restore Files** under *Browse & Restore*, and select the backup file in which the file (or files) reside.
2. Cloud Backup displays the folders and files that exist within the selected backup 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.



As you can see, you need to know the working environment name, volume name, backup file date, and file name to perform a file restore.

Restoring files using Browse & Restore

Follow these steps to restore files to a volume from an ONTAP volume backup. 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 each backup file.

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

Cloud Backup Service: Restore Demo

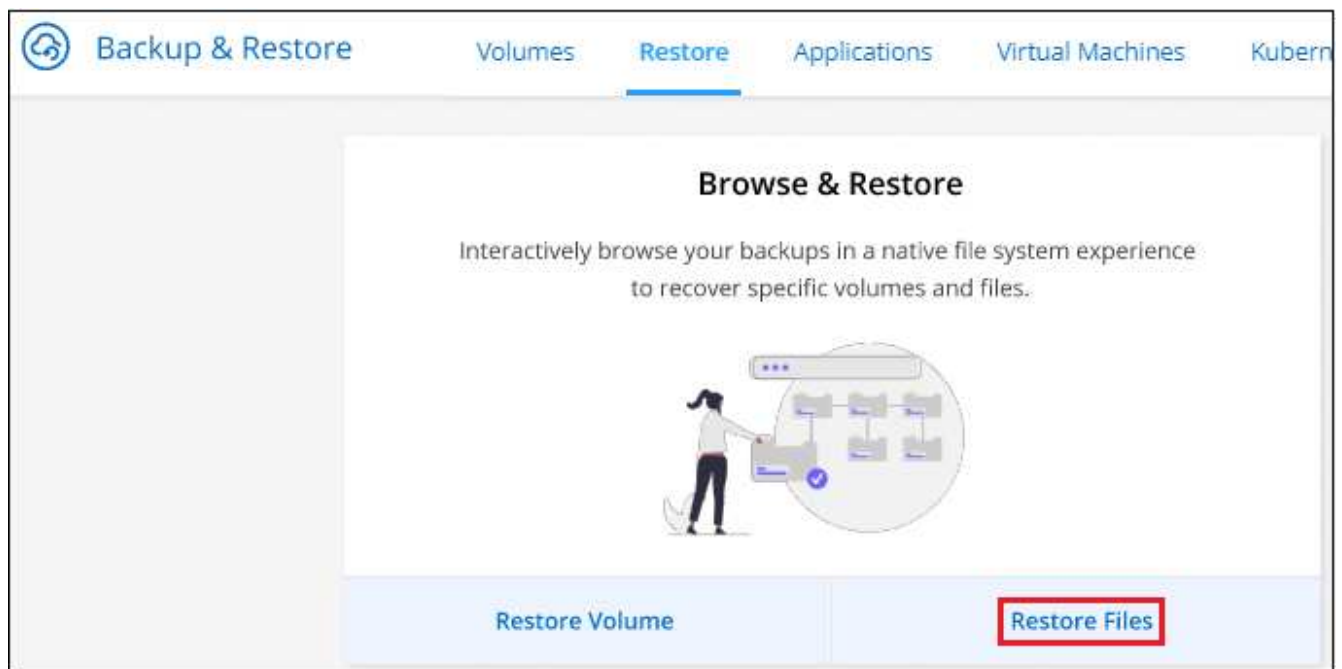
Powered by Cloud Manager

January 2022

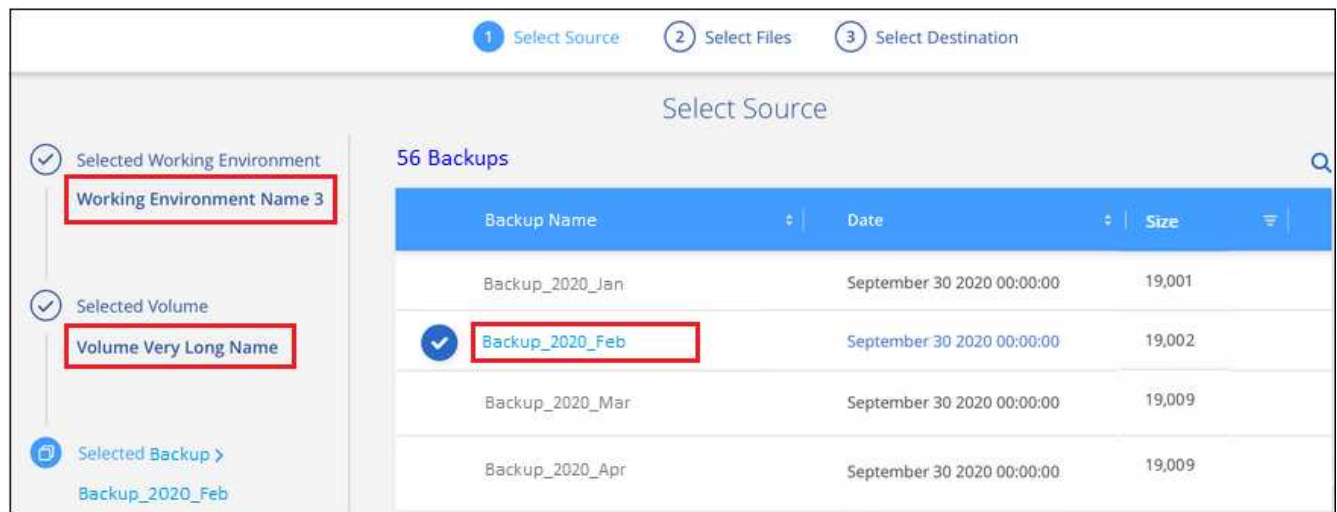


Steps

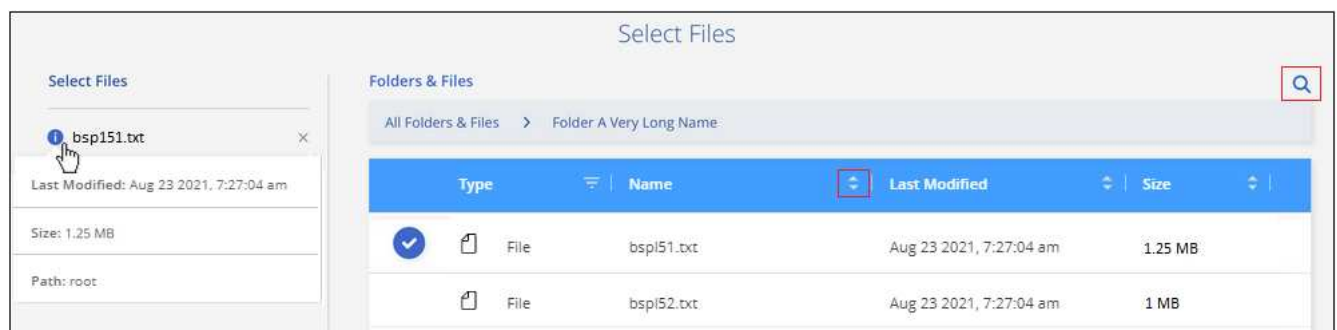
1. Select the **Backup & Restore** service.
2. Click the **Restore** tab and the Restore Dashboard is displayed.
3. From the *Browse & Restore* section, click **Restore Files**.



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 list of folders and files from the volume backup are displayed.

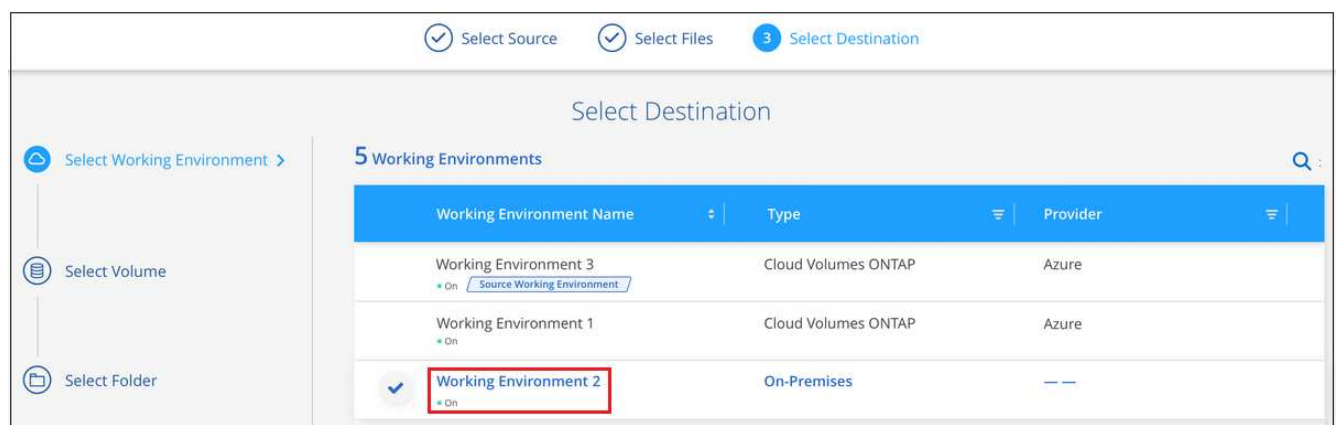


6. In the *Select Files* page, select the file or files that you want to restore and click **Continue**. To assist you in finding the file:

- You can click the file name if you see it.
- You can click the search icon and enter the name of the file to navigate directly to the file.
- 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.

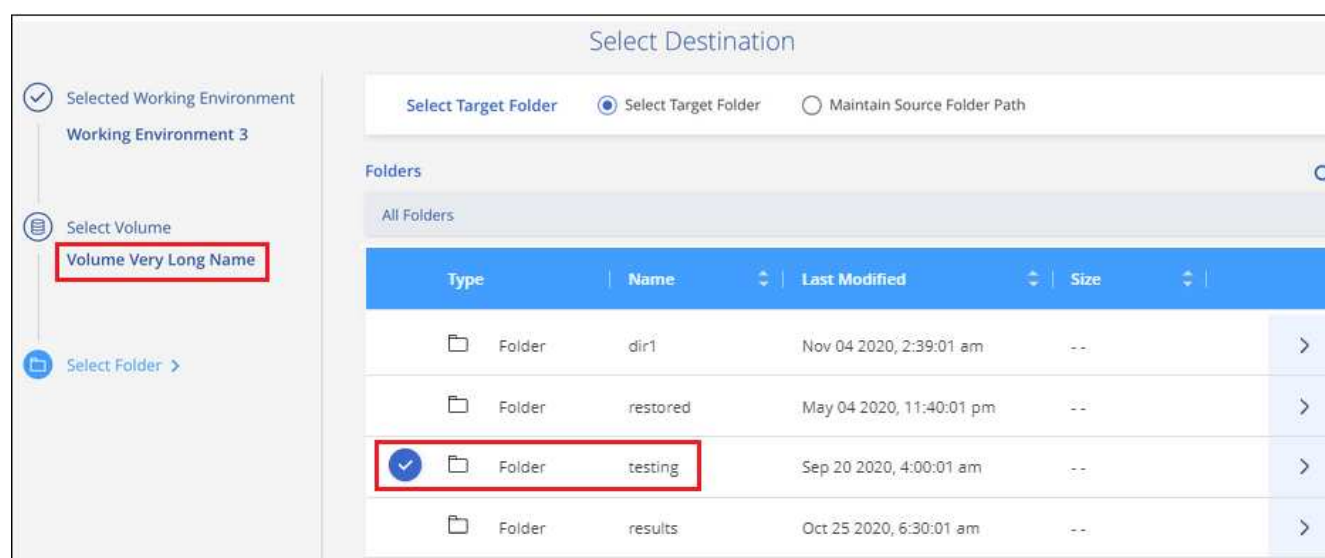
7. In the *Select Destination* page, select the **Working Environment** where you want to restore the files.




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 volume resides, 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 volume resides.
- When restoring from Google Cloud Storage, enter the IPspace in the ONTAP cluster where the destination volumes reside, and the Access Key and Secret Key needed to access the object storage.
- When restoring from StorageGRID, enter the FQDN of the StorageGRID server and the port that ONTAP should use for HTTPS communication with StorageGRID, enter the Access Key and Secret Key needed to access the object storage, and the IPspace in the ONTAP cluster where the destination volume resides.

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. You can also click the **Job Monitor** tab to see the restore progress.

Restoring ONTAP data using Search & Restore

You can restore a volume or individual files from an ONTAP backup file using Search & Restore. Search & Restore enables you to search for a specific volume or file from all backups stored on cloud storage for a particular provider, and then perform a restore. You don't need to know the exact working environment name or volume name - the search looks through all volume backup files.

The search operation also looks across all local Snapshot copies that exist for your ONTAP volumes too. Since restoring data from a local Snapshot copy can be faster and less costly than restoring from a backup file, you may want to restore data from the Snapshot. You can restore the Snapshot as a new volume from the Volume Details page on the Canvas.

When you restore a volume from a backup file, Cloud Backup creates a *new* volume using the data from the backup. You can restore the data as a volume in the original 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.

You can restore files to the original volume location, to a different 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 a volume on an on-premises ONTAP system.

If the backup file for the volume that you want to restore resides in archival storage (available starting with ONTAP 9.10.1), the restore operation will take a longer amount of time and will incur additional cost. Note that the destination cluster must also be running ONTAP 9.10.1 or greater, and that file restore from archival storage is not currently supported.

[Learn more about restoring from AWS archival storage.](#)

Before you start, you should have some idea of the name or location of the volume or file you want to restore.

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



Search & Restore supported working environments and object storage providers

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

Backup File Location	Destination Working Environment	
	Volume Restore	File Restore
Amazon S3	Cloud Volumes ONTAP in AWS On-premises ONTAP system	Cloud Volumes ONTAP in AWS On-premises ONTAP system
Azure Blob	Not currently supported	
Google Cloud Storage	Cloud Volumes ONTAP in Google On-premises ONTAP system	Cloud Volumes ONTAP in Google On-premises ONTAP system
NetApp StorageGRID	Not currently supported	



The Connector must be deployed in your cloud provider platform for this support. Search & Restore is not supported when the Connector is installed on your premises.

Note that references to "on-premises ONTAP systems" includes FAS, AFF, and ONTAP Select systems.

Prerequisites

- Cluster requirements:
 - The ONTAP version must be 9.8 or greater.
 - The storage VM (SVM) on which the volume resides must have a configured data LIF.
 - NFS must be enabled on the volume.
 - The SnapDiff RPC Server must be activated on the SVM. Cloud Manager does this automatically when you enable Indexing on the working environment.
- AWS requirements:
 - Specific Amazon Athena, AWS Glue, and AWS S3 permissions must be added to the user role that provides Cloud Manager with permissions. [Make sure all the permissions are configured correctly.](#)

Note that if you were already using Cloud Backup with a Connector you configured in the past, you'll need to add the Athena and Glue permissions to the Cloud Manager user role now. These are new, and they are required for Search & Restore.

- Google Cloud requirements:
 - Specific Google BigQuery permissions must be added to the user role that provides Cloud Manager with permissions. [Make sure all the permissions are configured correctly.](#)

Note that if you were already using Cloud Backup with a Connector you configured in the past, you'll need to add the BigQuery permissions to the Cloud Manager user role now. These are new, and they are required for Search & Restore.

Search & Restore process

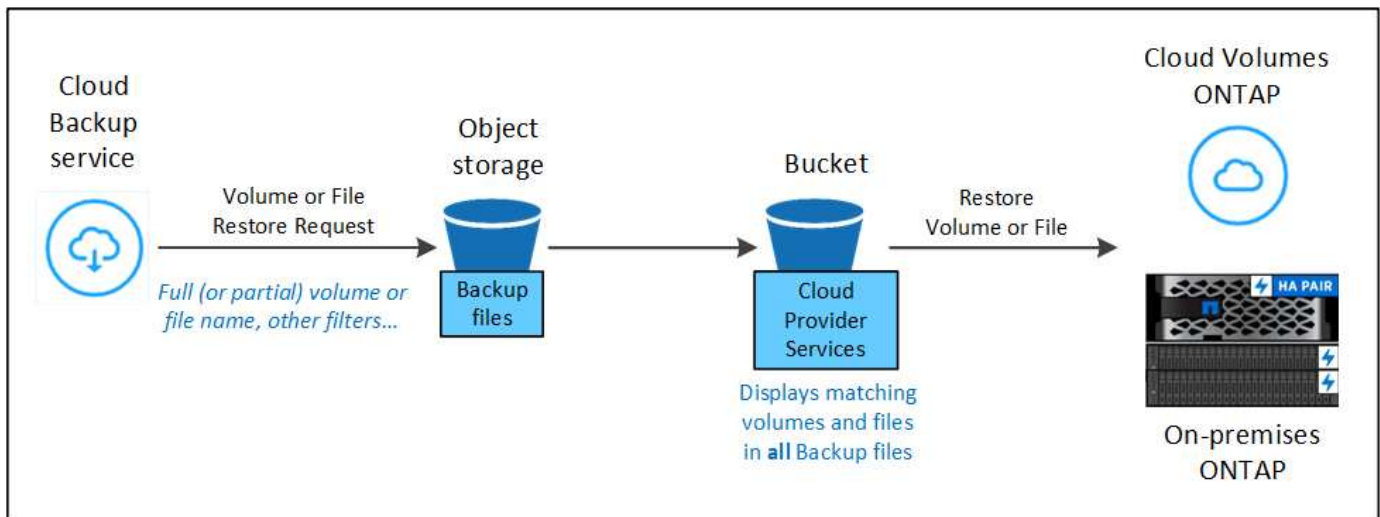
The process goes like this:

1. Before you can use Search & Restore, you need to enable "Indexing" on each source working environment from which you'll want to restore volumes or files. This allows the Indexed Catalog to track the backup files for every volume.

2. When you want to restore a volume or files from a volume backup, under *Search & Restore*, click **Search & Restore**.
3. Enter the search criteria for a volume or file by partial or full volume name, partial or full file name, size range, creation date range, other search filters, and click **Search**.

The Search Results page displays all the locations that have a file or volume that matches your search criteria.

4. Click **View All Backups** for the location you want to use to restore the volume or file, and then click **Restore** on the actual backup file you want to use.
5. Select the location where you want the volume or file(s) to be restored and click **Restore**.
6. The volume or file(s) are restored.



As you can see, you really only need to know a partial volume or file name and Cloud Backup searches through all backup files that match your search.

Enabling the Indexed Catalog for each working environment

Before you can use Search & Restore, you need to enable "Indexing" on each source working environment from which you're planning to restore volumes or files. This allows the Indexed Catalog to track every volume and every backup file - making your searches very quick and efficient.

When you enable this functionality, Cloud Backup enables SnapDiff v3 on the SVM for your volumes, and it performs the following actions:

- For backups stored in AWS, it provisions a new S3 bucket and the [Amazon Athena interactive query service](#) and [AWS Glue serverless data integration service](#).
- For backups stored in Google Cloud, it provisions a new bucket, and the [Google Cloud BigQuery services](#) are provisioned on an account/project level.

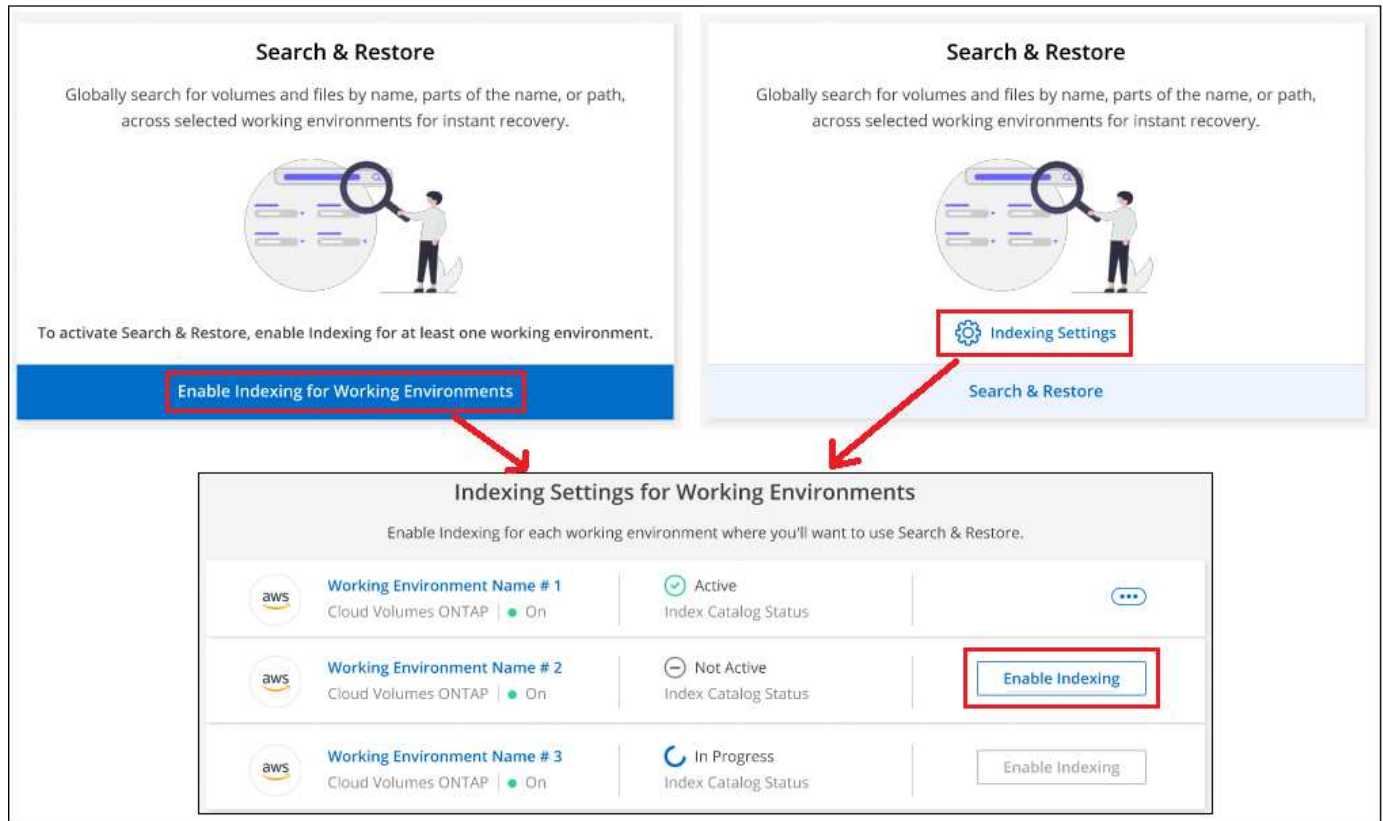
If Indexing has already been enabled for your working environment, go to the next section to restore your data.

To enable Indexing for a working environment:

- If no working environments have been indexed, on the Restore Dashboard under *Search & Restore*, click **Enable Indexing for Working Environments**, and click **Enable Indexing** for the working environment.

- If at least one working environment has already been indexed, on the Restore Dashboard under *Search & Restore*, click **Indexing Settings**, and click **Enable Indexing** for the working environment.

After all the services are provisioned and the Indexed Catalog has been activated, the working environment is shown as "Active".



Depending on the size of the volumes in the working environment, and the number of backup files in the cloud, the initial indexing process could take up to an hour. After that it is transparently updated hourly with incremental changes to stay current.

Restoring volumes and files using Search & Restore

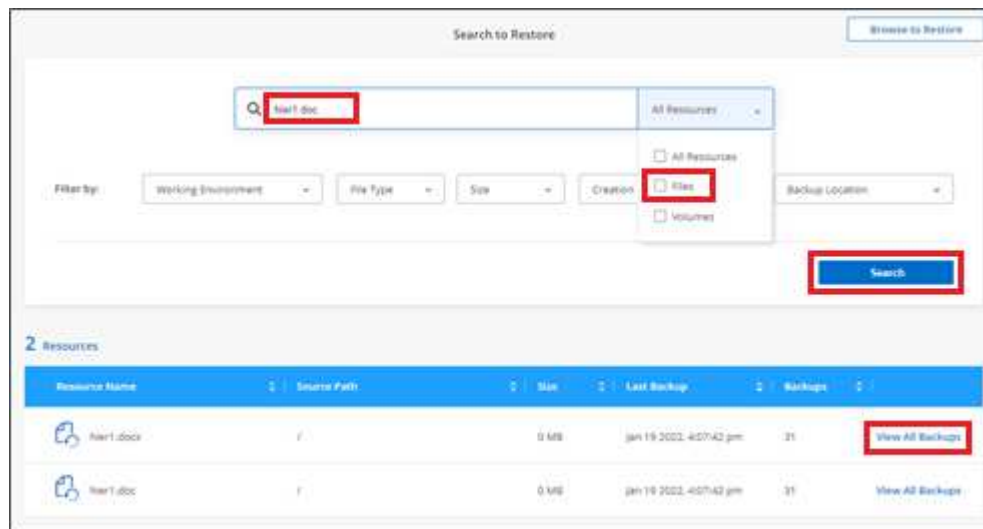
After you have [enabled Indexing for your working environment](#), you can restore volumes or files using Search & Restore. This allows you to use a broad range of filters to find the exact file or volume that you want to restore from all backup files.

Steps

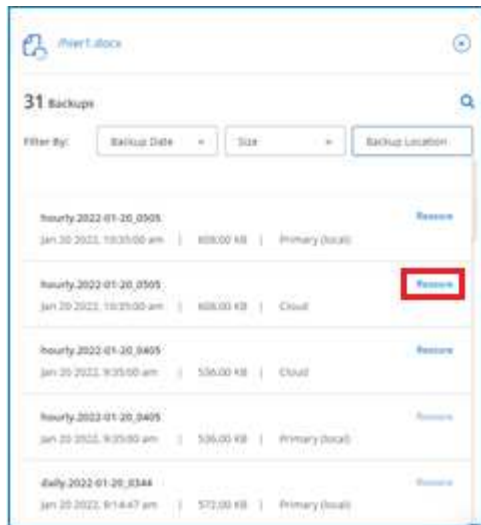
1. Select the **Backup & Restore** service.
2. Click the **Restore** tab and the Restore Dashboard is displayed.
3. From the *Search & Restore* section, click **Search & Restore**.



4. From the Search & Restore page:
 - a. In the Search bar, enter a full or partial volume name or file name.
 - b. In the Filter area, select the filter criteria. For example, you can select the working environment where the data resides and the file type, for example a .doc file.
5. Click **Search** and the Search Results area displays all the locations that have a file or volume that matches your search.



6. Click **View All Backups** for the location that has the data you want to restore to display all the backup files that contain the volume or file.



7. Click **Restore** for the backup file you want to use to restore the volume or file from the cloud.

Note that the results also identify local volume Snapshot copies that contain the file in your search. The **Restore** button is not functional for Snapshots at this time, but if you want to restore the data from the Snapshot copy instead of from the Backup file, write down the name and location of the volume, open the Volume Details page on the Canvas, and use the **Restore from Snapshot copy** option.

8. Select the location where you want the volume or file(s) to be restored and click **Restore**.

- For files, you can restore to the original location or you can select an alternate location
- For volumes you can select the location.

Results

The volume or file(s) are restored and you are returned to the Restore Dashboard so you can review the progress of the restore operation. You can also click the **Job Monitor** tab to see the restore progress.

For restored volumes, you can [manage the backup settings for this new volume](#) as required.

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