VERITAS

Veritas Alta™ Recovery Vault Deployment Guide

Cloud-based Storage-as-a-Service to Isolated Cloud Data Vault

This paper is designed to highlight the steps customers will need to perform to setup and use Veritas Alta™ Recovery Vault

For more information on Veritas products and solutions, visit www.veritas.com

September 2024

TABLE OF CONTENTS

Revision History

Version	Date	Changes	Author
1.00	10/27/2021	Initial Version	Neil Glick
1.01	11/4/2021	Updated to reflect that customers will create their own storage buckets. Also added an appendix to show how to create the container using an explorer tool.	Neil Glick
1.02	3/22/2022	Updated for AWS and Immutability.	Neil Glick
1.03	6/7/2022	Split Azure and AWS. Added more best practices.	Neil Glick
1.04	11/10/2022	Veritas Alta rebranding, archive tier added, more best practices.	Neil Glick
1.05	2/14/2023	Added token-based authentication.	Neil Glick
1.06	5/17/2023	Immutability re-write	Neil Glick
1.07	5/17/2023	Immutability notes	Ramya Kalyanam
1.08	8/2/2023	Immutability through web UI	Neil Glick
1.09	11/1/2023	Added AWS Direct Connect, 10.3 and 10.1.1 deployment steps.	Neil Glick
1.10	03/01/2024	AWS token support, Azure and AWS archive updates, reporting, creating policies, restoring data and more best practices.	Neil Glick

1.11	08/19/2024	Update for proxy server, corrections, make document easier to use.	Neil Glick

Target Audience

This document is for customers interested in learning more about Veritas Alta Recovery Vault and how to implement it.

Introduction

Executive Summary

Veritas Alta Recovery Vault is a cloud-based data vault designed to protect applications and infrastructure from threats that target backup data, by immutably isolating an off-site data copy in the cloud with a virtual air gap. With Alta Recovery Vault, there is no need to build, manage, and protect a physical site to isolate backup data.

Why Veritas Alta Recovery Vault

In a few short years, the adoption of public cloud-based data protection-as-a-service has grown significantly. This trend is placing the onus on data owners to deliver on data protection SLAs, data sovereignty, security, and ransomware resiliency.

Traditional approaches to cloud data protection aren't keeping pace with IT complexity, growing threats, or economic expectations.

Alta Recovery Vault provides a fully managed cloud data protection tier that's seamlessly integrated in NetBackup. With Alta Recovery Vault, Veritas customers can be confident that their data is secure in the cloud and protected from ransomware, is disaster recovery ready, and is able to meet compliance and governance requirements.

Alta Recovery Vault is the right technology at the right time. Alta Recovery Vault not only simplifies the process of provisioning new storage in the cloud, it also reduces risks. All storage as-a-service resources are provisioned and managed from within NetBackup's locked-down security and role-based authentication policies. Eliminating separate accounts and user interfaces across cloud providers helps ensure that security and compliance policies are in check. And because Alta Recovery Vault is an integral feature of NetBackup, customer cloud storage benefits from all its capabilities.

Veritas only supports immutable storage for Alta Recovery Vault. Non immutable storage leaves backups vulnerable to malicious attacks.

See Veritas Knowledge Base Article 100055803 for more information on Alta Recovery Vault and immutability.

With Alta Recovery Vault you can:

- **Reduce Risks** – Crucial cloud security, retention, and compliance managed within NetBackup.
- **Scale Limitlessly** – Efficiently manage data growth without compromising manageability.
- **Lower Total Cost of Ownership (TCO)** – Predictable as-a-service subscription. Zero hidden costs.
- **Automate Resiliency** – Intelligent cloud policies and air-gapped multi-cloud isolation protect data from ransomware and other threats.

Looking to Get Veritas Alta Recovery Vault?

How to Use This Deployment Guide

The implementation of Alta Recovery Vault will require certain prerequisites and the possibility of patches before a connection can be made to your new storage.

It is strongly recommended to use the Alta Recovery Vault Pre-Install Checklist to help ensure proper prerequisites and Emergency Engineering Binaries (EEBs) have been applied to your environment.

This most efficient way to use this deployment guide is to navigate to the Table of Contents and find the Prerequisites section. From there, navigate to the version of NetBackup you are currently running and what Cloud Storage Provider you wish to connect to.

Each prerequisite section will contain what ports will need to be opened, necessary patches and connection tests that will help ensure the ports are ready to connect to your new storage.

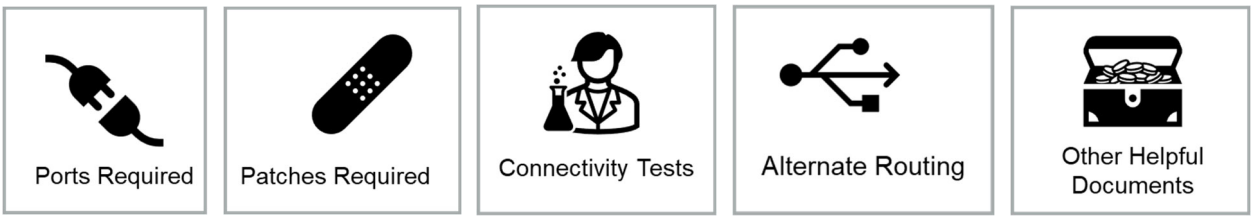
After the prerequisites section, the guide discusses how connection will be made to the CSP and if you would like to use alternate connectivity methods other than the default HTTPS.

Next comes the discussion regarding immutability of your data and how Veritas handles it.

The following section discusses short lived token-based authentication and how to create your credential that will be necessary to connect to your storage. You can create the credential now or create it when you are in the process of connecting to your storage.

The following three sections are for migrations from previous versions of Alta Recovery Vault. If you are not migrating a proxy server or upgrading to token-based authentication, go back to the Table of Contents and find the "Connecting To Your New Storage Account In…" section. Navigate which version of NetBackup you are currently running and which CSP you'll connect to.

Click on the icons below to link to the required sections.



Additional Resources

Along with this deployment guide, the following resources will help your implementation of Alta Recovery Vault.

1. Veritas Alta Recovery Vault: Setting up Immutable Storage Part 1 of 2
2. Veritas Alta Recovery Vault: Backup, Recovery, and Expiring Immutable Storage Part 2 of 2
3. Veritas Alta Recovery Vault Short Lived Token Based Authentication Overview
4. Veritas Alta Recovery Vault Security Guide
5. Veritas Alta Recovery Vault Azure ExpressRoute Overview
6. Veritas Alta Recovery Vault AWS Direct Connect
7. Veritas Alta Recovery Vault Pre-Install Checklist
8. Veritas Alta Recovery Vault Image Sharing and Disaster Recovery
9. Veritas Alta Recovery Vault Troubleshooting Guide

Where to Download The Software

Alta Recovery Vault is already part of NetBackup and there is no additional software to install.

AWS – Alta Recovery Vault with AWS can be used with NetBackup 9.1 and later.

Azure – Alta Recovery Vault with Azure can be used with NetBackup 10.0 and later.

Note: The minimum version for Azure short lived tokens is NetBackup 10.2

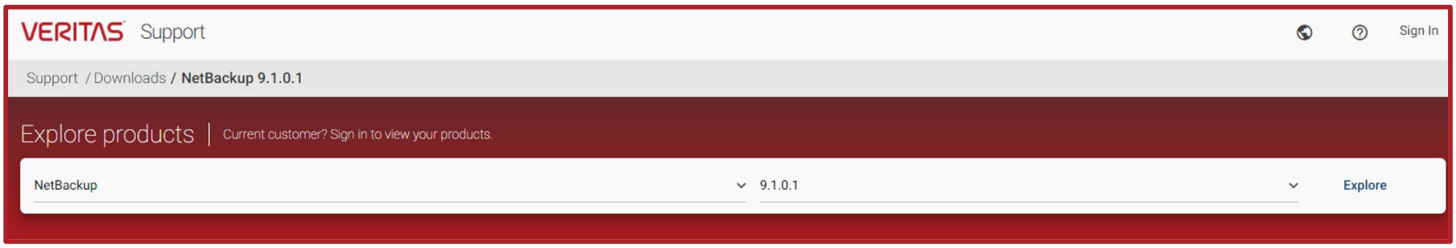
The minimum version for AWS short lived tokens is NetBackup 10.4.

It is recommended to use the latest version of NetBackup with Alta Recovery Vault since it will contain all the new product and security features. Review the Alta Recovery Vault Pre-Install Checklist to ensure you have the latest EEBs applied and are following all best practices. See the Emergency Engineering Binaries (EEB) section to learn more.

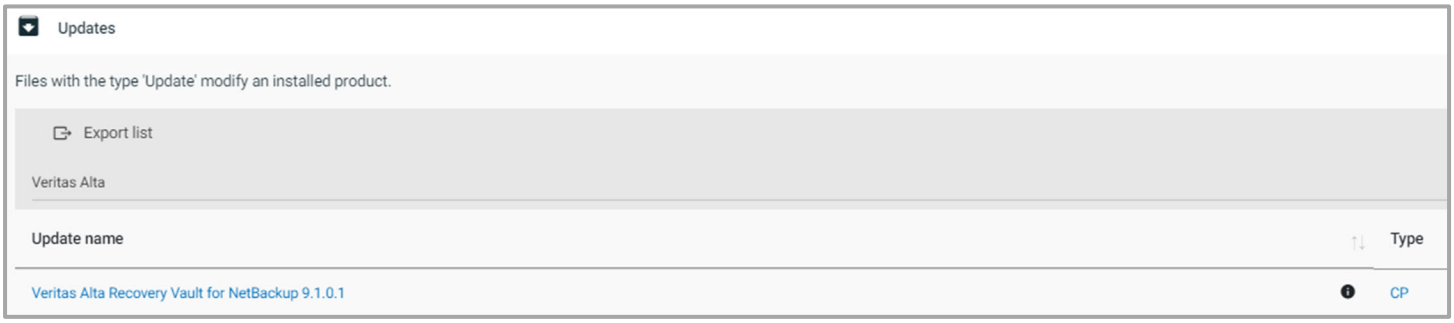
If you would like to run Alta Recovery Vault on NetBackup 10.1 or earlier, proceed to the Veritas Support and Downloads page to download necessary EEBs.

Note: Additional EEBs not available on the download page may be necessary for earlier versions of NetBackup. Contact your account representative or Veritas Support for more information.

1. After you are on the download page, enter in your version of NetBackup and click **Explore**.



2. Click **Updates** and search for Veritas Alta Recovery Vault.



Prerequisites

Review and implement the following prerequisites before the Alta Recovery Vault implementation.

Note: It is a best practice to download and fill out the Alta Recovery Vault Pre-Install Checklist to assist in your implementation.

Note: NetBackup 9.1 is the earliest version to support AWS Alta Recovery Vault.

Note: NetBackup 10.0 is the earliest version to support Azure for Alta Recovery Vault.

NetBackup 10.2 and Above for Azure and 10.4 and above for AWS

Emergency Engineering Binaries (EEB)

Many versions of NetBackup require that NetBackup EEBs be applied to the primary and/or media servers that connect to Alta Recovery Vault. To download EEBs, navigate to the Veritas Software Download Site. Each .zip file contains the EEBs and a README file with the installation instructions. EEBs are updated on a regular basis, so it's important to apply the most recent version of the EEB on your primary or media server.

Note: Follow the instructions in the README file in the .zip EEB file. Some EEBs must be installed on the primary and/or on the media server and may not be applied if other EEBs have already been applied. If you have any questions regarding patching your primary or media servers, contact Veritas Support for more assistance.

Note: The Veritas Alta Recovery Vault Pre-Install Checklist lists most of the EEBs necessary, however please check with Veritas Support before implementing Alta Recovery Vault to ensure you have the latest EEBs in place.

Media Server

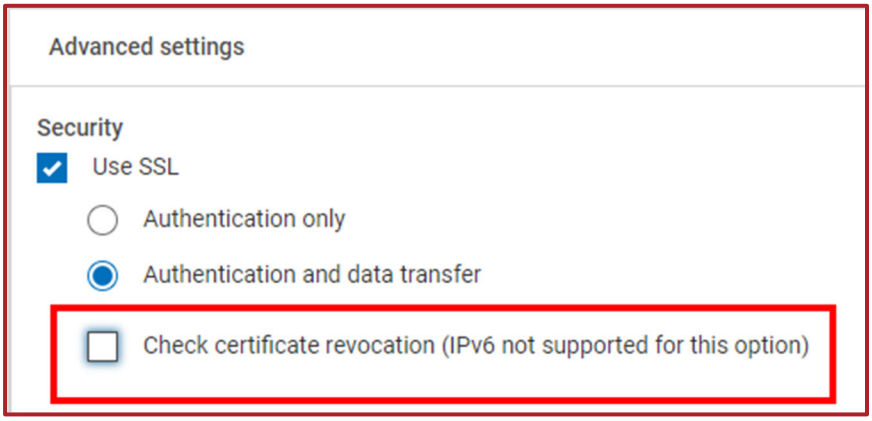
Alta Recovery Vault uses MSDP Direct Cloud Tiering (MSDP-C) functionality in NetBackup. MSDP-C can be configured on CentOS, RHEL-based and SUSE media servers, NetBackup appliances (NetBackup Appliance, Flex Appliance, or Flex Scale) or Alta Data Protection (Cloud Scale).

Note: Microsoft Windows Media Servers are not supported for Alta Recovery Vault.

Ports

Port 443 – Communication to the external storage bucket requires TCP port 443 to be open outbound so the NetBackup API can communicate with the storage bucket through HTTPS. If you do not wish to open TCP port 443 outbound and choose to use products like Azure ExpressRoute or AWS Direct Connect, see the Veritas Alta Recovery Vault Security Profile for more information.

Port 80 – Veritas checks for certificate revocation to ensure the certificates are valid, which means that TCP port 80 needs to be opened outbound on the media server configured for MSDP-C unless you do not wish to check for certificate revocation. To remove this certificate validation, simply uncheck certificate revocation when creating the disk pool.



Note: For more information on Alta Recovery Vault security, see the Veritas Alta Recovery Vault Security Profile.

Primary Server

Ports

Port 443 – Alta Recovery Vault uses the NetBackup primary server to communicate with the Veritas secure short lived token server. A proxy server can also be used if direct connection to the internet is not available. (This step can be seen later in this guide.)

Communication Test

Check the connectivity with the Alta Recovery Vault service on the NetBackup Primary server with the following curl command to ensure communication can occur.

```
curl -v https://rvltapi.nr1.archivecloud.net/api/servicestatus/info
```

Note: Look for "Connected to rvltapi.nr1.archivecloud.net (52.52.233.219) port 443 (#0)" for a successful connection.

NetBackup 10.1.x and Below for Azure and 10.3 and below for AWS

Emergency Engineering Binaries (EEB)

NetBackup versions 9.0.0.1, 9.1.0.1, 10.0.0.1 and 10.1 require that NetBackup EEBs be applied to the primary and/or media servers that connect to Alta Recovery Vault. To download EEBs, navigate to the Veritas Software Download Site. Each .zip file contains the EEBs and a README file with the installation instructions. EEBs are updated on a regular basis, so it's important to apply the most recent version of the EEB on your primary or media server.

Note: Follow the instructions in the README file in the .zip EEB file. Some EEBs must be installed on the primary and/or on the media server and may not be applied if other EEBs have already been applied. If you have any questions regarding patching your primary or media servers, contact Veritas Support for more assistance.

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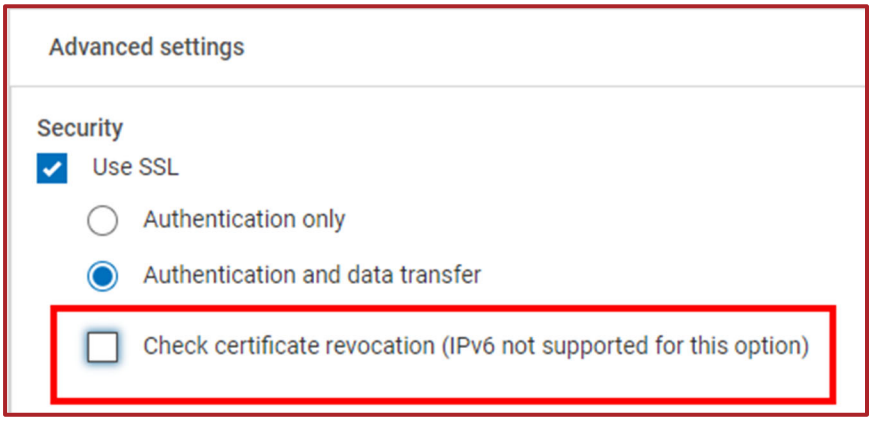
Ports

Port 443 – Communication to the external storage bucket requires TCP port 443 to be open outbound so the NetBackup API can communicate with the storage bucket through HTTPS. If you do not wish to open TCP port 443 outbound and choose to use products like Azure ExpressRoute or AWS Direct Connect, see the Veritas Alta Recovery Vault Security Profile for more information.

Port 80 – Veritas checks for certificate revocation to ensure the certificates are valid, which means that TCP port 80 needs to be opened outbound on the media server configured for MSDP-C unless you do not wish to check for certificate revocation. To remove this certificate validation, simply uncheck certificate revocation when creating the disk pool.



Note: For more information on Alta Recovery Vault security, see the Veritas Alta Recovery Vault Security Profile.

Communication Test

Check the connectivity with the Alta Recovery Vault service on the NetBackup media server with the following curl command.

Azure:

```
curl -v https://<storageaccount>.blob.core.windows.net
```

AWS:

```
curl -v https://<s3bucket>.s3.dualstack.us-east-1.amazonaws.com
```

All Versions of NetBackup

AWS and Azure Public IP Addresses

You may want to allowlist IP addresses that Azure and AWS use to connect to your service. See the following for more information:

Azure: https://www.microsoft.com/en-us/download/confirmation.aspx?id=56519

AWS: https://docs.aws.amazon.com/quicksight/latest/user/regions.html

Azure ExpressRoute with Microsoft Peering

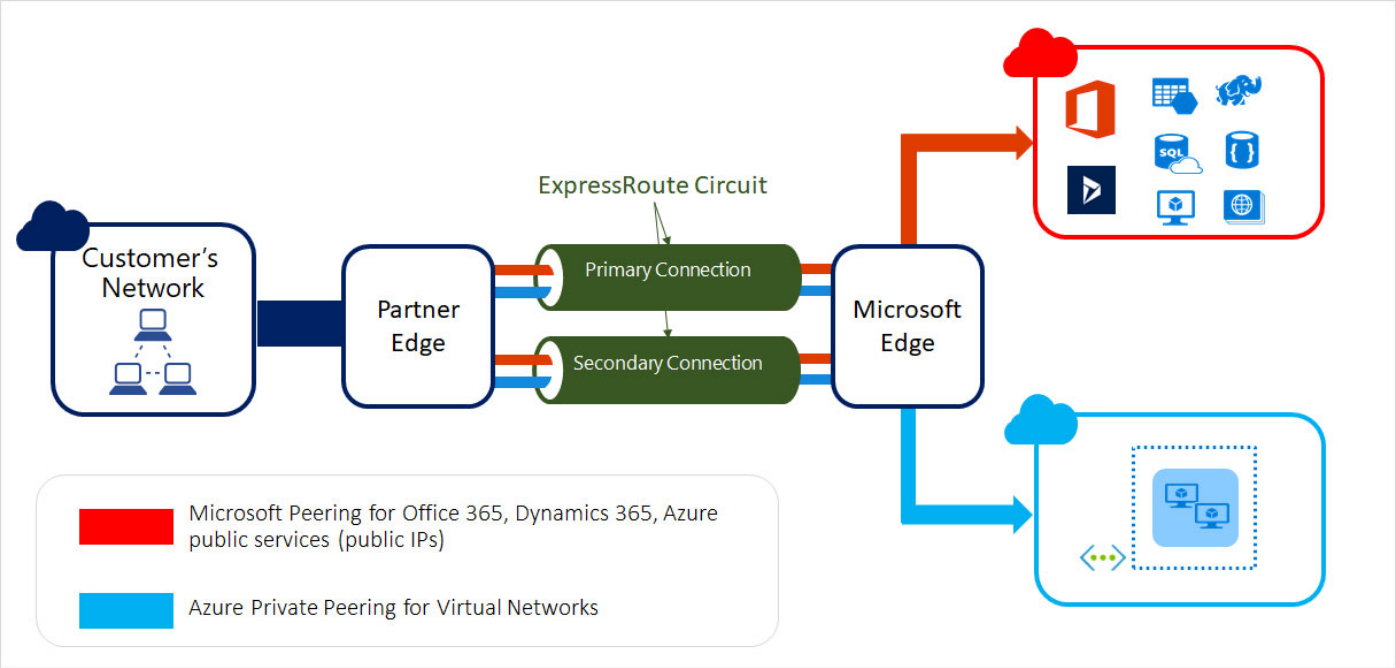
Alta Recovery Vault has been tested and certified to use Azure ExpressRoute. To use Azure ExpressRoute to connect to Alta Recovery Vault storage in Azure, customers should use Azure ExpressRoute "Microsoft Peering", and not Azure "Private Peering".

The differences are described on Microsoft's site: https://docs.microsoft.com/en-us/azure/expressroute/expressroute-circuit-peerings

With an ExpressRoute configured for Microsoft Peering, in the past, Microsoft used to send all the prefixes for public IPs. Now, customers should configure a route filter first, which is a Border Gateway Protocol (BGP) community value for the prefixes you want to receive to the storage region (such as East US or West US 2, etc.) you have chosen for your Alta Recovery Vault Azure storage.

Please review Microsoft's guide on setting up a route filter for the prefixes you want to receive:

https://learn.microsoft.com/en-us/azure/expressroute/how-to-routefilter-portal



For more information on our testing with Azure ExpressRoute, see the Veritas Alta Recovery Vault ExpressRoute Overview Guide.

Microsoft vNet Peering

Veritas does not recommend using Microsoft vNet Peering for Alta Recovery Vault. vNet Peering is cost prohibitive when it is used for backup and restore purposes. The least expensive vNet Peering is within the same region, at $0.01 per GB for both inbound or outbound traffic and charged at both ends of the peered networks. Both Veritas as well as the end user would incur costs which will lead to transfers out of the same region that are 3.5x to 16x more expensive, depending on the regions used.

vNet Peering also requires non-overlapping IP addresses, and Alta Recovery Vault is a multi-tenant environment. As multiple customers are connecting to their storage in the same Veritas Azure subscription, there could be overlap with IP ranges with other future customers and we would not be able to support future customers' requests.

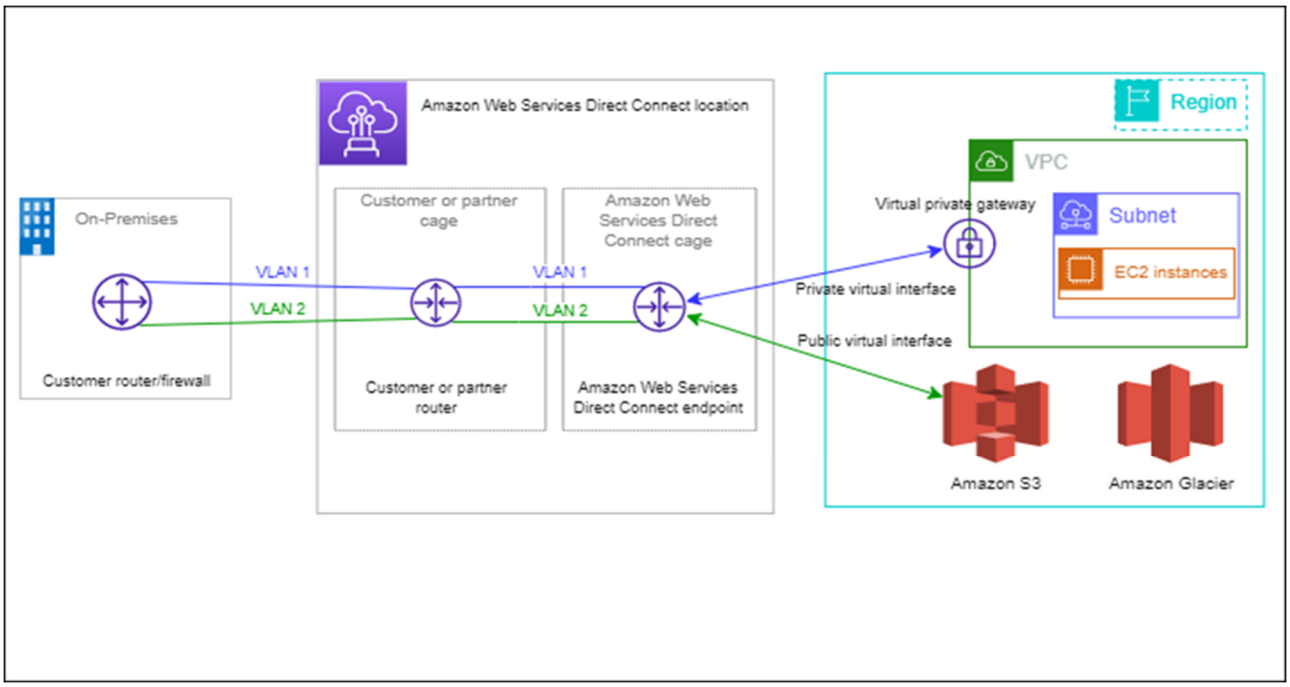
AWS Direct Connect Hosted Connection

Alta Recovery Vault has been tested and certified to use AWS Direct Connect using a hosted connection. AWS Direct Connect links your internal network to an AWS Direct Connect location over a standard Ethernet fiber-optic cable. One end of the cable is connected to your router, the other to an AWS Direct Connect router. With this connection, you can create virtual interfaces directly to public AWS services (for example, to Amazon

S3) or to Amazon VPC, bypassing internet service providers in your network path. An AWS Direct Connect location provides access to AWS in the Region with which it is associated. You can use a single connection in a public Region or AWS GovCloud (US) to access public AWS services in all other public Regions.

While in transit, your network traffic remains on the AWS global network and never touches the public internet. This reduces the chance of hitting bottlenecks or unexpected increases in latency. When creating a new connection, you can choose a hosted connection provided by an AWS Direct Connect Delivery Partner or choose a dedicated connection from AWS—and deploy at over 100 AWS Direct Connect locations around the globe. For more information: https://aws.amazon.com/directconnect/

The following diagram shows a high-level overview of how AWS Direct Connect interfaces with your network.



For more information on our testing with AWS Direct Connect, see the Veritas Alta Recovery Vault Direct Connect Overview Guide.

Necessary Information

The first step to your journey to storage-as-a-service is to contact your Veritas account manager. Your account manager will collect the necessary information needed to provision your Alta Recovery Vault storage account. Following are examples of the information you might provide:

- Cloud provider(s)
- Data center region
- Number of buckets
- Size of the buckets (2.4PB per disk volume)
- Veritas account representative
- Veritas partner name
- Immutability support requirements
  - **Note**: Non-Immutable storage is not available in Alta Recovery Vault.

After the necessary information has been collected, the Veritas Alta Recovery Vault Provisioning Team creates the storage account, enabling you to create cloud buckets in the cloud provider.

Note for Azure Customers – Use the NetBackup web UI to attach to the new storage account and create the desired cloud bucket(s) or use the cloud buckets created by the Veritas Alta Recovery Vault Provisioning Team.

Note for AWS Customers –The cloud buckets are created, and the names are given to you by the Veritas Alta Recovery Vault Provisioning Team.

Information about Archive Tier Limitations

The introduction of Archive Tier gives backup administrators even more flexibility when using Alta Recovery Vault storage-as-a-service. However, you should review the NetBackup Cloud Administrators Guide and NetBackup Deduplication Guide regarding NetBackup capabilities while using specific cloud vendor archive tiers.

AWS https://www.veritas.com/content/support/en_US/doc/58500769-157138736-0/v113989222-157138736

Azure https://www.veritas.com/content/support/en_US/doc/58500769-157138736-0/v135373405-157138736

https://www.veritas.com/content/support/en_US/doc/25074086-156145854-0/v144509100-156145854

Immutability/WORM

Immutability/WORM gives you the ability to write once, and read many, to your Alta Recovery Vault storage and select how long you would like the images to be retained. In the event of a threat actor/malware compromise, immutability prevents the threat actor from expiring your backup images in Alta Recovery Vault or manipulating the data in any way.

Alta Recovery Vault currently only supports Governance mode (also known as enterprise mode). Governance immutability gives users special permissions to disable the retention lock and then delete the image.

Governance mode allows users to accelerate the expiration of images, compliance mode does not allow this. Alta Recovery Vault is closer to compliance mode because no users have the ability to shorten a lock duration since the customer is not the cloud tenant for the storage.

Note: Only the cloud administrator user can disable the retention lock and then delete the image if required. For Alta Recovery Vault, Veritas is the cloud administrator.

When requesting storage from Veritas, your Alta Recovery Vault storage buckets, created by Veritas, will have immutability enabled. All NetBackup Cloud Storage Units must be created with Governance mode immutability enabled in order to ensure that data is written in an immutable format.

Note: For more information on immutability and the msdpcldutil command, refer to the NetBackup Deduplication Guide:

https://www.veritas.com/support/en_US/doc/25074086-159245004-0/v152917675-159245004.

https://www.veritas.com/support/en_US/doc/25074086-149019166-0/v149102641-149019166.

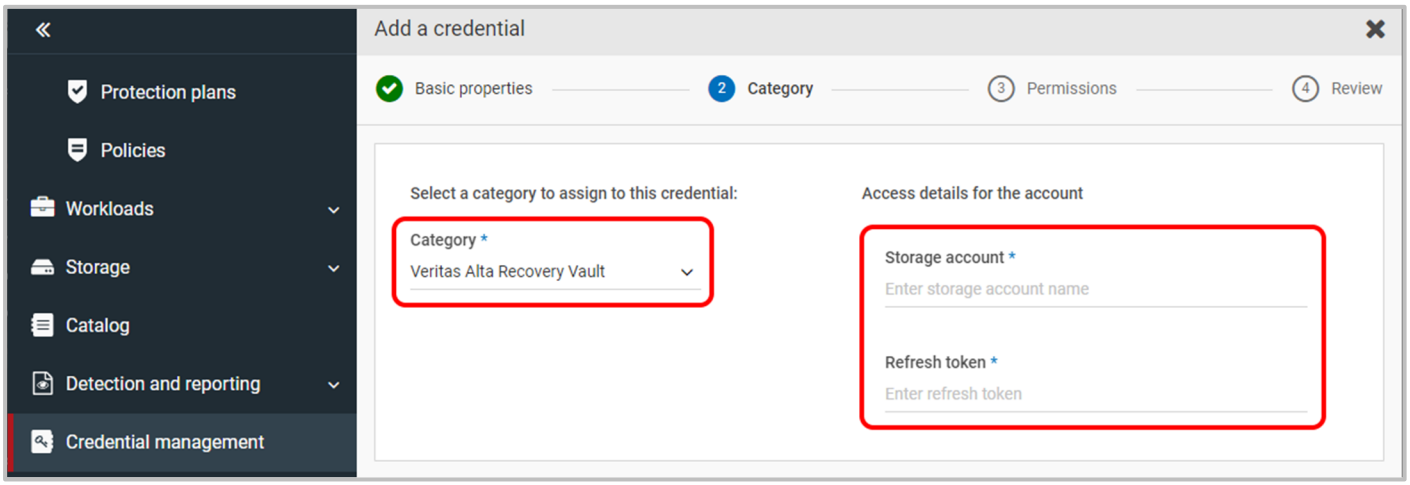
Short lived token based authentication

Veritas provides the ability to connect to Alta Recovery Vault cloud storage in Azure and AWS using token-based credentials provided by Veritas. Enhanced security of token-based credentials further minimizes the risk window when authenticating users or devices in the NetBackup zero trust model by providing a credential management mechanism that uses short lived tokens instead of standard credentials. This new mechanism uses refresh tokens as its security input and generates a new access token periodically before the existing tokens expire.

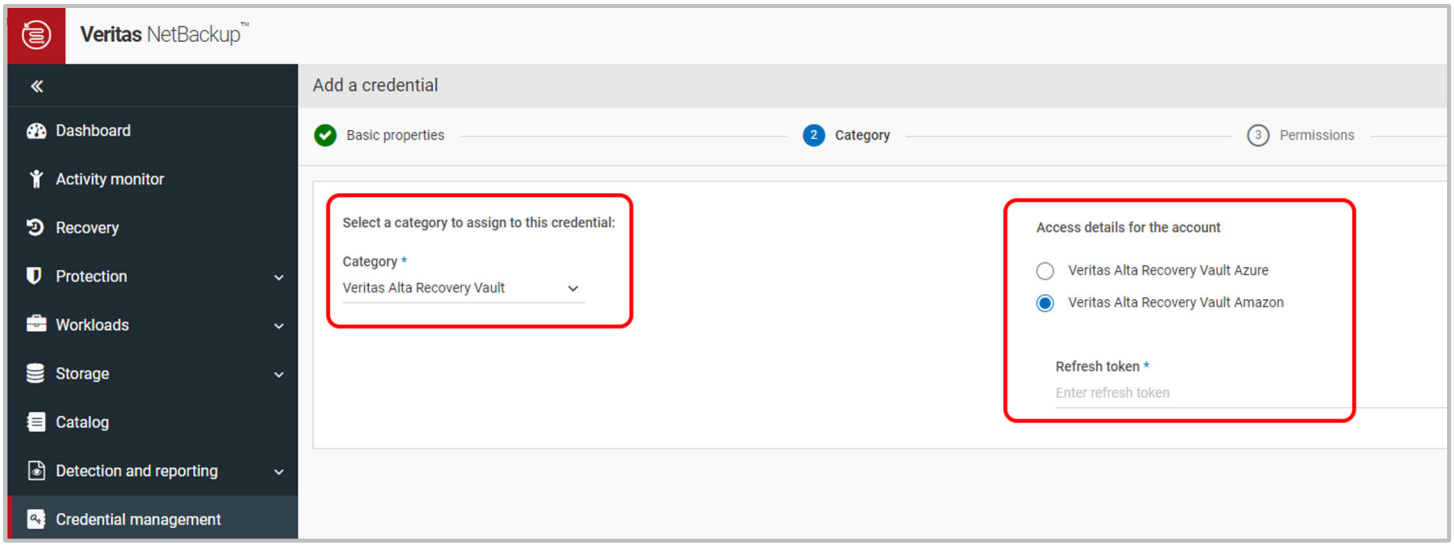
Note: The minimum version for Azure short lived tokens is NetBackup 10.2

The minimum version for AWS short lived tokens is NetBackup 10.4.

For Azure users: Take the storage account and refresh token given to you by Veritas and create a new credential under the Credential Management tab in the NetBackup WebUI.



For AWS users: Take the refresh token given to you by Veritas and create a new credential under the Credential Management tab in the NetBackup WebUI.



Use the credential created when connecting to your Alta Recovery Vault cloud storage in Azure or AWS.

Note: These credentials should be unique. Duplicate entries might lead to failures in configuration or with NetBackup jobs. If you need to update your refresh token for any reason, use the edit option and update the

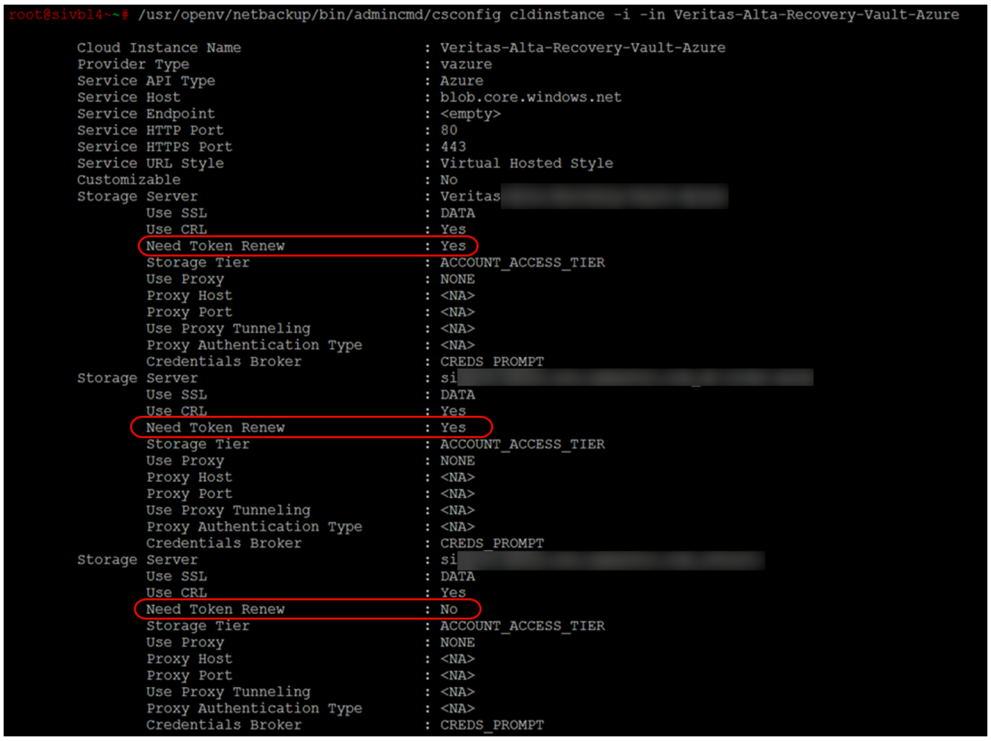
existing storage account instead of creating a new credential with same storage account and new refresh token.

Migrating from Access Key to Token-Based Authentication for Azure

To migrate from access key to token-based authentication, the media server connected to the Alta Recovery Vault must be upgraded to NetBackup 10.2 or later. Currently the command line interface (CLI) is needed to complete the migration.

An attribute called “Need Token Renew” (NTR) will be set to “No” after the upgrade and it must be set to “Yes.”

1. Check to see what the NTR is set as on your storage server after the media server has been upgraded to 10.2 or later.
    a. <*install path*>/netbackup/bin/admincmd/csconfig cldinstance -i



Note: As seen in the image above, the first two storage servers are new media servers and the third is an upgrade. The NTR is currently set to No and needs to be flipped to Yes.

2. Run the following command for the storage server that needs NTR flipped to Yes.
    a. <*install path*>/netbackup/bin/admincmd/csconfig cldinstance -us -in <*Your_Cloud_Instance_Name*> -sts <*Alias_Name*> -ntr 1

- Example: /usr/openv/netbackup/bin/admincmd/csconfig cldinstance -us -in Veritas-Alta-Recovery-Vault-Azure -sts storageserver.com_myvolume -ntr 1

3. Run the following command to ensure your NTR has been set to Yes.

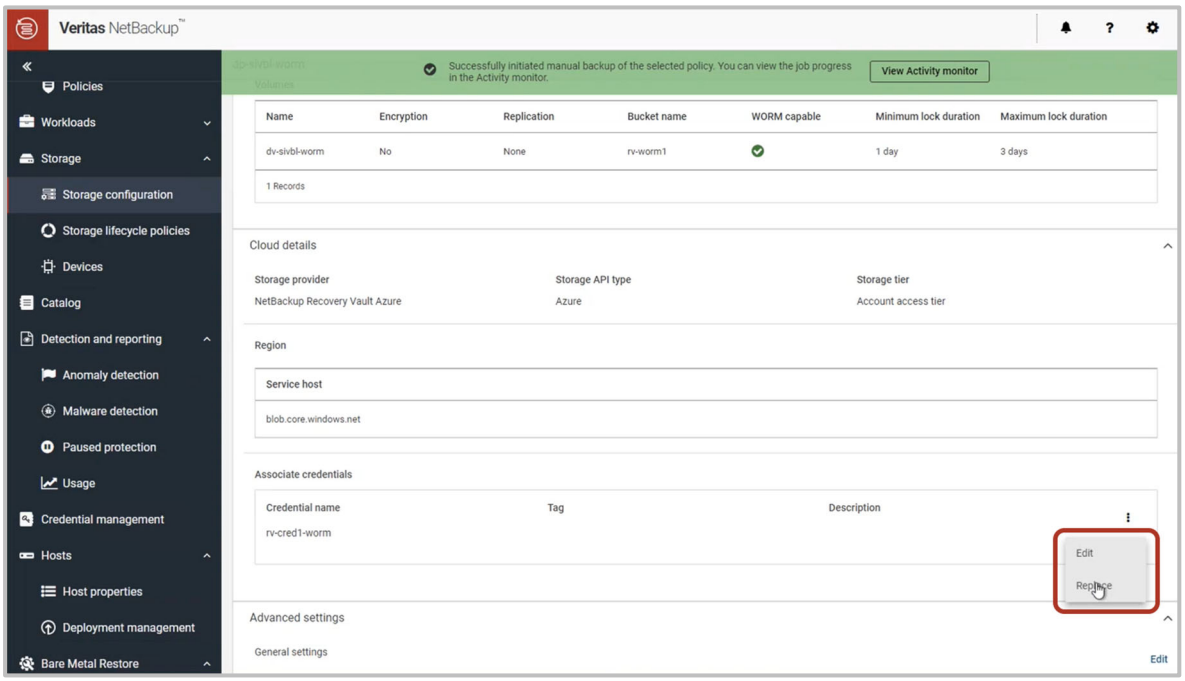
a. <*install path*>/netbackup/bin/admincmd/csconfig cldinstance -i

4. (CLI) –
    a. Update the cloud alias credentials using nbdevconfig
    b. Create or update a text config file with the new credentials.
    c. Set lsuCloudUser to the credential name you created using Credential Management
    d. Fill in lsuCloudPassword with a dummy string
    e. Example content of the file:

        V7.5 "operation" "update-lsu-cloud" string
        V7.5 "lsuName" "myvolume" string
        V7.5 “cmsCredName” “credentialname” string
        V7.5 "lsuCloudBucketName" "mybucket" string
        V7.5 "lsuCloudBucketSubName" "myvolume" string
        <install path>/netbackup/bin/admincmd/nbdevconfig -setconfig -stype PureDisk -storage_server <storage_server> -configlist <config file path>

5. (Web UI) - Navigate to **Storage** > **Storage configuration** > **Disk pools** and select the disk pool your Alta Recovery Vault is located in. Under **Associate credentials**, replace the existing credential.

    Note: Upgrading the MSDP server to use the new credential requires a restart of the MSDP service.



Migrating from Access Key to Token-Based Authentication for AWS

To migrate from access key to token-based authentication, the media server connected to the Alta Recovery Vault must be upgraded to NetBackup 10.4 or later. Currently the command line interface (CLI) is needed to complete the migration.

An attribute called “Need Token Renew” (NTR) will be set to “No” after the upgrade and it must be set to “Yes.”

1. Check to see what the NTR is set as on your storage server after the media server has been upgraded to 10.4 or later.
    a. <*install path*>/netbackup/bin/admincmd/csconfig cldinstance -i

2. Run the following command for the storage server that needs NTR flipped to Yes.
    a. <*install path*>/netbackup/bin/admincmd/csconfig cldinstance -us -in <*Your_Cloud_Instance_Name*> -sts <*Alias_Name*> -ntr 1
        i. Example: /usr/openv/netbackup/bin/admincmd/csconfig cldinstance -us -in Veritas-Alta-Recovery-Vault-Amazon -sts storageserver.com_myvolume -ntr 1

3. Run the following command to ensure your NTR has been set to Yes.
    a. <*install path*>/netbackup/bin/admincmd/csconfig cldinstance -i

4. (CLI) –
    a. Update the cloud alias credentials using nbdevconfig
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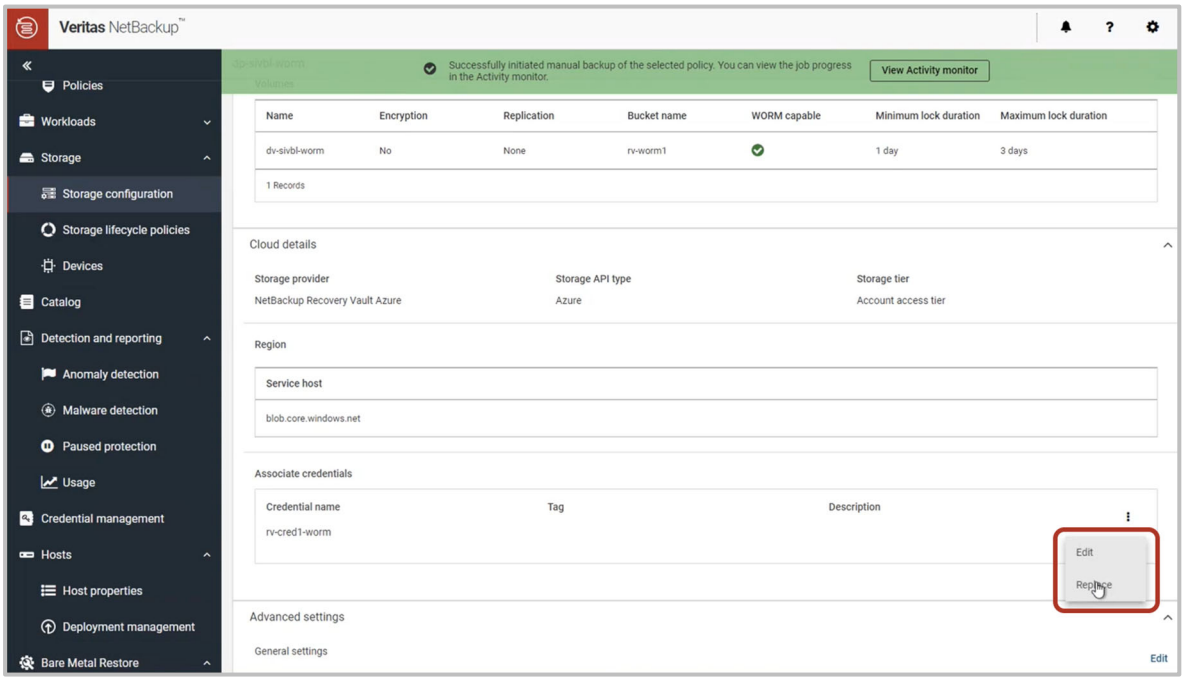
        V7.5 "operation" "update-lsu-cloud" string
        V7.5 "lsuName" "myvolume" string
        V7.5 “cmsCredName” “credentialname” string

        V7.5 "lsuCloudBucketName" "mybucket" string
        V7.5 "lsuCloudBucketSubName" "myvolume" string
        <install path>/netbackup/bin/admincmd/nbdevconfig -setconfig -stype PureDisk -storage_server <storage_server> -configlist <config file path>

5. (Web UI) - Navigate to **Storage** > **Storage configuration** > **Disk pools** and select the disk pool your Alta Recovery Vault is located in. Under **Associate credentials**, replace the existing credential.

   Note: Upgrading the MSDP server to use the new credential requires a restart of the MSDP service.



PROXY SERVER UPDATE FOR ALTA RECOVERY VAULT

To change a proxy server configured for Alta Recovery Vault in NetBackup the following steps are necessary.

Update the information of the cloud instance

1. For a NetBackup Primary server running on Linux connect via ssh. If NetBackup is on Flex or Flex Scale use sudo -i to become root.
2. Examine the storage server name and current proxy server configuration on the cloud instance:
   a. If Alta Recovery Vault is on Azure, use the command:
   `/usr/openv/netbackup/bin/admincmd/csconfig cldinstance -i -in Veritas-Alta-Recovery-Vault-Azure`
   b. If Alta Recovery Vault is on AWS, use the command:
   `/usr/openv/netbackup/bin/admincmd/csconfig cldinstance -i -in Veritas-Alta-Recovery-Vault-Amazon`

   Note: The parameter -in <instance_name> depends on your NetBackup version of cloud configuration file. The command

   `/usr/openv/netbackup/bin/admincmd/csconfig cldinstance -l`

will display the list of cloud providers available.

3. Update the current proxy configuration using the command below

   a. `/usr/openv/netbackup/bin/admincmd/csconfig cldinstance -us -in <instance_name> -sts <storage_server_name> -pxtype HTTP -pxhost <proxy_ip> -pxport <proxy_port>`

4. Update the information on the NetBackup WebUI.
   a. Open the NetBackup WebUI, select Storage, then Disk Storage.
   b. Under Disk Pools, select the Disk Pool used by Alta Recovery Vault by clicking on its name.
   c. Use the Edit button on the Disk Pool Advanced Settings and update the Proxy information as needed.

CONNECTING TO YOUR NEW STORAGE ACCOUNT IN AZURE

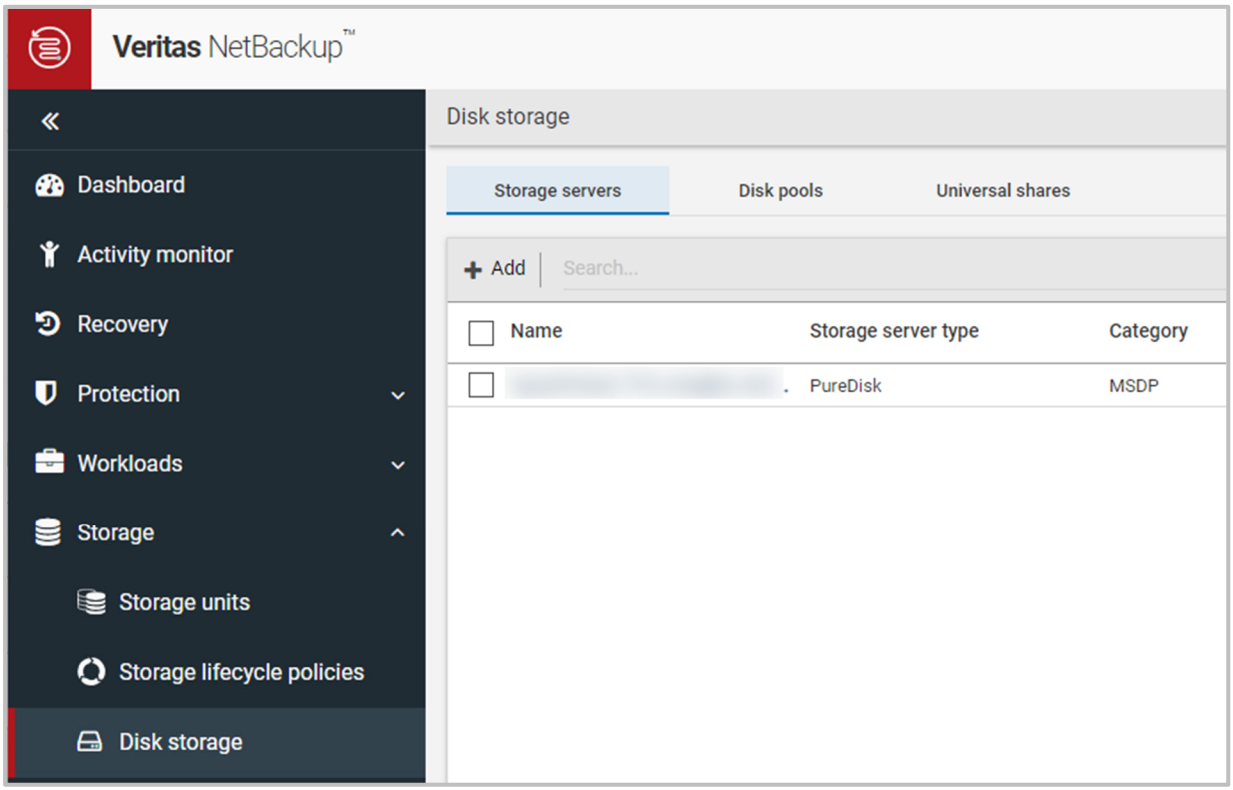
NetBackup 10.4 or later

Note: Having trouble installing Alta Recovery Vault? See the Alta Recovery Vault Troubleshooting Guide.

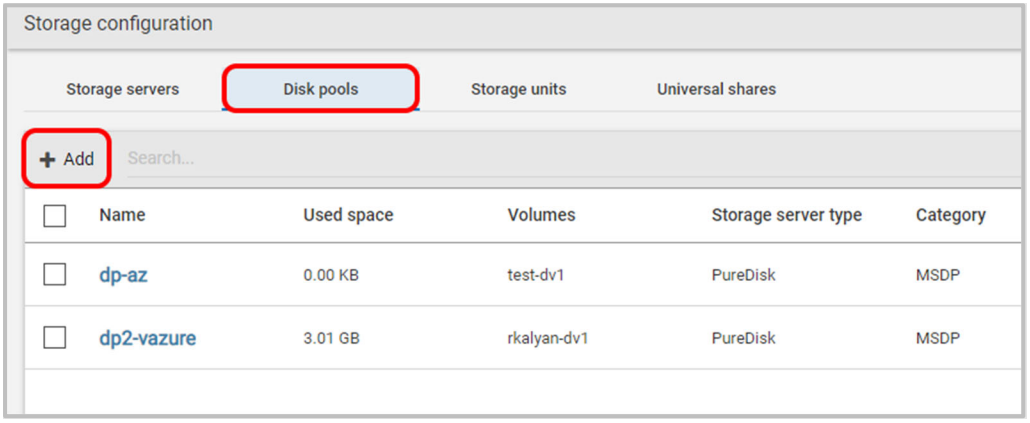
1. Ensure your storage server has been created.
   a. Note that this document assumes you already have an MSDP storage server created. For more information on how to add a storage server, see the *NetBackup Deduplication Guide*: https://www.veritas.com/content/support/en_US/doc/25074086-159245004-0/v24332600-159245004

2. From within your NetBackup primary server web UI, navigate to **Storage > Disk Storage**

   You should see your storage server(s) listed.

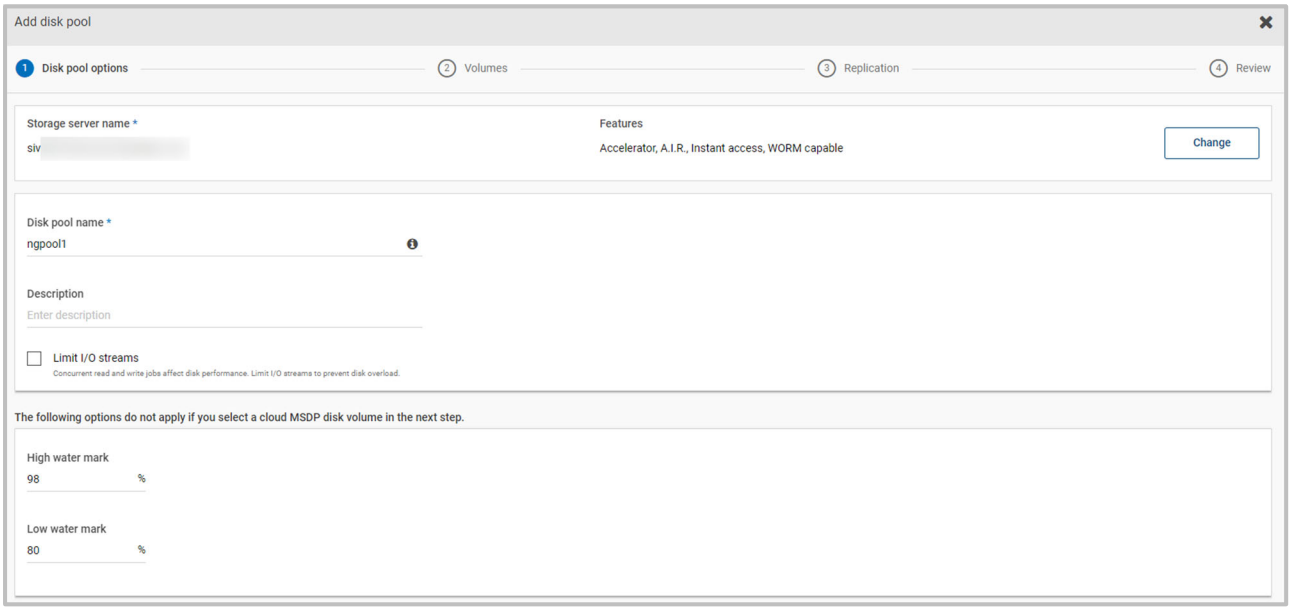


3. Click the **Disk pools** tab and click **+ Add**.

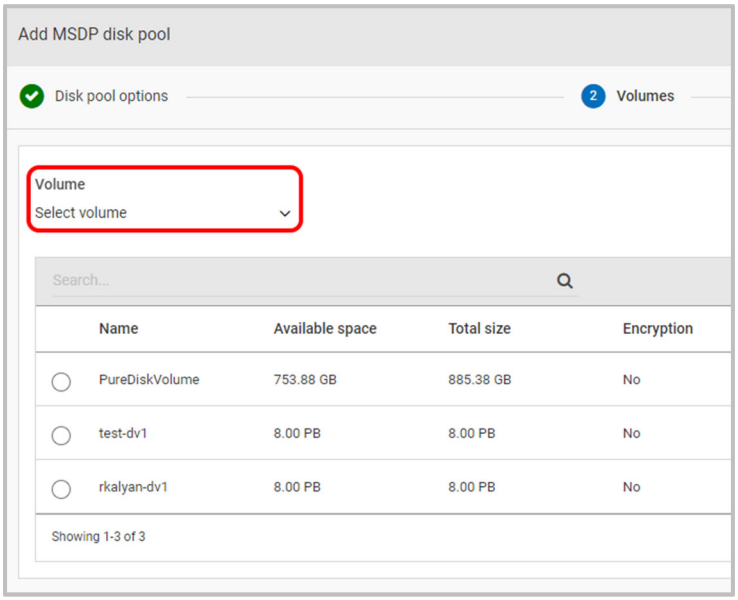


4. First, enter the details for disk pool options.

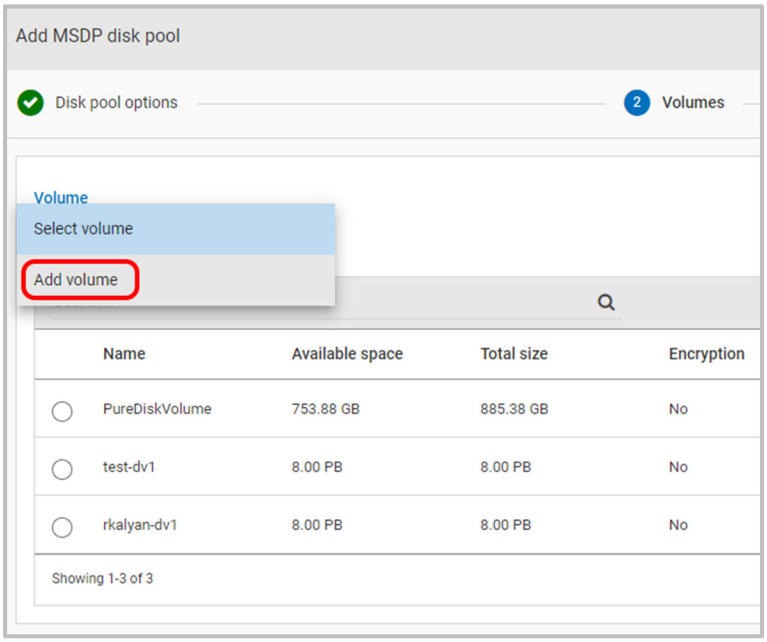
    a. Select the storage server name where this disk pool will reside. In this example, the choice is the storage server seen in step 1 of this procedure.
    b. Provide a name for the disk pool. This example uses “ngpool1”.
    c. If you choose, provide a description for the pool.
    d. Select **Limit I/O streams** if desired. This option could help limit disk I/O contention.
    e. Click **Next** at the bottom of the page to continue. (Not seen in the image.)



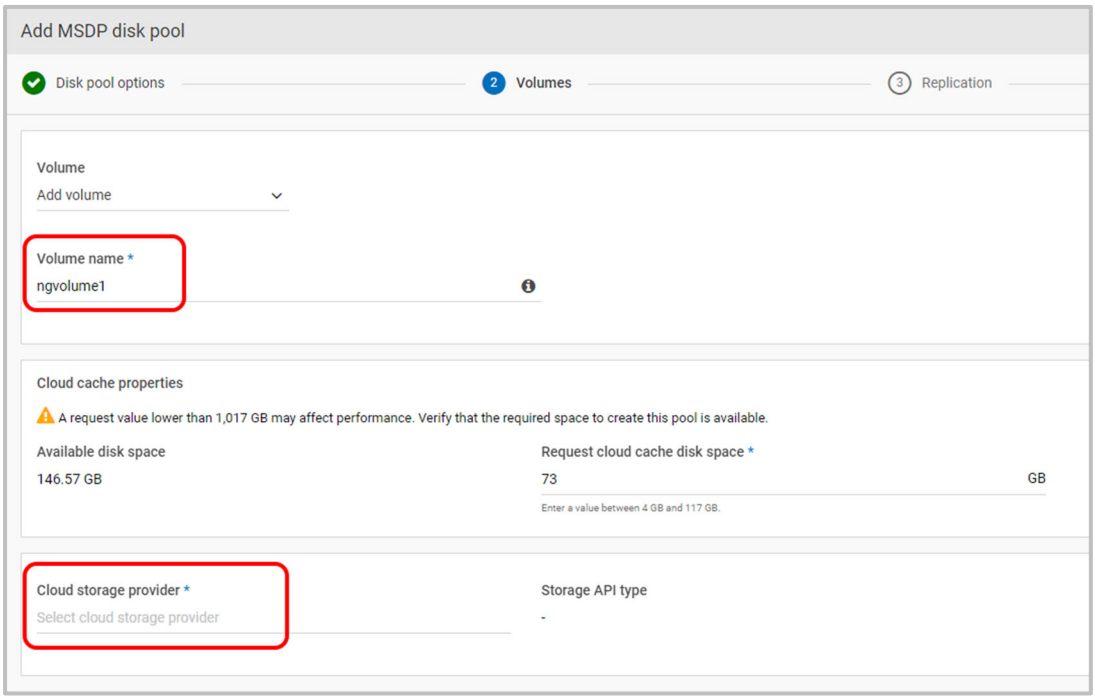
5. Next, you’re brought to the Volumes page. In the example you can see that there are already three volumes created, but you want to add your new Alta Recovery Vault volume. Click **Volume > Select volume**.



6. Click **Add volume** to begin the process.



7. Provide a name for the new volume and click **Cloud storage provider**.



8. Search for “Veritas Alta Recovery Vault Azure” and the following Cloud storage providers appear. For this example, you will choose **Veritas Alta Recovery Vault Azure**.

9. After you select the cloud storage provider, you’re taken back to the Add MSDP disk pool screen. Select the Storage tier you purchased and the Azure region to be used.

   Note: Choices for Storage Tier are:

   Alta Recovery Vault Standard – AZURE

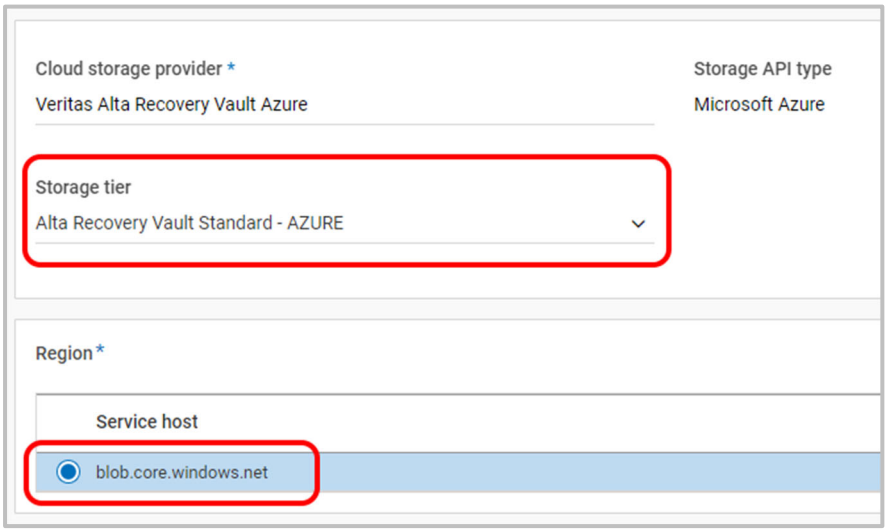
   or

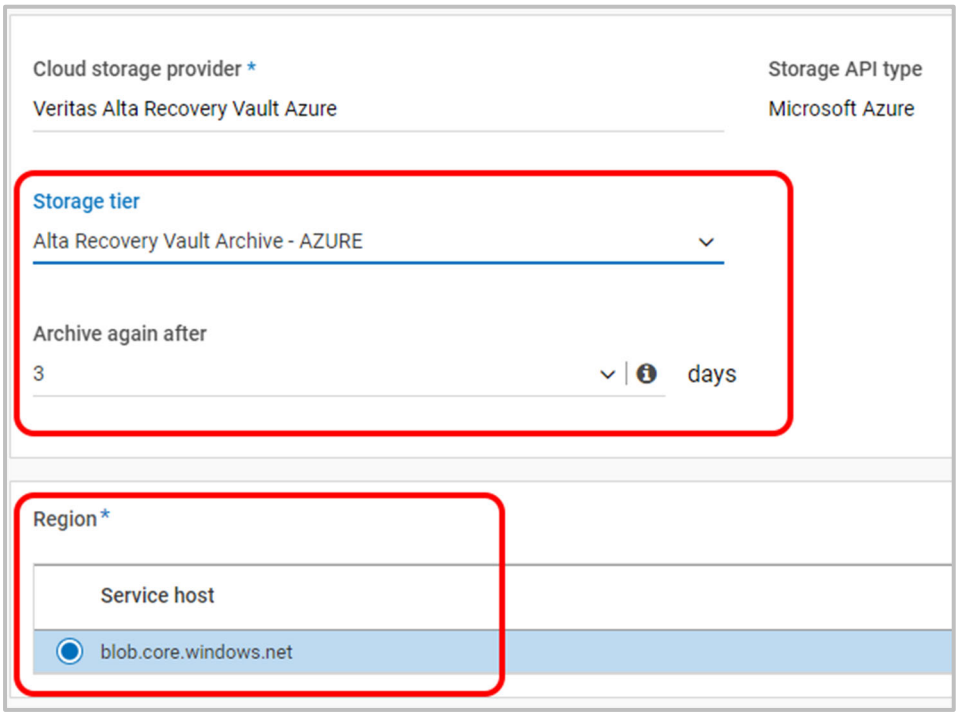
   Alta Recovery Vault Archive - AZURE

   Note: If you’ve purchased archive tier, select Alta Recovery Vault Archive - AZURE. You have a choice to archive again every 3 to 30 days.

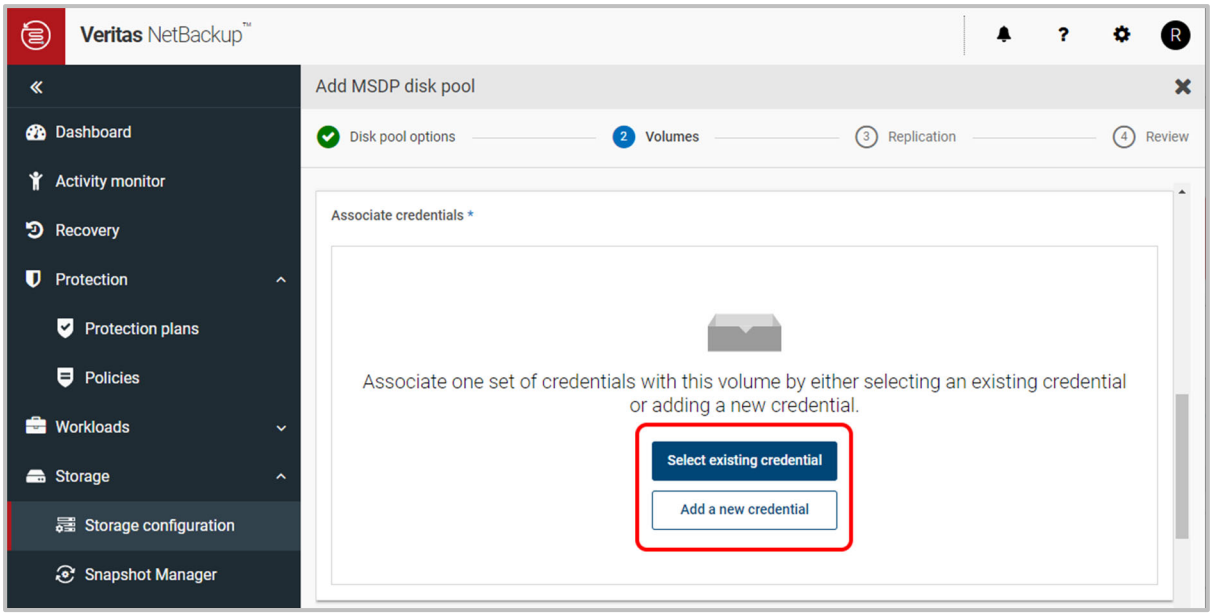
   Note: For archive tier, ensure your cloud vendor provides archive support in the desired region. If archive tier is not supported in the region, this feature will not function correctly.

   Note: The region is provided by the Veritas Alta Recovery Vault Provisioning Team.



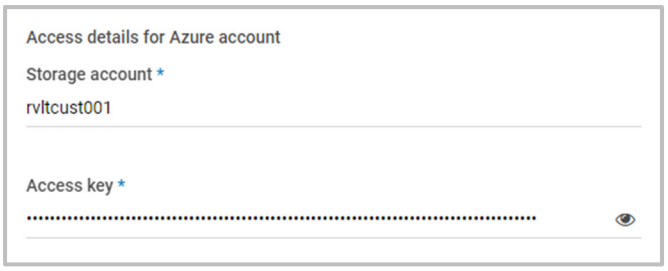

Cloud storage provider *
Veritas Alta Recovery Vault Azure
Storage API type
Microsoft Azure
Storage tier
Alta Recovery Vault Archive - AZURE
Archive again after
3
days
Region *
Service host
blob.core.windows.net

10. Click **Select existing credential** if you've already created your credential from the Short-Lived Token Based Authentication section earlier in this document. If not, click **Add a new credential** and create a new credential using the storage account and refresh token given to you by Veritas.



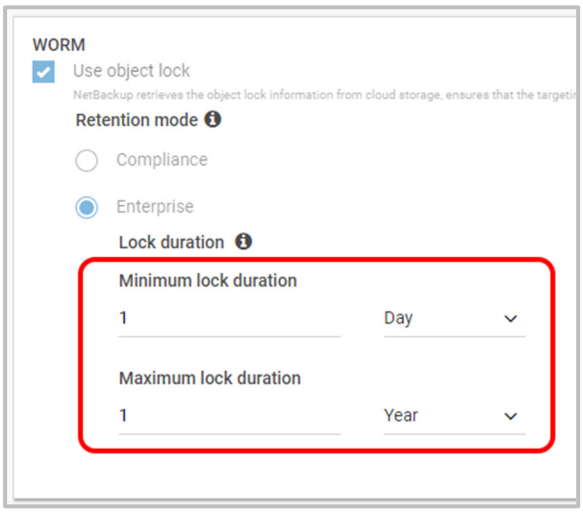
Note: You can create multiple disk volumes/buckets using the same credentials. There is no need to add multiple credentials for the same storage account.

Note: The storage account, short lived tokens, and access keys are provided by the Veritas Alta Recovery Vault Provisioning Team.



11. In the WORM section is where you set the immutability time duration. During the Lock duration the image is locked. For more information regarding immutability, see the Veritas Knowledge Base Article 100055803 for more information on Alta Recovery Vault and immutability.

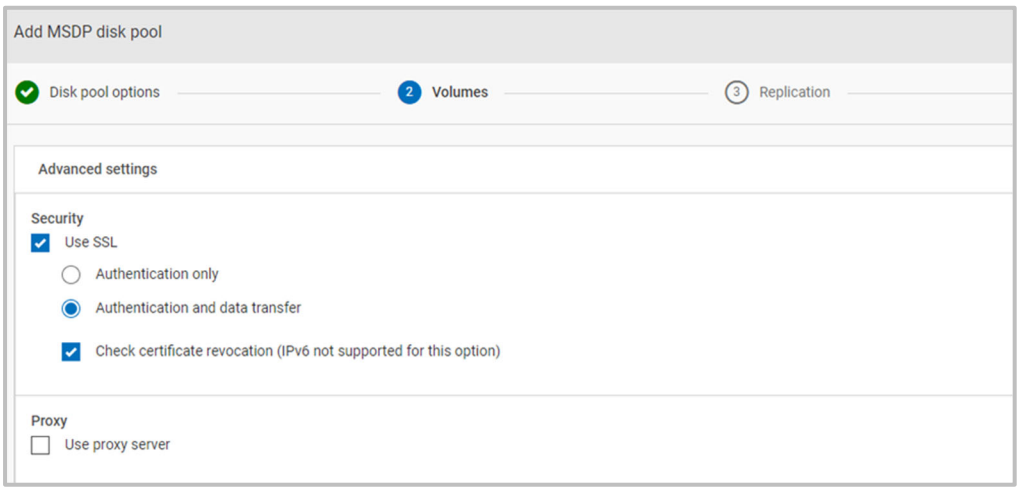
    Note: WORM and Enterprise mode are selected by default and cannot be changed.



12. In Advanced settings, enter the required Security or Proxy preferences.

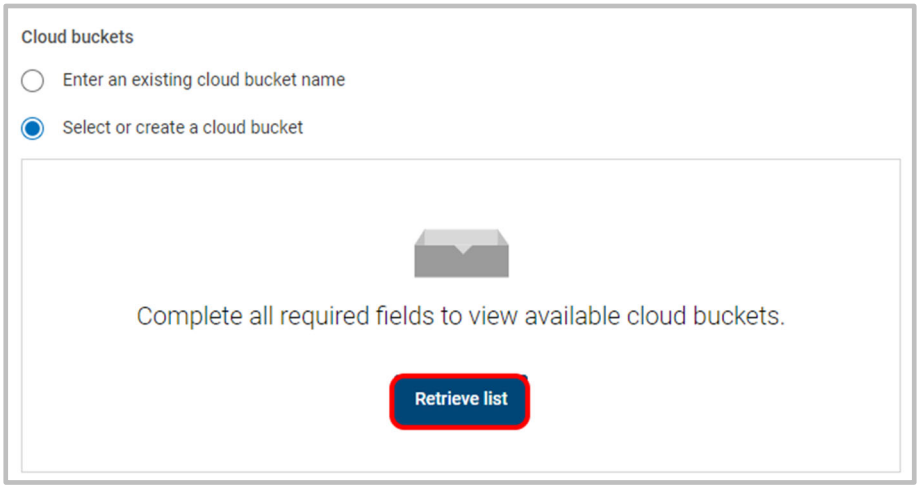
    Note: If you do not want to open port 80 externally, you will need to uncheck "Check certificate revocation", For more information on check certificate revocation, see the following: https://en.wikipedia.org/wiki/Certificate_revocation_list#:~:text=In%20cryptography%2C%20a%20certificate%20revocation,should%20no%20longer%20be%20trusted%22.

    Note: A proxy server can be used if wanted. Check the box seen below and enter the required information for the proxy server.

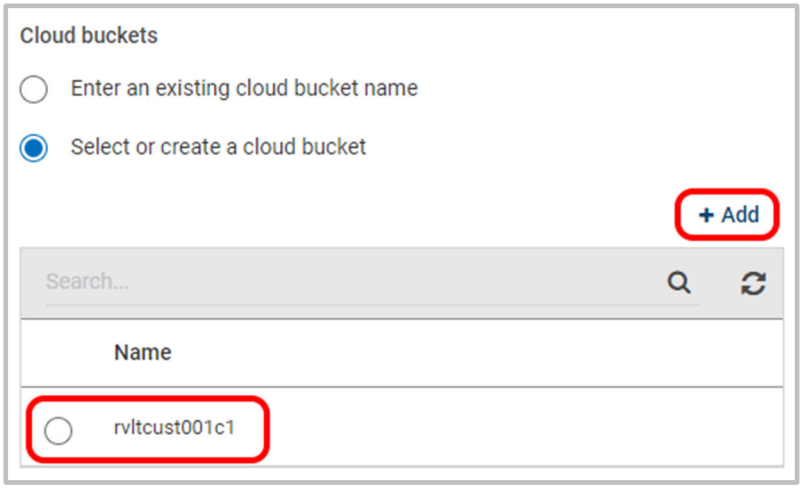


13. Click **Select or create a cloud bucket** and then click **Retrieve list**. This process logs into Azure using the credentials provided earlier.

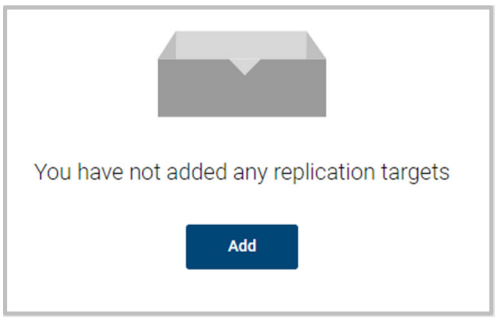
    Note: If the Retrieve List operation is successful, the credentials to connect to the Azure storage are correct.



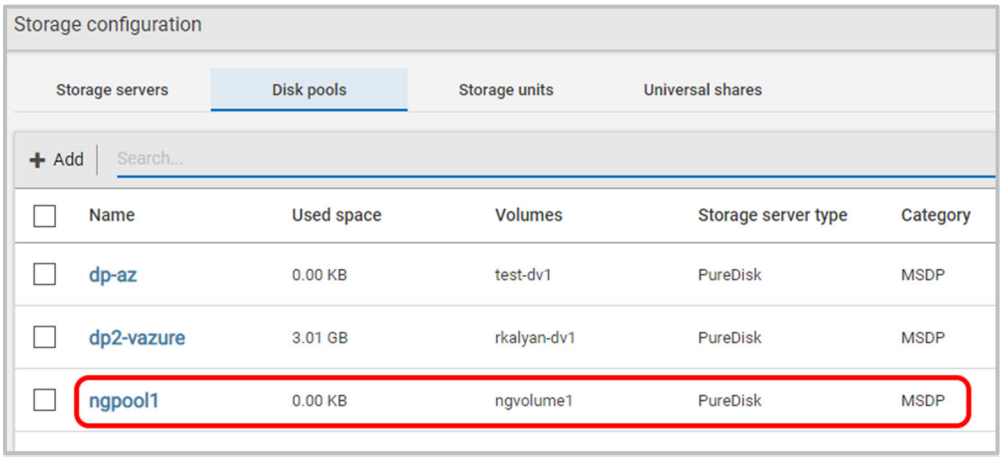
14. A new bucket can also be created using the **+ Add** button in the NetBackup web UI after you connect to the new storage account. Listed below is the Alta Recovery Vault cloud bucket “rvltcust001c1”. The name of your cloud bucket will be different; the one below is for reference only.



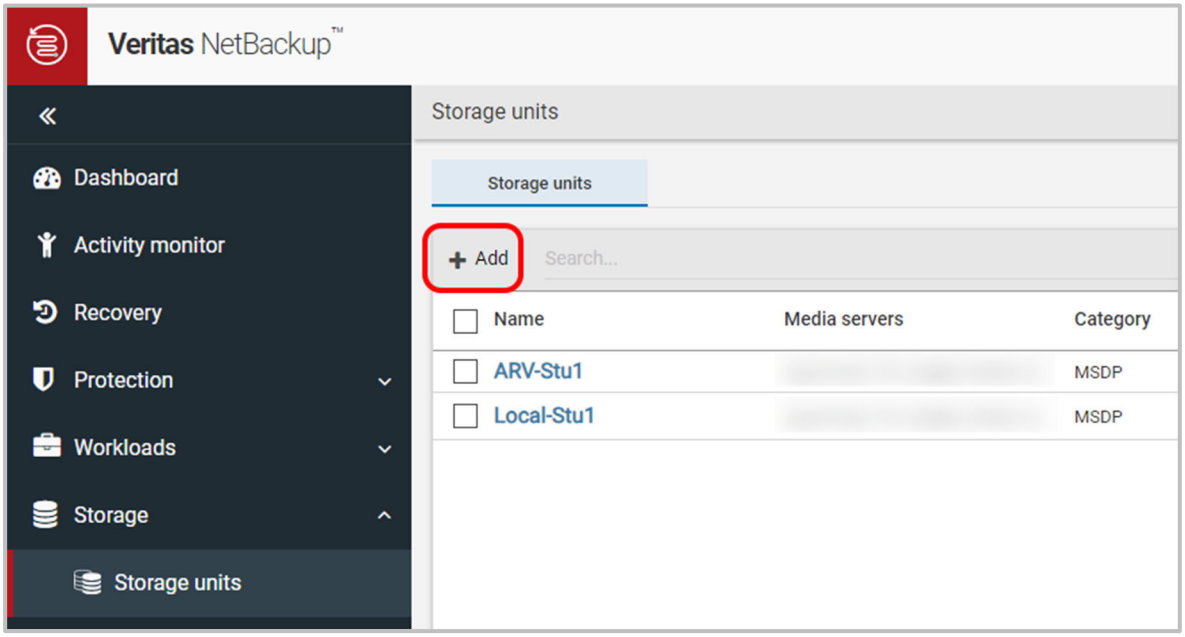
15. If you would like to set up replication targets, they can be set up now. If none are needed, click **Next**. (Not shown in the image.)



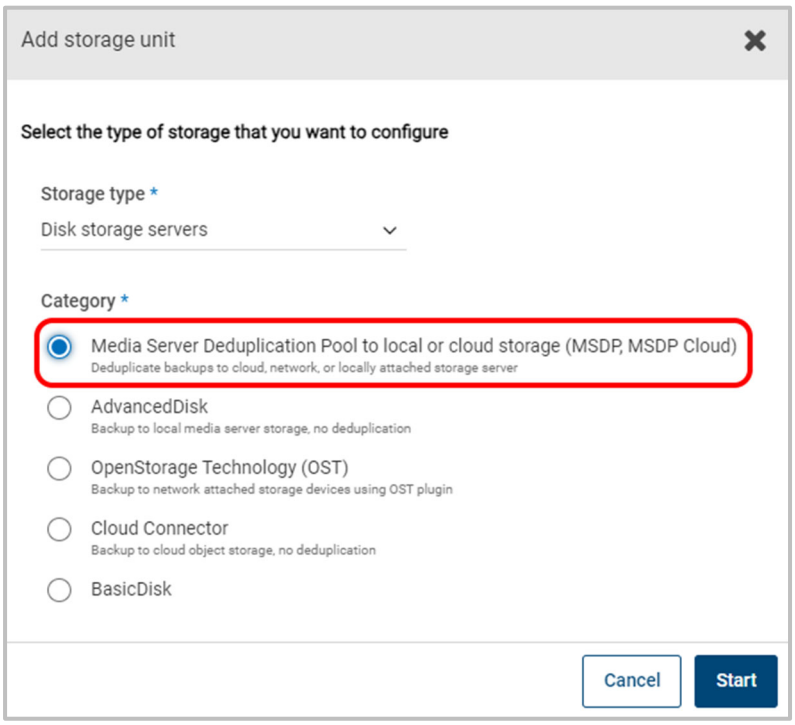
16. The next page is a summary page. If everything looks good, create the new disk pool. In this example, the new “ngpool1” has been created.



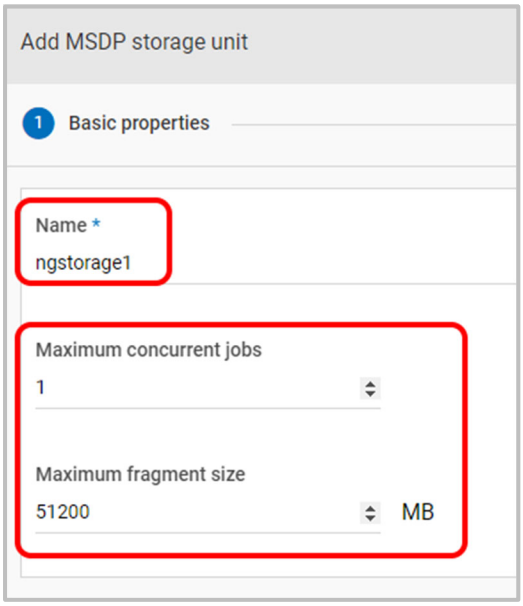
17. Next, add a storage unit so you can use your new Alta Recovery Vault storage. Under Storage > Storage Units, click **+ Add**.



18. Select **Media Server Deduplication Pool to local or cloud storage (MSDP, MSDP Cloud)** and click **Start**.

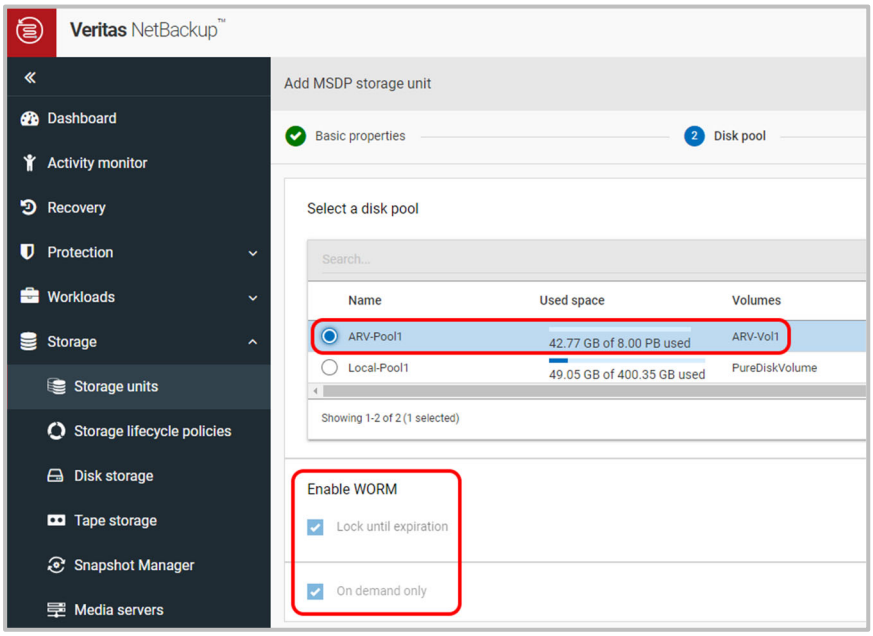


19. Provide a new MSDP storage unit name and select the desired **Maximum concurrent jobs** and **Maximum fragment size**. Click **Next** to continue. (Not shown in the image.)

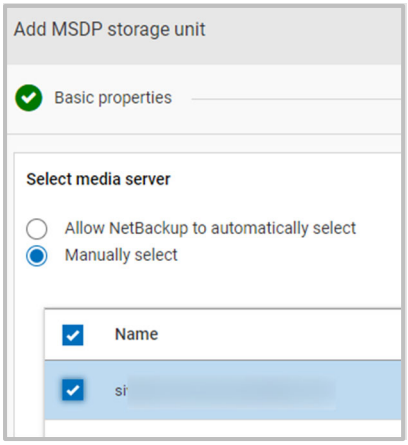


20. Select the Alta Recovery Vault volume created earlier. Click **Next** to continue. (Not shown in the image.)

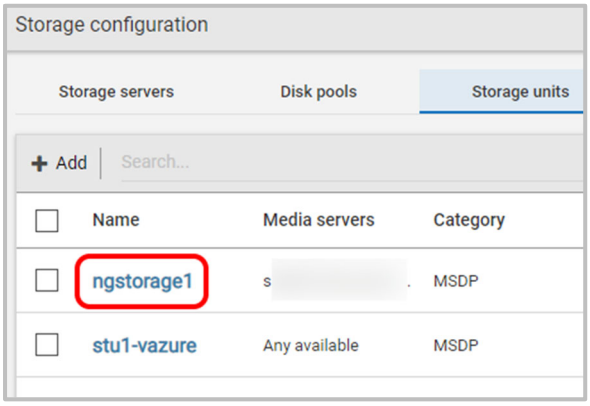
    Note: Enable WORM will be checked by default and cannot be un-checked.



21. Select the media server you wish to use. Click **Next** to continue. (Not shown in the image.)



22. Here you can see your new “ngstorage1” storage unit successfully created.



The new Alta Recovery Vault storage can now be used for backups.

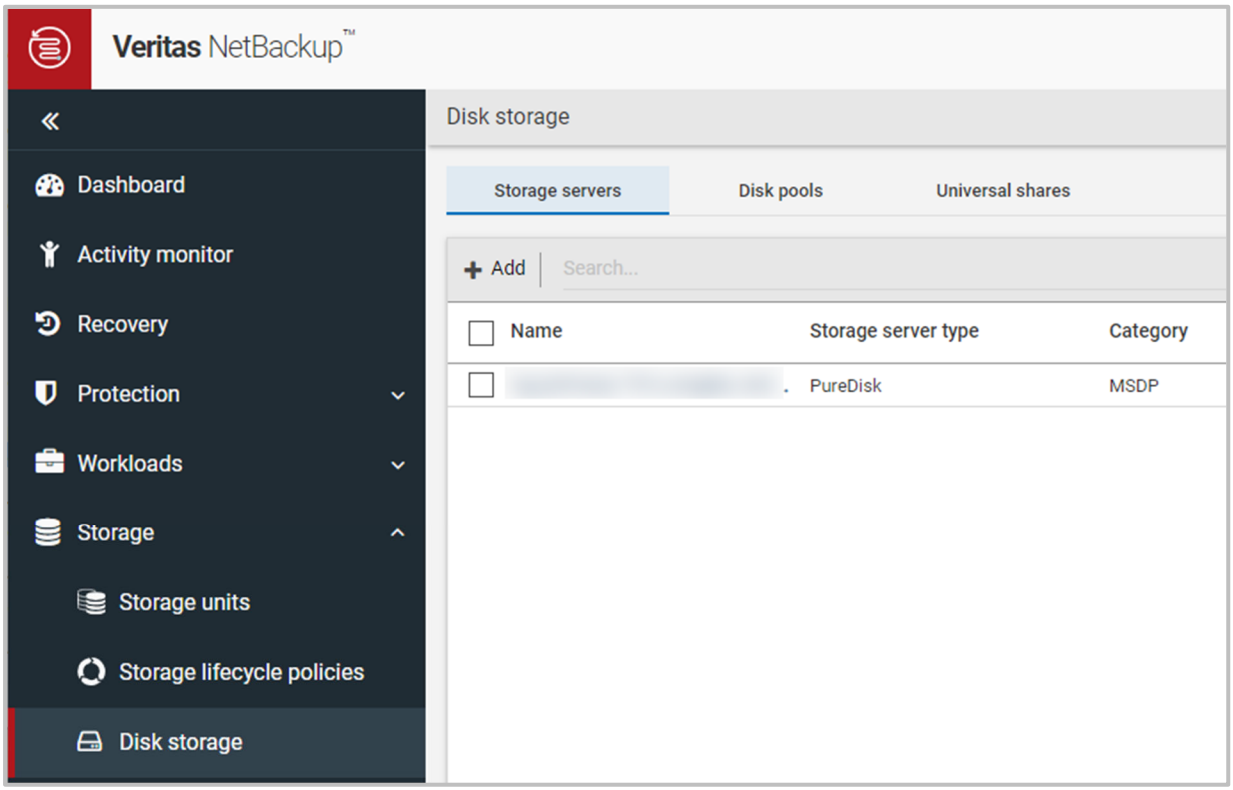
NetBackup 10.3

Note: Having trouble installing Alta Recovery Vault? See the Alta Recovery Vault Troubleshooting Guide.

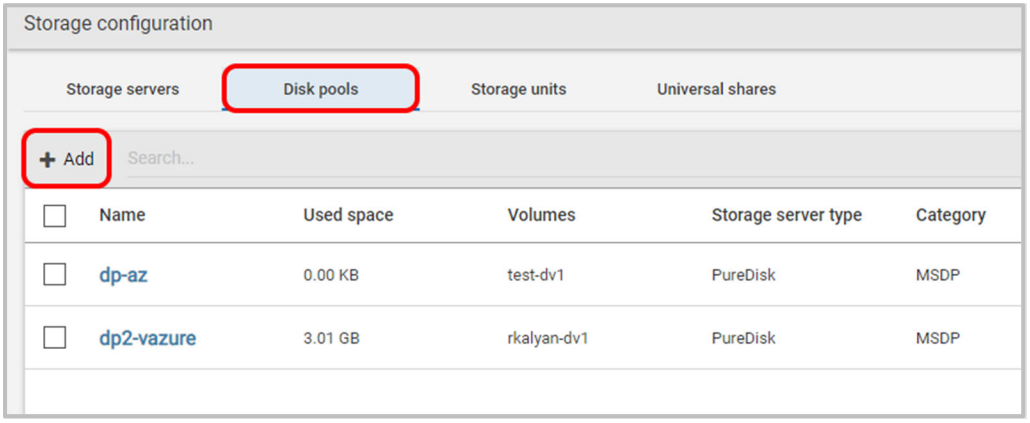
1. Ensure your storage server has been created.
    a. Note that this document assumes you already have an MSDP storage server created. For more information on how to add a storage server, see the *NetBackup Deduplication Guide*: https://www.veritas.com/content/support/en_US/doc/25074086-159245004-0/v24332600-159245004

2. From within your NetBackup primary server web UI, navigate to **Storage > Disk Storage**

   You should see your storage server(s) listed.

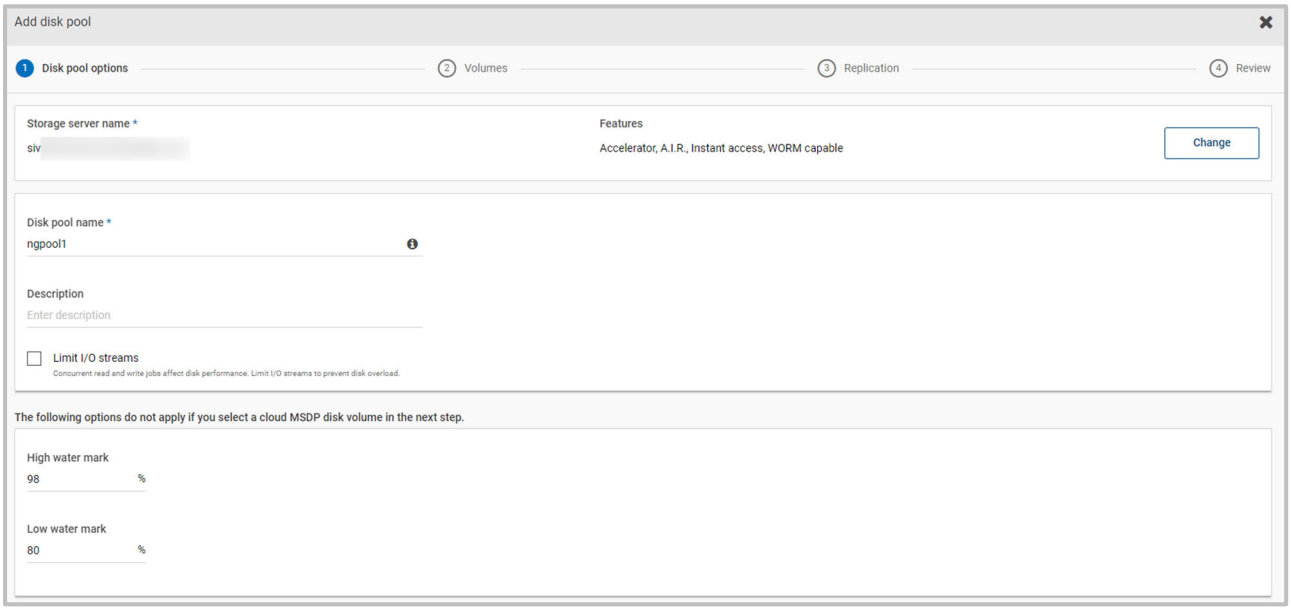


3. Click the **Disk pools** tab and click **+ Add**.

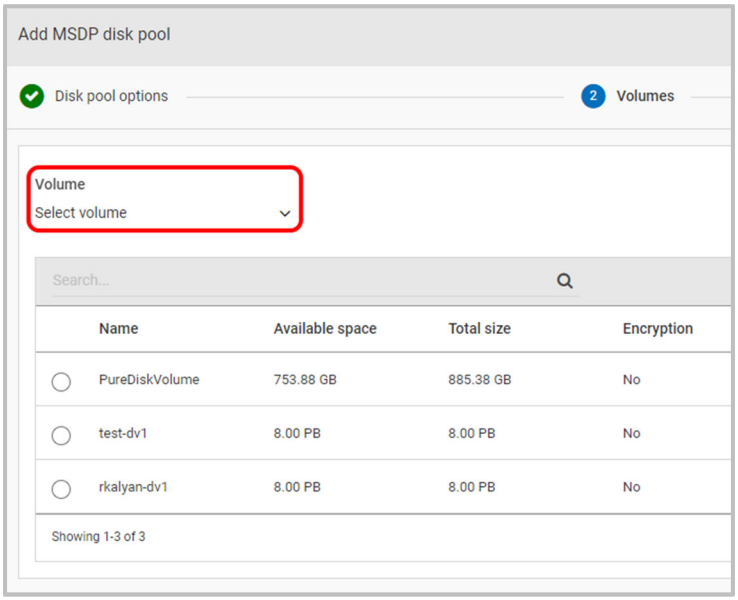


4. First, enter the details for disk pool options.

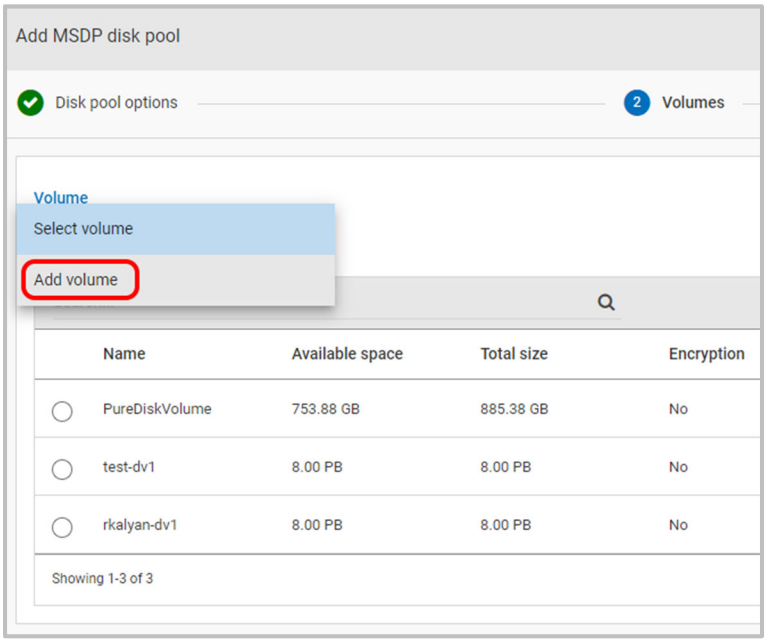
    f. Select the storage server name where this disk pool will reside. In this example, the choice is the storage server seen in step 1 of this procedure.
    g. Provide a name for the disk pool. This example uses “ngpool1”.
    h. If you choose, provide a description for the pool.
    i. Select **Limit I/O streams** if desired. This option could help limit disk I/O contention.
    j. Click **Next** at the bottom of the page to continue. (Not seen in the image.)



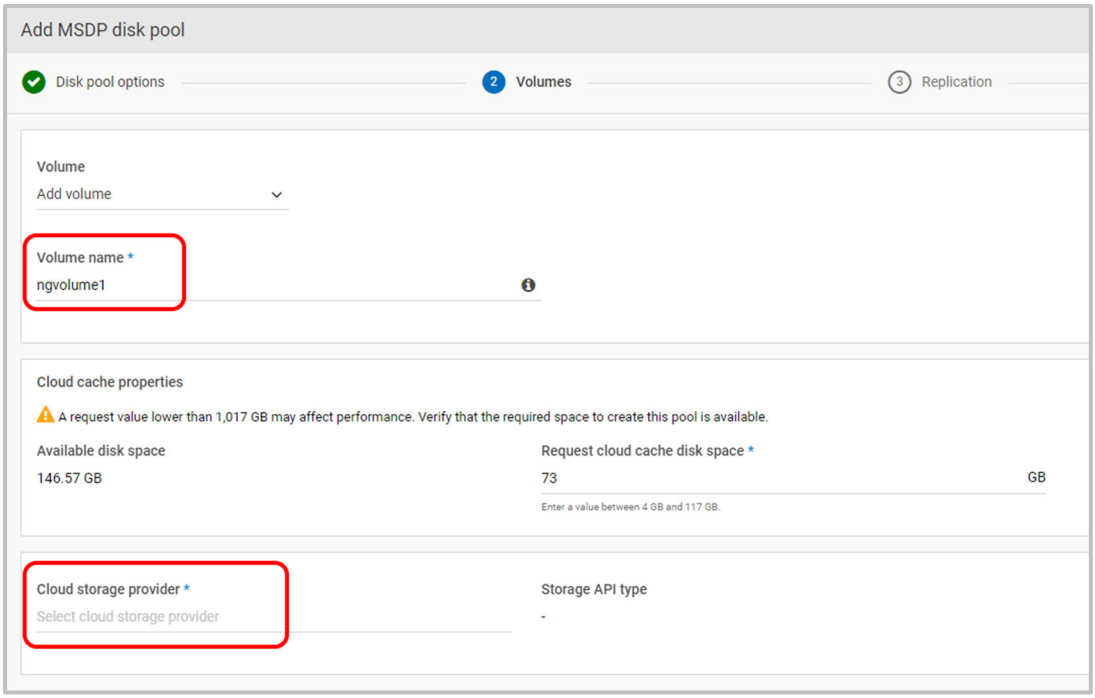
5. Next, you’re brought to the Volumes page. In the example you can see that there are already three volumes created, but you want to add your new Alta Recovery Vault volume. Click **Volume > Select volume**.



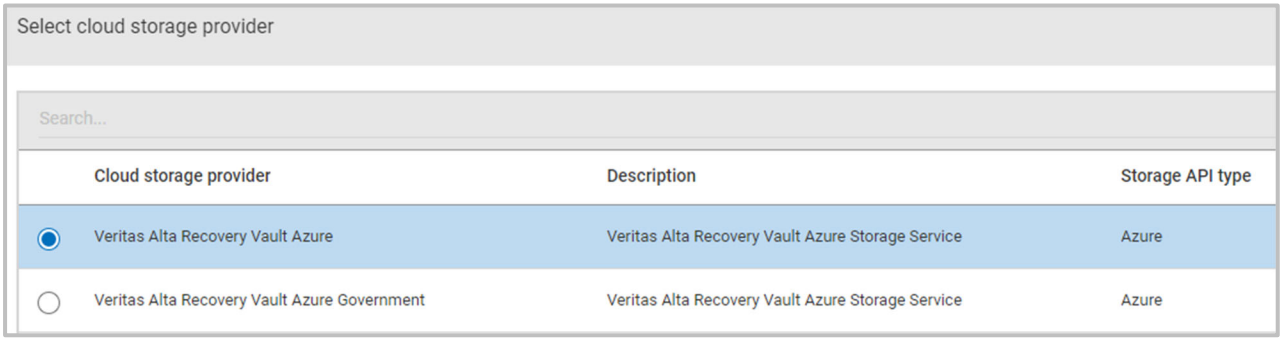
6. Click **Add volume** to begin the process.



7. Provide a name for the new volume and click **Cloud storage provider**.

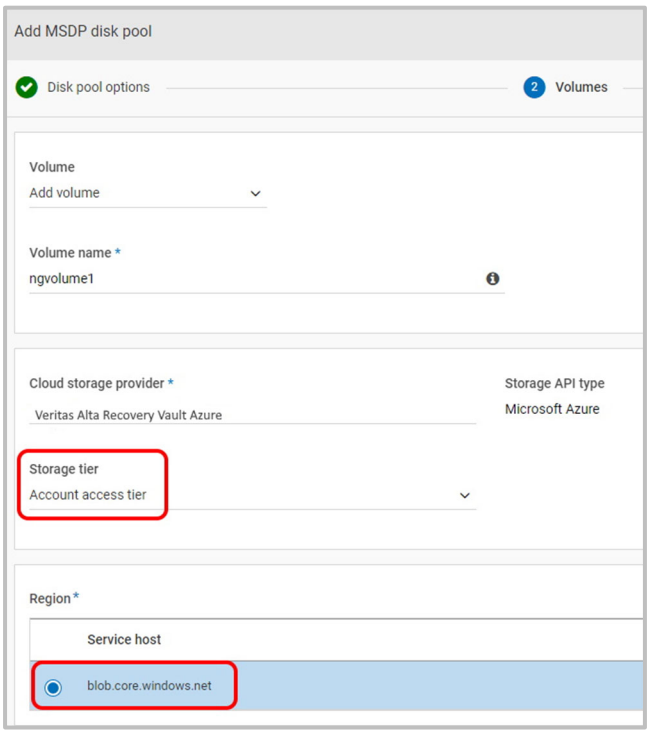


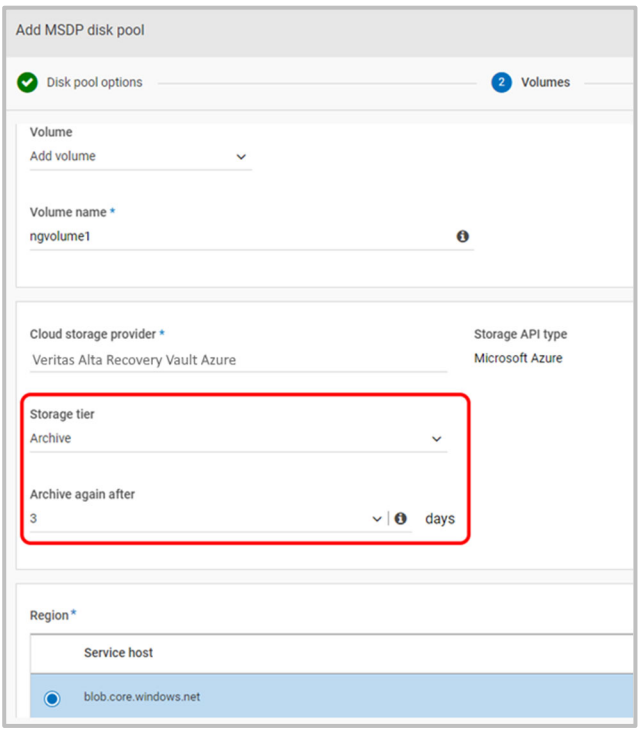
8. Search for “Veritas Alta Recovery Vault Azure” and the following Cloud storage providers appear. For this example, you will choose **Veritas Alta Recovery Vault Azure**.



9. After you select the cloud storage provider, you’re taken back to the Add MSDP disk pool screen. Select the Storage tier you would like and the Azure region to be used.

   Note: The region is provided by the Veritas Alta Recovery Vault Provisioning Team.

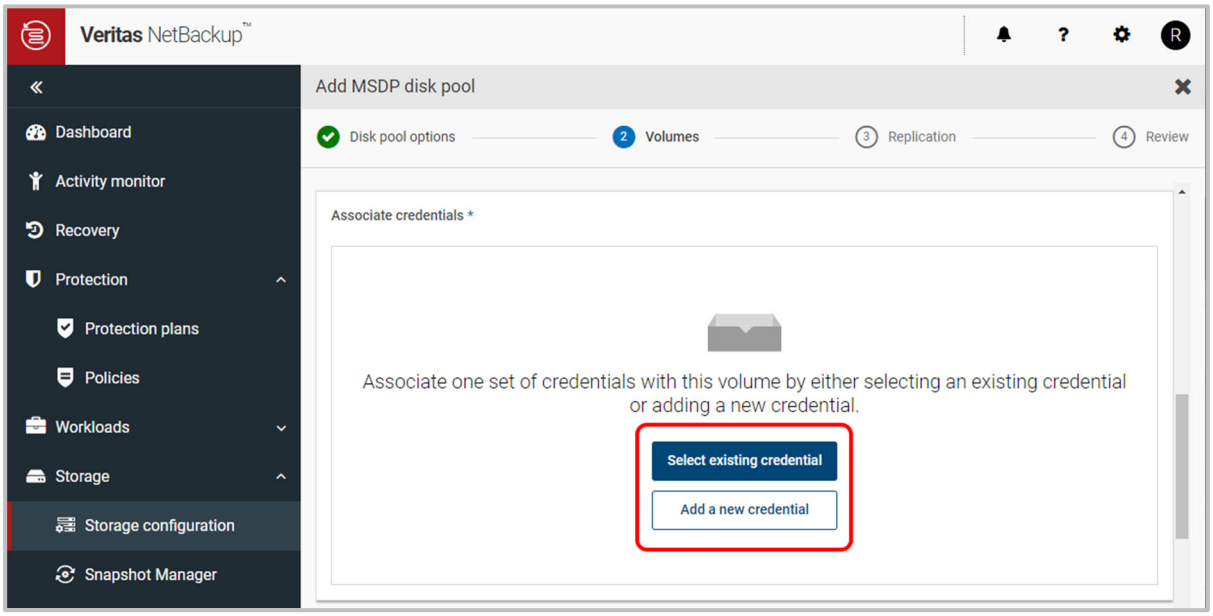




If you’ve purchased archive tier, click **Account access tier** and select **Archive**. You have a choice to archive again every 3 to 30 days.

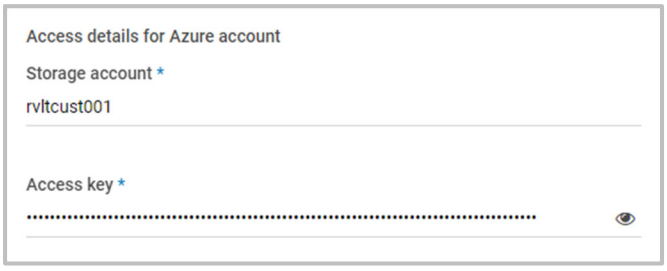
Note: For archive tier, ensure your cloud vendor provides archive support in the desired region. If archive tier is not supported in the region, this feature will not function correctly.

10. Click **Select existing credential** if you've already created your credential from the Short-Lived Token Based Authentication section earlier in this document. If not, click **Add a new credential** and create a new credential using the storage account and refresh token given to you by Veritas.



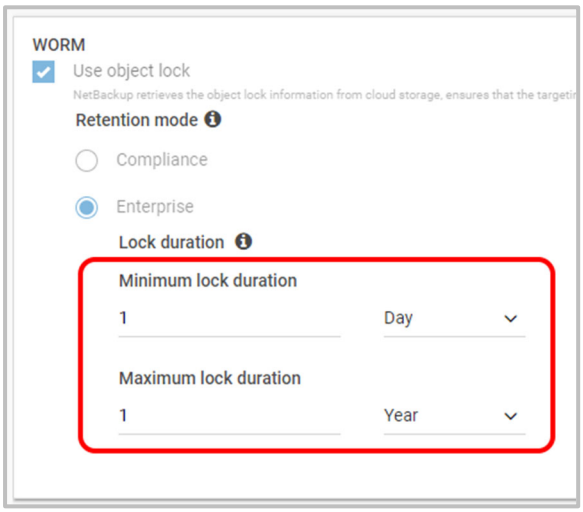
Note: You can create multiple disk volumes/buckets using the same credentials. There is no need to add multiple credentials for the same storage account.

Note: The storage account, short lived tokens, and access keys are provided by the Veritas Alta Recovery Vault Provisioning Team.



11. In the WORM section is where you set the immutability time duration. During the Lock duration the image is locked. For more information regarding immutability, see the Veritas Knowledge Base Article 100055803 for more information on Alta Recovery Vault and immutability.

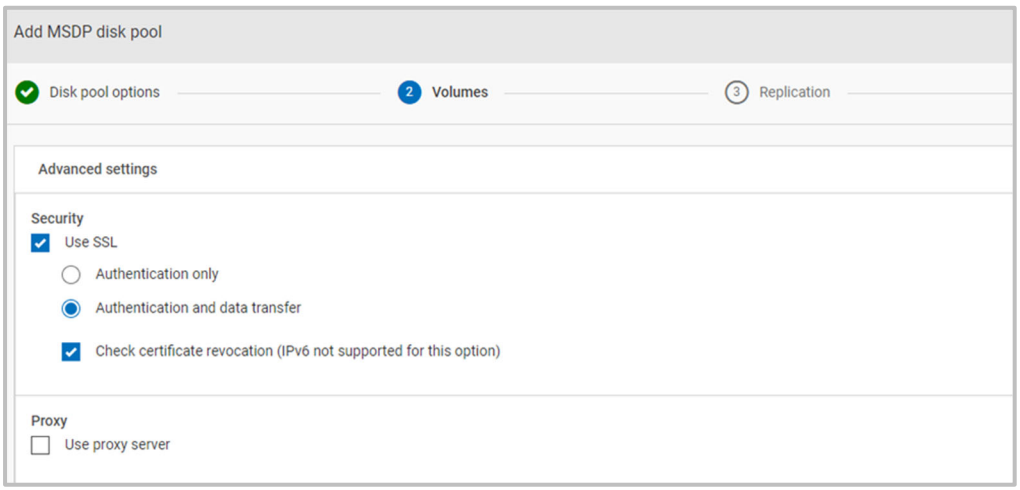
    Note: WORM and Enterprise mode are selected by default and cannot be changed.



12. In Advanced settings, enter the required Security or Proxy preferences.

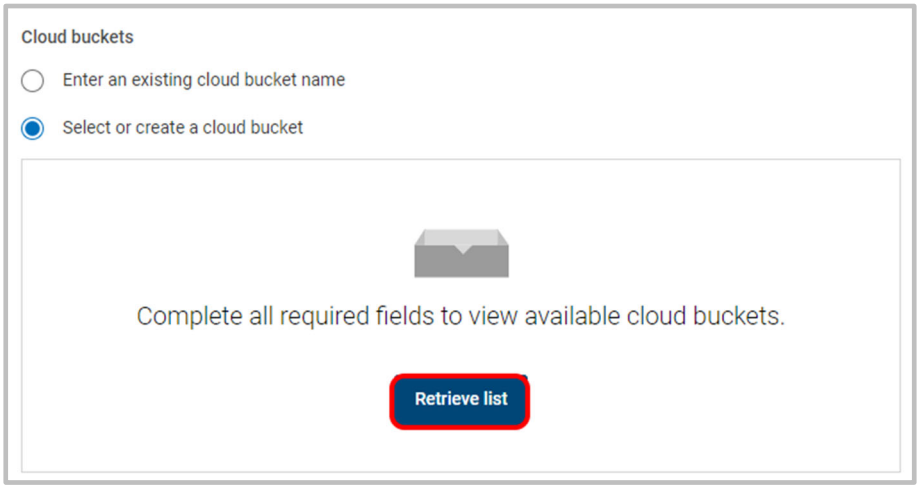
    Note: If you do not want to open port 80 externally, you will need to uncheck "Check certificate revocation", For more information on check certificate revocation, see the following: https://en.wikipedia.org/wiki/Certificate_revocation_list#:~:text=In%20cryptography%2C%20a%20certificate%20revocation,should%20no%20longer%20be%20trusted%22.

    Note: A proxy server can be used if wanted. Check the box seen below and enter the required information for the proxy server.

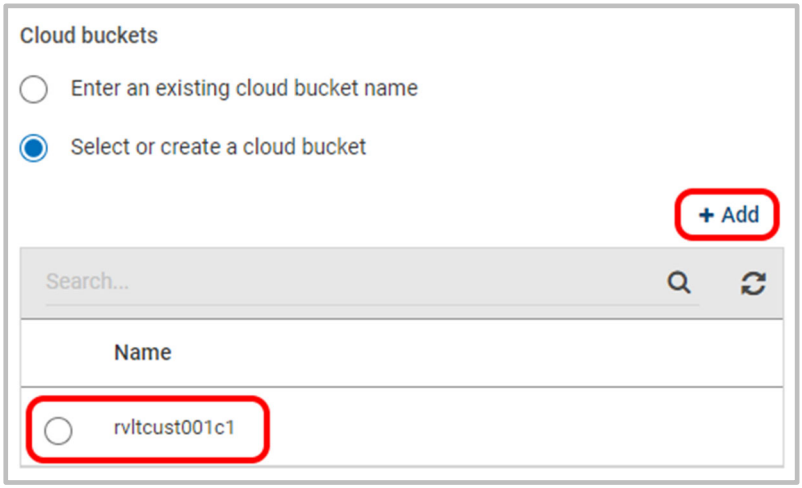


13. Click **Select or create a cloud bucket** and then click **Retrieve list**. This process logs into Azure using the credentials provided earlier.

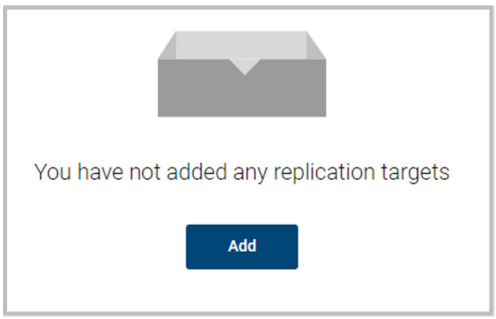
    Note: If the Retrieve List operation is successful, the credentials to connect to the Azure storage are correct.



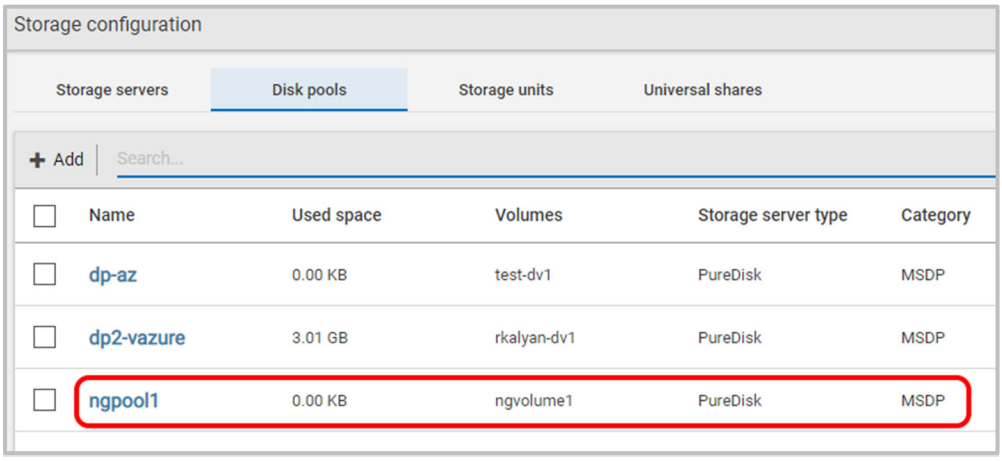
14. A new bucket can also be created using the **+ Add** button in the NetBackup web UI after you connect to the new storage account. Listed below is the Alta Recovery Vault cloud bucket “rvltcust001c1”. The name of your cloud bucket will be different; the one below is for reference only.



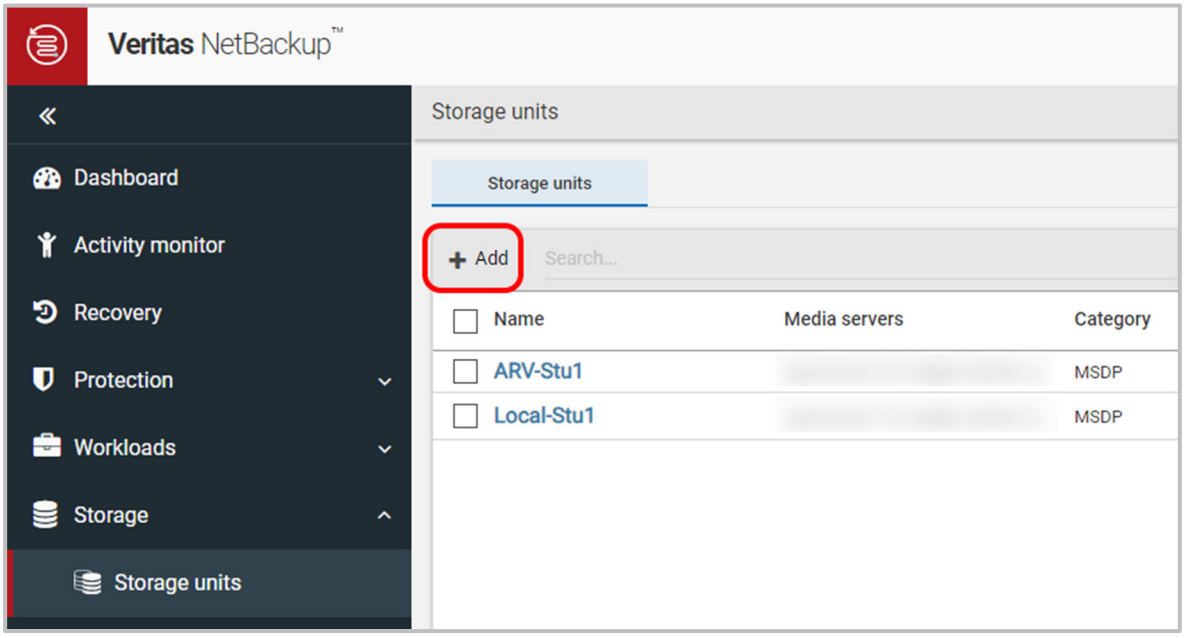
15. If you would like to set up replication targets, they can be set up now. If none are needed, click **Next**. (Not shown in the image.)



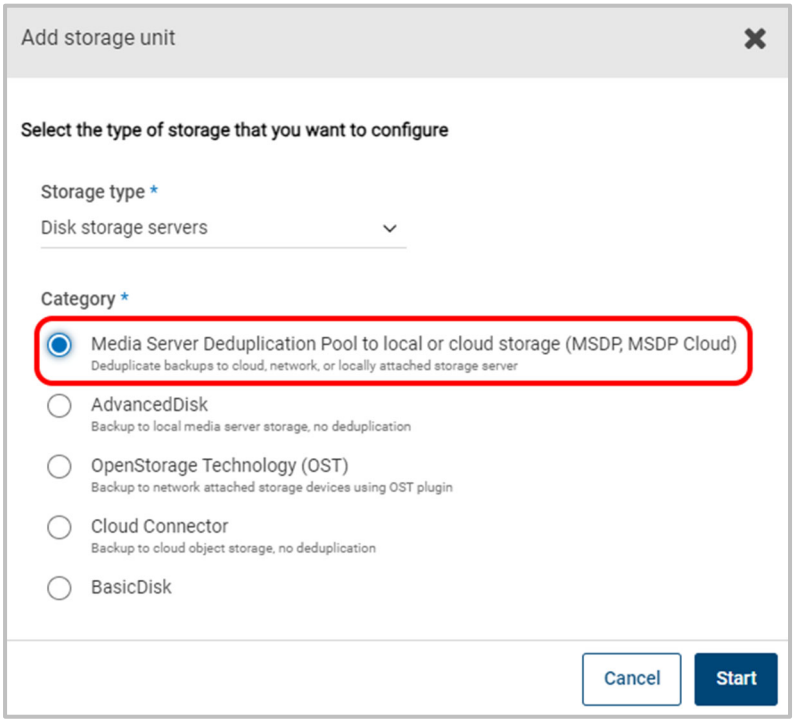
16. The next page is a summary page. If everything looks good, create the new disk pool. In this example, the new “ngpool1” has been created.



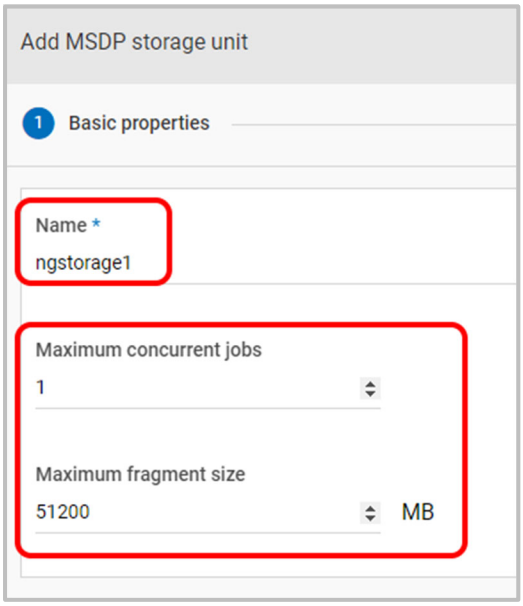
17. Next, add a storage unit so you can use your new Alta Recovery Vault storage. Under Storage > Storage Units, click **+ Add**.



18. Select **Media Server Deduplication Pool to local or cloud storage (MSDP, MSDP Cloud)** and click **Start**.

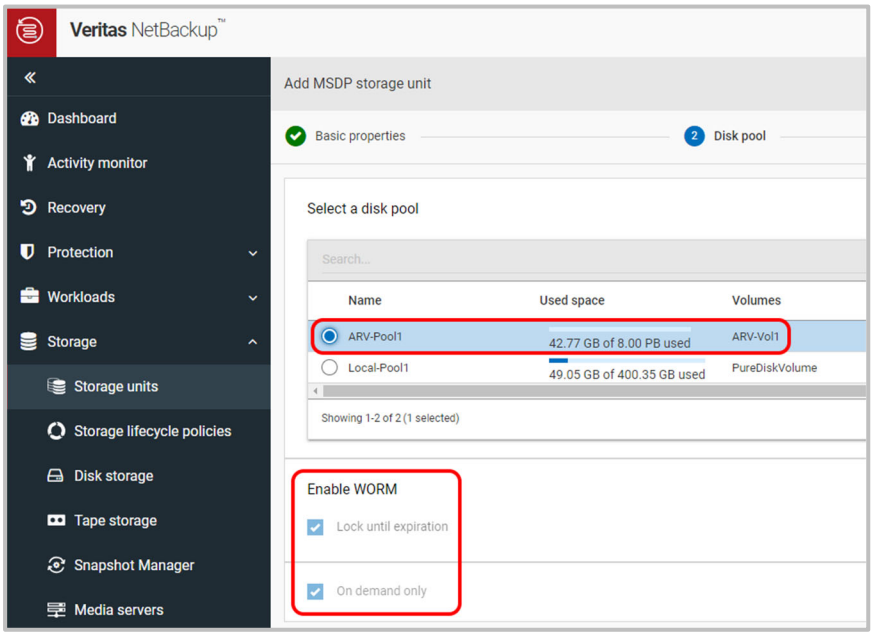


19. Provide a new MSDP storage unit name and select the desired **Maximum concurrent jobs** and **Maximum fragment size**. Click **Next** to continue. (Not shown in the image.)

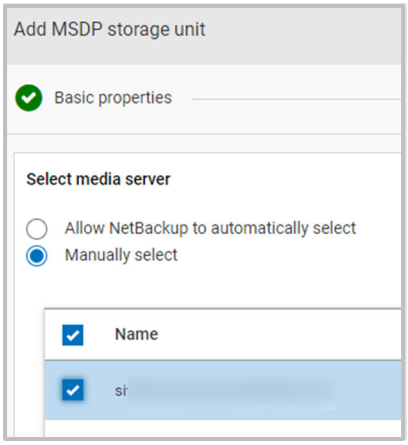


20. Select the Alta Recovery Vault volume created earlier. Click **Next** to continue. (Not shown in the image.)

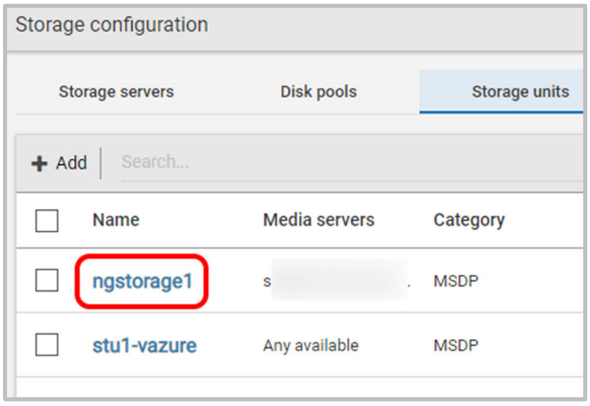
    Note: Enable WORM will be checked by default and cannot be un-checked.



21. Select the media server you wish to use. Click **Next** to continue. (Not shown in the image.)



22. Here you can see your new “ngstorage1” storage unit successfully created.



23. The new Alta Recovery Vault storage can now be used for backups.

Netbackup 10.2

Note: Having trouble installing Alta Recovery Vault? See the Alta Recovery Vault Troubleshooting Guide.

1. Ensure your storage server has been created.
    a. Note that this document assumes you already have an MSDP storage server created. For more information on how to add a storage server, see the *NetBackup Deduplication Guide*: https://www.veritas.com/content/support/en_US/doc/25074086-159245004-0/v24332600-159245004
2. Log into the console of your media server that is your MSDP storage server you created in step 1.
3. A Volume and a Volume Container must be created at the CLI before they can be created in the web UI.
4. Run the following command to create the volume and volume container (without archive):
    a. /usr/openv/netbackup/bin/admincmd/csconfig cldinstance -as -in NetBackup-Recovery-Vault-Azure -sts <*storage_server_name*> -pxtype NONE -lsu_name <lsu_name>
    b. Example:
        i. /usr/openv/netbackup/bin/admincmd/csconfig cldinstance -as -in Veritas-Alta-Recovery-Vault-Azure -sts MSDP-FQDN.com -pxtype NONE -lsu_name my-lsu-name
        ii. OUTPUT:
            1. *Successfully added storage server(s): <storage_server_name>_lsu_name>*
            2. *Example:*
                a. *Successfully added storage server(s): MSDP-FQDN.com_my-lsu-name*
5. Run the following command to create the volume and volume container (with archive):

a. /usr/openv/netbackup/bin/admincmd/csconfig cldinstance -as -in Veritas-Alta-Recovery-Vault-Azure -sts <*Storage_Server_Name*> -pxtype NONE -lsu_name <lsu-name> **-storage_tier ARCHIVE -post_rehydration_period <# of days>**

b. Example:

i. /usr/openv/netbackup/bin/admincmd/csconfig cldinstance -as -in Veritas-Alta-Recovery-Vault-Azure -sts MSDP-FQDN.com -pxtype NONE -lsu_name my-lsu-name **-storage_tier ARCHIVE -post_rehydration_period 3**

6. Navigate to /usr/openv/pdde/pdcr/bin/ on the command line of your media server.

7. Set environment variables for Azure.
   a. Azure with short lived tokens (two new variables highlighted in yellow):
      i. # export MSDPC_REGION=<your region>
      ii. # export MSDPC_PROVIDER=vazure
      iii. # export MSDPC_ACCESS_KEY=<the credential name you create in the web UI>
      iv. # export MSDPC_SECRET_KEY=<this is a dummy value, enter anything>
      v. # export MSDPC_ENDPOINT=https://*xxxx*.blob.core.windows.net/ "*xxxx*" is the Storage Account Name
      vi. # export MSDPC_MASTER_SERVER=<name_of_your_primary_with_fqdn>
      vii. #export MSDPC_ALIAS=<output from commands 4 or 5>

   b. Azure Example:

      i. # export MSDPC_REGION=<your region like "West US 2">
      ii. # export MSDPC_PROVIDER=vazure
      iii. # export MSDPC_ACCESS_KEY= <RV-Credential1>
      iv. # export MSDPC_SECRET_KEY=<my_dummy_secret>
      v. # export MSDPC_ENDPOINT=<your endpoint such as https:// rvltcust001c1.blob.core.windows.net>
      vi. # export MSDPC_MASTER_SERVER=<widget.widgets.are.us.com>
      vii. #export MSDPC_ALIAS=MSDP-FQDN.com_my-lsu-name

Note: MSDP-C variables highlighted in yellow are new variables added in 10.2. These are necessary for immutability to function properly with Azure.

8. Run the following command with your immutability inputs:
   a. ./msdpcldutil create -b <*container_name*> -v <some_*volumename*> --mode *GOVERNANCE* --min *time* --max *time* -l *expirationdate* --enable_sas
   b. Example ./msdpcldutil create -b rvltcust001c1 -v rk-v01 --mode GOVERNANCE --min 1D --max 1Y -l 2024-10-24 --enable_sas

Governance mode (also known as enterprise mode):

Users require special permissions to disable the retention lock and then delete the image. Only the cloud administrator user can disable the retention lock and then delete the image if required.

Note: '--enable_sas' in the above command is not needed if you are using NB 10.1.x or earlier than NB 10.2

9. A list of the immutable buckets can be seen with the following command:
    a. ./msdpcldutil list -b *nameofcontainer*
    b. Example ./msdpcldutil list -b jzh-worm-bucket07

    Note: '--enable_sas' in the above command is not needed if you are using NB 10.1.x or earlier than NB 10.2

10. Now that the immutable container (bucket) has been configured on the command line, the immutable disk pool can be created.

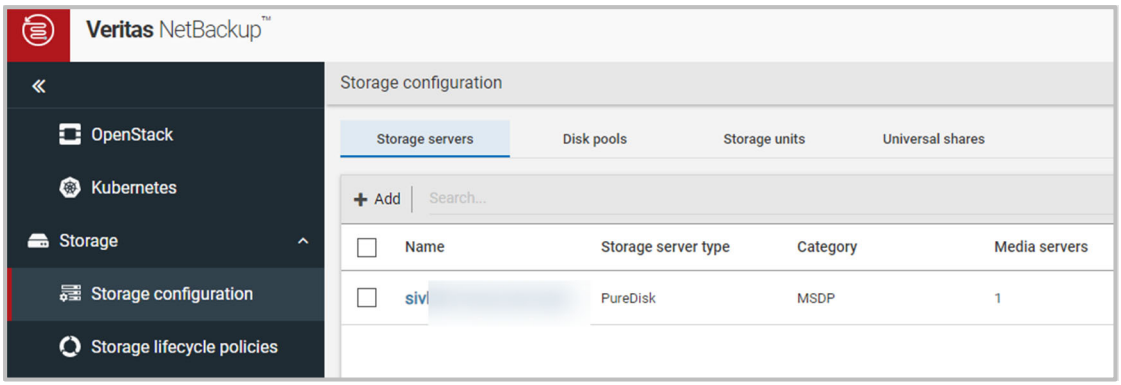
11. Go to the NetBackup web UI and navigate to **Storage > Storage configuration**.

After you receive the storage access keys and the volume and volume container has been created on your media server's CLI, it's time to connect to the new storage container (bucket) in NetBackup through the web UI.

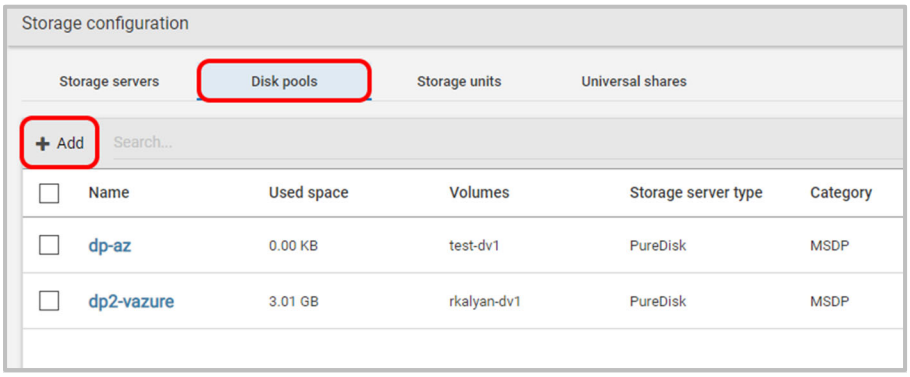
Note that this document assumes you already have an MSDP storage server created. For more information on how to add a storage server, see the *NetBackup Deduplication Guide*: https://www.veritas.com/content/support/en_US/doc/25074086-149019166-0/v24332600-149019166

1. From within your NetBackup primary server web UI, navigate to **Storage > Storage configuration**.

    You should see your storage servers listed.

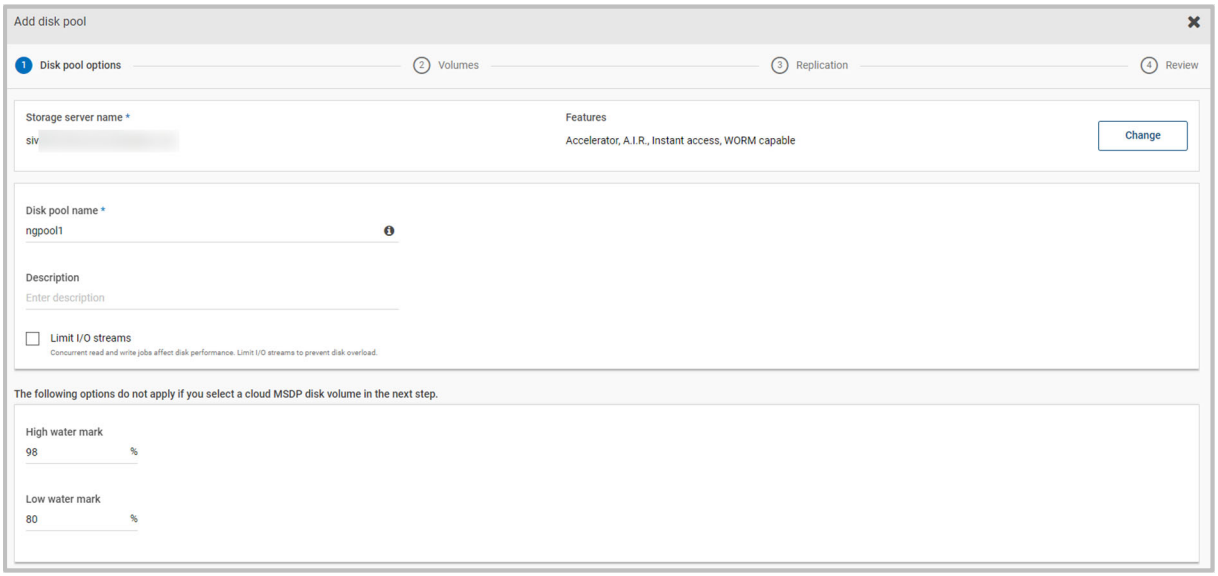


2. Click the **Disk pools** tab and click **+ Add**.

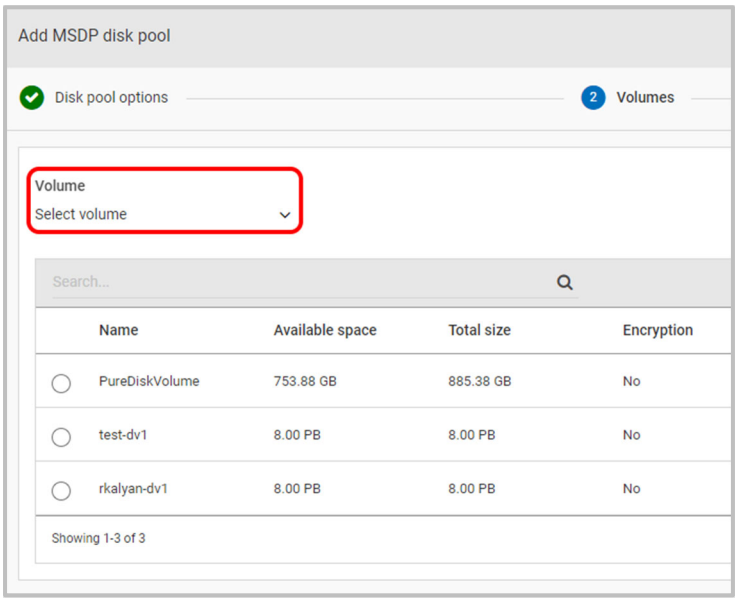


3. Enter the details for disk pool options.

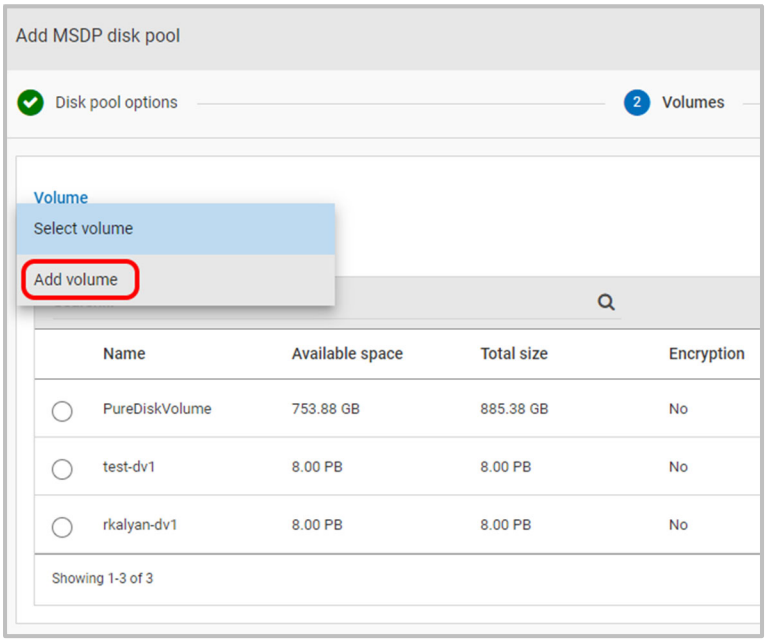
    a. Select the storage server name where this disk pool will reside. In this example, the choice is the storage server seen in step 1 of this procedure.
    b. Provide a name for the disk pool. This example uses “ngpool1”.
    c. If you choose, provide a description for the pool.
    d. Select **Limit I/O streams** if desired. This option could help limit disk I/O contention.
    e. Click **Next** at the bottom of the page to continue. (Not seen in the image.)



4. Next, you're brought to the Volumes page. In the example you can see that there are already three volumes created, but you want to add your new Alta Recovery Vault volume. Click **Volume > Select volume**.

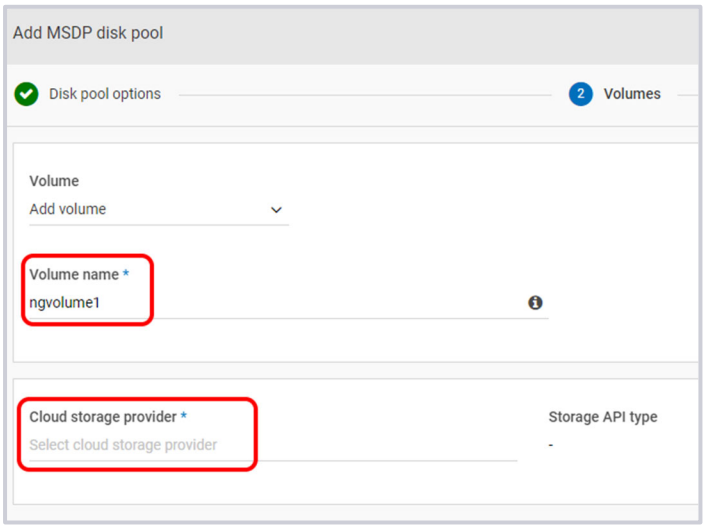


5. Click **Add volume** to begin the process.

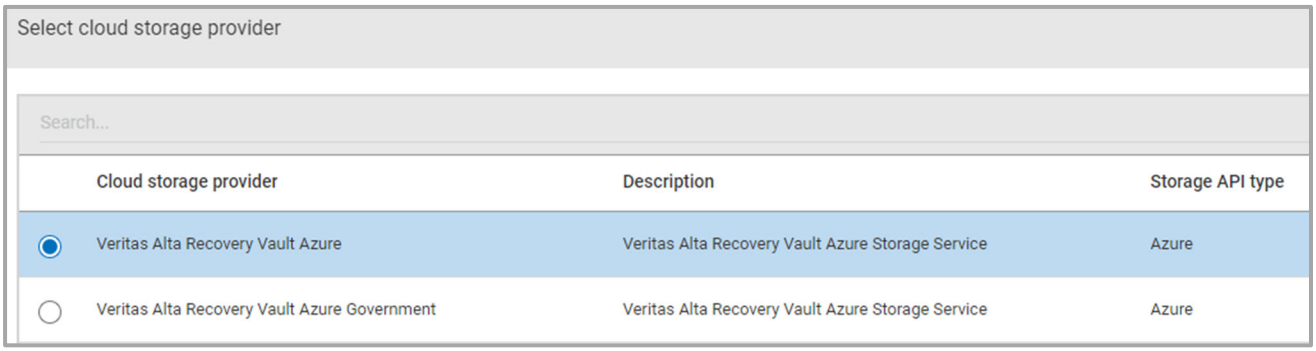


6. Provide a name for the new volume and click **Cloud storage provider**.

   Note: Name the volume the same as you did using the msdpcldutil command.

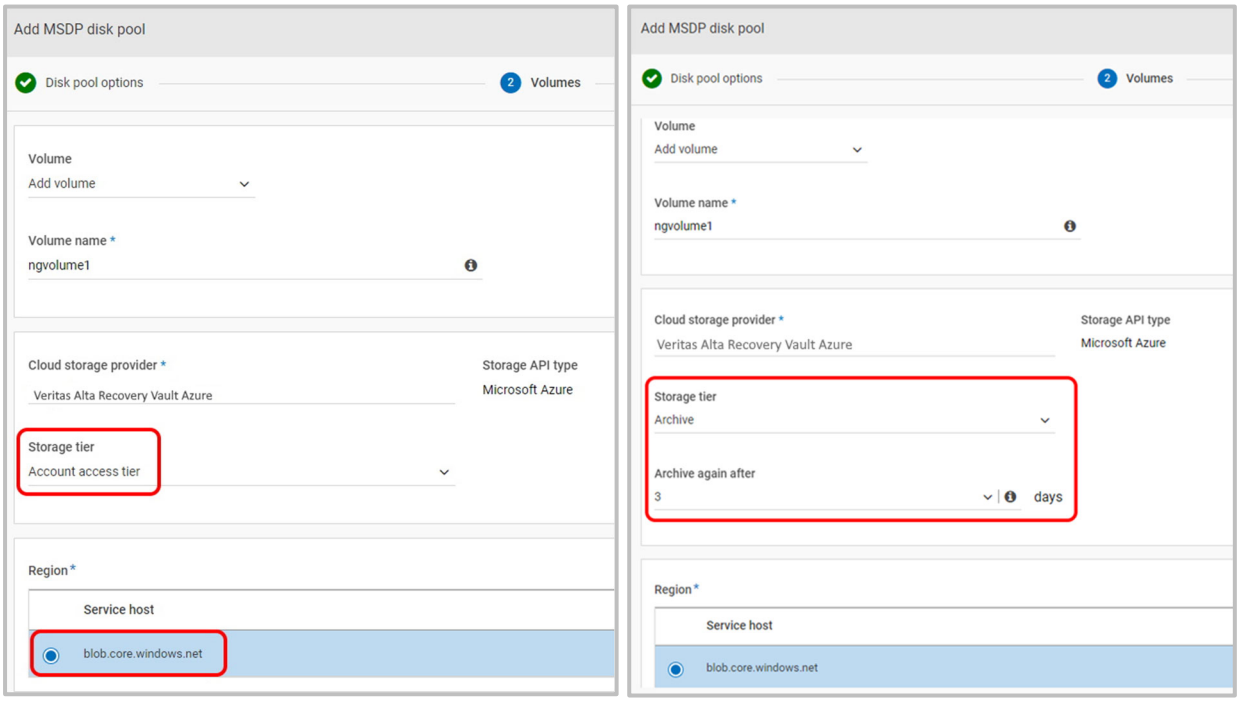


7. Search for “veritas” and the following Cloud storage providers appear. For this example, you will choose **Veritas Alta Recovery Vault Azure**.



8. After you select the cloud storage provider, you're taken back to the Add MSDP disk pool screen. Select the Storage tier you would like and the Azure region to be used.

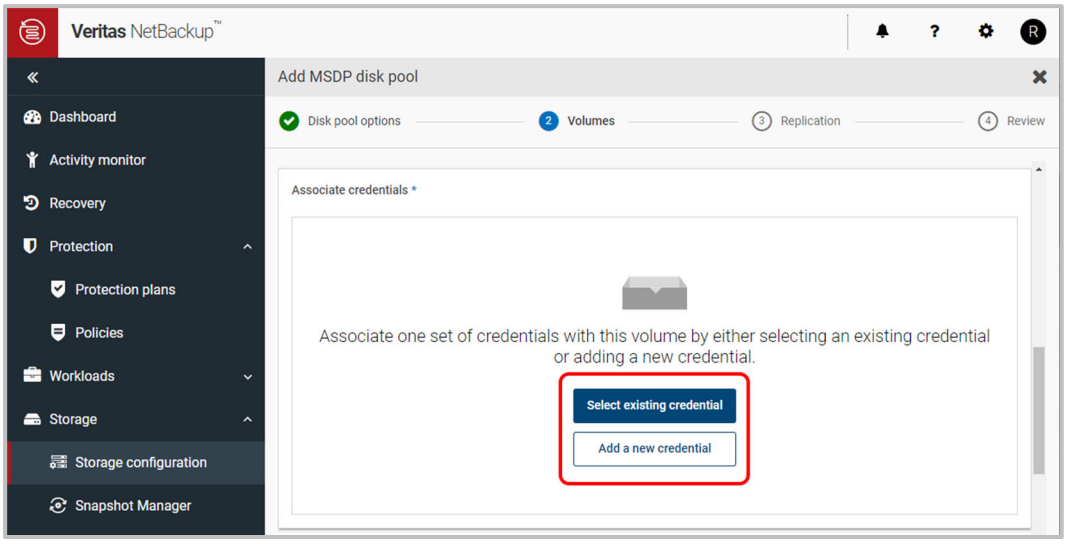
   Note: The region is provided by the Veritas Alta Recovery Vault Provisioning Team.



   If you've purchased archive tier, click **Account access tier**, and select **Archive**. You have a choice to archive again every 3 to 30 days.

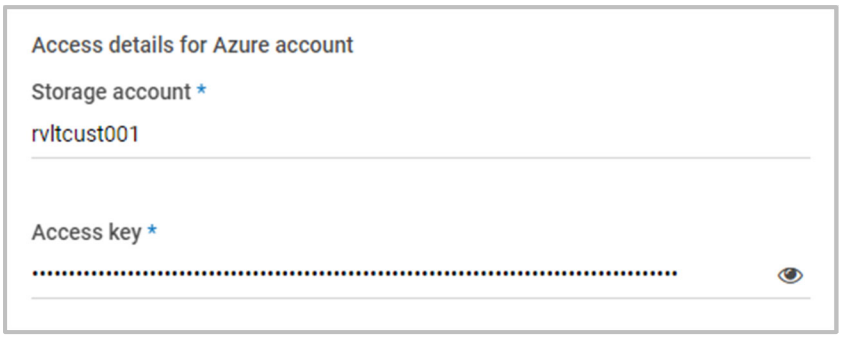
   Note: For archive tier, ensure your cloud vendor provides archive support in the desired region. If archive tier is not supported in the region, this feature will not function correctly.

9. Click **Select existing credential** if you've already created your credential from the Short-Lived Token Based Authentication section earlier in this document. If not, click **Add a new credential** and create a new credential using the storage account and refresh token given to you by Veritas.



Note: You can create multiple disk volumes/buckets using the same credentials. There is no need to add multiple credentials for the same storage account.

Note: The storage account, short lived tokens, and access keys are provided by the Veritas Alta Recovery Vault Provisioning Team.

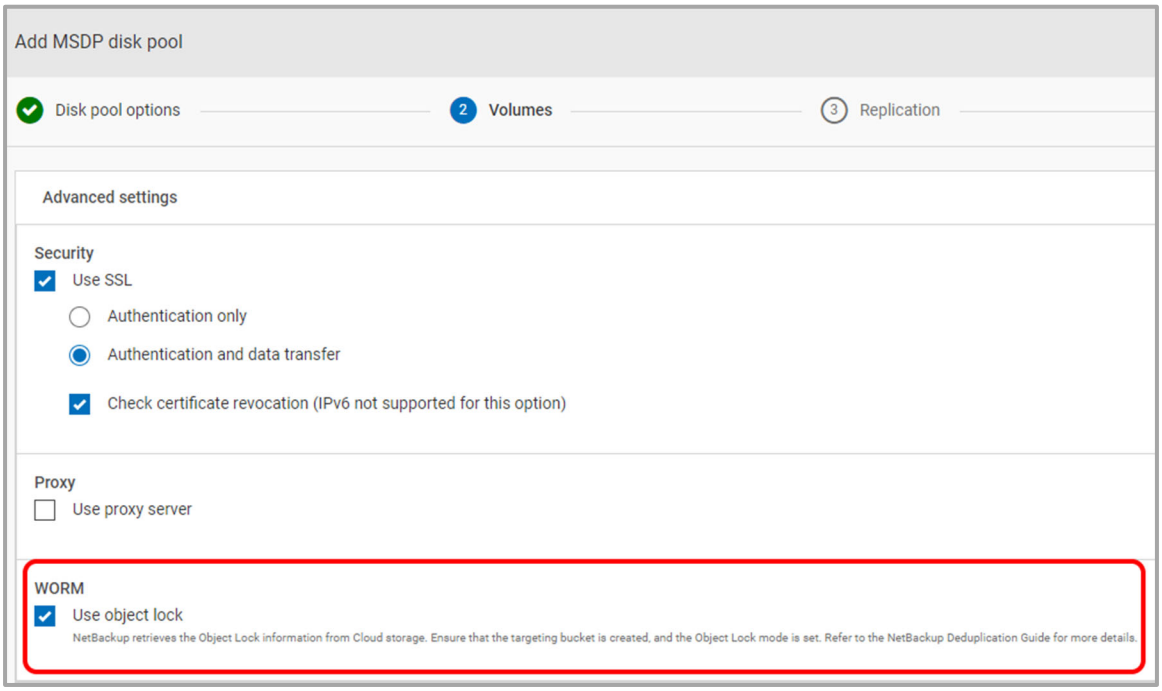


10. In Advanced settings, enter the required Security, Proxy, or WORM preferences.

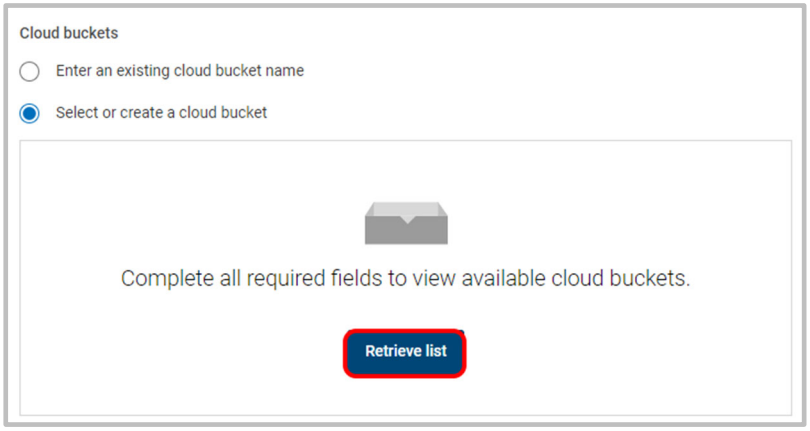
Note: If you do not want to open port 80 externally, you will need to uncheck "Check certificate revocation", For more information on check certificate revocation, see the following: https://en.wikipedia.org/wiki/Certificate_revocation_list#:~:text=In%20cryptography%2C%20a%20certificate%20revocation,should%20no%20longer%20be%20trusted%22.

Note: Ensure to check the **WORM** > **Use object lock** checkbox.

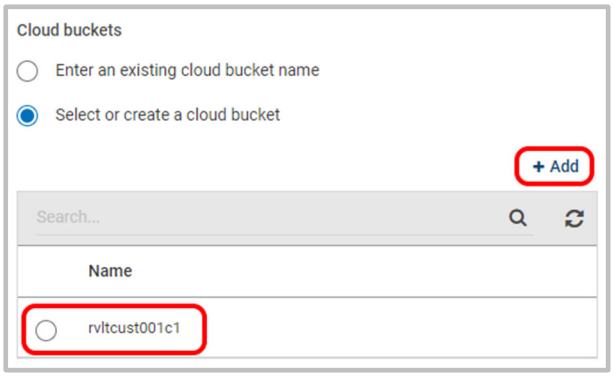
Note: If you have not completed the CLI steps earlier in the document, the Web UI will give you an error when trying to connect to your Alta Recovery Vault storage.



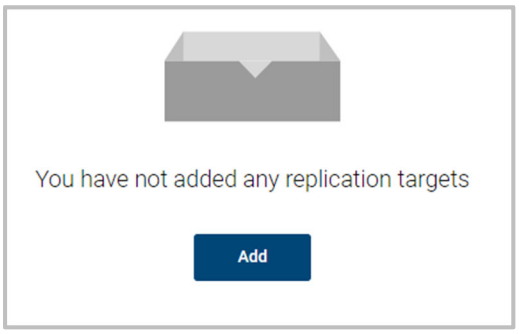
11. Click **Select or create a cloud bucket** and then click **Retrieve list**. This process logs into Azure using the credentials provided earlier.



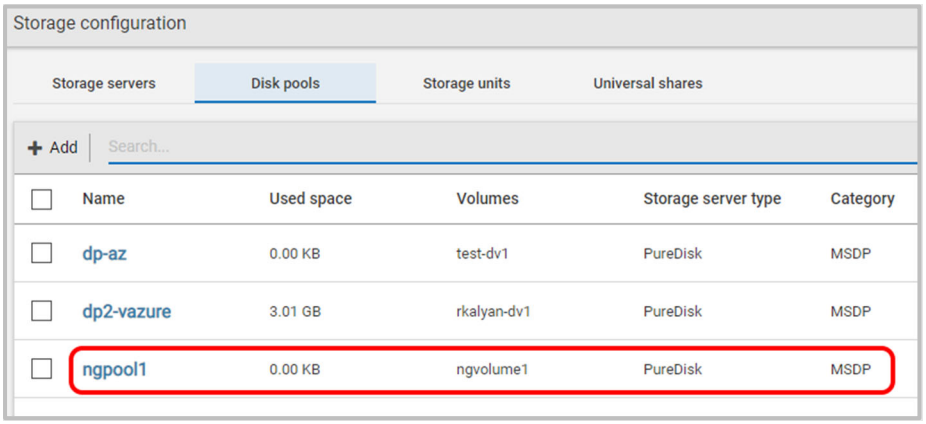
12. A new container (bucket) can also be created using the **+ Add** button in the web UI after you connect to the new storage account. Listed below is the Alta Recovery Vault cloud bucket “rvltcust001c1”. The name of your cloud bucket will be different; the one below is for reference only.



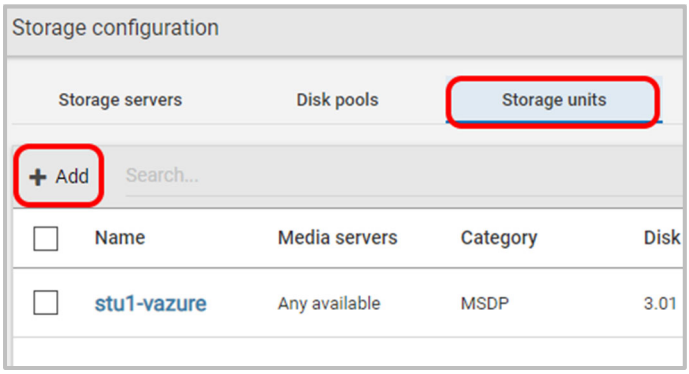
13. If you would like to set up replication targets, they can be set up now. If none are needed, click **Next**. (Not shown in the image.)



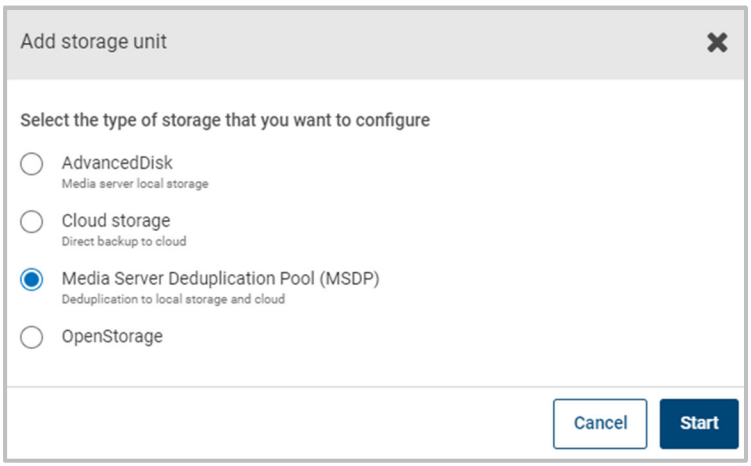
14. The next page is a summary page. If everything looks good, create the new disk pool. In this example, the new “ngpool1” has been created.



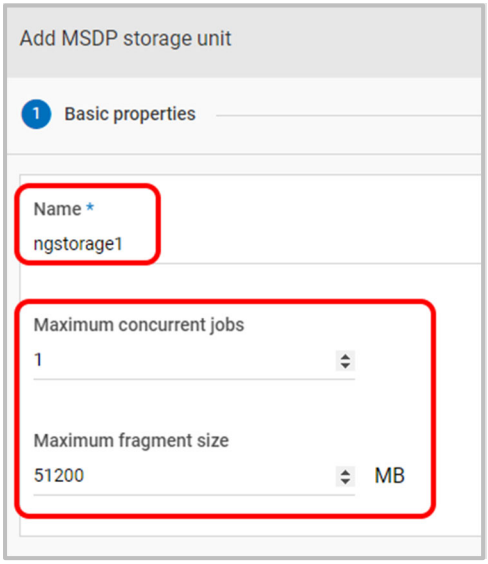
15. Next, add a storage unit so you can use your new Alta Recovery Vault storage. Click the **Storage units** tab and click **+ Add**.



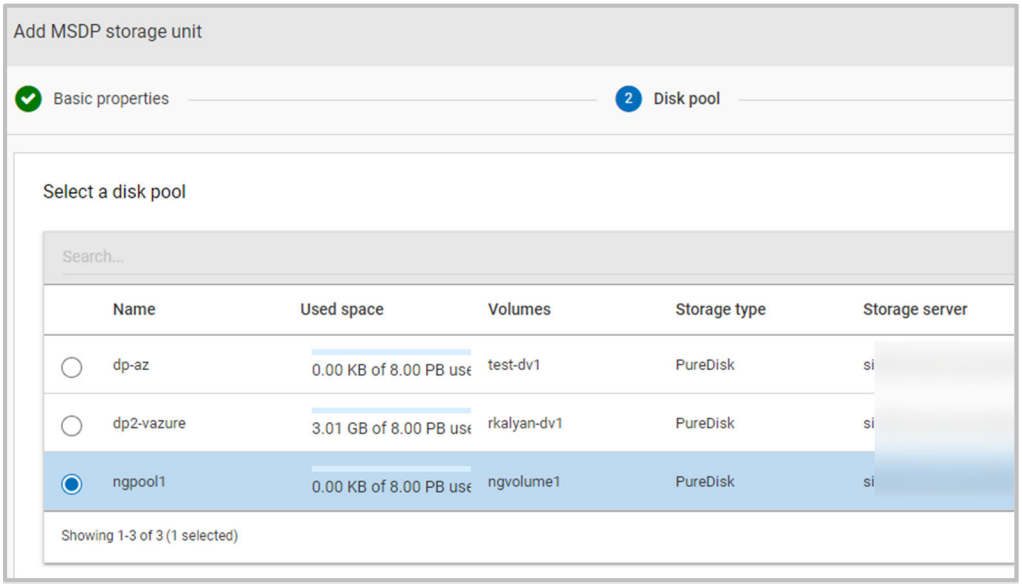
16. Select **Media Server Deduplication Pool (MSDP)** and click **Start**.



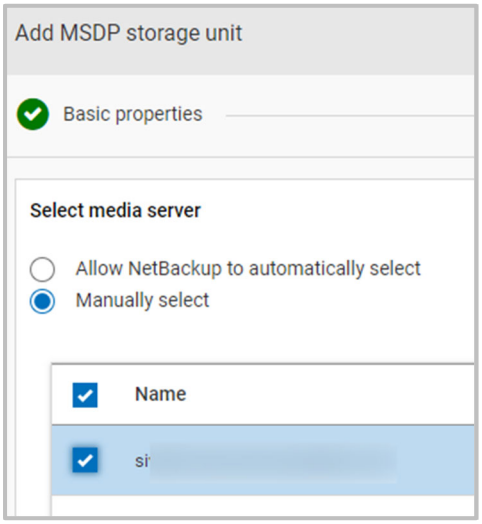
17. Provide a new MSDP storage unit name and select the desired **Maximum concurrent jobs** and **Maximum fragment size**. Click **Next** to continue. (Not shown in the image.)



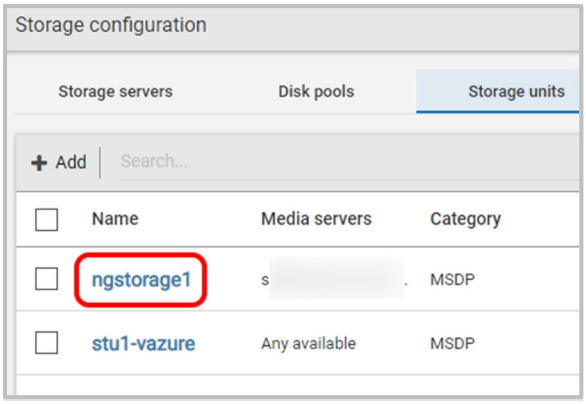
18. Select the Alta Recovery Vault volume created earlier. Click **Next** to continue. (Not shown in the image.)



19. Select the media server you wish to use. Click **Next** to continue. (Not shown in the image.)



20. Here you can see your new “ngstorage1” storage unit successfully created.



21. The new Alta Recovery Vault storage can now be used for backups.

NetBackup 10.1.1 or earlier

Note: Having trouble installing Alta Recovery Vault? See the Alta Recovery Vault Troubleshooting Guide.

1. Ensure your storage server has been created.
    a. Note that this document assumes you already have an MSDP storage server created. For more information on how to add a storage server, see the *NetBackup Deduplication Guide*: https://www.veritas.com/content/support/en_US/doc/25074086-149019166-0/v24332600-149019166
2. Log into the console of your media server that is your MSDP storage server you created in step 1.

3. Navigate to `/usr/openv/pdde/pdcr/bin/` on the command line of your media server.

Set environment variables for Azure.

a. Azure:
   i. # export MSDPC_ACCESS_KEY=xxxx(Your Storage Account)
   ii. # export MSDPC_SECRET_KEY=yyyyyyyyyyyyy (Your Access Key)
   iii. # export MSDPC_REGION=<selectedregion>
   iv. # export MSDPC_PROVIDER=vazure
   v. #export MSDPC_ENDPOINT="https://<container>.blob.core.windows.net/"
b. Azure Example:
   i. # export MSDPC_ACCESS_KEY=<giventoyoubyVeritas> (Your Storage Account)
   ii. # export MSDPC_SECRET_KEY=<giventoyoubyVeritas> (Your Access Key)
   iii. # export MSDPC_REGION=<"East US 1">
   iv. # export MSDPC_PROVIDER=vazure
   v. #export MSDPC_ENDPOINT="https://<container>.blob.core.windows.net/"

Governance mode (also known as enterprise mode):

Users require special permissions to disable the retention lock and then delete the image. Only the cloud administrator user can disable the retention lock and then delete the image if required.

4. Run the following command with your immutability inputs:
   a. `./msdpcldutil create -b <container_name> -v volumename --mode GOVERNANCE --min time --max time -l expiriationdate`
   b. Example `./msdpcldutil create -b jzh-worm-bucket07 -v jzh-b01-v02 --mode GOVERNANCE --min 1D --max 1Y -l 2024-10-24`
5. A list of the immutable containers (buckets) can be seen with the following command:
   a. `./msdpcldutil list -b nameofcontainer`
   b. Example `./msdpcldutil list -b jzh-worm-bucket07`

6. Now that the immutable bucket has been configured on the command line, the immutable disk pool can be created.

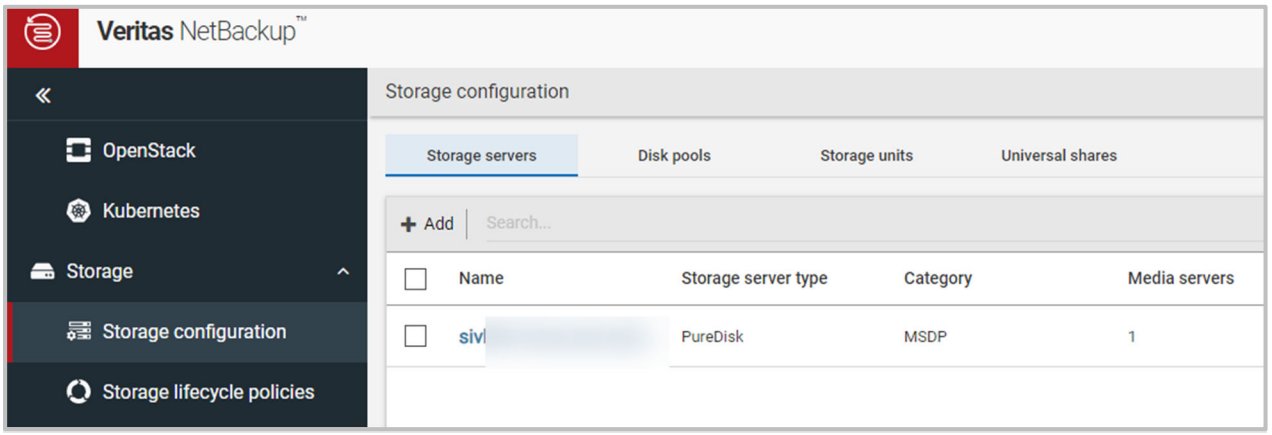
7. Go to the NetBackup web UI and navigate to **Storage > Storage configuration**.

After the volume and volume container have been created on your media server's CLI, it's time to connect to the new storage container (bucket) in NetBackup through the Web UI.

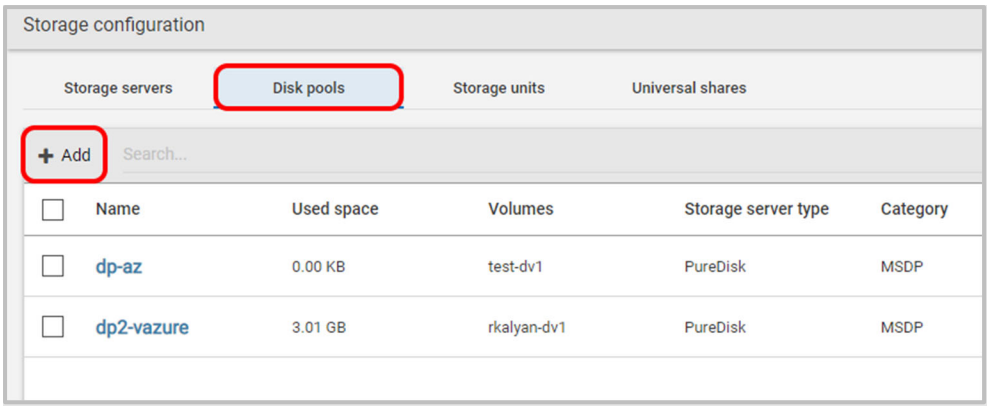
Note that this document assumes you already have an MSDP storage server created. For more information on how to add a storage server, see the *NetBackup Deduplication Guide*: https://www.veritas.com/content/support/en_US/doc/25074086-149019166-0/v24332600-149019166

On your primary server web UI, navigate to **Storage > Storage configuration**.

1. You should see your storage servers listed.

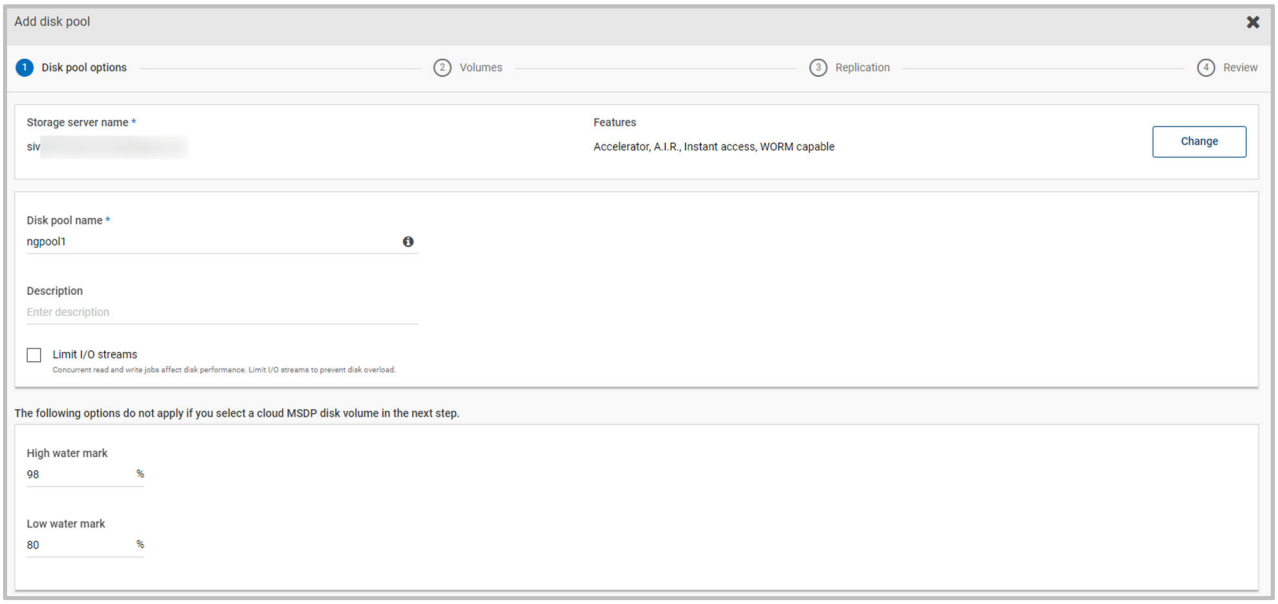


2. Click the **Disk pools** tab and click **+ Add**.

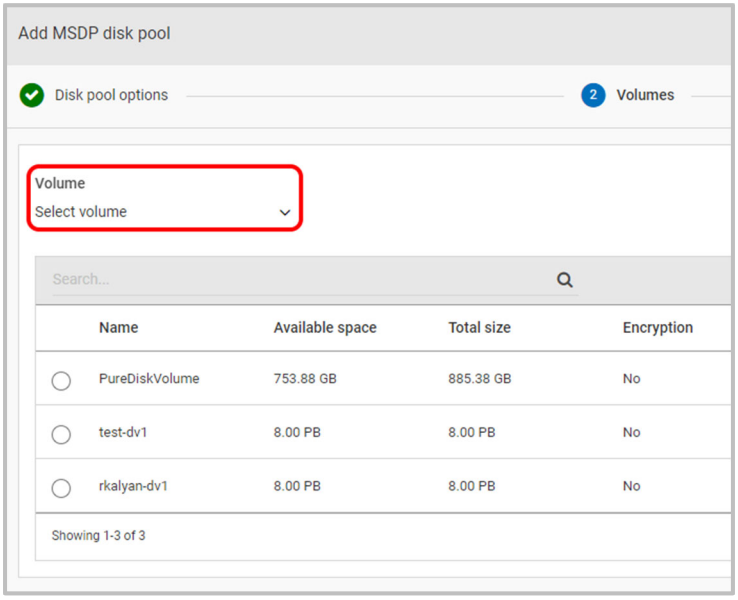


3. First, you enter in the details for disk pool options.

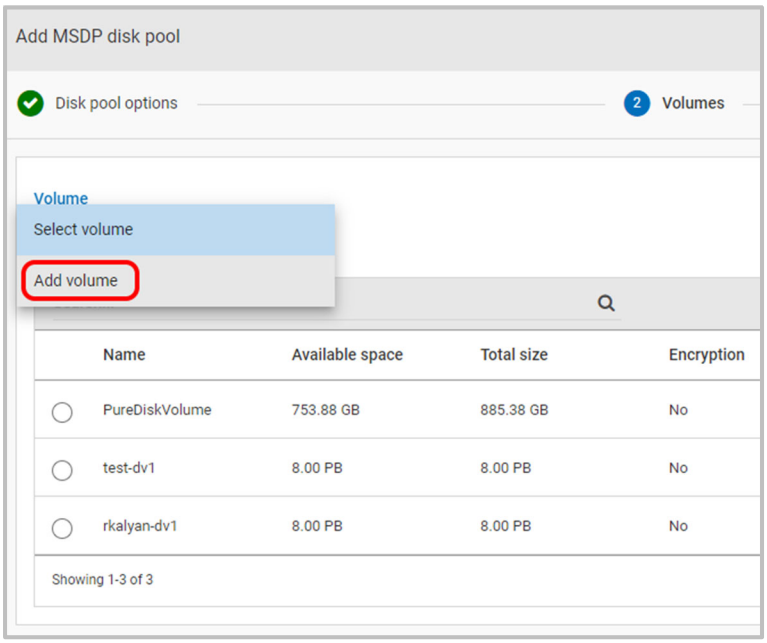
    a. Select the storage server name where this disk pool will reside. In this example, the choice is the storage server seen in step 1 of this procedure.
    b. Provide a name for the disk pool. This example uses “ngpool1”.
    c. If you choose, provide a description for the pool.
    d. Select **Limit I/O streams** if desired. This option could help limit disk I/O contention.
    e. Click **Next** at the bottom of the page to continue. (Not shown in the image.)



4. Next, you'll be brought to the Volumes page. As you can see, there are already three volumes created, but you want to add your new Alta Recovery Vault volume. Click **Volume > Select volume**.

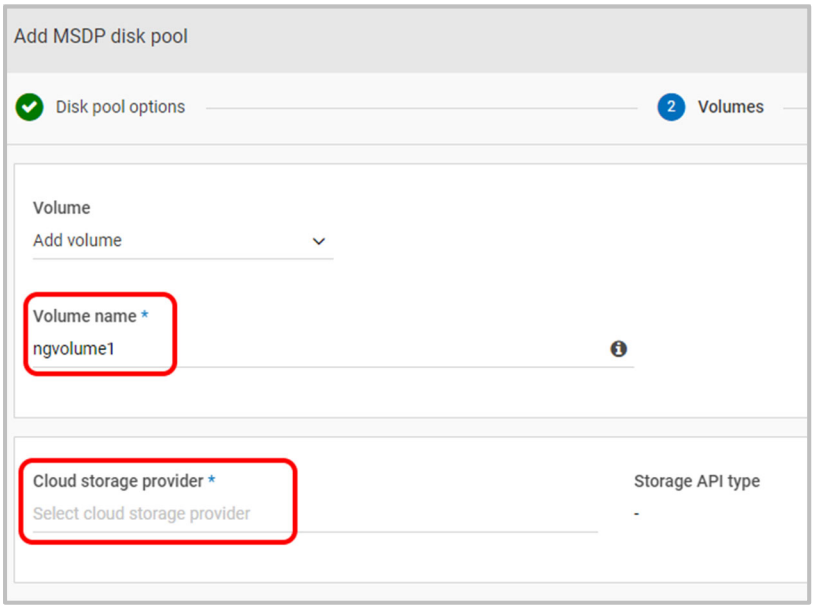


5. Click **Add volume** to begin the volume add process.

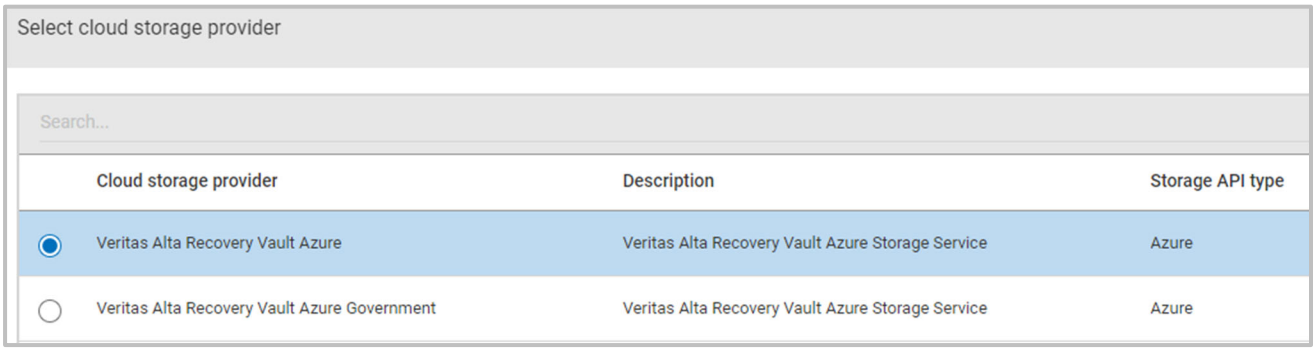


6. Provide a name for the new volume and click **Cloud storage provider**.

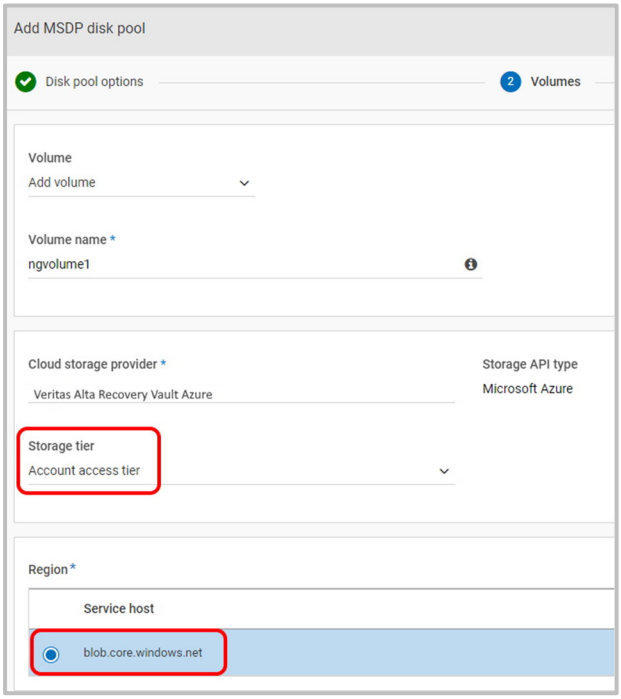
   Note: If WORM is being used, the volume name should be same as the volume created using msdpcldutil. For more information, see immutability section.



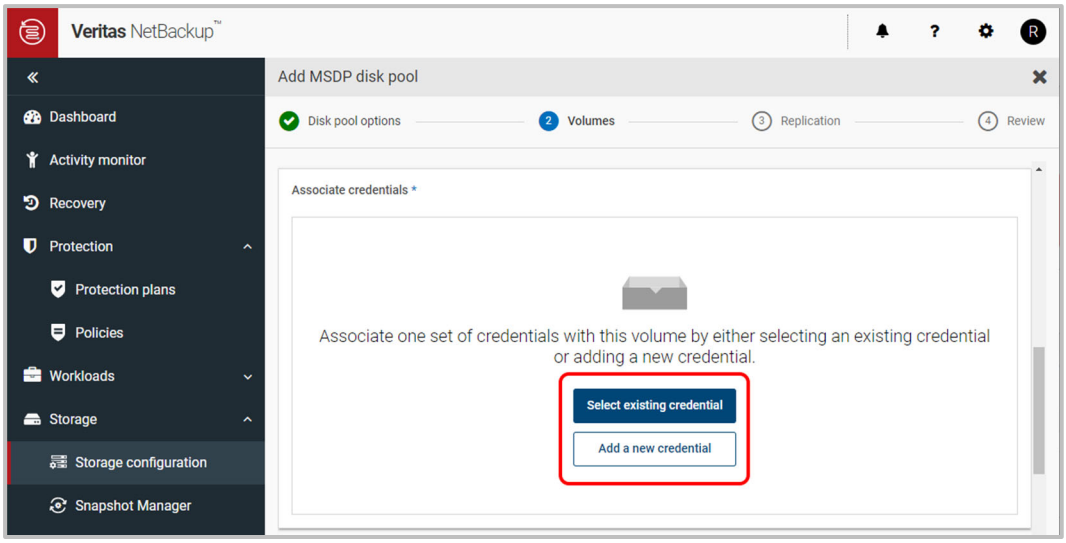
7. Search for “veritas” and the following Cloud storage providers appear. For this example, the choice is **Veritas Alta Recovery Vault Azure**.



8. After you select the cloud storage provider, you're taken back to the Add MSDP disk pool screen. Select Account Access Tier as the **Storage tier** and select **blob.core.windows.net** for the Region.



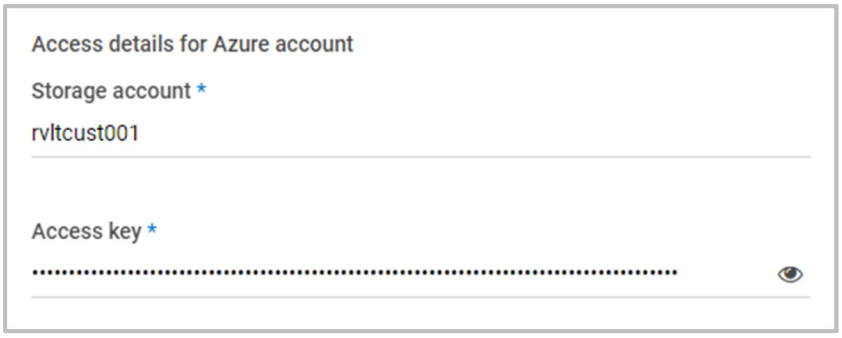
9. Click **Select existing credential** if you've already created your credential from the Short-Lived Token Based Authentication section earlier in this document. If not, click **Add a new credential** and create a new credential using the storage account and refresh token given to you by Veritas.



Note: You can create multiple disk volumes/buckets using the same credentials. There is no need to add multiple credentials for the same storage account.

If you are using NetBackup 10.1.1 or earlier, enter the storage account and Access key for Azure.

Note: The storage account, short lived tokens, and access keys are provided by the Veritas Alta Recovery Vault Provisioning Team.

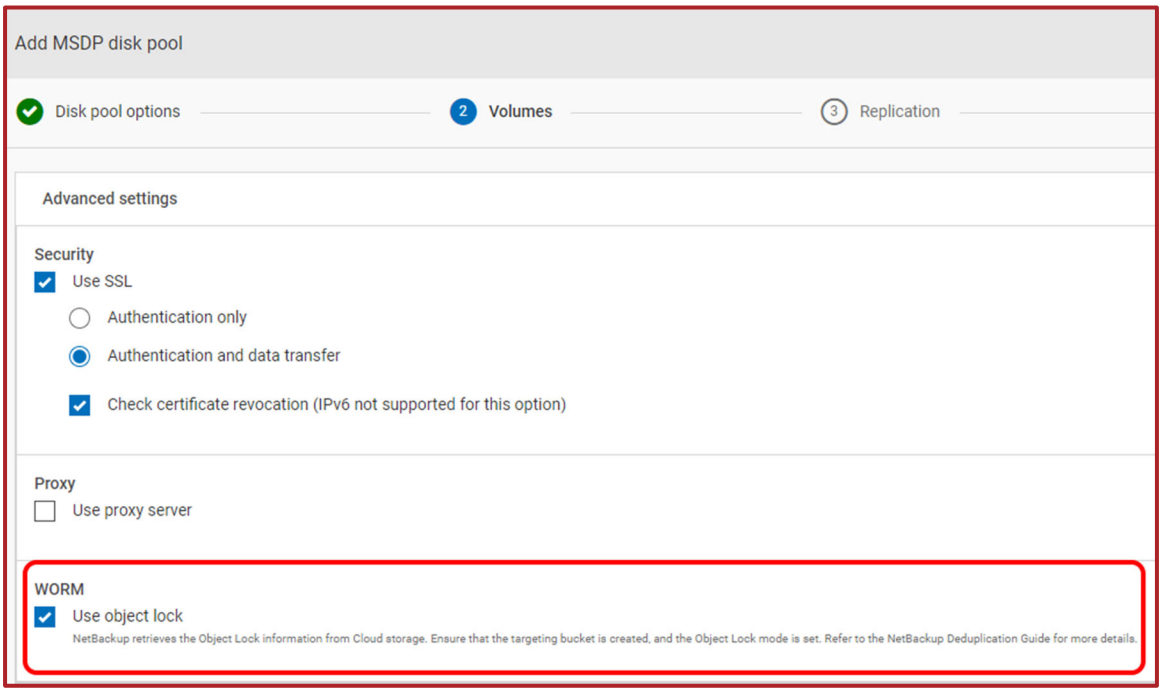


10. In Advanced settings, enter the required Security, Proxy, or WORM preferences.

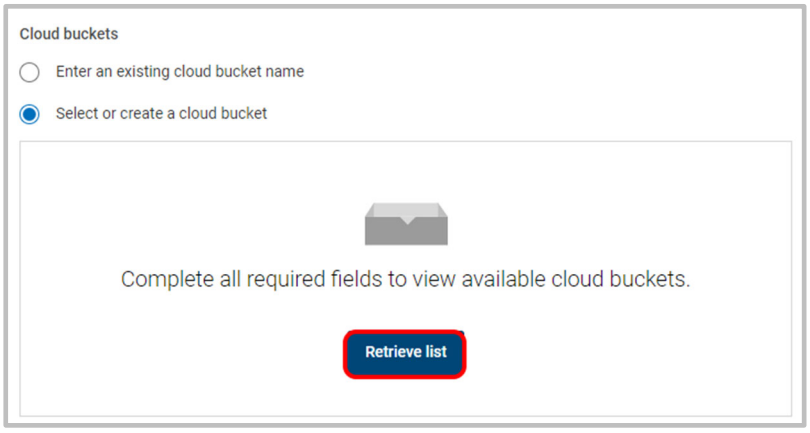
Note: If you do not want to open port 80 externally, you will need to uncheck "Check certificate revocation", For more information on check certificate revocation, see the following: https://en.wikipedia.org/wiki/Certificate_revocation_list#:~:text=In%20cryptography%2C%20a%20certificate%20revocation,should%20no%20longer%20be%20trusted%22.

Note: Ensure to check the **WORM** > **Use object lock** checkbox.

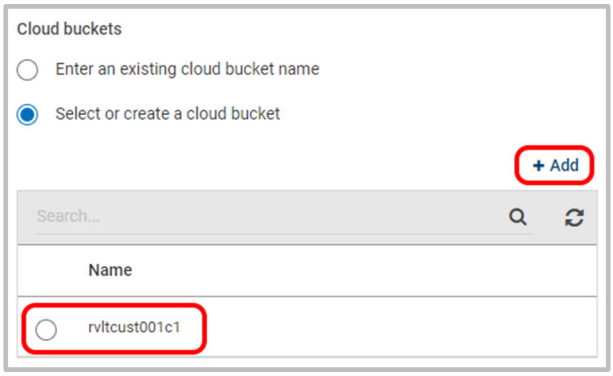
Note: If you have not completed the CLI steps earlier in the document, the Web UI will give you an error when trying to connect to your Alta Recovery Vault storage.



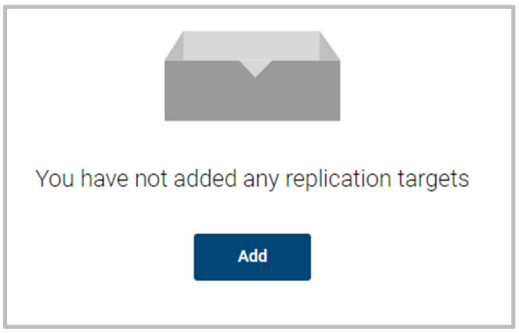
11. Click **Select or create a cloud bucket** and then click **Retrieve list**. This process logs into Azure using the credentials provided earlier.



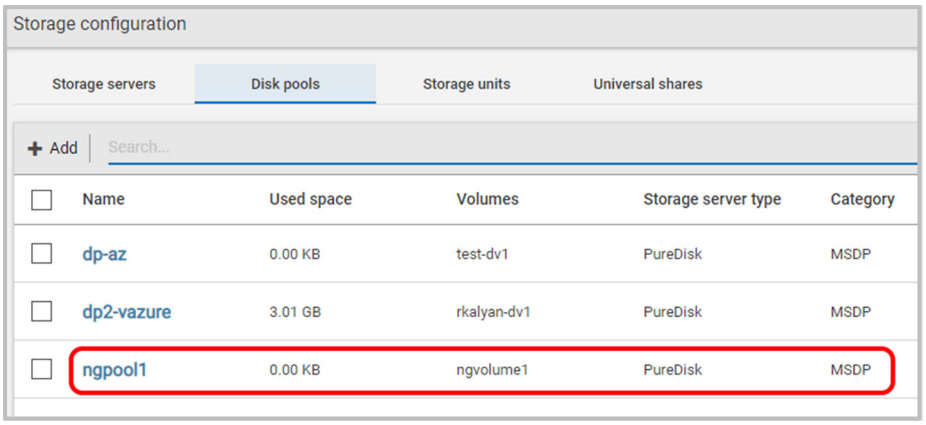
12. A new bucket can also be created using the **+ Add** button in the NetBackup web UI after you connect to the new storage account. Listed below is the Alta Recovery Vault cloud bucket “rvltcust001c1”. The name of your cloud bucket will be different; the one below is for reference only.



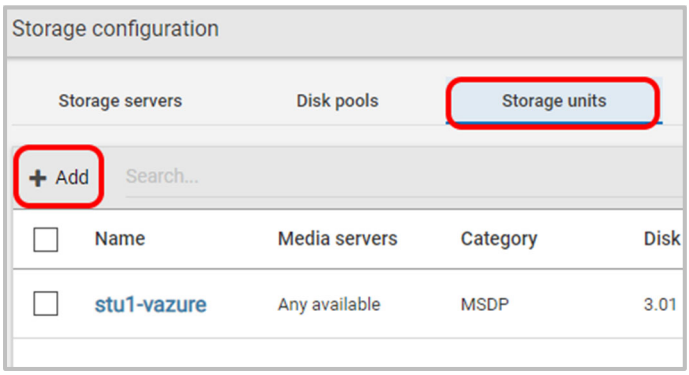
13. If you would like to set up replication targets, they can be set up now. If none are needed, click **Next**. (Not shown in the image.)



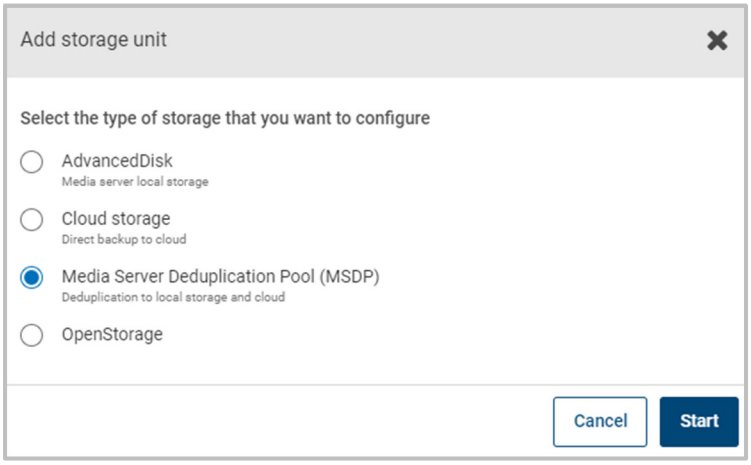
14. The next page is a summary page. If everything looks good, create the new disk pool. In this example, the new “ngpool1” has been created.



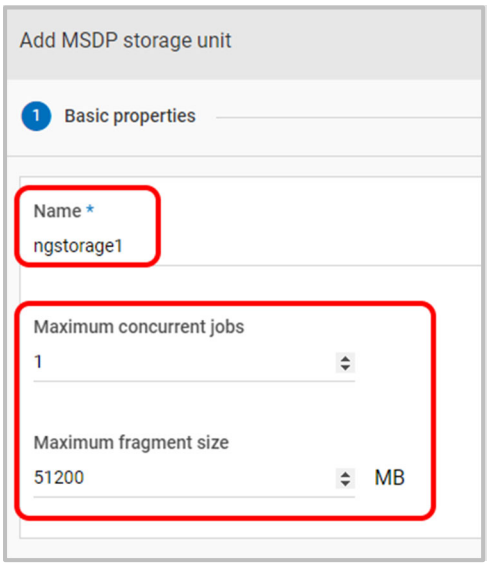
15. Next, add a storage unit so you can use your new Alta Recovery Vault storage. Click the **Storage units** tab and click **+ Add**.



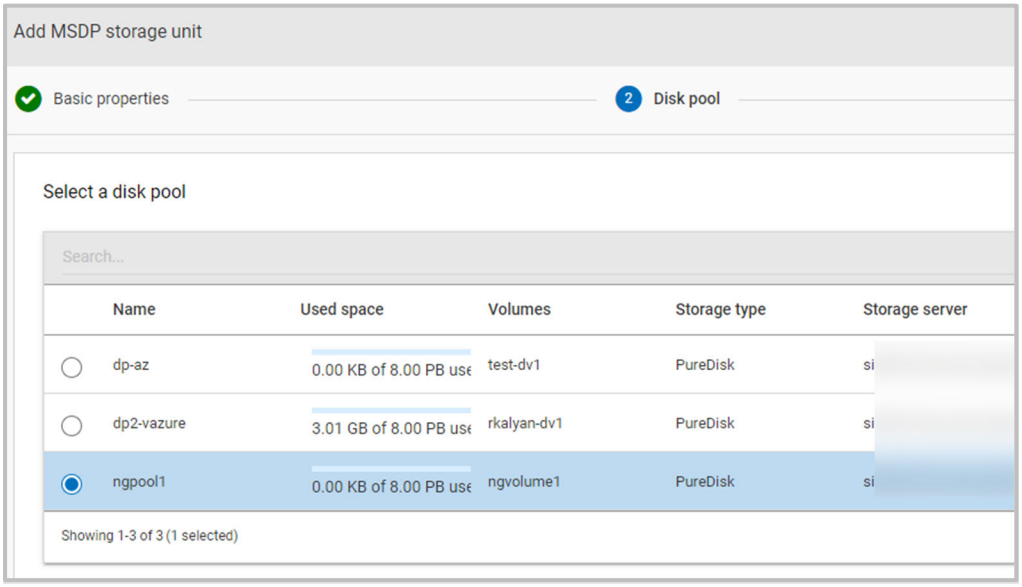
16. Select **Media Server Deduplication Pool (MSDP)** and click **Start**.



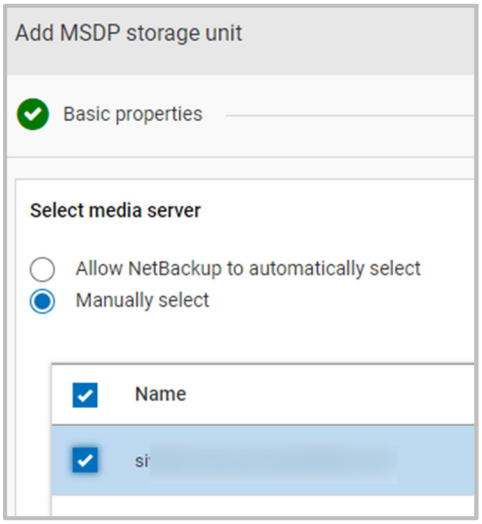
17. Provide a new MSDP storage unit name and select the desired **Maximum concurrent jobs** and **Maximum fragment size**. Click **Next** to continue. (Not shown in the image.)



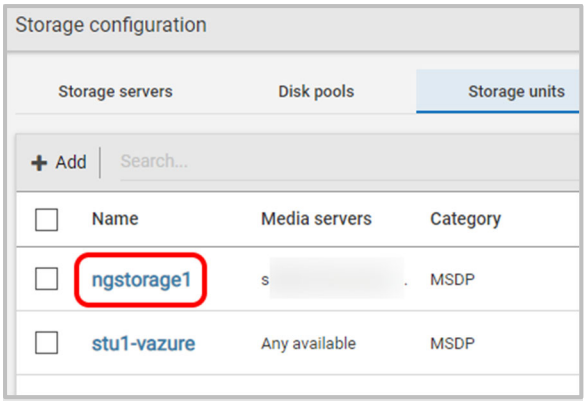
18. Select the Alta Recovery Vault volume created earlier. Click **Next** to continue. (Not shown in the image.)



19. Select the media server you wish to use. Click **Next** to continue. (Not shown in the image.)



20. Here you can see your new “ngstorage1” storage unit successfully created.



21. The new Alta Recovery Vault storage can now be used for backups.

CONNECTING TO YOUR NEW STORAGE ACCOUNT IN AWS

NetBackup 10.4 or later

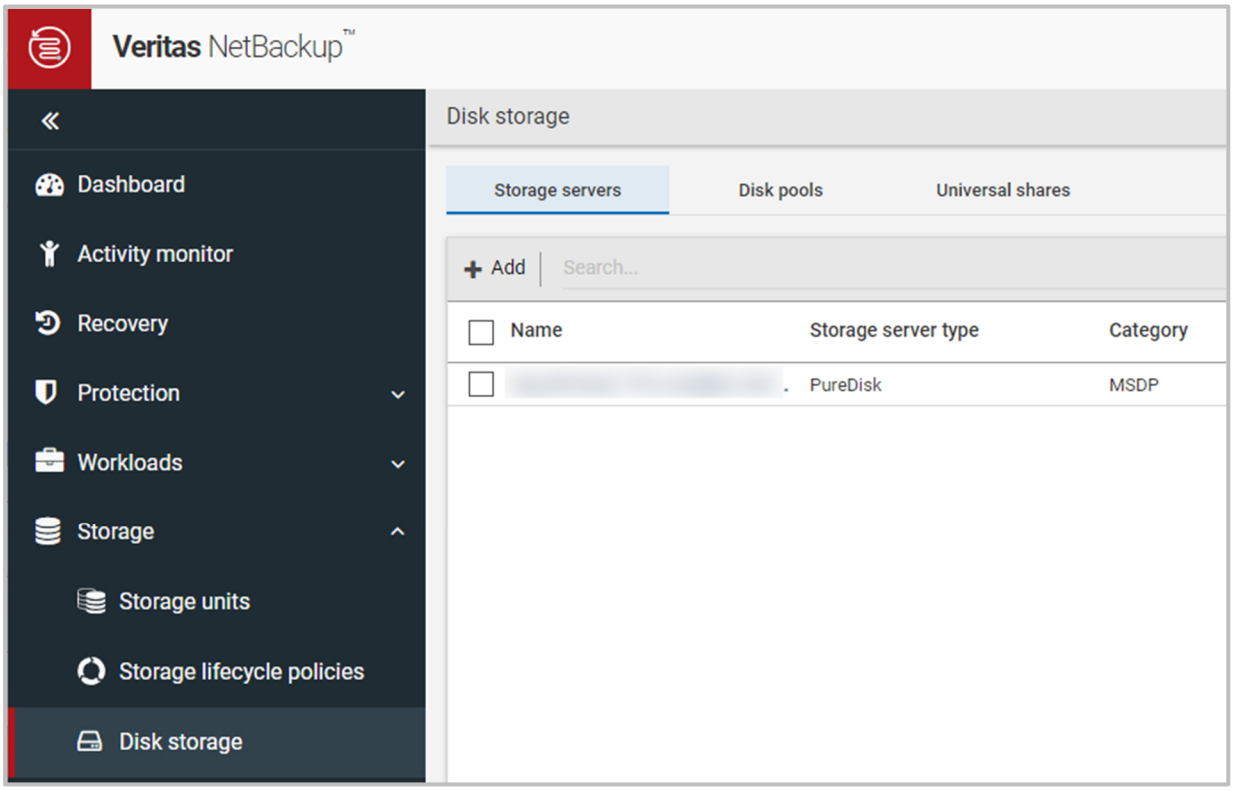
Note: Having trouble installing Alta Recovery Vault? See the Alta Recovery Vault Troubleshooting Guide.

1. Ensure your storage server has been created.

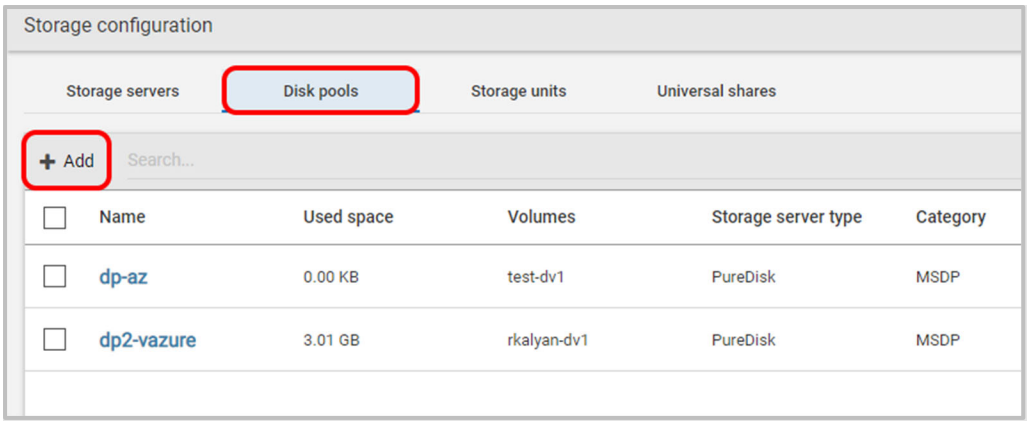
a. Note that this document assumes you already have an MSDP storage server created. For more information on how to add a storage server, see the *NetBackup Deduplication Guide*: https://www.veritas.com/content/support/en_US/doc/25074086-159245004-0/v24332600-159245004

2. From within your NetBackup primary server web UI, navigate to **Storage > Disk Storage**

   You should see your storage server(s) listed.

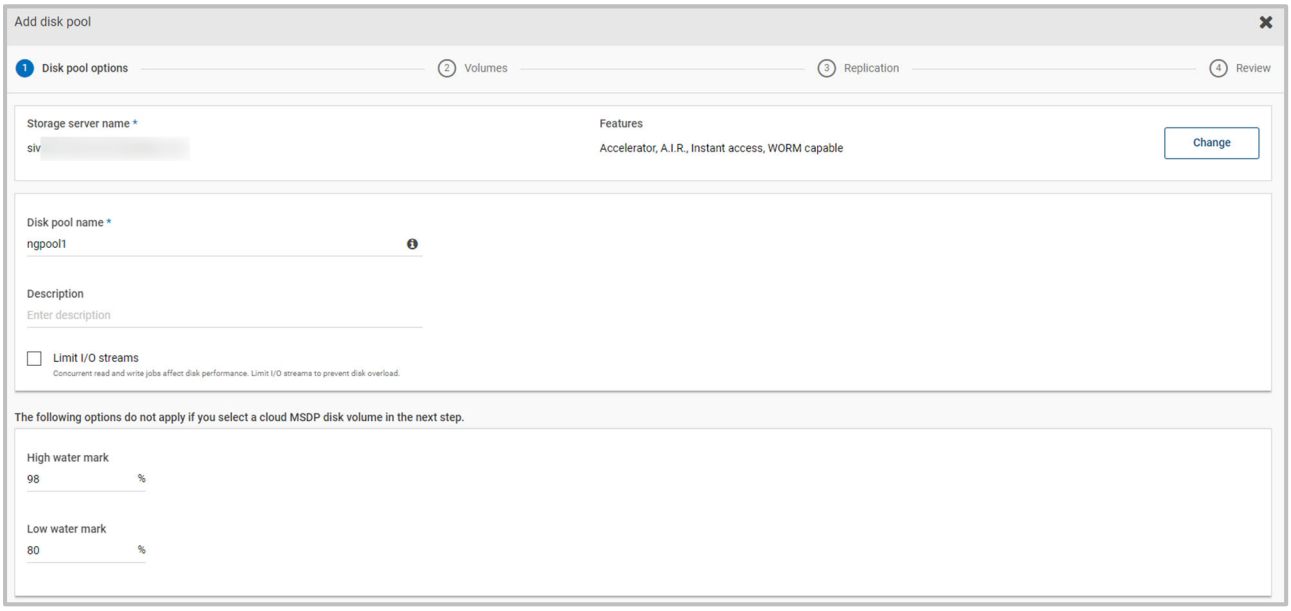


3. Click the **Disk pools** tab and click **+ Add**.

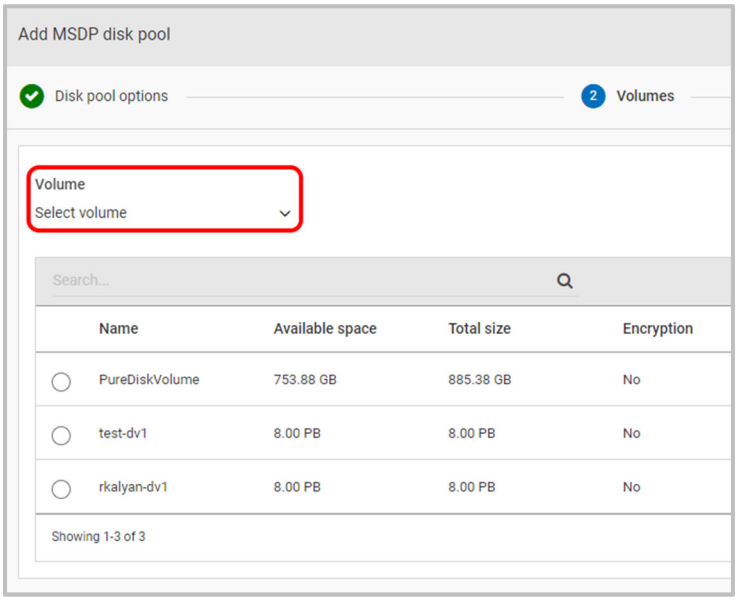


4. First, enter the details for disk pool options.

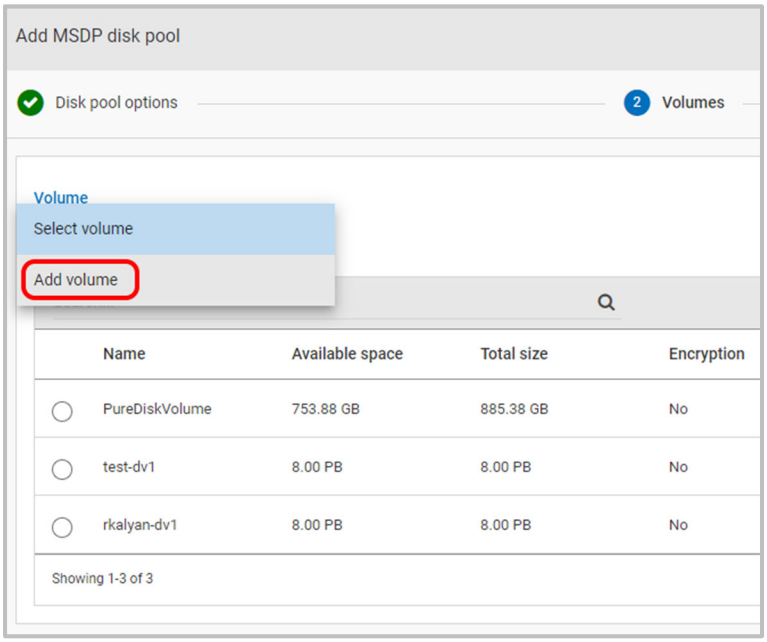
    k. Select the storage server name where this disk pool will reside. In this example, the choice is the storage server seen in step 1 of this procedure.
    l. Provide a name for the disk pool. This example uses “ngpool1”.
    m. If you choose, provide a description for the pool.
    n. Select **Limit I/O streams** if desired. This option could help limit disk I/O contention.
    o. Click **Next** at the bottom of the page to continue. (Not seen in the image.)



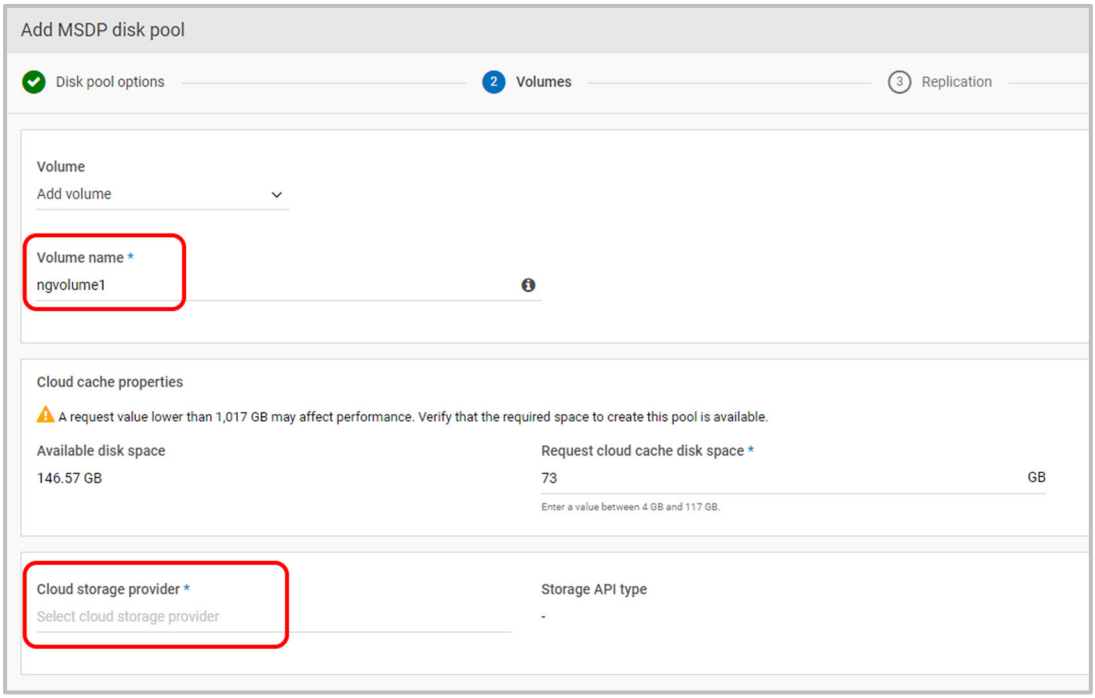
5. Next, you’re brought to the Volumes page. In the example you can see that there are already three volumes created, but you want to add your new Alta Recovery Vault volume. Click **Volume > Select volume**.



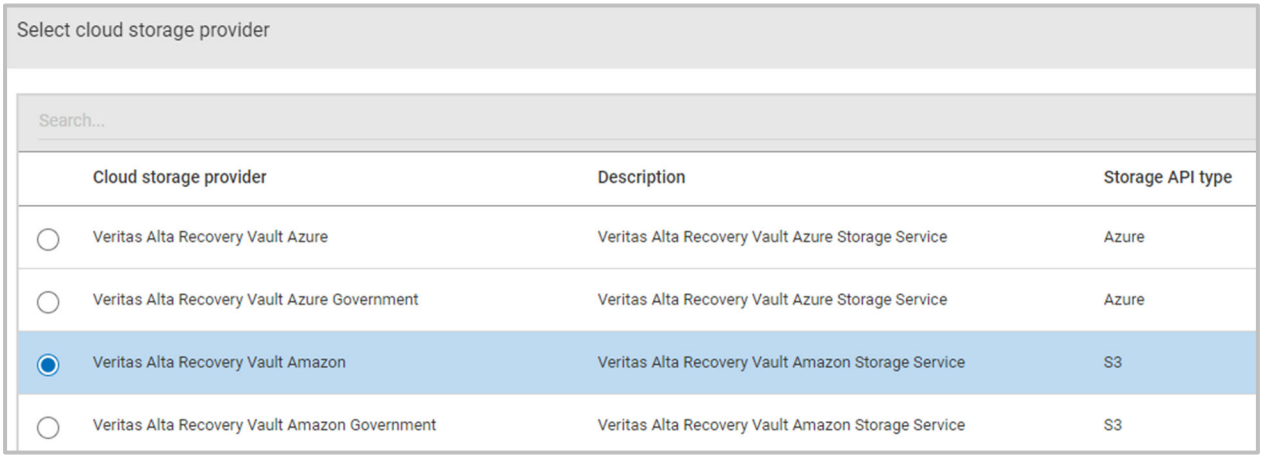
6. Click **Add volume** to begin the process.



7. Provide a name for the new volume and click **Cloud storage provider**.



8. Search for “Veritas Alta Recovery Vault Amazon” and the following Cloud storage providers appear. For this example, you will choose **Veritas Alta Recovery Vault Amazon**.



9. After you select the cloud storage provider, you’re taken back to the Add MSDP disk pool screen. Select the Storage tier you purchased and the AWS region to be used.

   Note: Choices for Storage Tier are:

   Alta Recovery Vault Standard – AWS

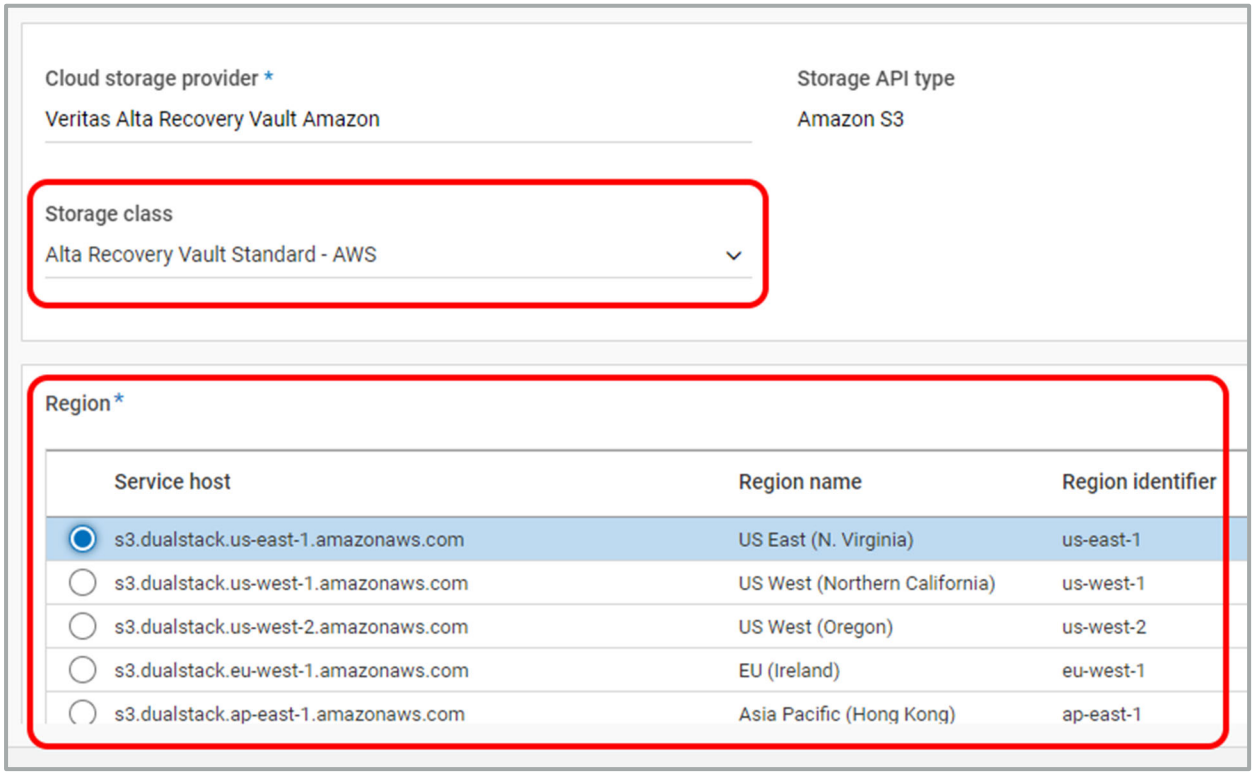
   or

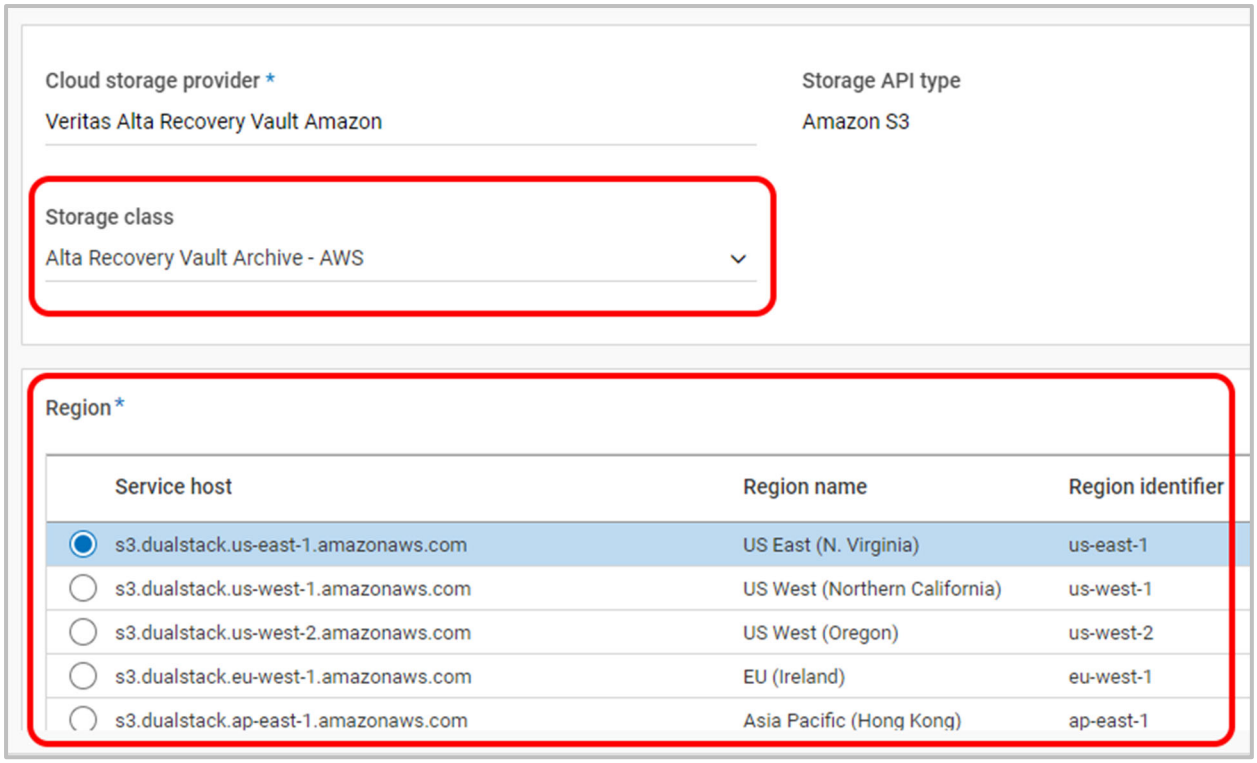
   Alta Recovery Vault Archive - AWS

   Note: If you’ve purchased archive tier, select Alta Recovery Vault Archive - AWS.

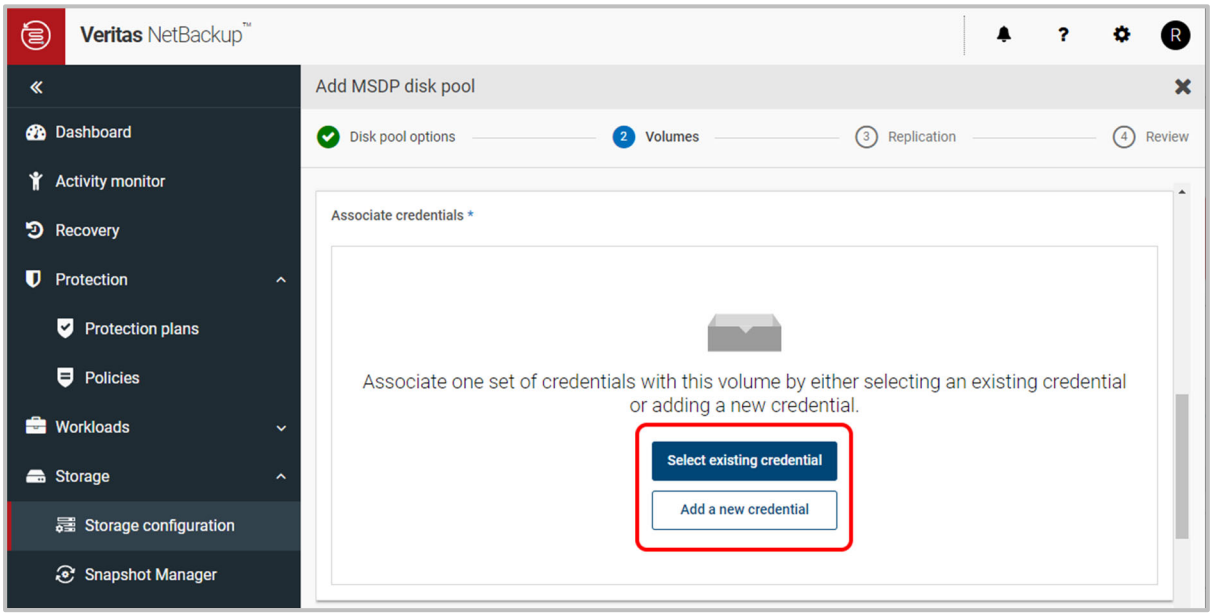
   Note: For archive tier, ensure your cloud vendor provides archive support in the desired region. If archive tier is not supported in the region, this feature will not function correctly.

Note: The region is provided by the Veritas Alta Recovery Vault Provisioning Team.



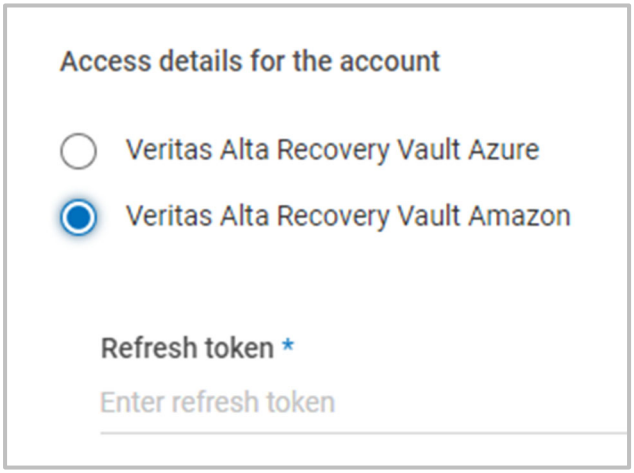


10. Click **Select existing credential** if you've already created your credential from the Short-Lived Token Based Authentication section earlier in this document. If not, click **Add a new credential** and create a new credential using the storage account and refresh token given to you by Veritas.



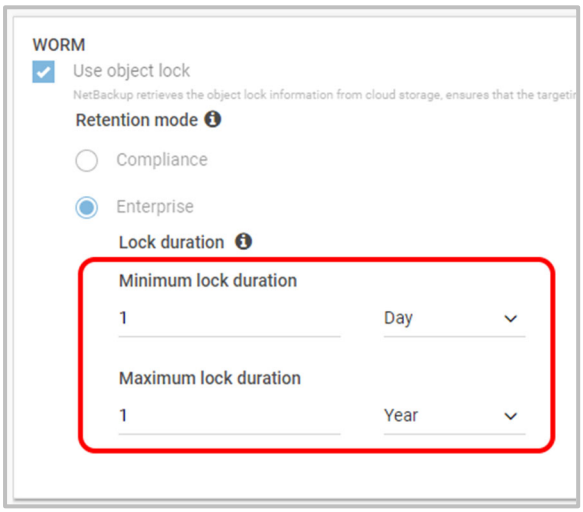
Note: You can create multiple disk volumes/buckets using the same credentials. There is no need to add multiple credentials for the same storage account.

Note: Refresh tokens are provided by the Veritas Alta Recovery Vault Provisioning Team.



11. In the WORM section is where you set the immutability time duration. During the Lock duration the image is locked. For more information regarding immutability, see the Veritas Knowledge Base Article 100055803 for more information on Alta Recovery Vault and immutability.

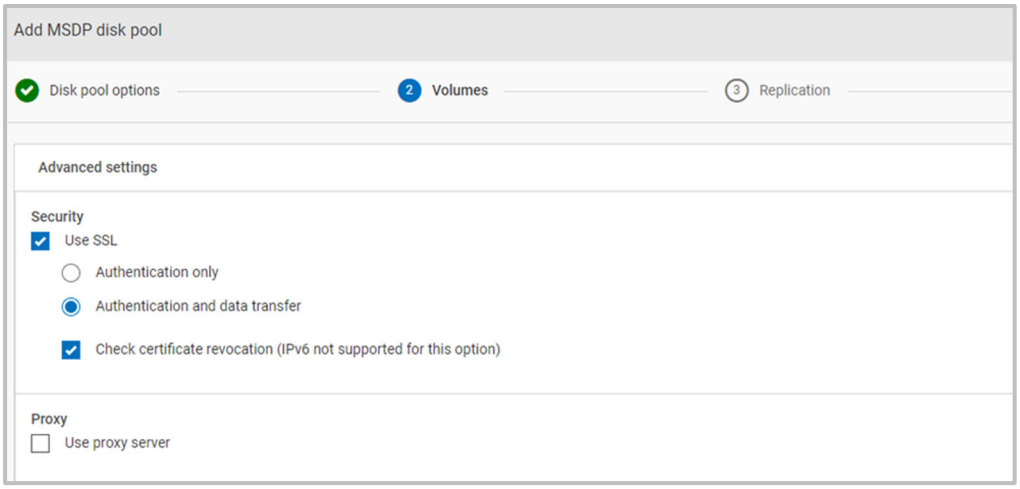
    Note: WORM and Enterprise mode are selected by default and cannot be changed.



12. In Advanced settings, enter the required Security or Proxy preferences.

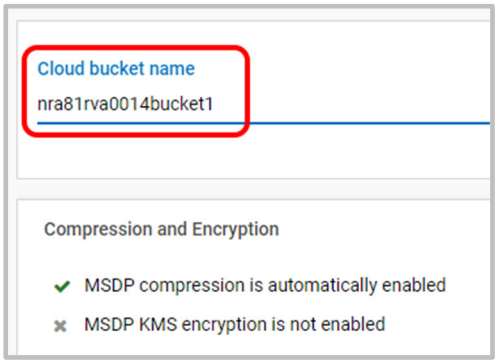
    Note: If you do not want to open port 80 externally, you will need to uncheck “Check certificate revocation”, For more information on check certificate revocation, see the following: https://en.wikipedia.org/wiki/Certificate_revocation_list#:~:text=In%20cryptography%2C%20a%20certificate%20revocation,should%20no%20longer%20be%20trusted%22.

    Note: A proxy server can be used if wanted.

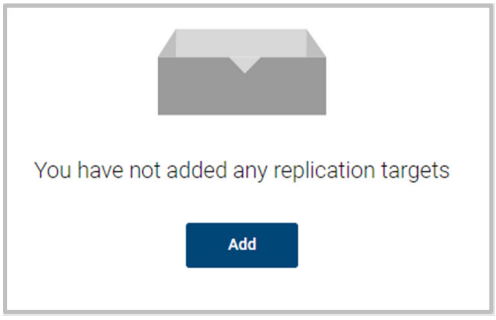


13. Enter the cloud bucket name.

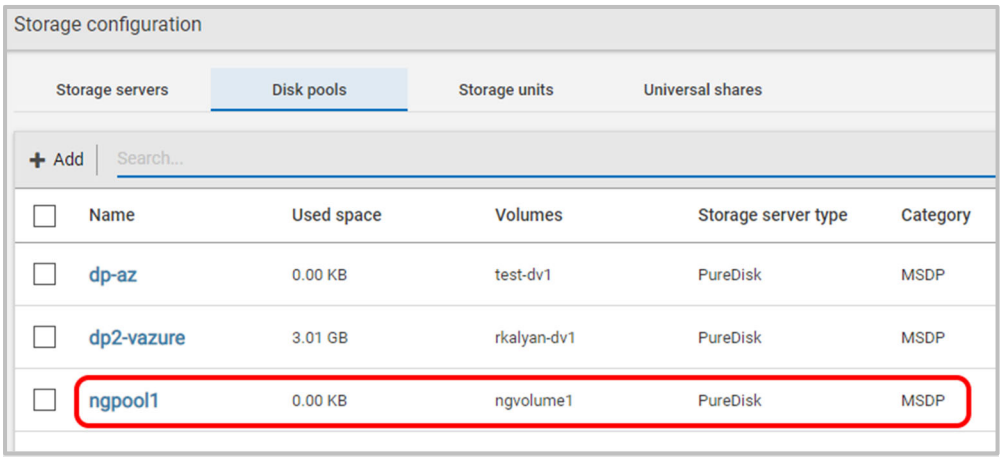
    Note: This name is provided by the Veritas Alta Recovery Vault Provisioning Team. The one shown below is for reference only. After entering the cloud bucket name, click **Next**. (Not shown in the image.)



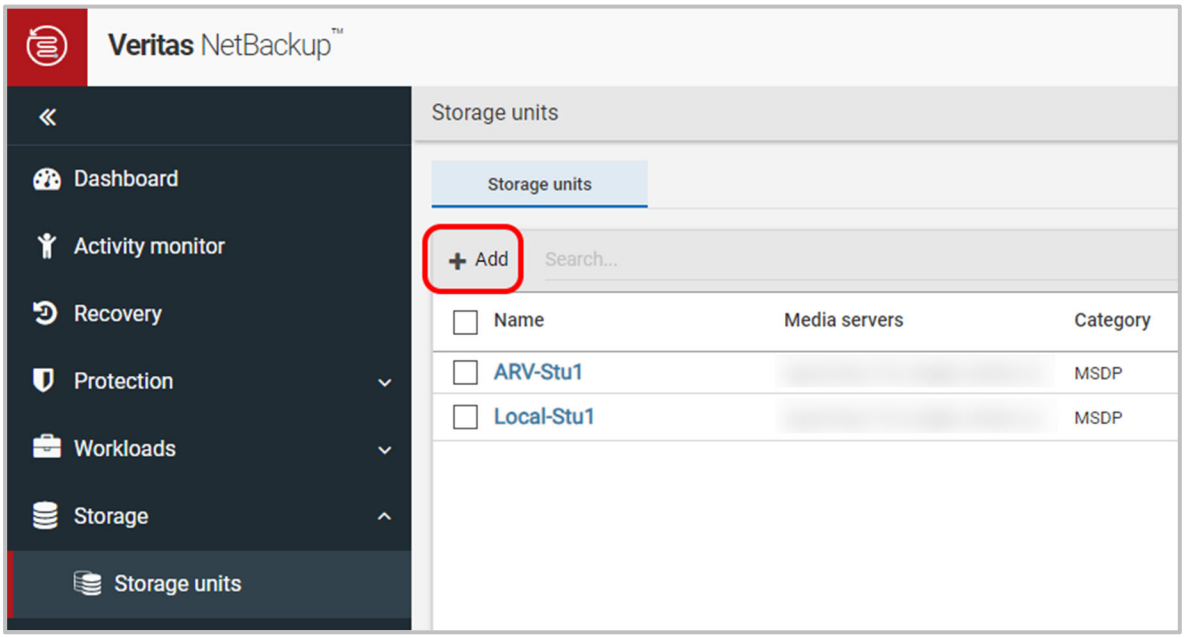
14. If you would like to set up replication targets, they can be set up now. If none are needed, click **Next**. (Not shown in the image.)



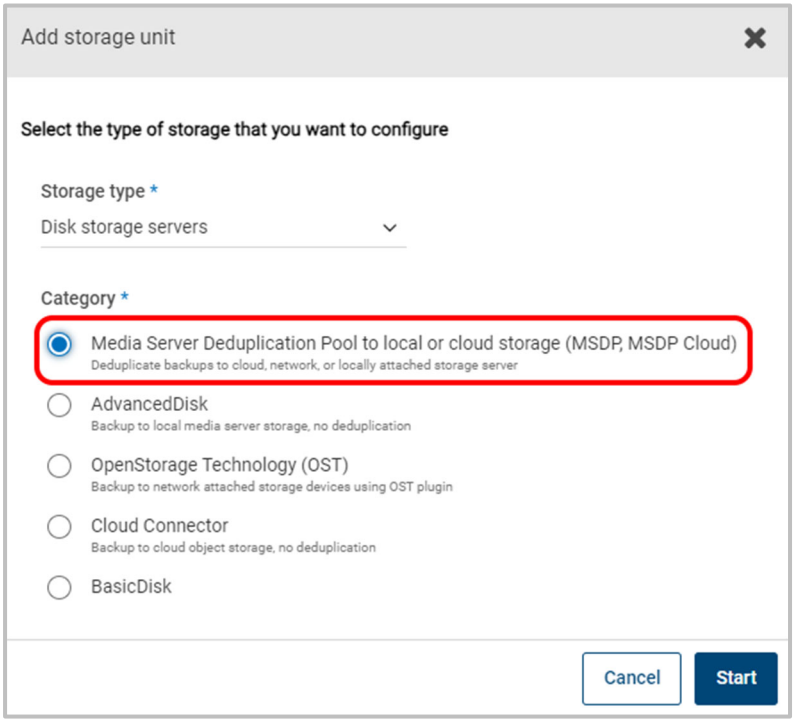
15. The next page is a summary page. If everything looks good, create the new disk pool. In this example, the new “ngpool1” has been created.



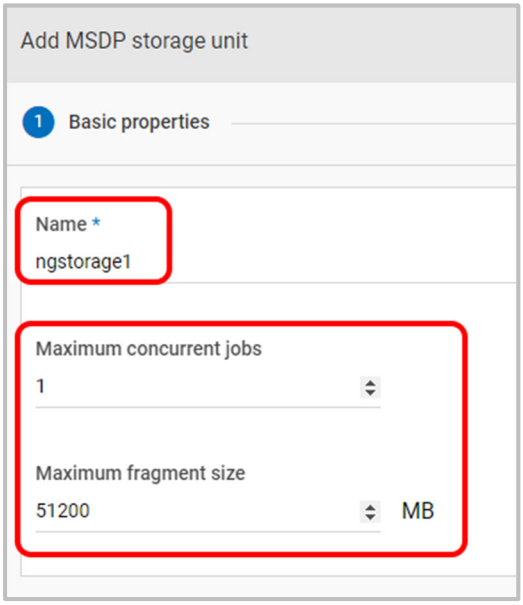
16. Next, add a storage unit so you can use your new Alta Recovery Vault storage. Under Storage > Storage Units, click **+ Add**.



17. Select **Media Server Deduplication Pool to local or cloud storage (MSDP, MSDP Cloud)** and click **Start**.

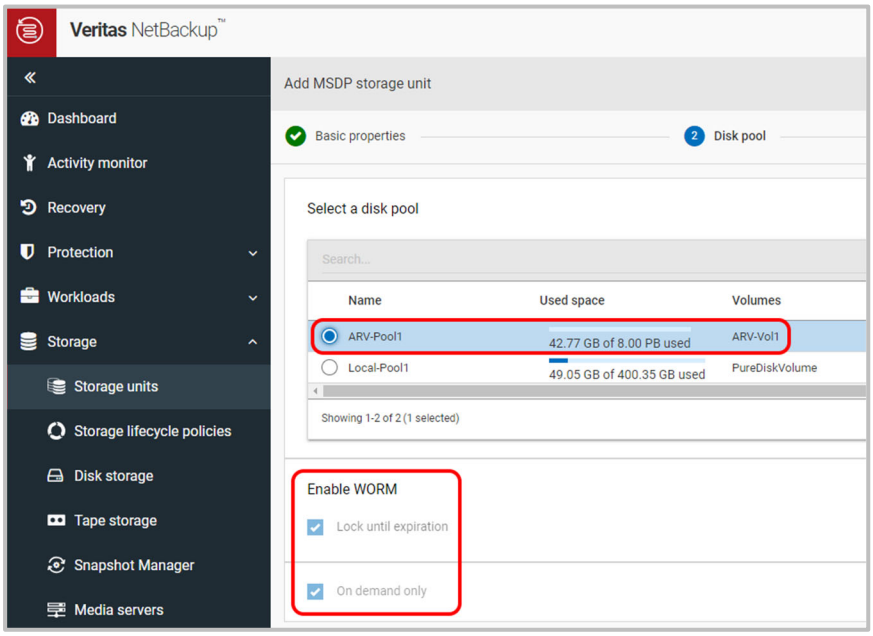


18. Provide a new MSDP storage unit name and select the desired **Maximum concurrent jobs** and **Maximum fragment size**. Click **Next** to continue. (Not shown in the image.)

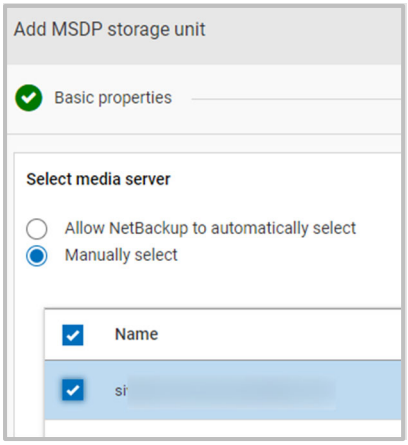


19. Select the Alta Recovery Vault volume created earlier. Click **Next** to continue. (Not shown in the image.)

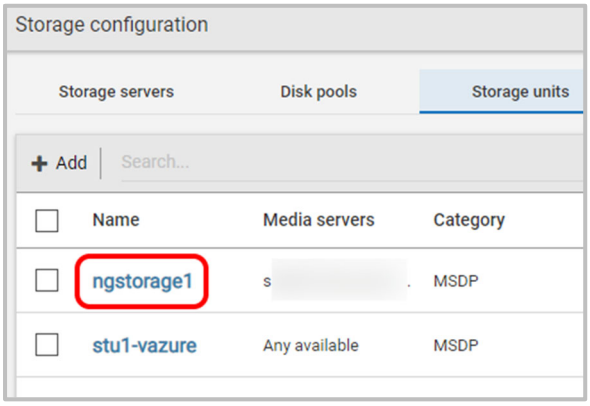
    Note: Enable WORM will be checked by default and cannot be un-checked.



20. Select the media server you wish to use. Click **Next** to continue. (Not shown in the image.)



21. Here you can see your new “ngstorage1” storage unit successfully created.



The new Alta Recovery Vault storage can now be used for backups.

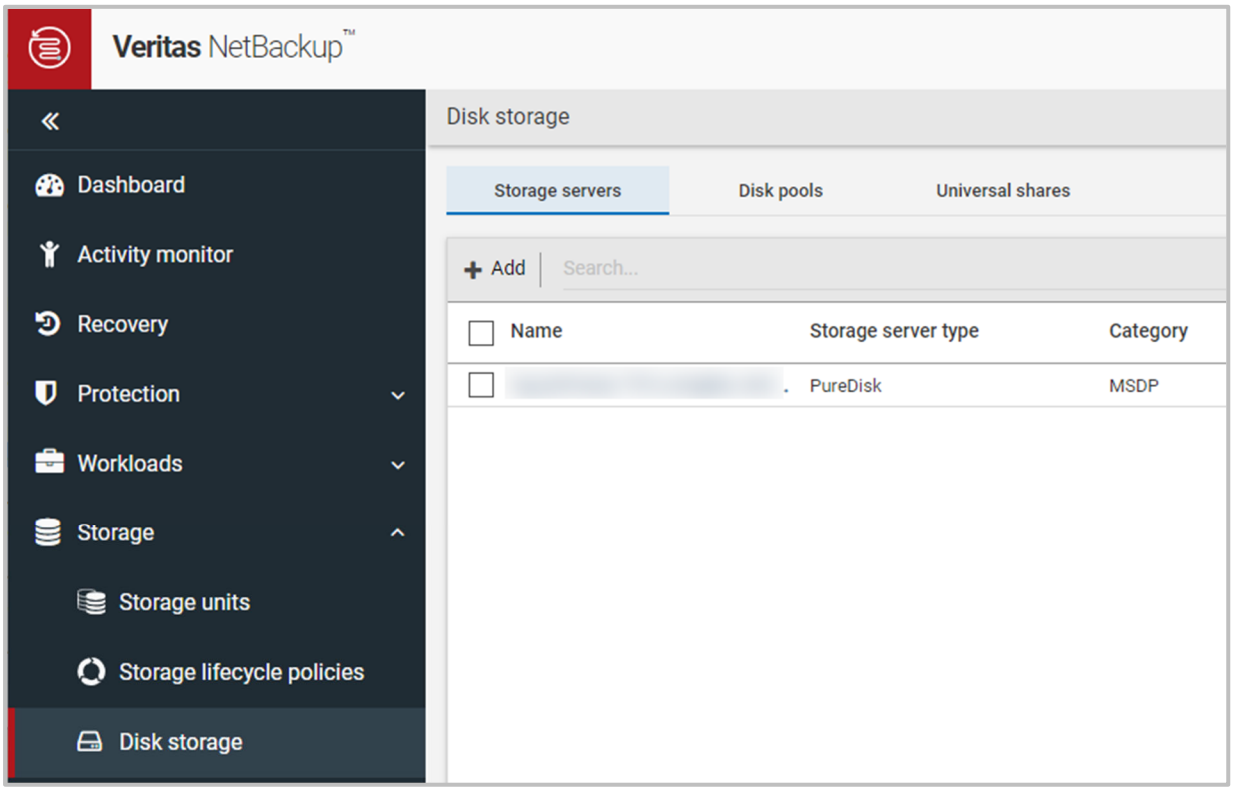
NetBackup 10.3

Note: Having trouble installing Alta Recovery Vault? See the Alta Recovery Vault Troubleshooting Guide.

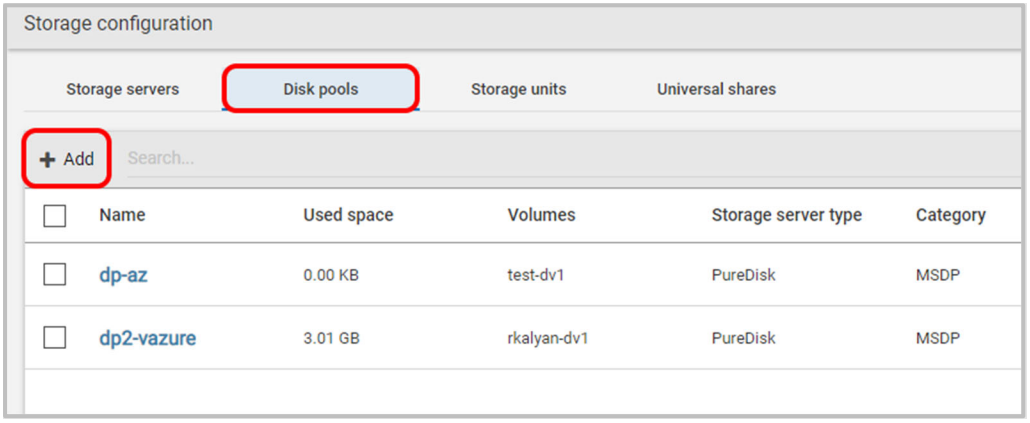
1. Ensure your storage server has been created.
    a. Note that this document assumes you already have an MSDP storage server created. For more information on how to add a storage server, see the *NetBackup Deduplication Guide*: https://www.veritas.com/content/support/en_US/doc/25074086-159245004-0/v24332600-159245004

2. From within your NetBackup primary server web UI, navigate to **Storage > Disk Storage**

   You should see your storage server(s) listed.

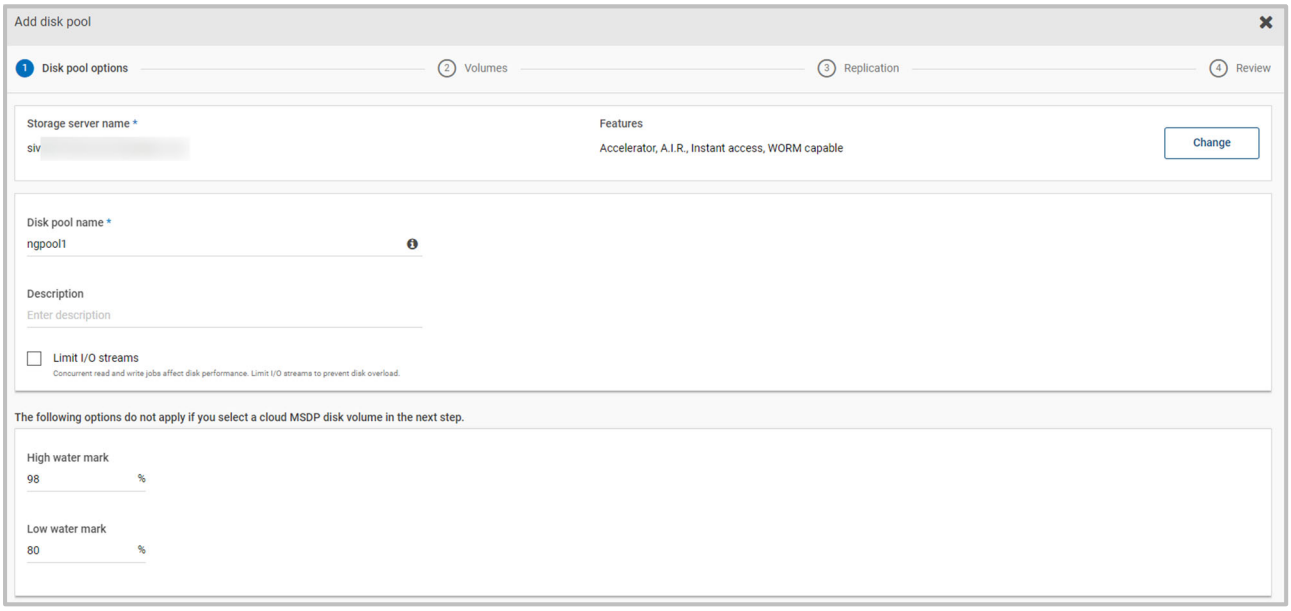


3. Click the **Disk pools** tab and click **+ Add**.

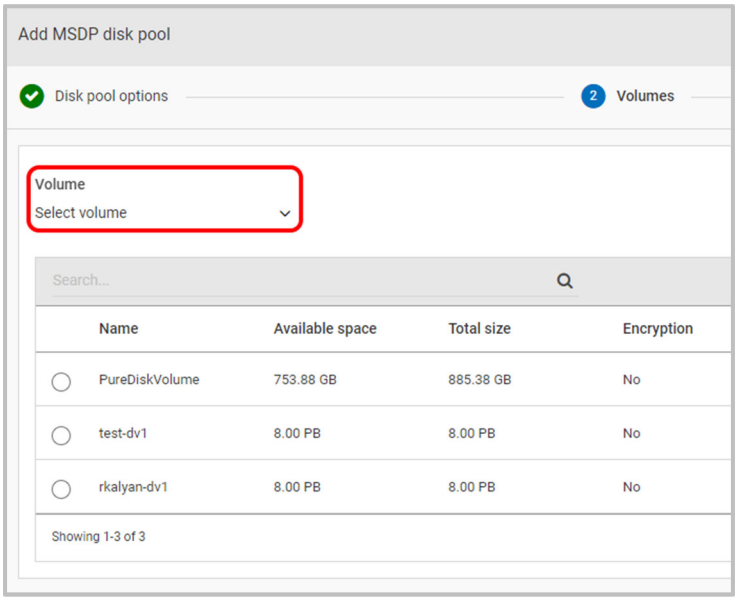


4. First, enter the details for disk pool options.

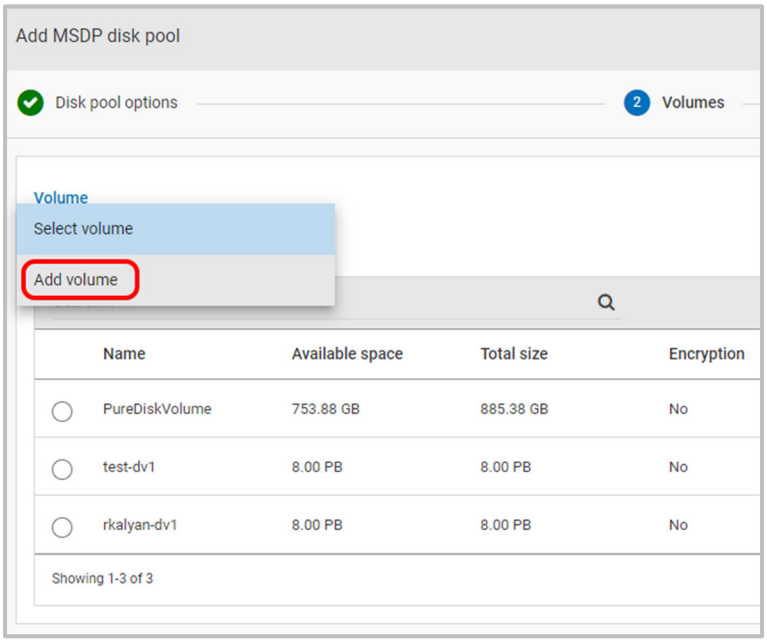
    p. Select the storage server name where this disk pool will reside. In this example, the choice is the storage server seen in step 1 of this procedure.
    q. Provide a name for the disk pool. This example uses “ngpool1”.
    r. If you choose, provide a description for the pool.
    s. Select **Limit I/O streams** if desired. This option could help limit disk I/O contention.
    t. Click **Next** at the bottom of the page to continue. (Not seen in the image.)



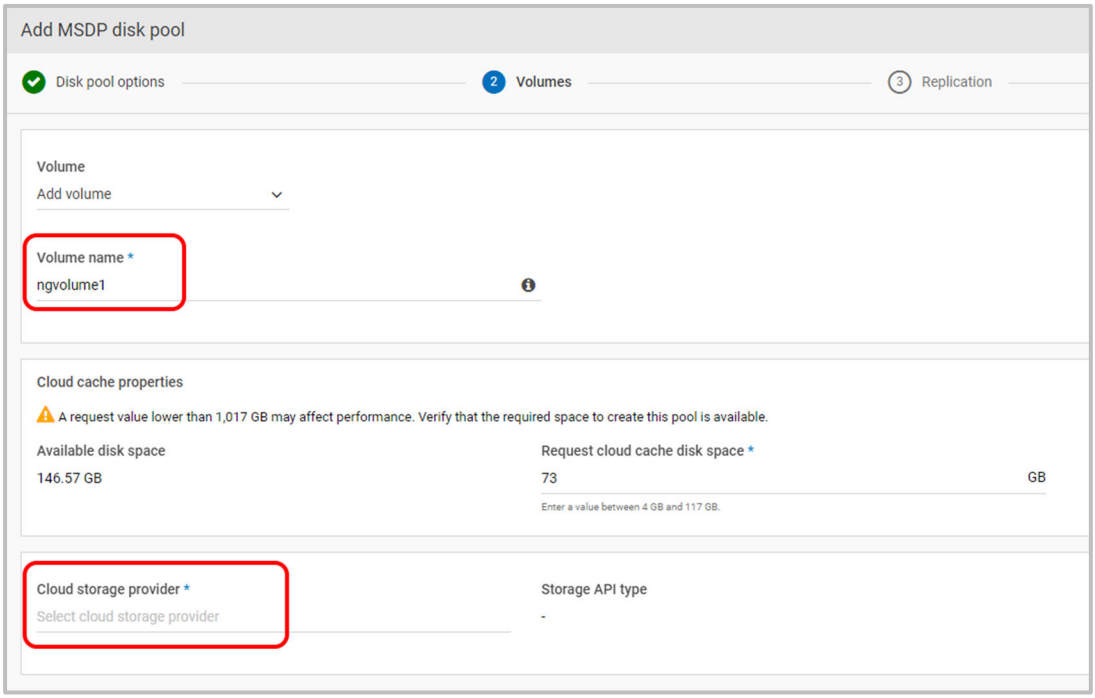
5. Next, you’re brought to the Volumes page. In the example you can see that there are already three volumes created, but you want to add your new Alta Recovery Vault volume. Click **Volume > Select volume**.



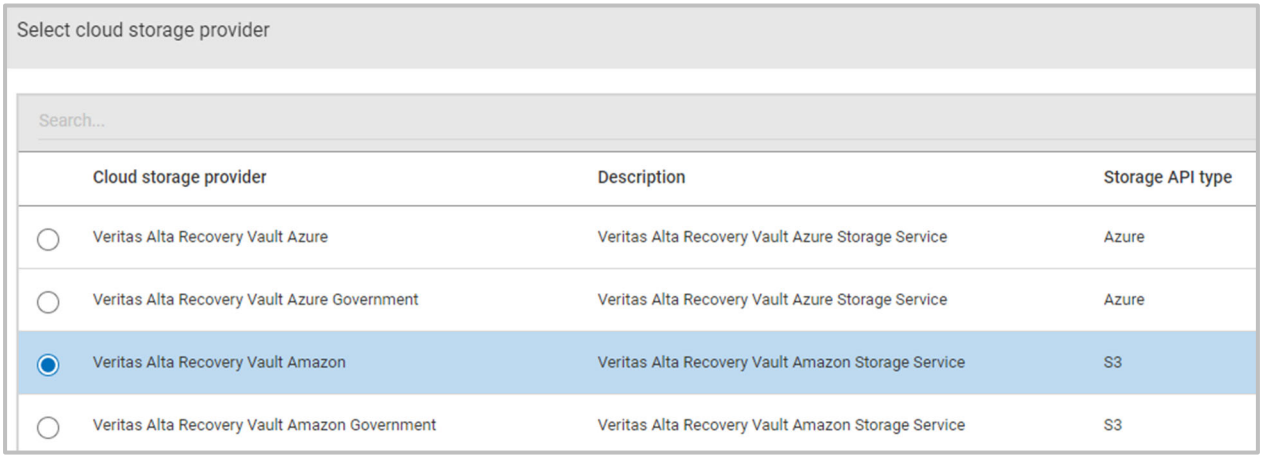
6. Click **Add volume** to begin the process.



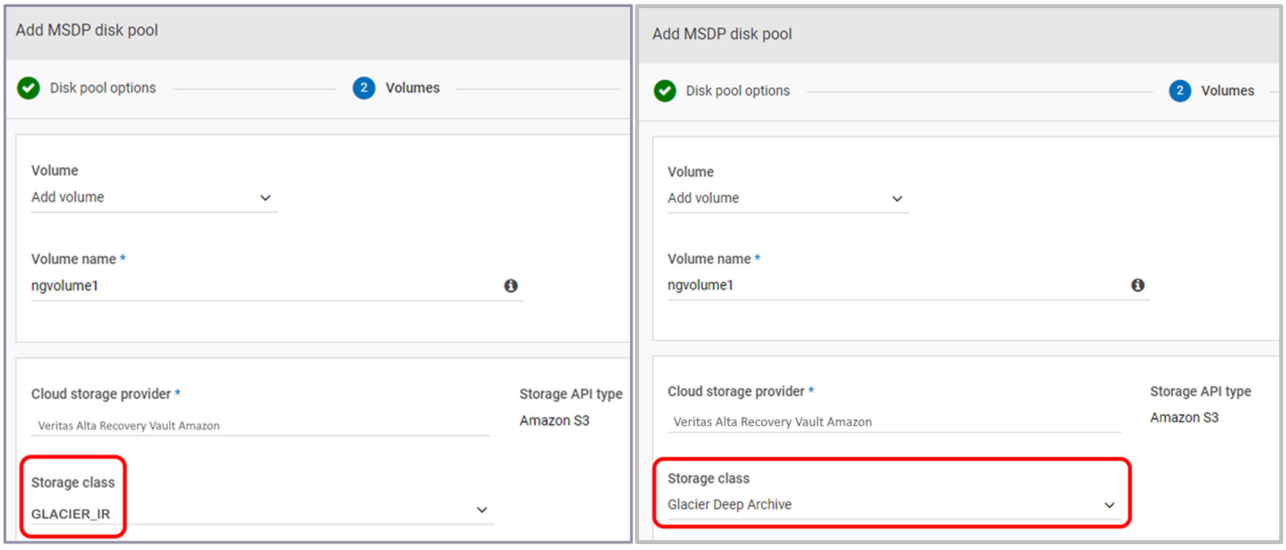
7. Provide a name for the new volume and click **Cloud storage provider**.



8. Search for “Veritas Alta Recovery Vault Amazon” and the following Cloud storage providers appear. For this example, you will choose **Veritas Alta Recovery Vault Amazon**.



9. After you select the cloud storage provider, you’re taken back to the Add MSDP disk pool screen. Select **GLACIER_IR** as the **Storage class**.

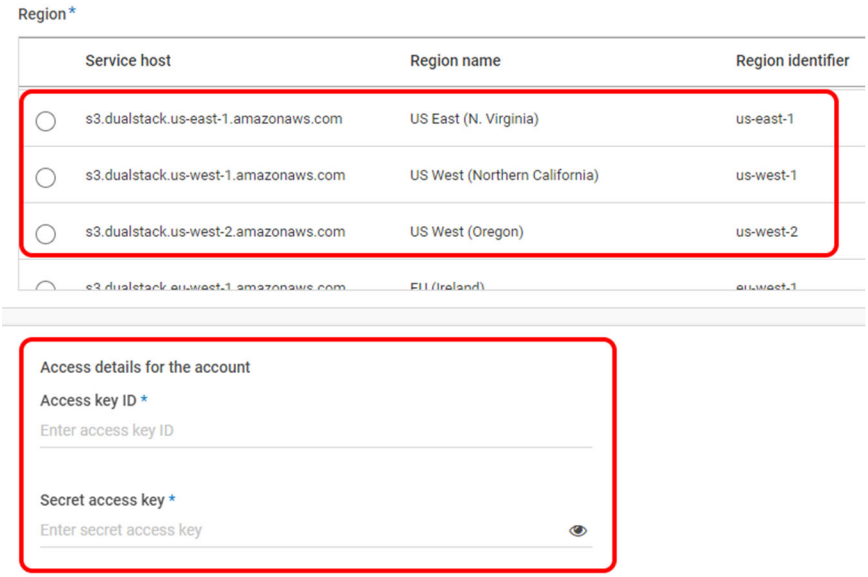


If you’ve purchased Archive tier, click **Storage class,** and select **Glacier Deep Archive**.

Note: For archive tier, ensure your cloud vendor provides archive support in the desired region. If archive tier is not supported in the region, this feature will not function correctly.

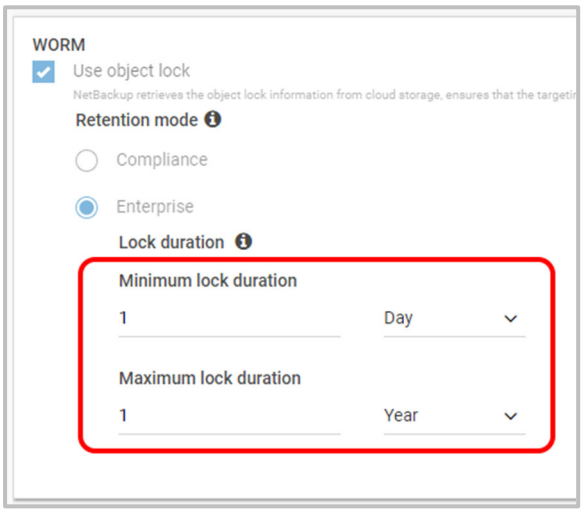
10. Next, enter the Region, Access Key ID, and Secret Access Key.

    Note: These are provided by the Veritas Alta Recovery Vault Provisioning Team.



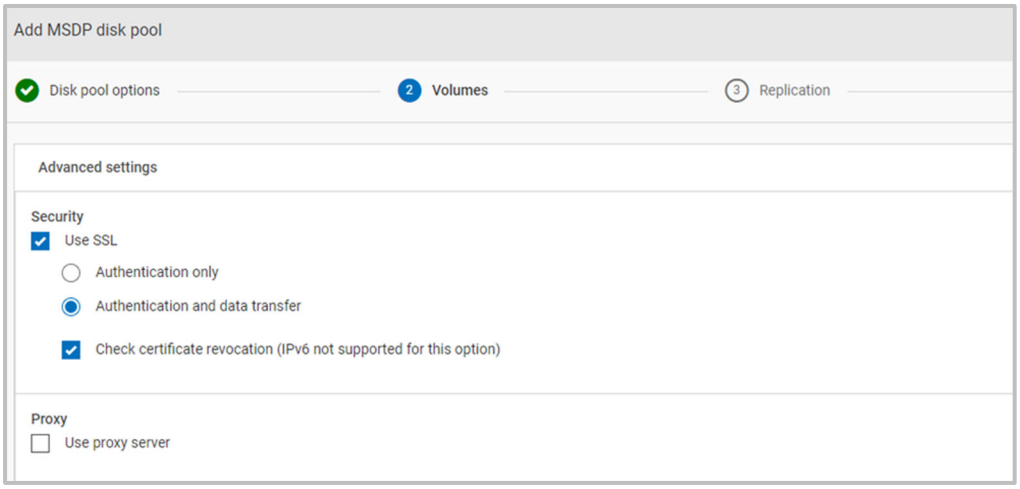
11. In the WORM section is where you set the immutability time duration. During the Lock duration the image is locked. For more information regarding immutability, see the Veritas Knowledge Base Article 100055803 for more information on Alta Recovery Vault and immutability.

    Note: WORM and Enterprise mode are selected by default and cannot be changed.



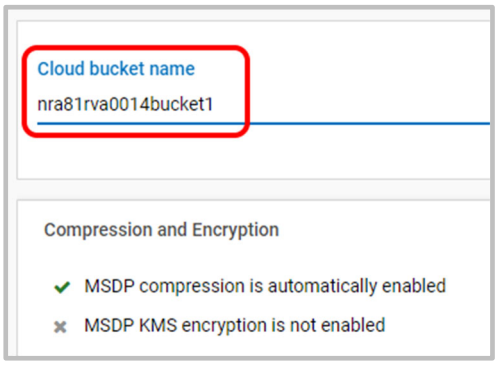
12. In Advanced settings, enter the required Security or Proxy preferences.

    Note: If you do not want to open port 80 externally, you will need to uncheck “Check certificate revocation”, For more information on check certificate revocation, see the following: https://en.wikipedia.org/wiki/Certificate_revocation_list#:~:text=In%20cryptography%2C%20a%20certificate%20revocation,should%20no%20longer%20be%20trusted%22.

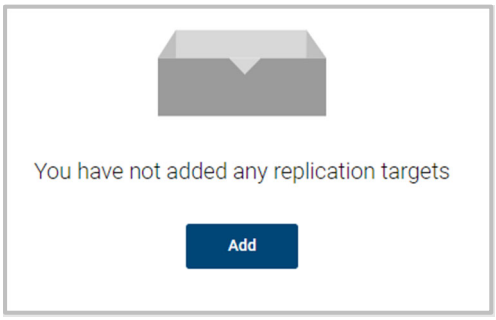


13. Enter the cloud bucket name.

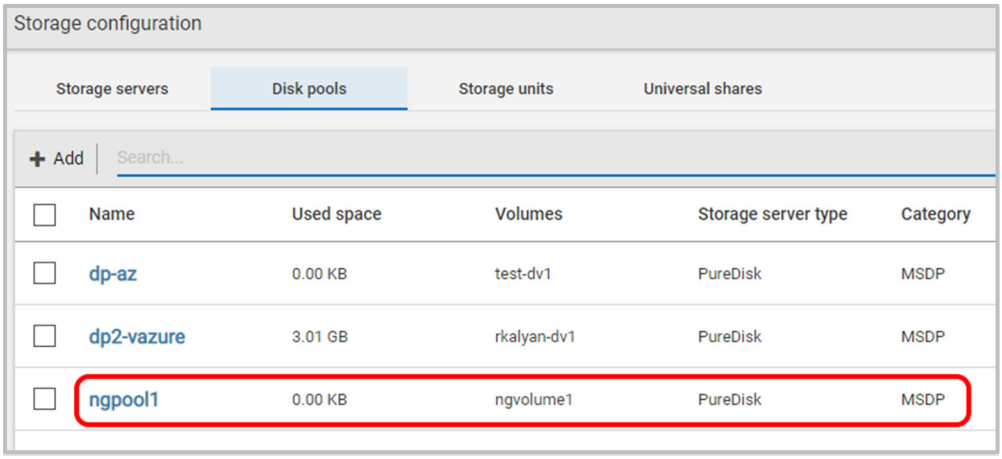
Note: This name is provided by the Veritas Alta Recovery Vault Provisioning Team. The one shown below is for reference only. After entering the cloud bucket name, click **Next**. (Not shown in the image).



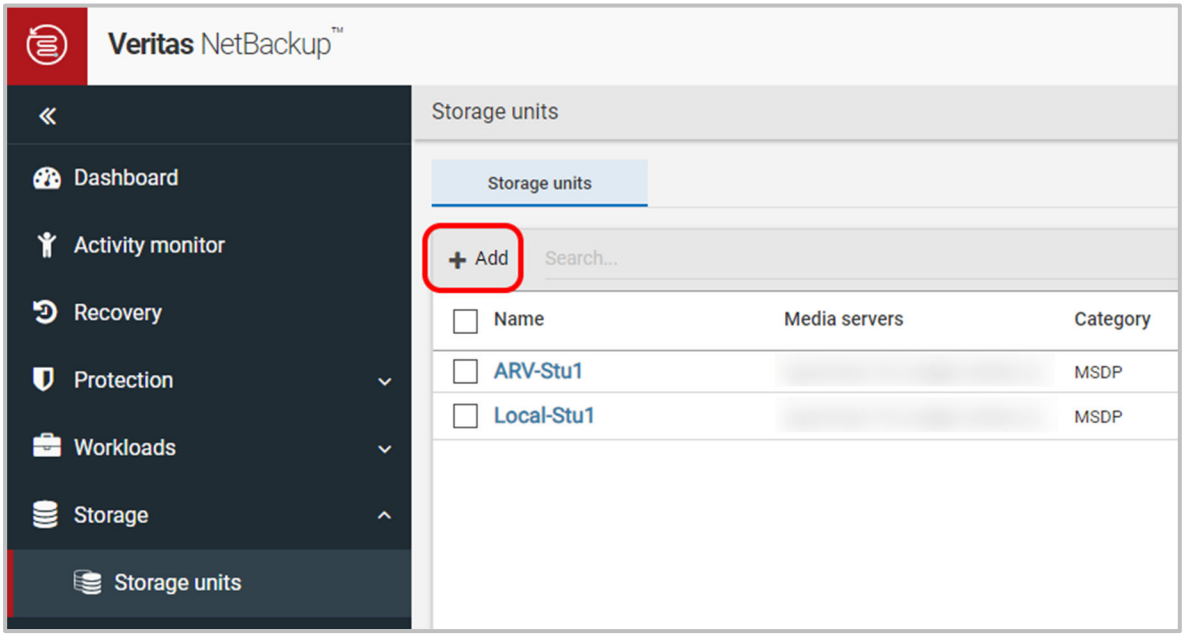
14. If you would like to set up replication targets, they can be set up now. If none are needed, click **Next**. (Not shown in the image.)



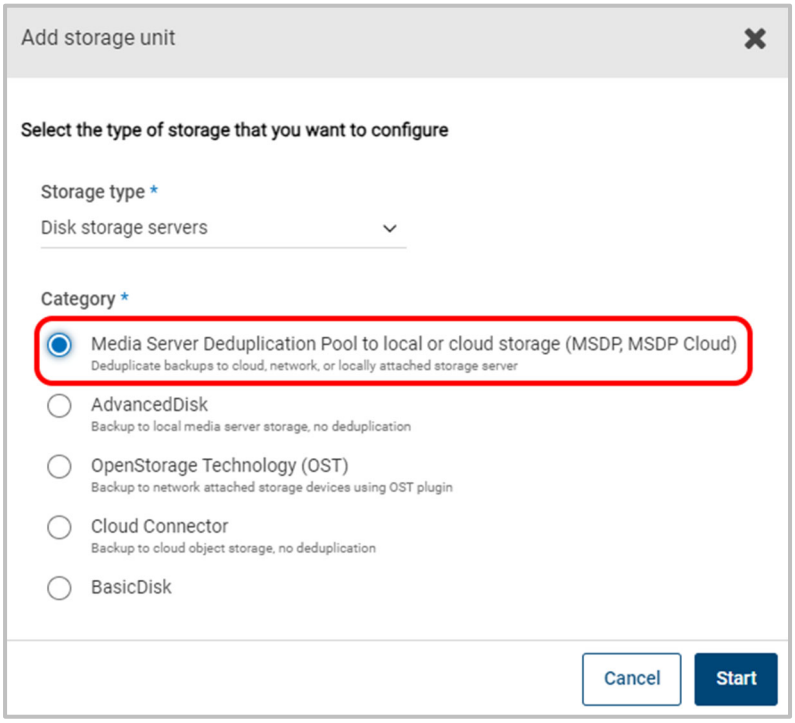
15. The next page is a summary page. If everything looks good, create the new disk pool. In this example, the new “ngpool1” has been created.



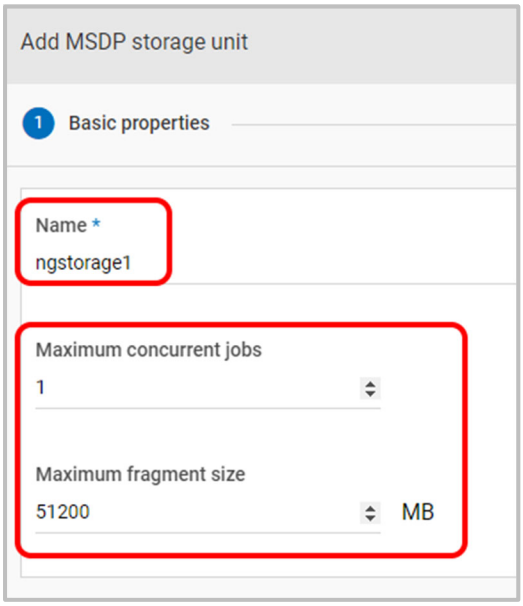
16. Next, add a storage unit so you can use your new Alta Recovery Vault storage. Under Storage > Storage Units, click **+ Add**.



17. Select **Media Server Deduplication Pool to local or cloud storage (MSDP, MSDP Cloud)** and click **Start**.

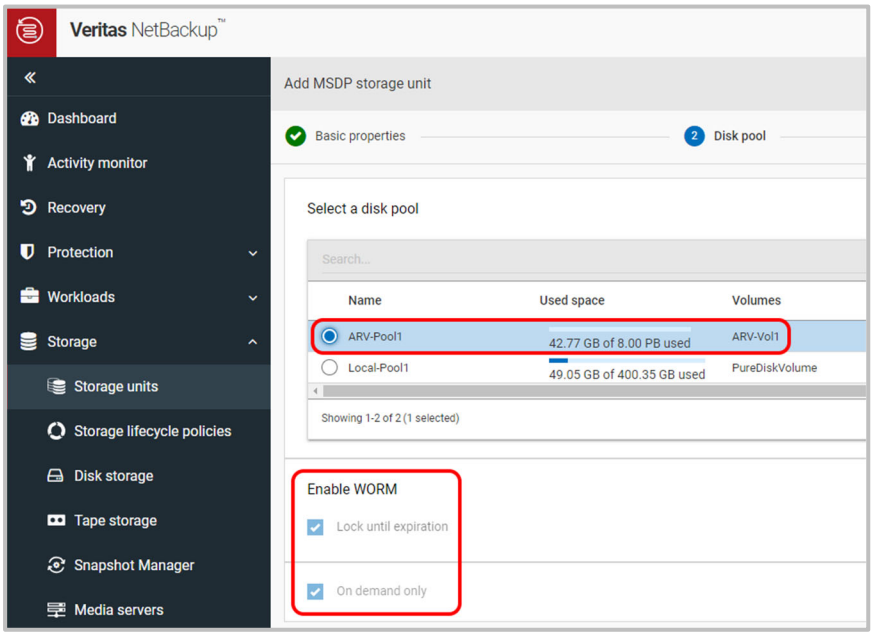


18. Provide a new MSDP storage unit name and select the desired **Maximum concurrent jobs** and **Maximum fragment size**. Click **Next** to continue. (Not shown in the image.)

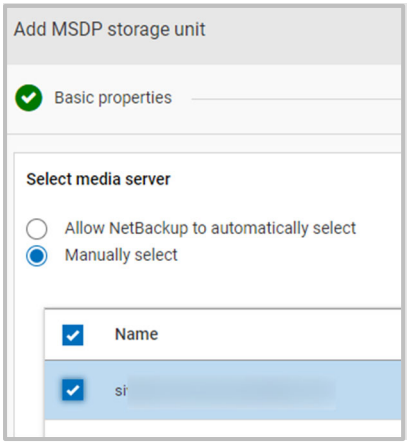


19. Select the Alta Recovery Vault volume created earlier. Click **Next** to continue. (Not shown in the image.)

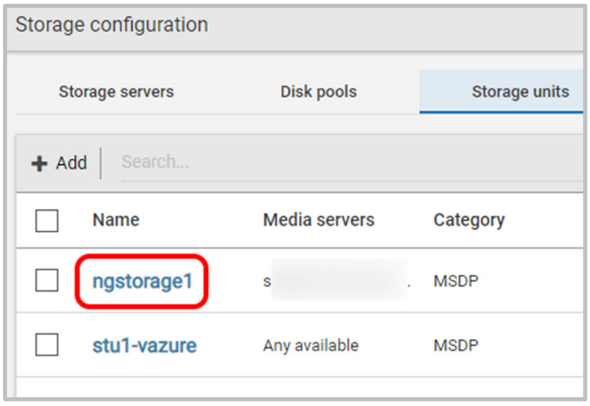
    Note: Enable WORM will be checked by default and cannot be un-checked.



20. Select the media server you wish to use. Click **Next** to continue. (Not shown in the image.)



21. Here you can see your new “ngstorage1” storage unit successfully created.



22. The new Alta Recovery Vault storage can now be used for backups.

NetBackup 10.2 or Earlier

Note: Having trouble installing Alta Recovery Vault? See the Alta Recovery Vault Troubleshooting Guide.

1. Ensure your storage server has been created.
    a. Note that this document assumes you already have an MSDP storage server created. For more information on how to add a storage server, see the *NetBackup Deduplication Guide*: https://www.veritas.com/content/support/en_US/doc/25074086-149019166-0/v24332600-149019166
2. Log into the console of your media server that is your MSDP storage server you created in step 1.
3. Navigate to `/usr/openv/pdde/pdcr/bin/` on the command line of your media server.

Set environment variables for AWS

a. AWS:
    i. `# export MSDPC_ACCESS_KEY=xxxx (Your Access Key)`
    ii. `# export MSDPC_SECRET_KEY=yyyyyyyyyyyyy (Your Secret Key)`
    iii. `# export MSDPC_REGION=<selectedregion>`
    iv. `# export MSDPC_PROVIDER=vamazon`
b. AWS Example
    i. `# export MSDPC_ACCESS_KEY=<givetoyoubyVeritas> (Your Access Key)`
    ii. `# export MSDPC_SECRET_KEY=<giventoyoubyVeritas> (Your Secret Key)`
    iii. `# export MSDPC_REGION=<your region like us-east-1>`
    iv. `# export MSDPC_PROVIDER=vamazon`

Governance mode (also known as enterprise mode):

Users require special permissions to disable the retention lock and then delete the image. Only the cloud administrator user can disable the retention lock and then delete the image if required.

4. Run the following command with your immutability inputs (non-archive)

a. `./msdpcldutil create -b containernamegivenbyveritas -v volumename --mode GOVERNANCE --min time --max time -l expirationdate --storageclass GLACIER_IR`
b. Example `./msdpcldutil create -b jzh-worm-bucket07 -v jzh-b01-v02 --mode GOVERNANCE --min 1D --max 1Y -l 2024-10-24 --storageclass GLACIER_IR`

5. Run the following command with your immutability inputs (archive)
    a. `./msdpcldutil create -b containernamegivenbyveritas -v volumename --mode GOVERNANCE --min time --max time -l expirationdate`
    b. Example `./msdpcldutil create -b jzh-worm-bucket07 -v jzh-b01-v02 --mode GOVERNANCE --min 1D --max 1Y -l 2024-10-24`

    Note: When running msdpcldutil for AWS **without** archive, the storage class must be set. Choose GLACIER_IR when setting up non-archive AWS storage.

    Note: When running msdcldutil for AWS **with** archive, do **NOT** include the storage class.

6. A list of the immutable containers (buckets) can be seen with the following command:
    a. ./`msdpcldutil list -b nameofcontainer`
    b. Example `./msdpcldutil list -b jzh-worm-bucket07`

7. Now that the immutable bucket has been configured on the command line, the immutable disk pool can be created.

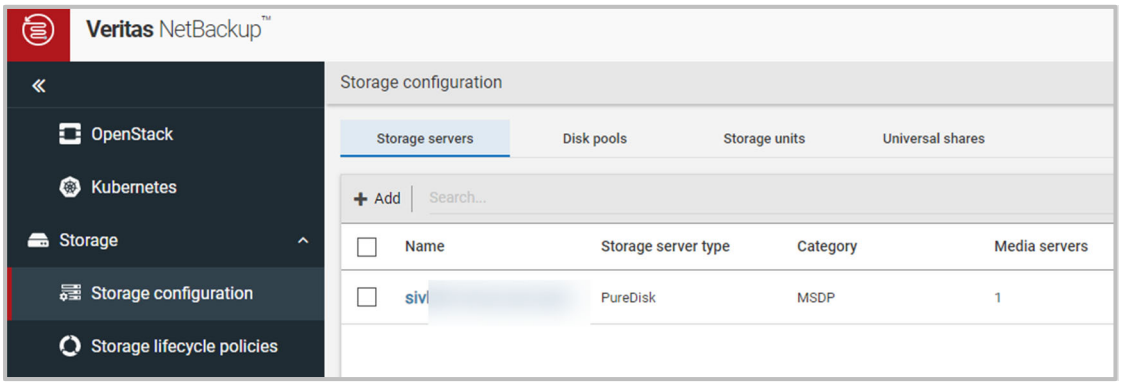
8. Go to the NetBackup web UI and navigate to **Storage > Storage configuration**.

After the volume and volume container have been created on your media server's CLI, it's time to connect to the new storage bucket in NetBackup through the Web UI.

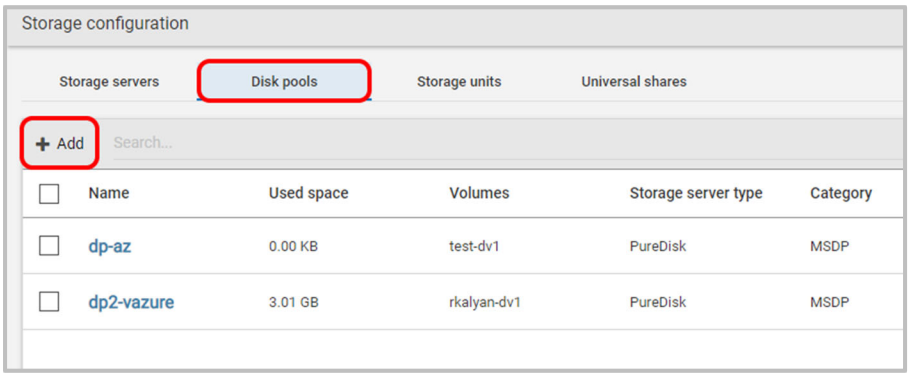
Note that this document assumes you already have an MSDP storage server created. For more information on how to add a storage server, see the *NetBackup Deduplication Guide*: https://www.veritas.com/content/support/en_US/doc/25074086-149019166-0/v24332600-149019166

9. From within your NetBackup primary server web UI, navigate to **Storage > Storage configuration**.

   You should see your storage servers listed.

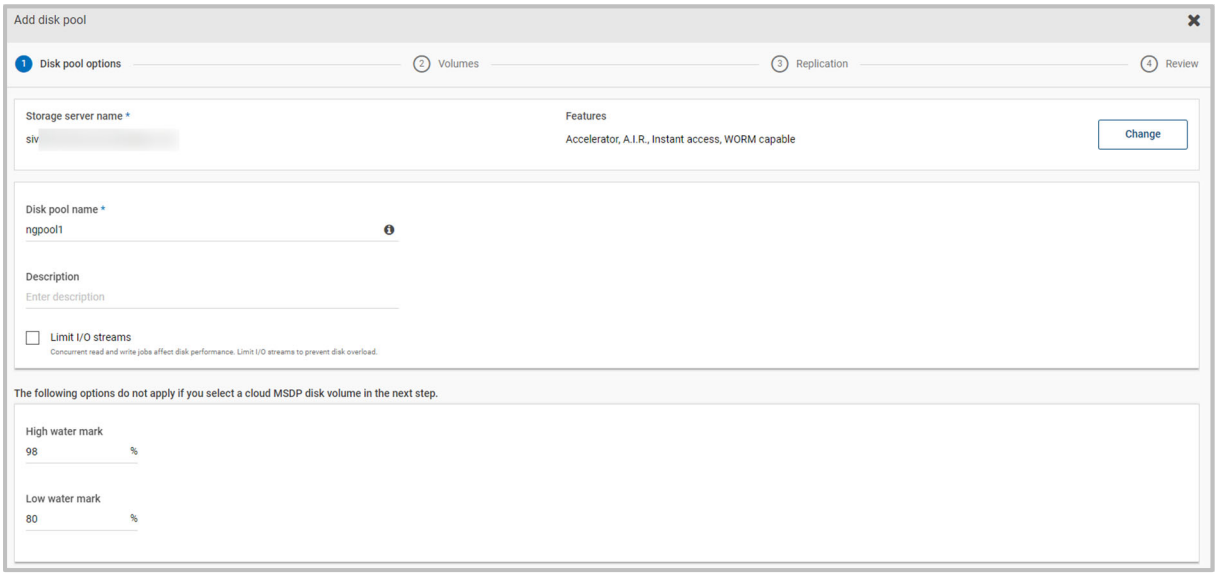


10. Click the **Disk pools** tab and click **+ Add**.

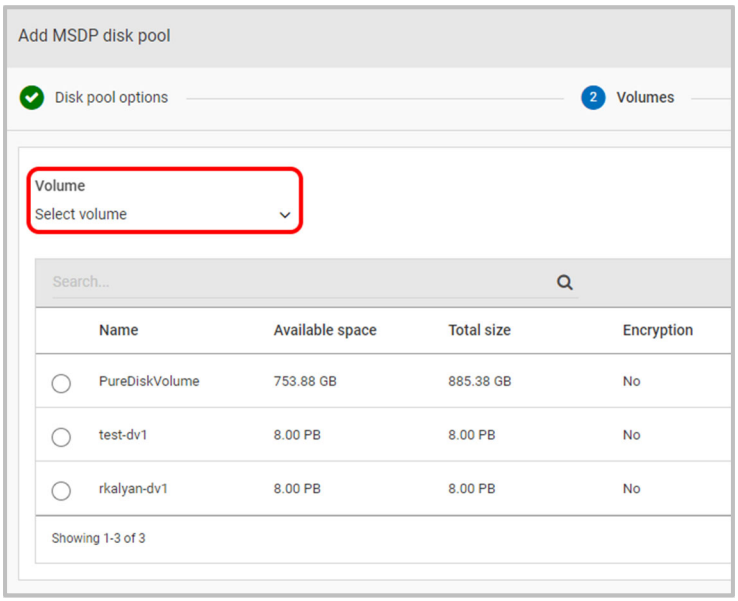


11. Enter the details for disk pool options.

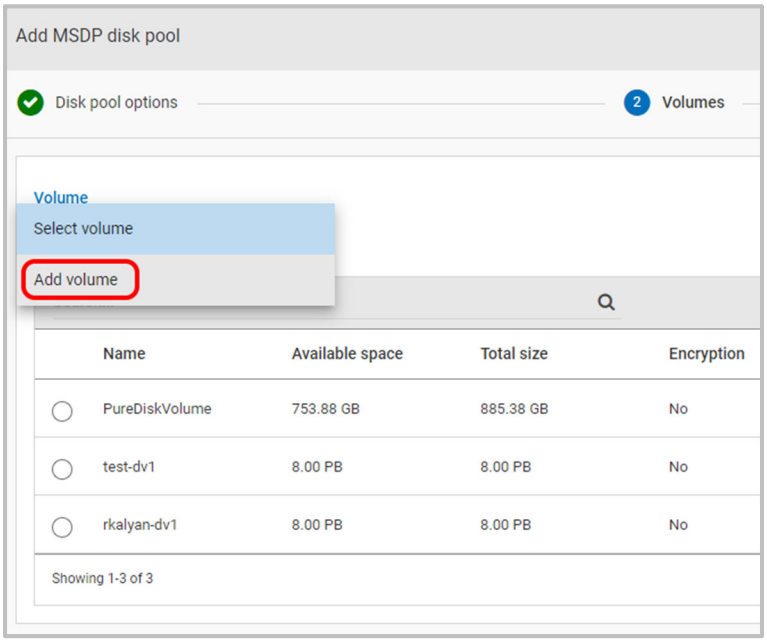
    f. Select the storage server name where this disk pool will reside. In this example, the choice is the storage server seen in step 1 of this procedure.
    g. Provide a name for the disk pool. This example uses “ngpool1”.
    h. If you choose, provide a description for the pool.
    i. Select **Limit I/O streams** if desired. This option could help limit disk I/O contention.
    j. Click **Next** at the bottom of the page to continue. (Not seen in the image.)



12. Next, you're brought to the Volumes page. In the example you can see that there are already three volumes created, but you want to add your new Alta Recovery Vault volume. Click **Volume > Select volume**.

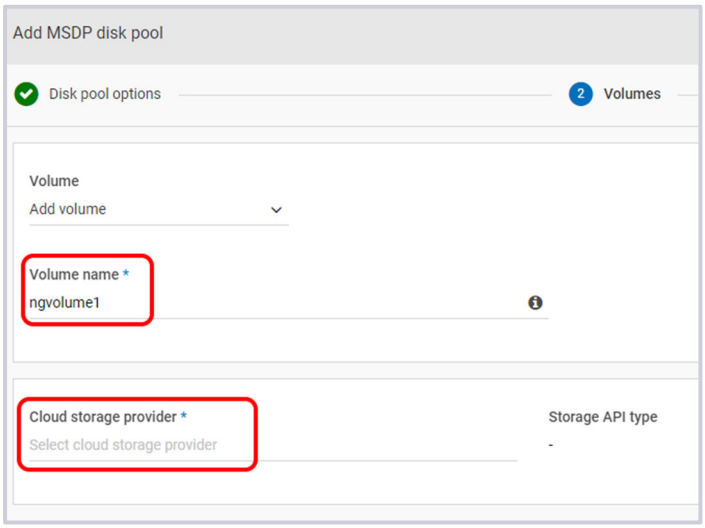


13. Click **Add volume** to begin the process.

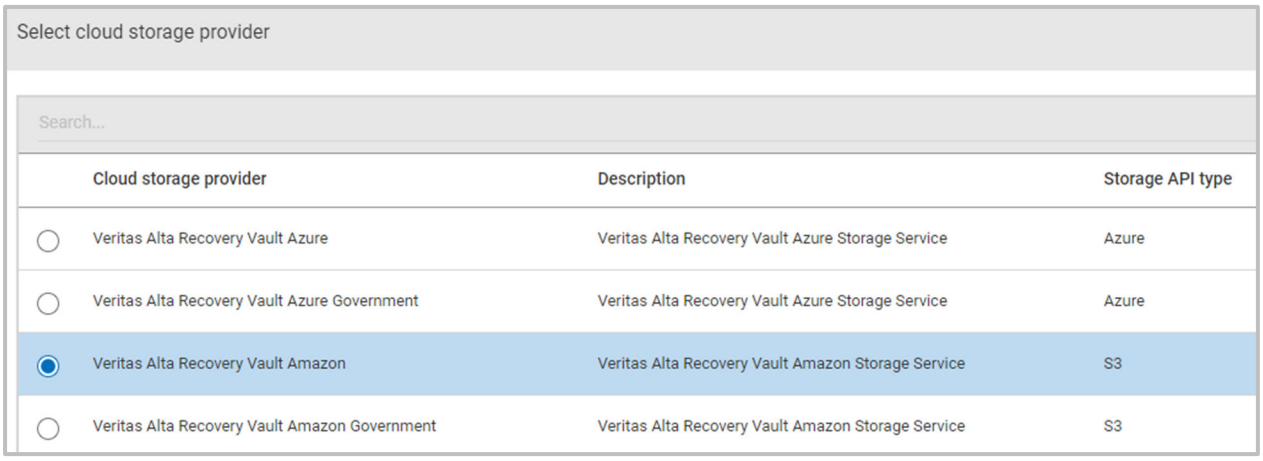


14. Provide a name for the new volume and click **Cloud storage provider**.

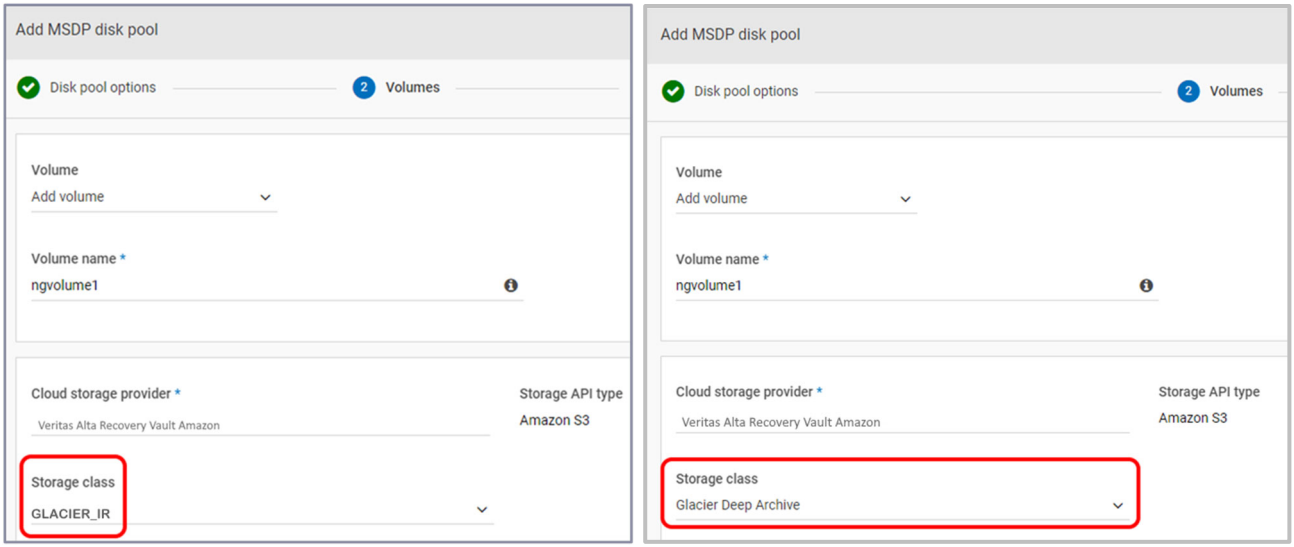
    Note: Name the volume the same as you did using the msdpcldutil command.



15. Search for “Veritas Alta Recovery Vault Amazon” and the following Cloud storage providers appear. For this example, you will choose **Veritas Alta Recovery Vault Amazon.**



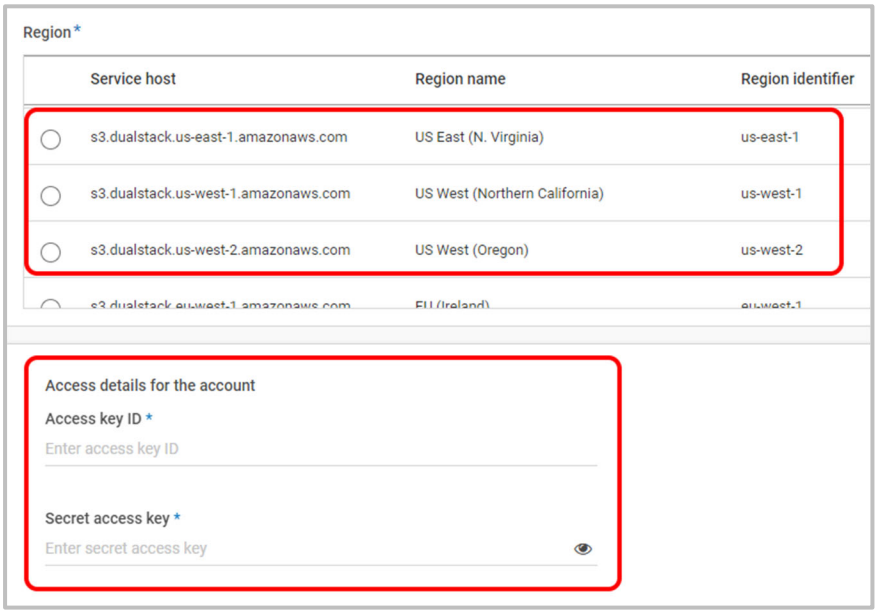
16. After you select the cloud storage provider, you're taken back to the Add MSDP disk pool screen. Select **GLACIER_IR** as the **Storage class**.



Note: For archive tier, ensure your cloud vendor provides archive support in the desired region. If archive tier is not supported in the region, this feature will not function correctly.

17. Next, enter the Region, Access Key ID, and Secret Access Key.

Note: These are provided by the Veritas Alta Recovery Vault Provisioning Team.

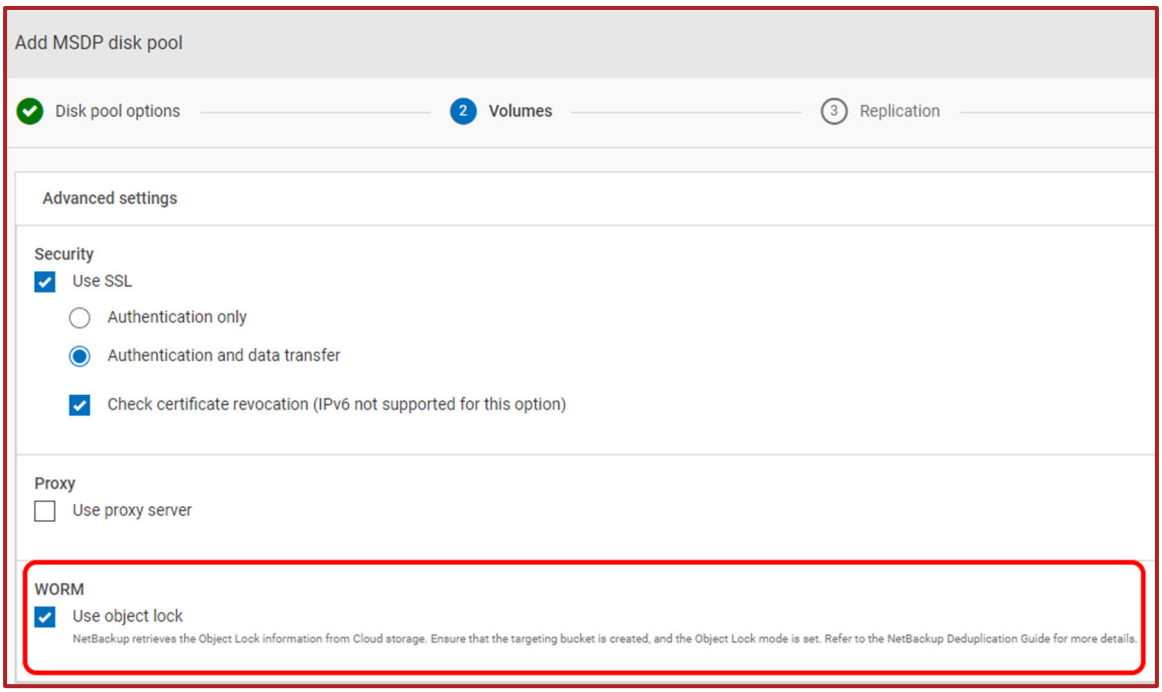


18. In Advanced settings, enter the required Security, Proxy, or WORM preferences.

    Note: If you do not want to open port 80 externally, you will need to uncheck “Check certificate revocation”, For more information on check certificate revocation, see the following: https://en.wikipedia.org/wiki/Certificate_revocation_list#:~:text=In%20cryptography%2C%20a%20certificate%20revocation,should%20no%20longer%20be%20trusted%22.

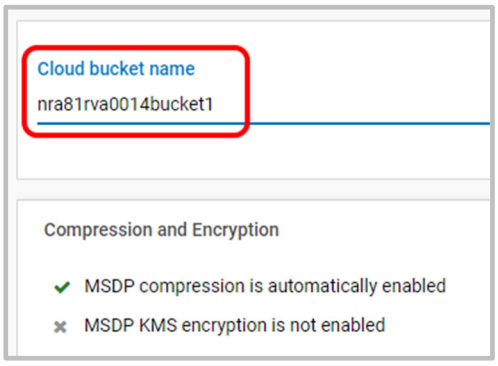
    Note: Ensure to check the **WORM** > **Use object lock** checkbox.

    Note: If you have not completed the CLI steps earlier in this section, the WebUI will give you an error when trying to connect to your Alta Recovery Vault storage.

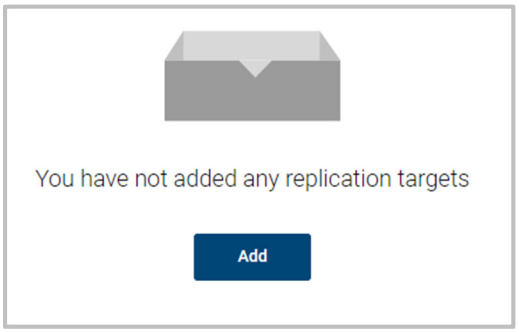


19. Enter the cloud bucket name.

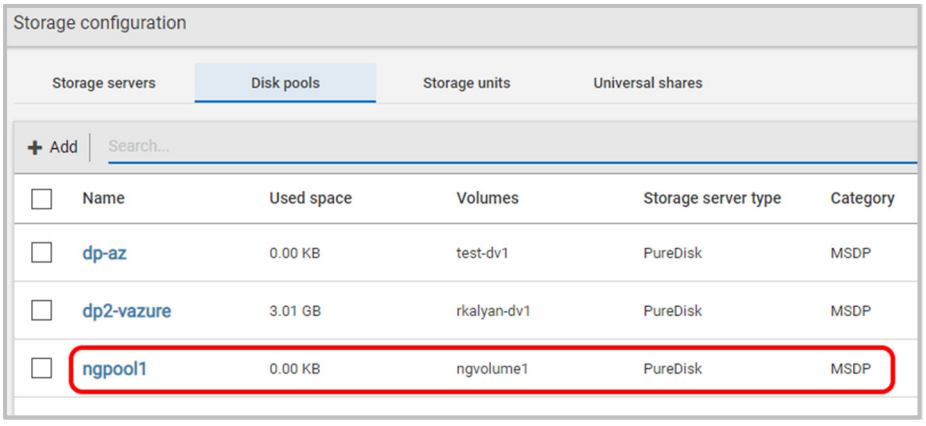
Note: This name is provided by the Veritas Alta Recovery Vault Provisioning Team. The one shown below is for reference only. After entering the cloud bucket name, click **Next**. (Not shown in the image).



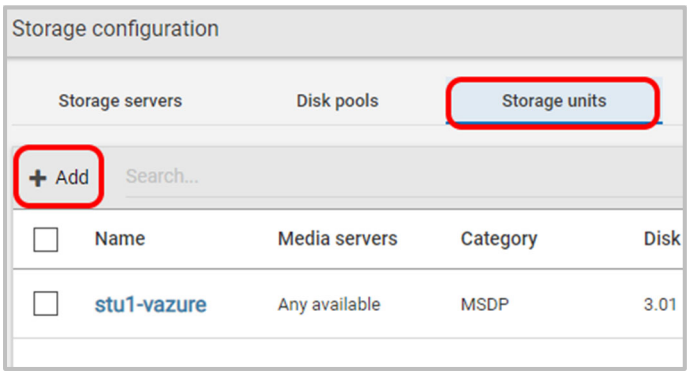
20. If you would like to set up replication targets, they can be set up now. If none are needed, click **Next**. (Not shown in the image.)



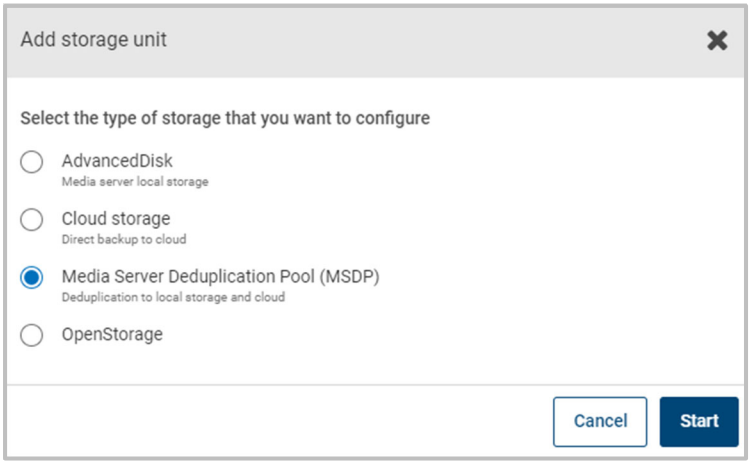
21. The next page is a summary page. If everything looks good, create the new disk pool. In this example, the new “ngpool1” has been created.



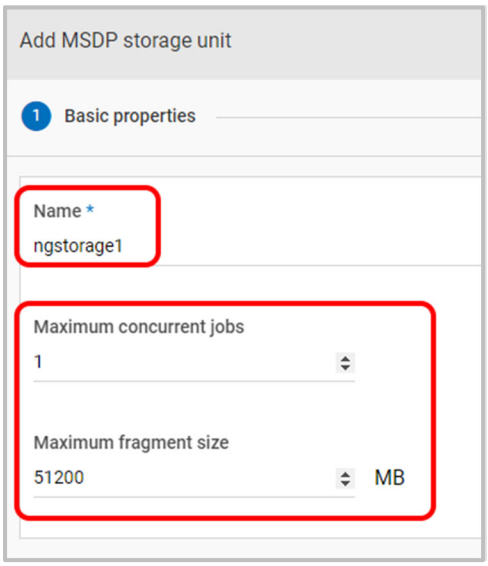
22. Next, add a storage unit so you can use your new Alta Recovery Vault storage. Click the **Storage units** tab and click **+ Add**.



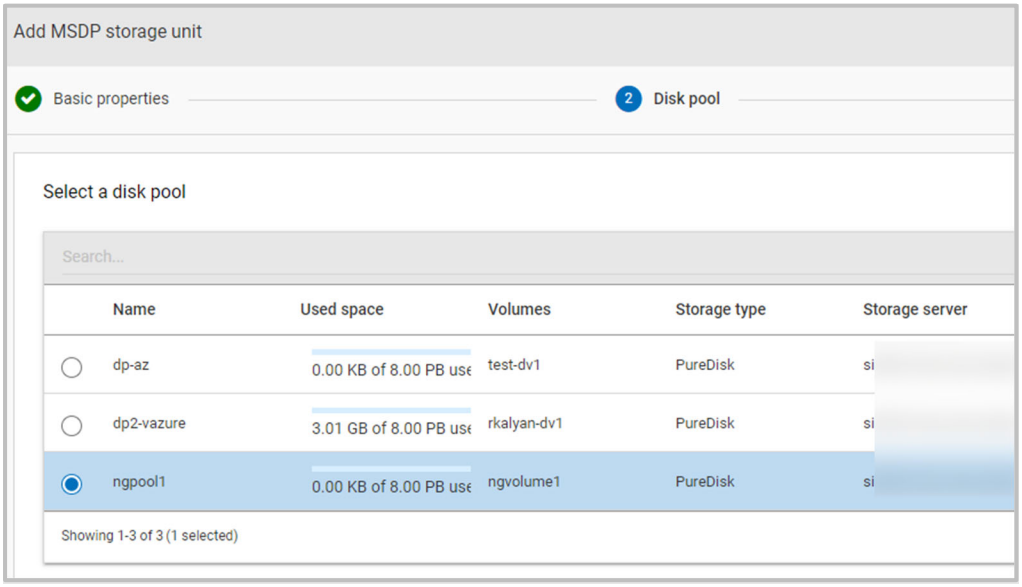
23. Select **Media Server Deduplication Pool (MSDP)** and click **Start**.



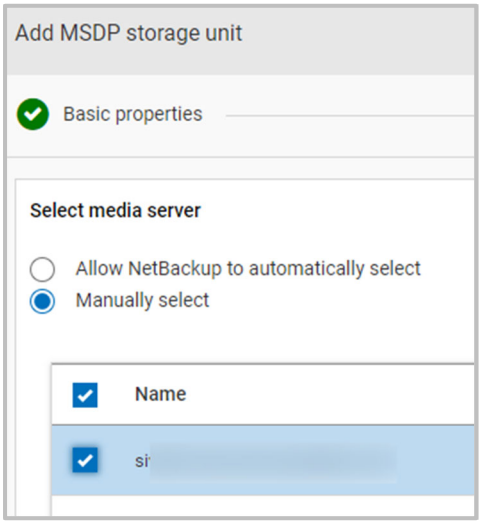
24. Provide a new MSDP storage unit name and select the desired **Maximum concurrent jobs** and **Maximum fragment size**. Click **Next** to continue. (Not shown in the image.)



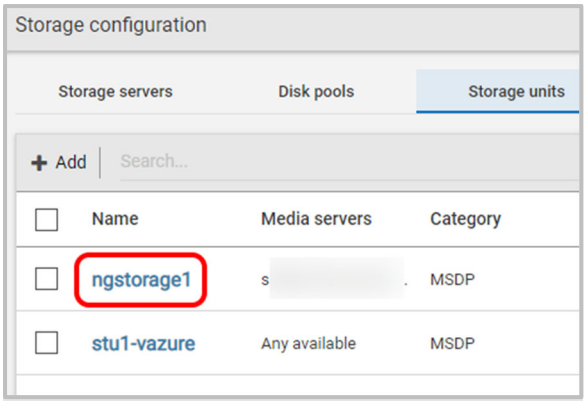
25. Select the Alta Recovery Vault volume created earlier. Click **Next** to continue. (Not shown in the image.)



26. Select the media server you wish to use. Click **Next** to continue. (Not shown in the image.)



27. Here you can see your new “ngstorage1” storage unit successfully created.



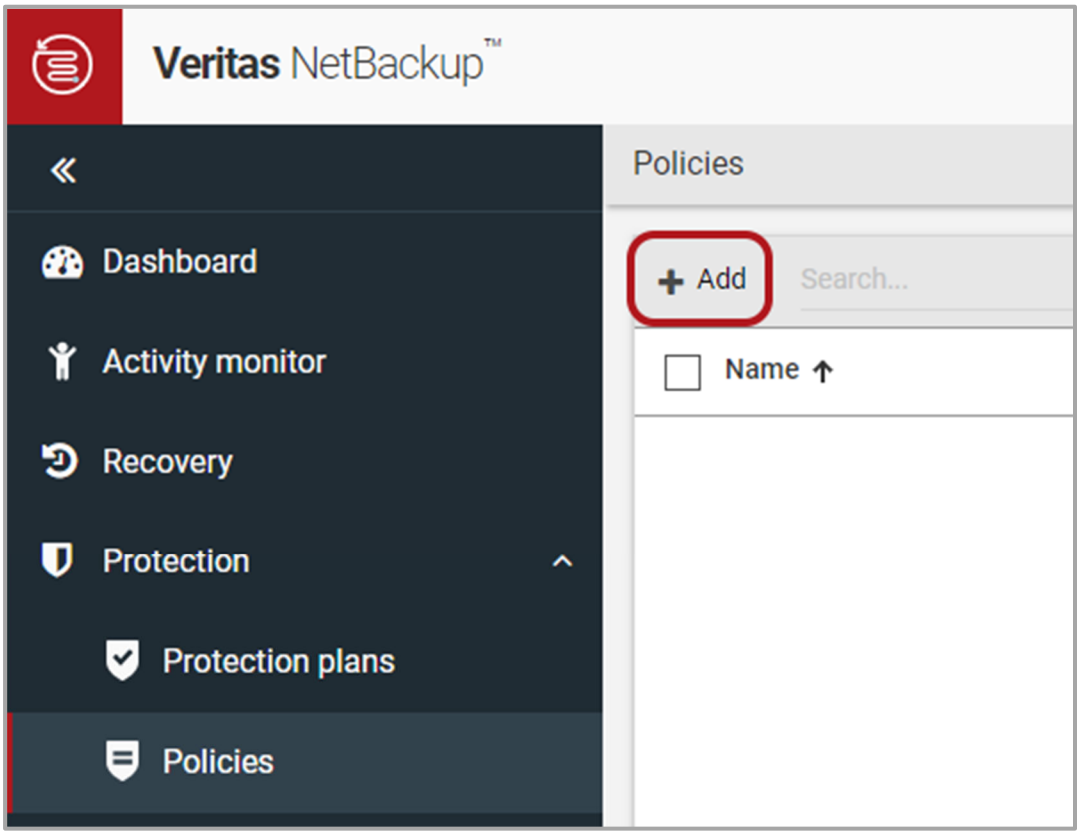
28. The new Alta Recovery Vault storage can now be used for backups.

Creating an Alta Recovery Vault Backup Policy

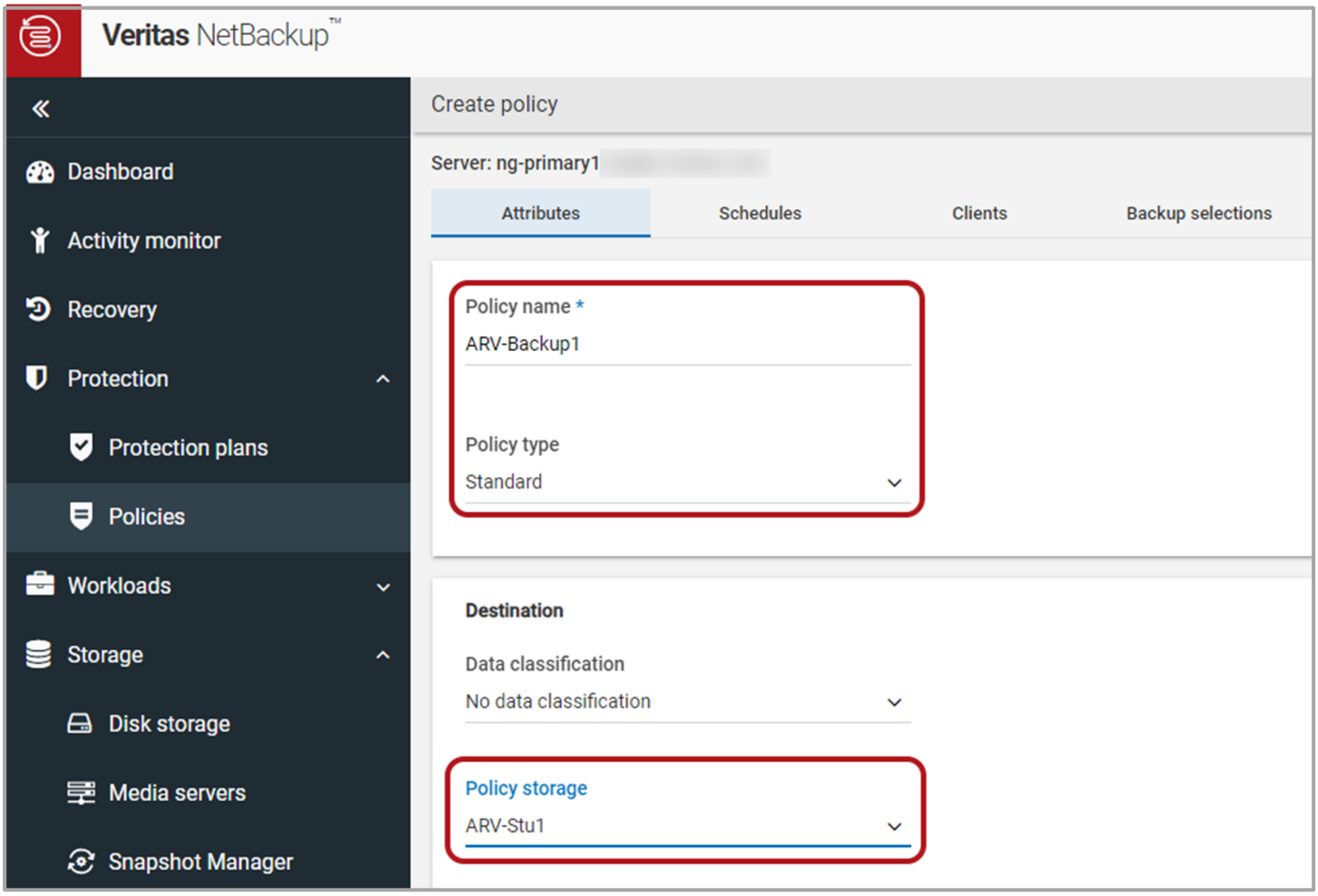
Note: Having trouble installing Alta Recovery Vault? See the Alta Recovery Vault Troubleshooting Guide.

Once the new storage unit(s) have been created it’s time to create a backup policy using the Alta Recovery Vault storage.

1. Navigate to Protection > Policies and click on the +Add button.

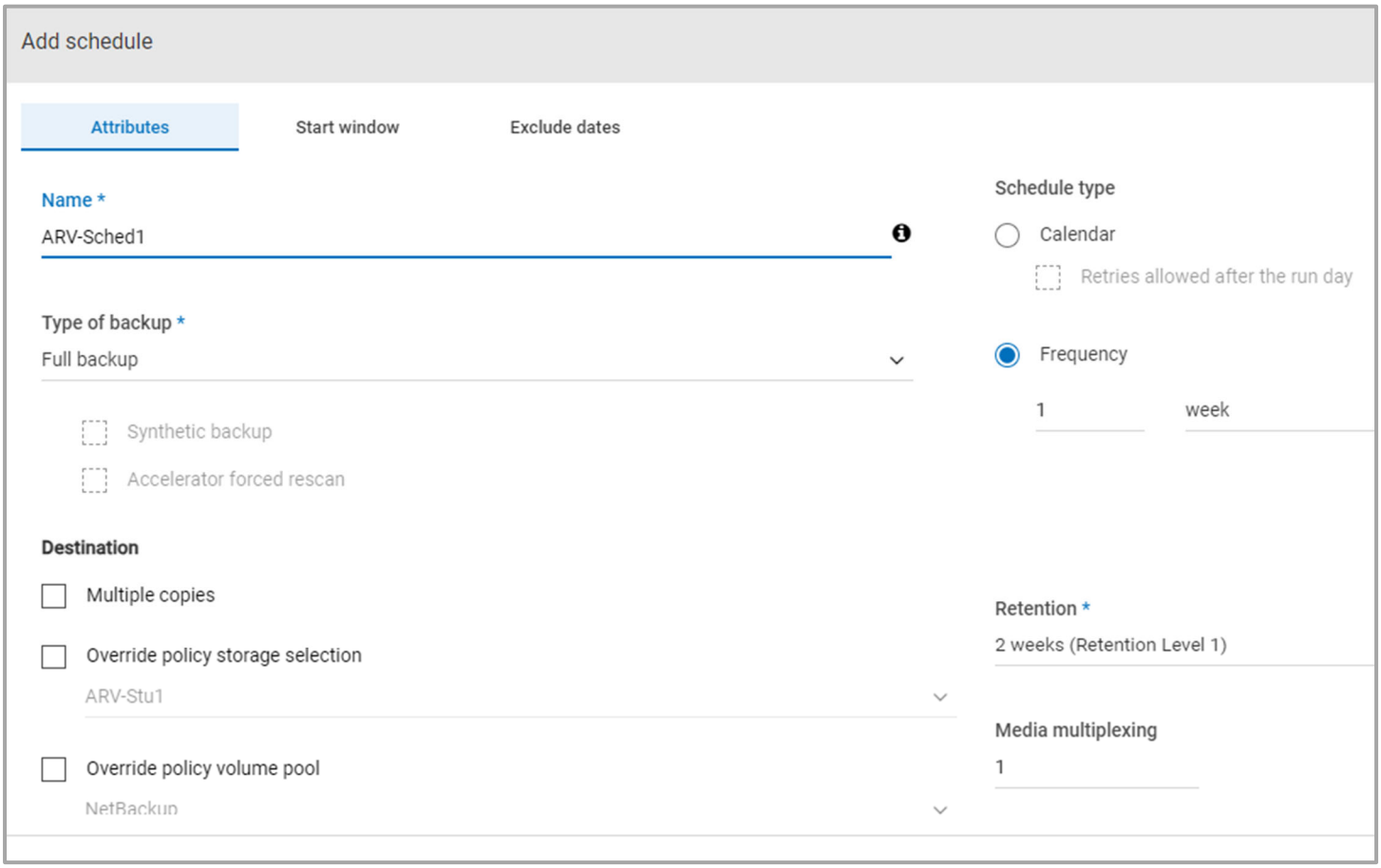


2. There are many options for Attributes for your backup that can be selected to customize the backup to your needs. For this example, you want to be sure to choose the storage unit created with Alta Recovery Vault.

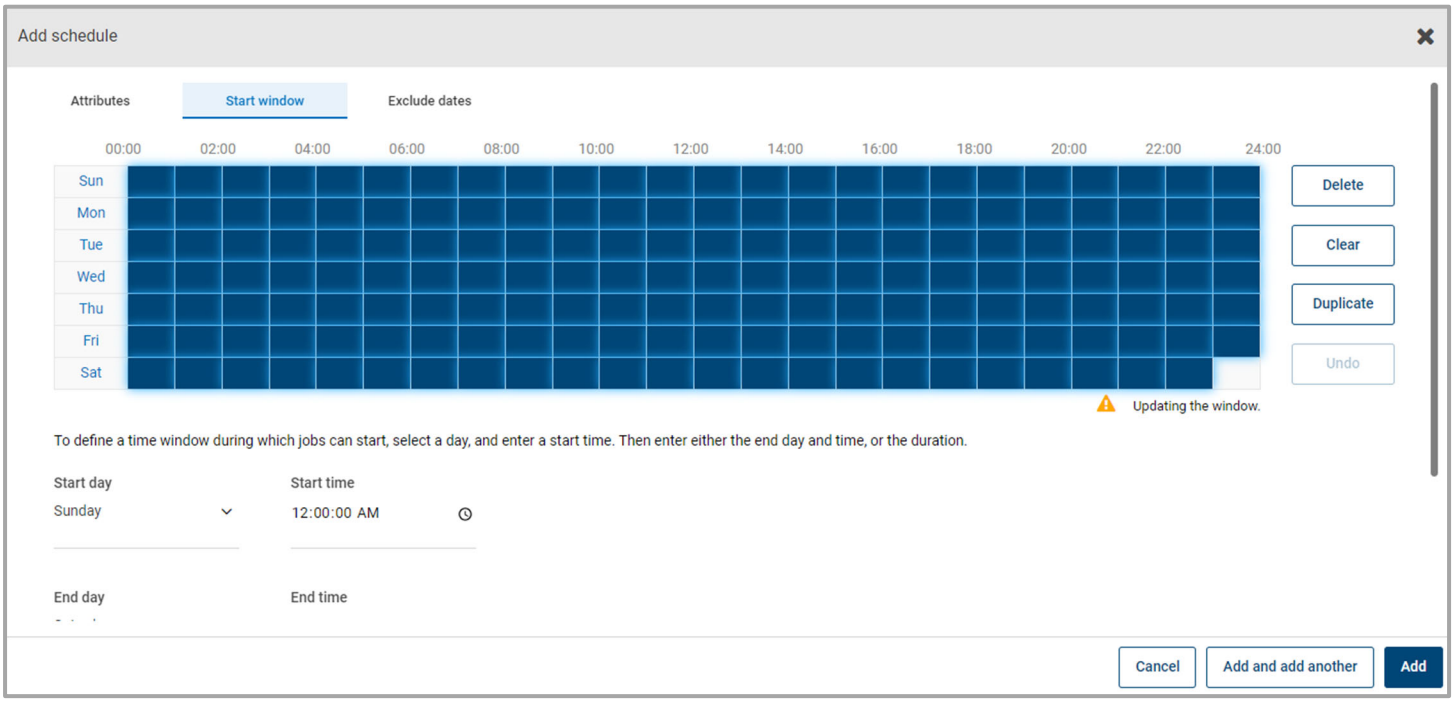


3. The next step is to add a schedule to the policy. Name your schedule and select from the attributes listed.

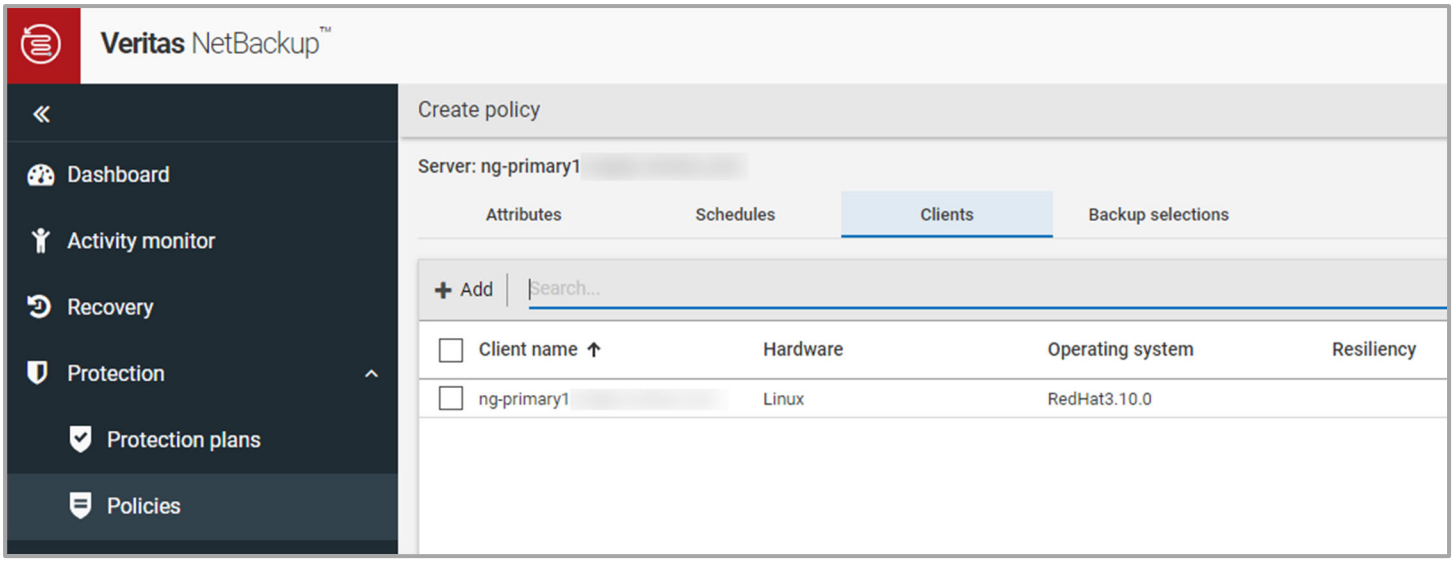
   Note: The backup policy retention must be less than the WORM max retention period otherwise the policy creation will fail.



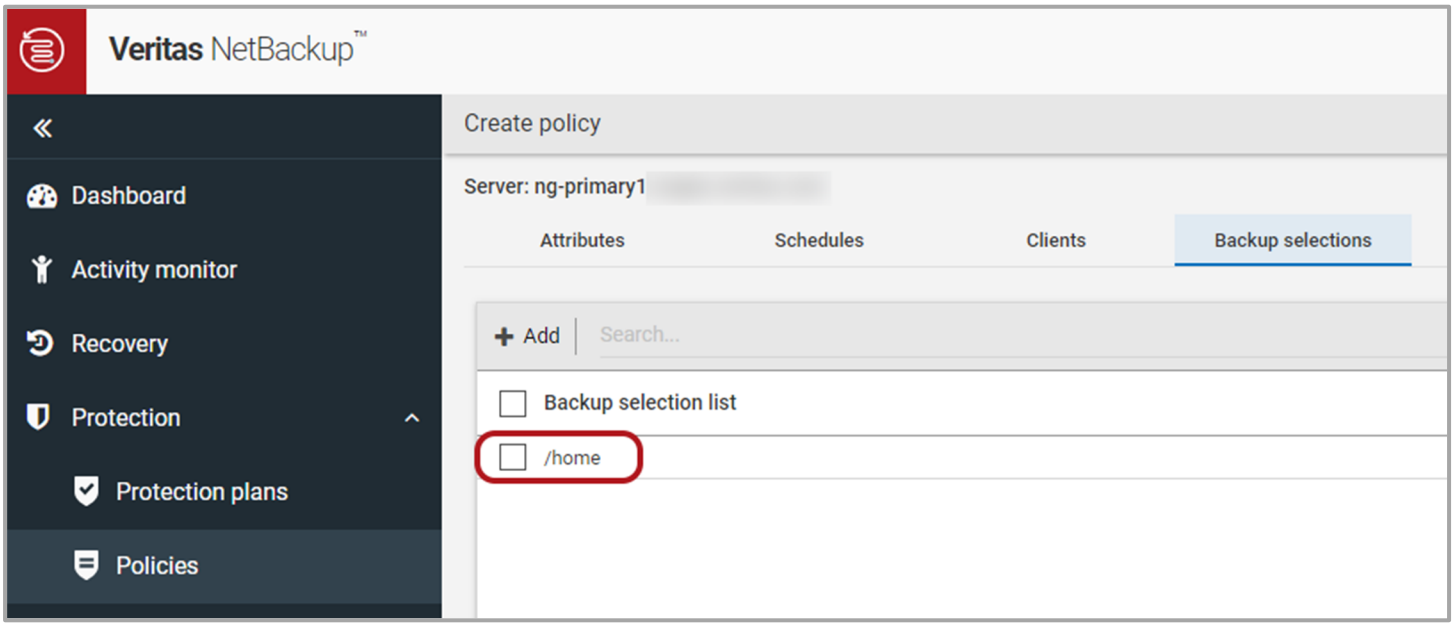
4. Select the start window and any exceptions you'd like to create.



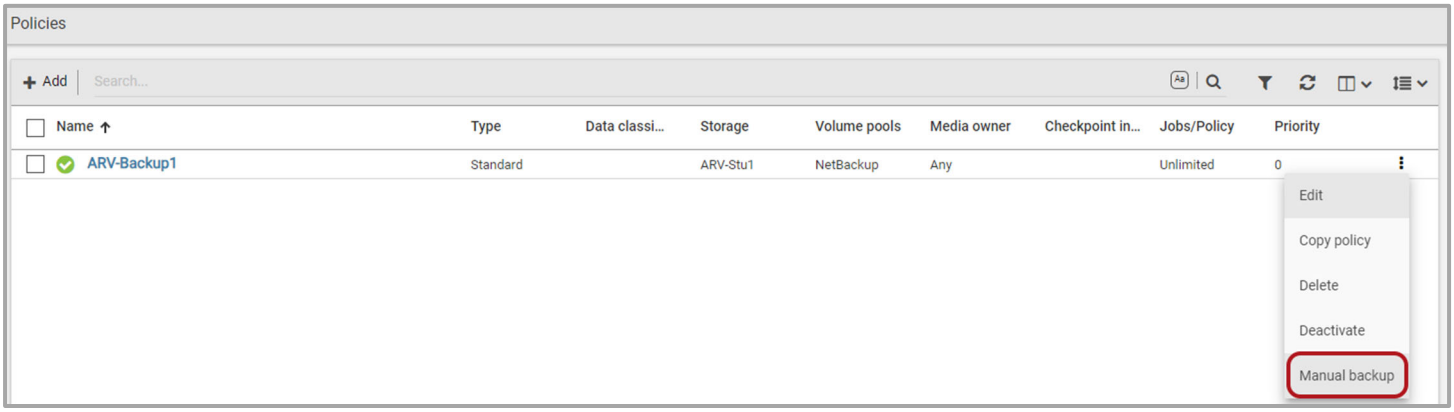
5. After creating your schedule, select which client will be backed up.



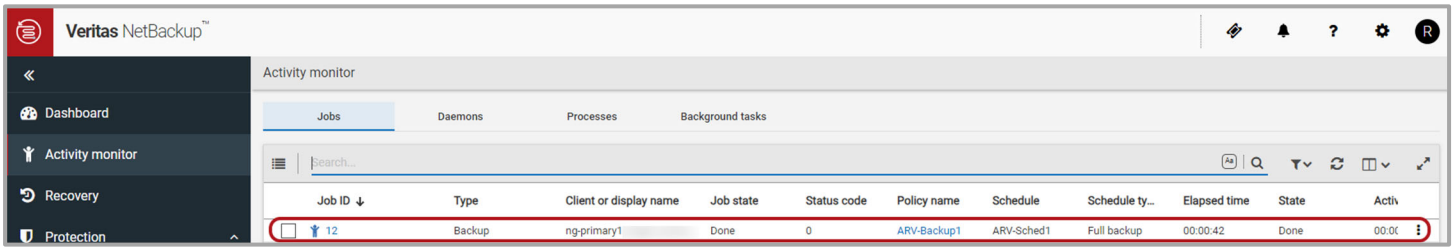
6. Next select what data will be backed up to the Alta Recovery Vault storage from the selected client.



7. Once the policy has been created you can wait for the start time for the backup to initiate. In this example a manual backup is started.



8. Checking the activity monitor will show you the progress state of your new Alta Recovery Vault backup.

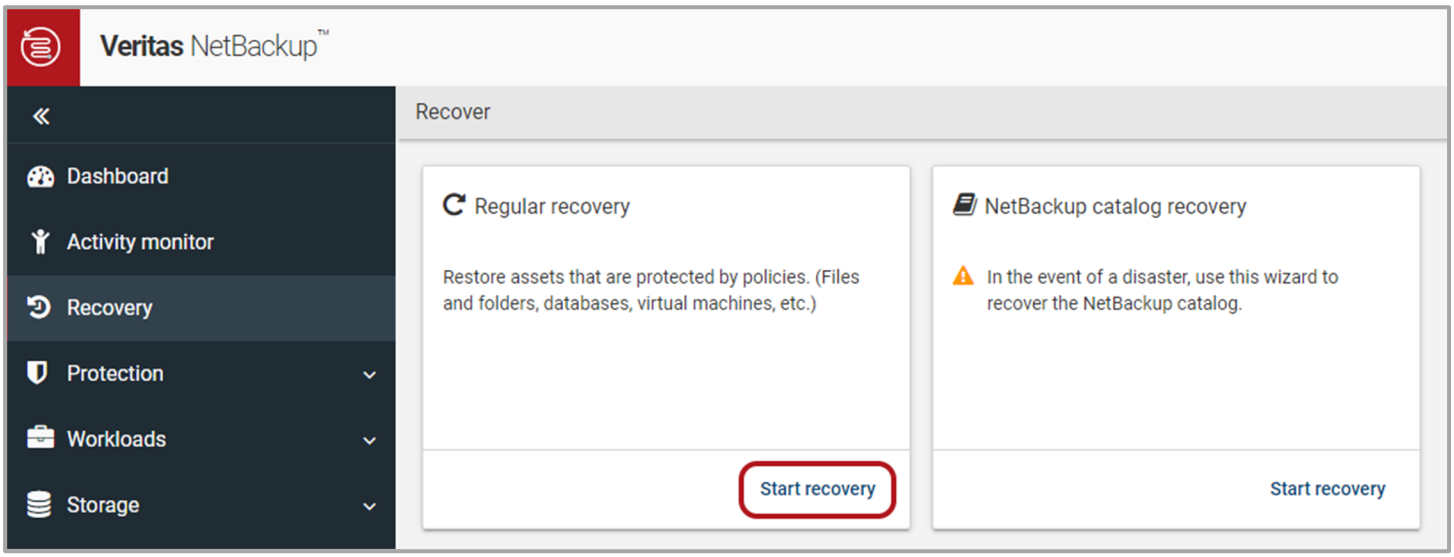


Restoring Data from Alta Recovery Vault

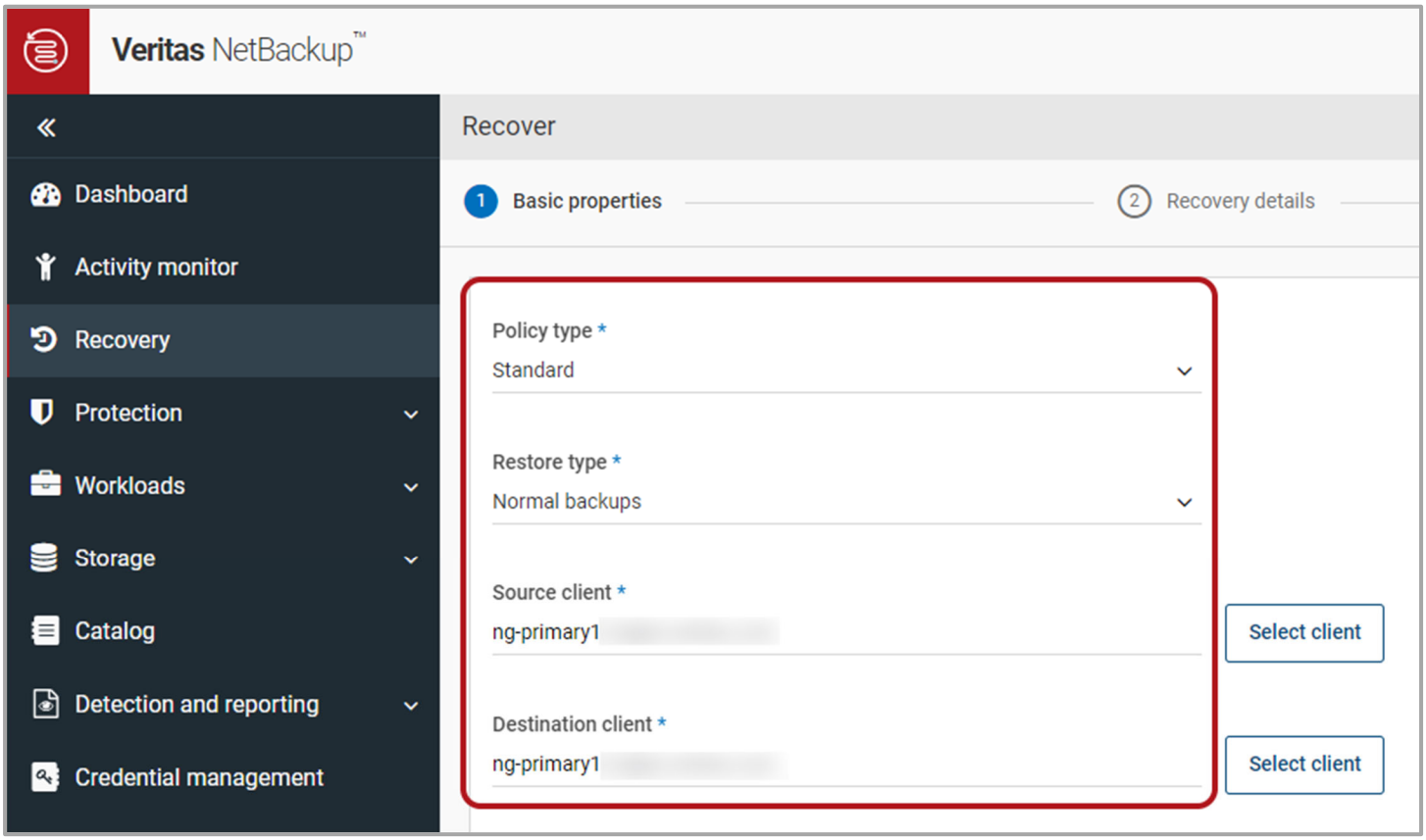
Note: Having trouble installing Alta Recovery Vault? See the Alta Recovery Vault Troubleshooting Guide.

Restoring data from Alta Recovery Vault is simple and follows the same process as restoring a standard MSDP storage unit.

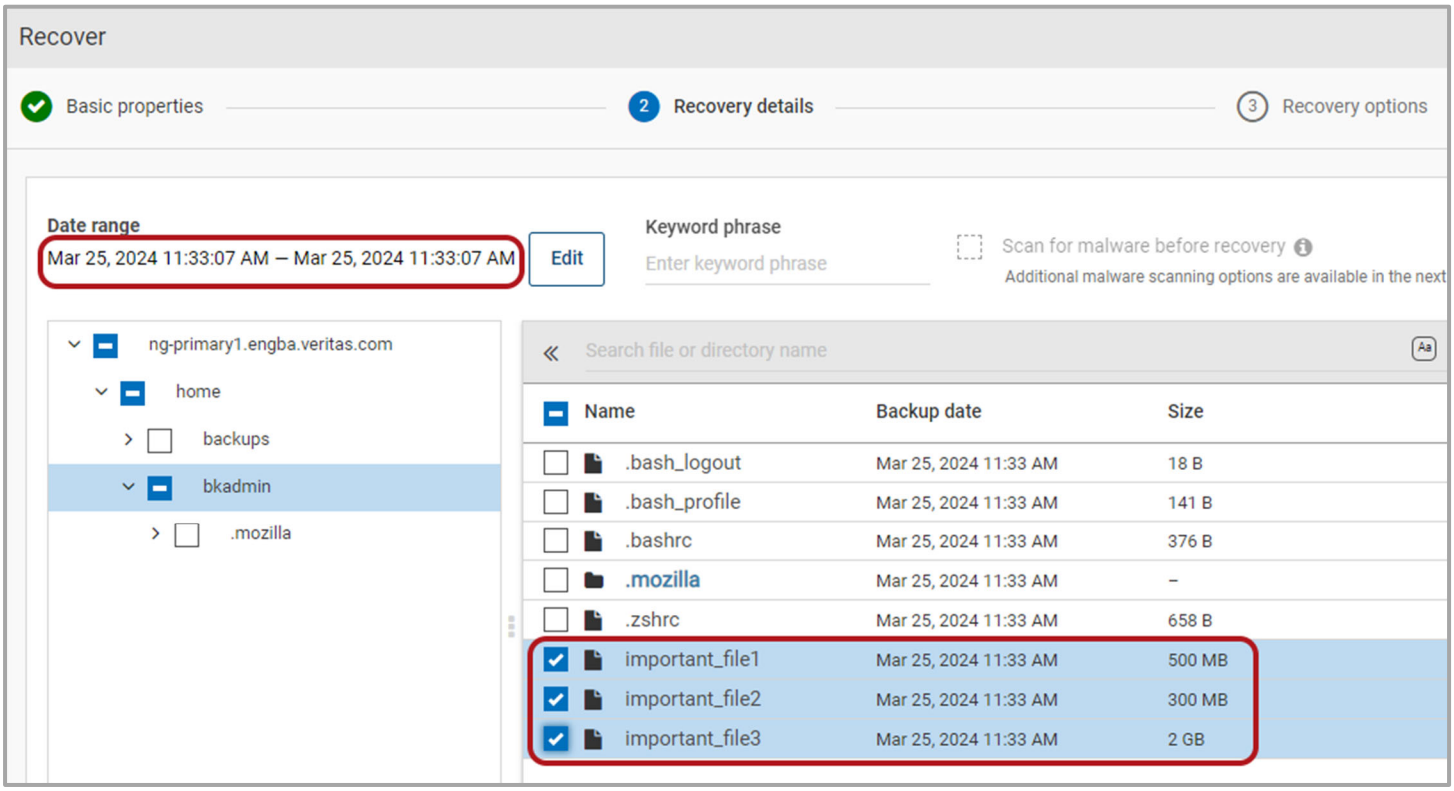
1. Click on Recovery in the navigation bar and select start recovery from the regular recovery box.



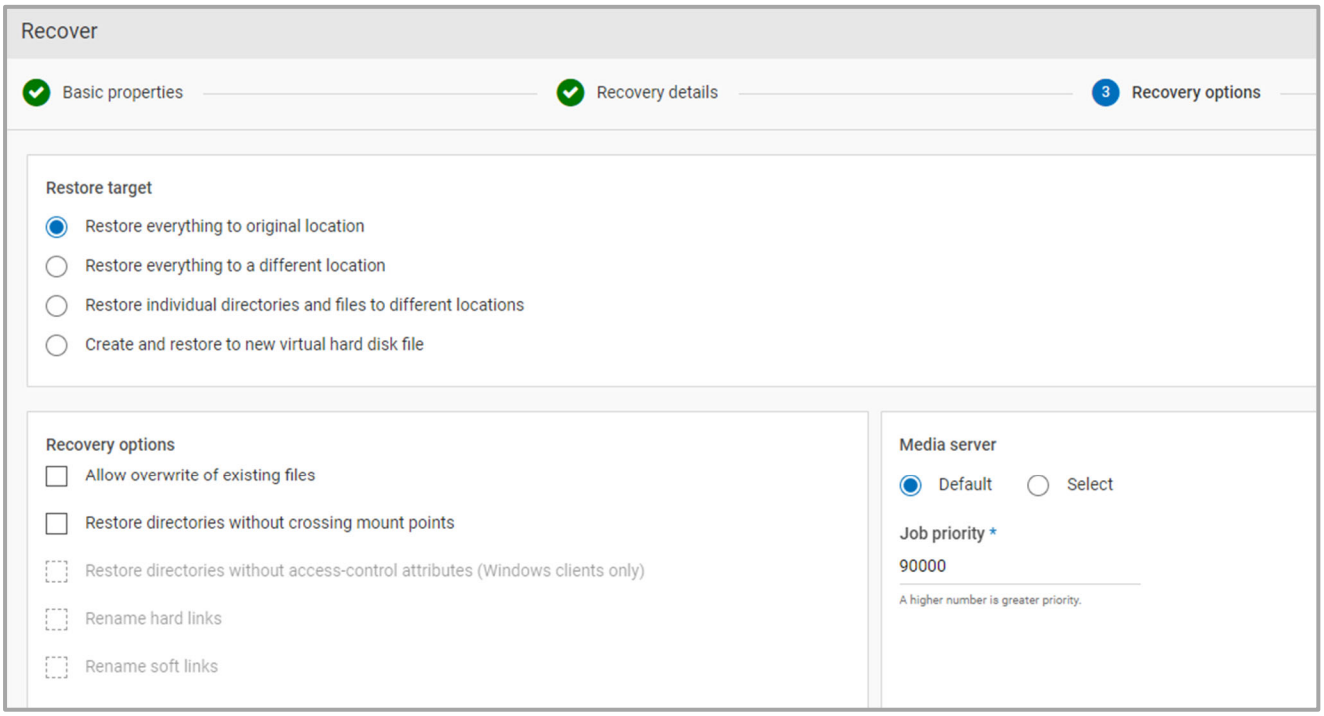
2. Select Standard Policy Type, Normal Backups as the Restore Type and finally select the source and destination clients.



3. Select the date range for the restore and what files you'd like restored. Since Alta Recovery Vault is built right into NetBackup, restores are simple and intuitive.

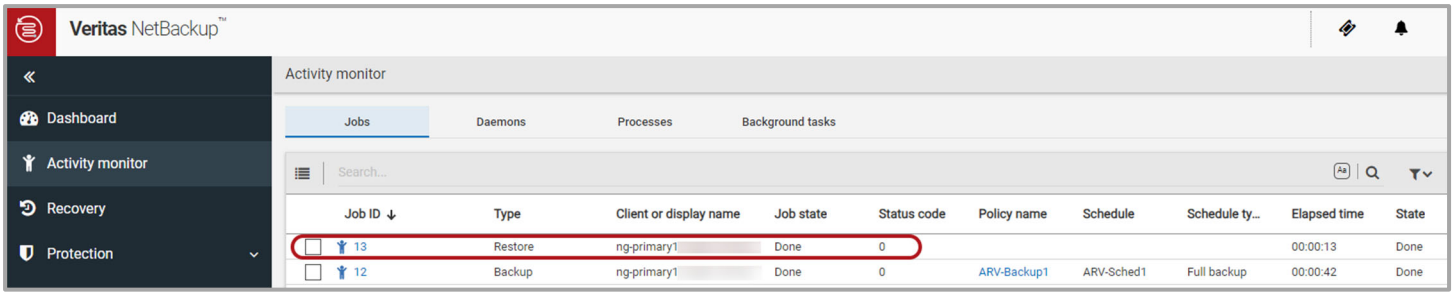


4. The final step is to customize your recovery options, which allow for even more flexibility for the file restore(s).



5. Review the summary of the review and when everything looks good, click on start recovery.

6. From the Activity Monitor you can see the status of your Alta Recovery Vault restore.



Consumption Reporting

Note: Having trouble installing Alta Recovery Vault? See the Alta Recovery Vault Troubleshooting Guide.

The amount of consumed and available Veritas Alta Recovery Vault storage can be easily observed in the Alta View user interface. View the total storage consumptions of your purchased Alta Recovery Vault storage. See the consumption report of standard and archive storage categories on Azure and AWS cloud providers. Also, view storage details including name, cloud provider name, region, used space, immutability type, and storage tier. For more information contact your Veritas Account Team.

To learn more about Veritas Alta View check out:

Alta View Overview Guide

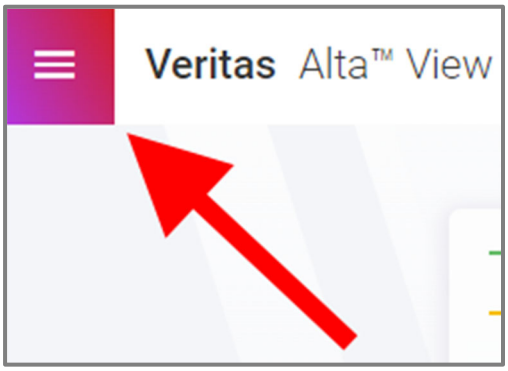
Get Started with Veritas Alta View Today

Ready for Veritas Alta View?

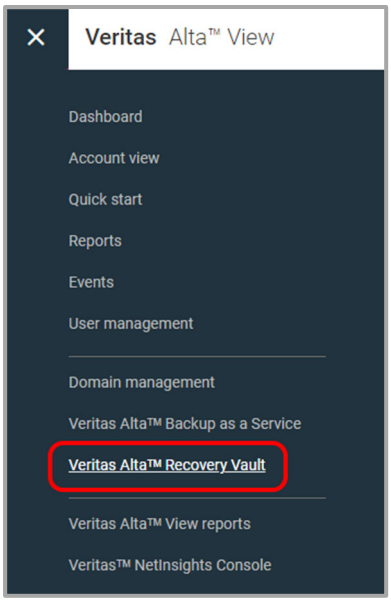
Overview: Veritas Alta View

Veritas Alta View – Getting Started

1. From the Alta View console, click on the three horizontal lines in the upper left corner.

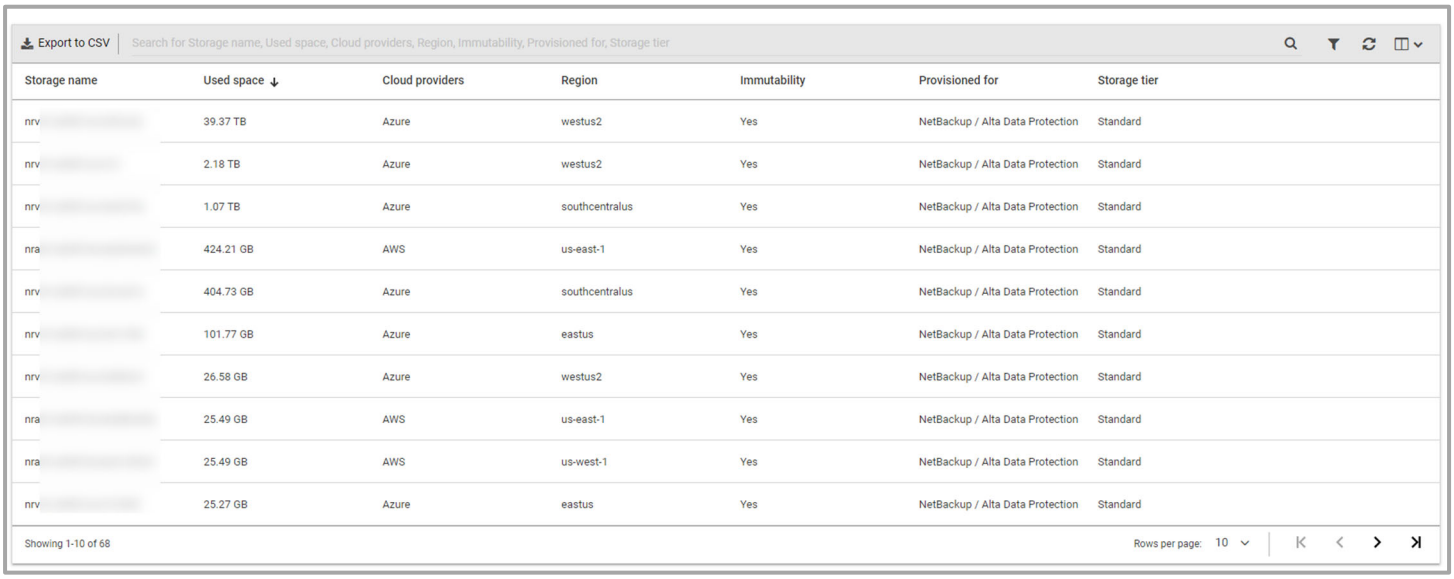


2. From the menu select Veritas Alta Recovery Vault.



3. You will now be able to see all of your Alta Recovery Vault storage at a simple glance. The charts are dynamic as well and can be clicked on to see specific types of data.

4. Further down the page all your storage containers from both Azure and AWS, standard and archive will show in further detail.



Generating a New Storage Account Credential Token

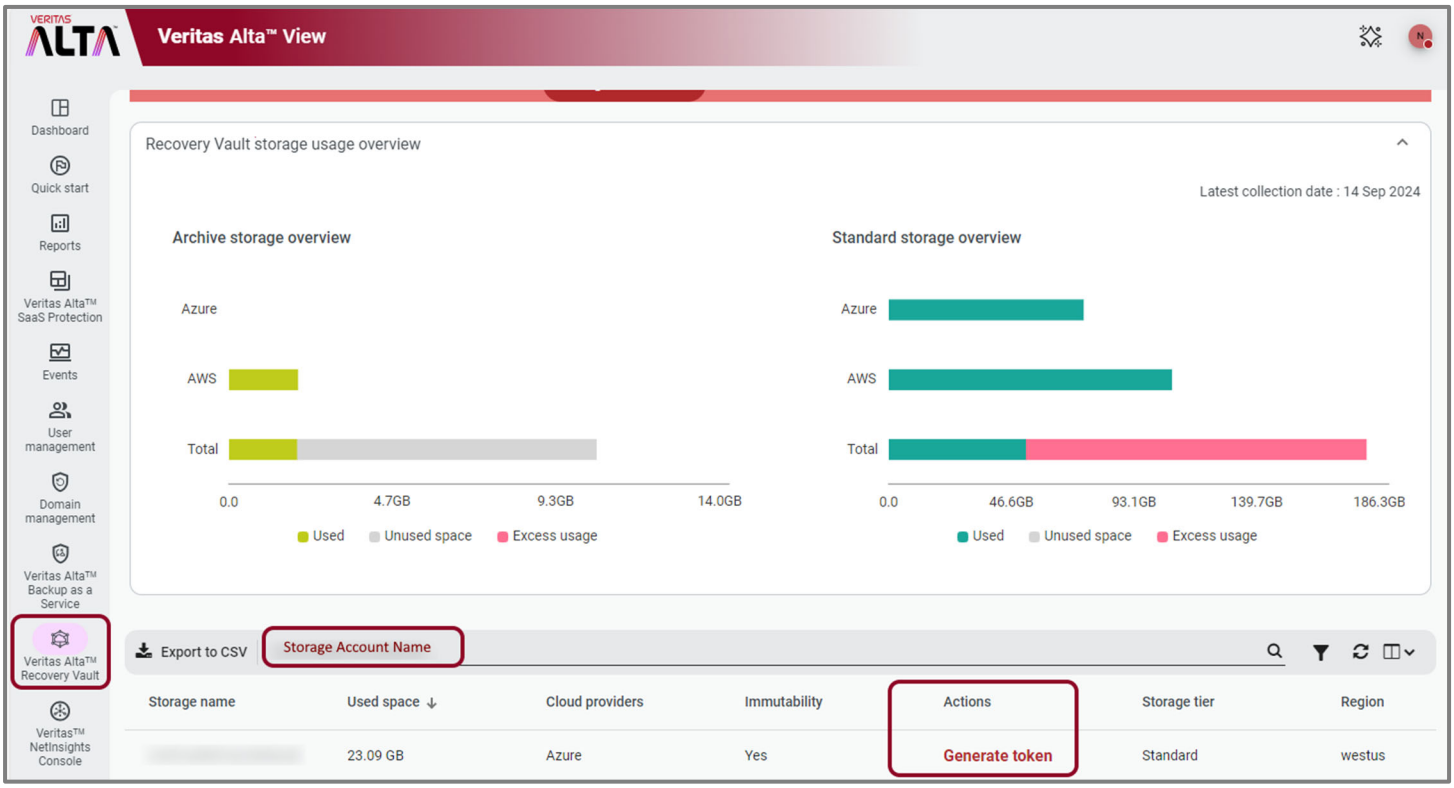
In the event you require a new storage account credential token, you can either contact Veritas Support or you can generate a new token right from Veritas Alta View. The following are reasons for needing a new token:

1. Your Primary with the Alta Recovery Vault credential is shut off for more than 30 days.
2. You re-apply your token to the same credential.
3. Your Primary is destroyed and needs to be re-built.
4. You would like to build a Cloud Recovery Server (CRS) and perform Image Sharing.

Note: See the Veritas Alta Recovery Vault Image Sharing and Disaster Recovery for more information.

To generate a new token:

1. From Alta View, click on the Veritas Alta Recovery Vault tab on the left side.
2. Search for your Storage Account name.
3. Look for the column labeled Actions.
4. Click on the Generate Token link. This will create a new token that can be used for your replacement Primary token or can be used on your CRS Image Sharing server (Alternate Primary).



Conclusion

Veritas Alta Recovery Vault not only simplifies the process of provisioning new storage in the cloud, it reduces risk, allows for limitless scalability, lowers TCO and automates resiliency. Through seamless integration with NetBackup together with an easy-to-use UI, management and monitoring of cloud storage resources and retention policies, provisioning storage, and protecting your data has never been easier.

About Veritas

Veritas Technologies is a leader in multi-cloud data management. Over 80,000 customers—including 95 percent of the Fortune 100—rely on Veritas to help ensure the protection, recoverability, and compliance of their data. Veritas has a reputation for reliability at scale, which delivers the resilience its customers need against the disruptions threatened by cyberattacks, like ransomware. No other vendor is able to match the ability of Veritas to execute, with support for 800+ data sources, 100+ operating systems, 1,400+ storage targets, and 60+ clouds through a single, unified approach. Powered by Cloud Scale Technology, Veritas is delivering today on its strategy for Autonomous Data Management that reduces operational overhead while delivering greater value. Learn more at veritas.com. Follow us on Twitter at @veritastechllc.

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