



BlueXP backup and recovery for VMs

NetApp Solutions

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Table of Contents

BlueXP backup and recovery for VMs 1

 3-2-1 Data Protection for VMware with SnapCenter Plug-in and BlueXP backup and recovery for VMs 1

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Overview

The 3-2-1 backup strategy is an industry accepted data protection method, providing a comprehensive approach to safeguarding valuable data. This strategy is reliable and ensures that even if some unexpected disaster strikes, there will still be a copy of the data available.

The strategy is comprised of three fundamental rules:

1. Keep at least three copies of your data. This ensures that even if one copy is lost or corrupted, you still have at least two remaining copies to fall back on.
2. Store two backup copies on different storage media or devices. Diversifying storage media helps protect against device-specific or media-specific failures. If one device gets damaged or one type of media fails, the other backup copy remains unaffected.
3. Finally, ensure that at least one backup copy is offsite. Offsite storage serves as a fail-safe against localized disasters like fires or floods that could render onsite copies unusable.

This solution document covers a 3-2-1 backups solution using SnapCenter Plug-in for VMware vSphere (SCV) to create primary and secondary backups of our on-premises virtual machines and BlueXP backup and recovery for virtual machines to backup a copy of our data to cloud storage or StorageGRID.

Use Cases

This solution addresses the following use cases:

- Backup and restore of on-premises virtual machines and datastores using SnapCenter Plug-in for VMware vSphere.
- Backup and restore of on-premises virtual machines and datastores, hosted on ONTAP clusters, and backed up to object storage using BlueXP backup and recovery for virtual machines.

NetApp ONTAP Data Storage

ONTAP is NetApp's industry leading storage solution that offers unified storage whether you access over SAN or NAS protocols. The 3-2-1 backup strategy ensures on-premises data is protected on more than one media type and NetApp offers platforms ranging from high-speed flash to lower-cost media.

| FAS | AFF C-Series | AFF A-Series | ASA A-Series |
|---|---|--|---|
|  |  |  |  |
| Hybrid flash storage | Capacity all-flash storage | Performance all-flash storage | All-flash SAN storage |
| Unified (file, block, object) | Unified (file, block, object) | Unified (file, block, object) | Block optimized |
| Lowest price storage | Balanced price storage | Premium priced storage | Aggressively priced storage |
| Tier 2 @ 5-10ms latency Backup / Low-cost DR | Refresh of hybrid flash, Tier 1 @ 2-4ms latency Tier 2 workloads VMware datastores | Ideal for Tier 1 business-critical workloads with <1ms latency | Ideal for Tier 1 Block Six Nines Guaranteed |

For more information on all of NetApp's hardware platform's check out [NetApp Data Storage](#).

SnapCenter Plug-in for VMware vSphere

The SnapCenter Plugin for VMware vSphere is a data protection offering which is tightly integrated with VMware vSphere and allows easy management of backup and restores for virtual machines. As part of that solution, SnapMirror provides a fast and reliable method to create a second immutable backup copy of virtual machine data on a secondary ONTAP storage cluster. With this architecture in place, virtual machine restore operations can easily be initiated from either the primary or secondary backup locations.

SCV is deployed as a linux virtual appliance using an OVA file. The plug-in now uses a remote plug-in architecture. The remote plug-in runs outside of the vCenter server and is hosted on the SCV virtual appliance.

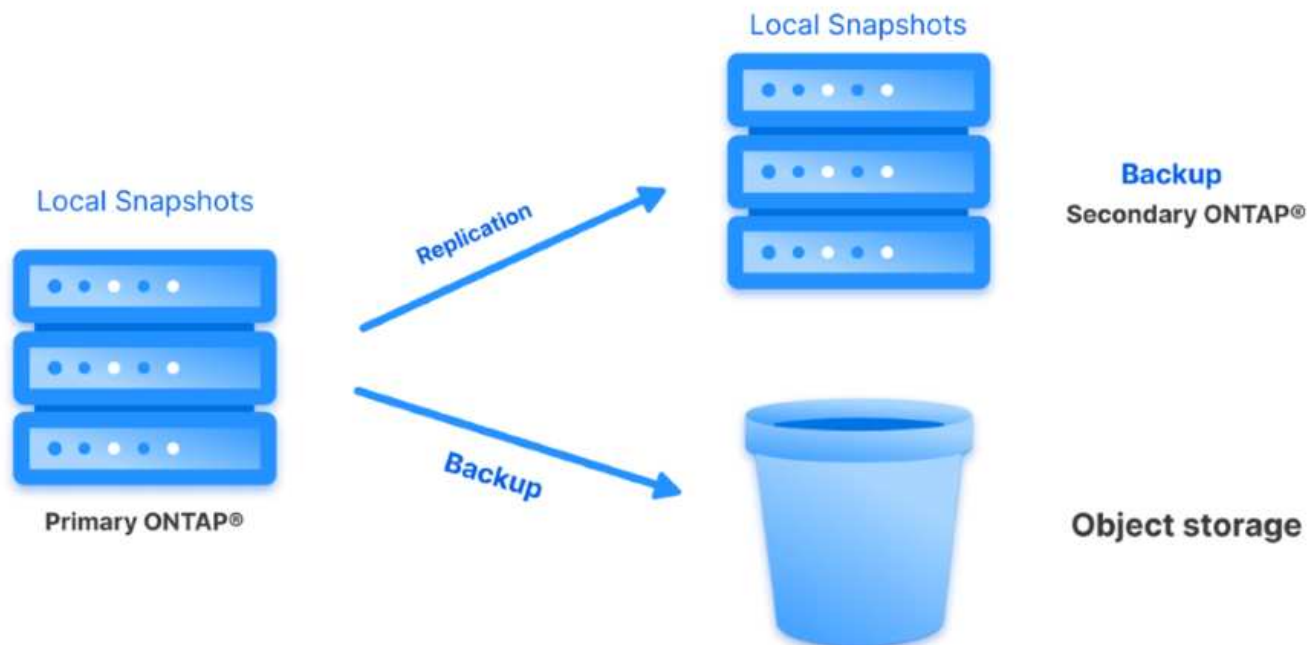
For detailed information on SCV refer to [SnapCenter Plug-in for VMware vSphere documentation](#).

BlueXP backup and recovery for virtual machines

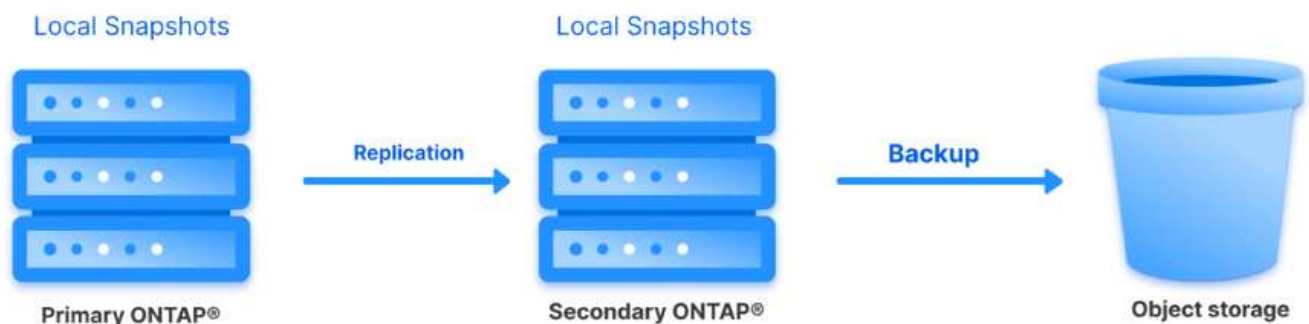
BlueXP backup and recovery is a cloud based tool for data management that provides a single control plane for a wide range of backup and recovery operations across both on-premises and cloud environments. Part of the NetApp BlueXP backup and recovery suite is a feature that integrates with the SnapCenter Plugin for VMware vSphere (on-premises) to extend a copy of the data to object storage in the cloud. This establishes a third copy of the data offsite that is sourced from the primary or secondary storage backups. BlueXP backup and recovery makes it easy to set up storage policies that transfer copies of your data from either of these two on-prem locations.

Choosing between the primary and secondary backups as the source in BlueXP Backup and Recovery will result in one of two topologies being implemented:

Fan-out Topology – When a backup is initiated by the SnapCenter Plug-in for VMware vSphere, a local snapshot is immediately taken. SCV then initiates a SnapMirror operation that replicates the most recent snapshot to the Secondary ONTAP cluster. In BlueXP Backup and Recovery, a policy specifies the primary ONTAP cluster as the source for a snapshot copy of the data to be transferred to object storage in your cloud provider of choice.



Cascading Topology – Creating the primary and secondary data copies using SCV is identical to the fan-out topology mentioned above. However, this time a policy is created in BlueXP Backup and Recovery specifying that the backup to object storage will originate from the secondary ONTAP cluster.



BlueXP backup and recovery can create backup copies of on-premises ONTAP snapshots to AWS Glacier, Azure Blob, and GCP Archive storage.



AWS Glacier and Deep Glacier



Azure Blob Archive



GCP Archive Storage

In addition, you can use NetApp StorageGRID as the object storage backup target. For more on StorageGRID refer to the [StorageGRID landing page](#).

Solution Deployment Overview

This list provides the high level steps necessary to configure this solution and execute backup and restore operations from SCV and BlueXP backup and recovery:

1. Configure SnapMirror relationship between the ONTAP clusters to be used for primary and secondary data copies.
2. Configure SnapCenter Plug-In for VMware vSphere.
 - a. Add Storage Systems
 - b. Create backup policies
 - c. Create resource groups
 - d. Run backup first backup jobs
3. Configure BlueXP backup and recovery for virtual machines
 - a. Add working environment
 - b. Discover SCV and vCenter appliances
 - c. Create backup policies
 - d. Activate backups
4. Restore virtual machines from primary and secondary storage using SCV.
5. Restore virtual machines from object storage using BlueXP backup and restore.

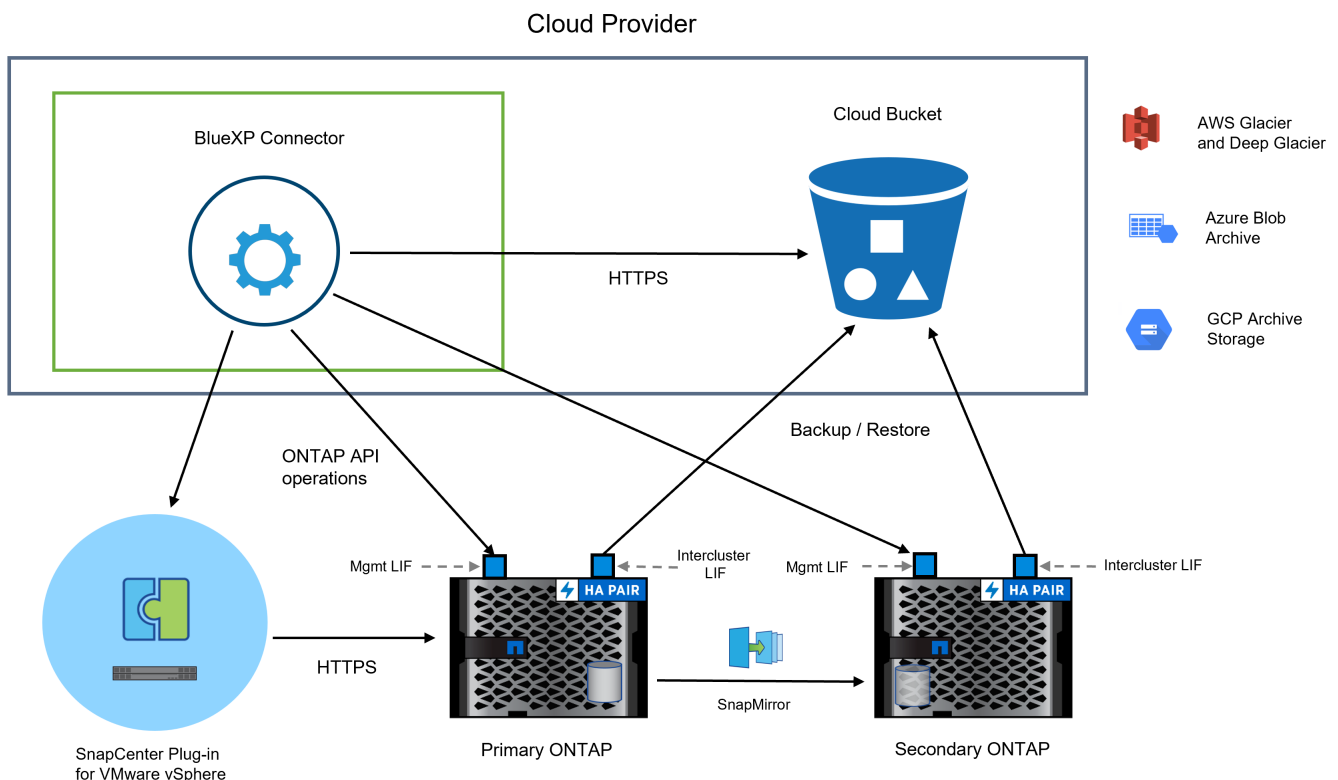
Prerequisites

The purpose of this solution is to demonstrate data protection of virtual machines running in VMware vSphere and located on NFS Datastores hosted by NetApp ONTAP. This solution assumes the following components are configured and ready for use:

1. ONTAP storage cluster with NFS or VMFS datastores connected to VMware vSphere. Both NFS and VMFS datastores are supported. NFS datastores were utilized for this solution.
2. Secondary ONTAP storage cluster with SnapMirror relationships established for volumes used for NFS datastores.
3. BlueXP connector installed for cloud provider used for object storage backups.
4. Virtual machines to be backed are on NFS datastores residing on the primary ONTAP storage cluster.
5. Network connectivity between the BlueXP connector and on-premises ONTAP storage cluster management interfaces.
6. Network connectivity between the BlueXP connector and on-premises SCV appliance VM and between the BlueXP connector and vCenter.
7. Network connectivity between the on-premises ONTAP intercluster LIFs and the object storage service.
8. DNS configured for management SVM on primary and secondary ONTAP storage clusters. For more information refer to [Configure DNS for host-name resolution](#).

High Level Architecture

The testing / validation of this solution was performed in a lab that may or may not match the final deployment environment.



Solution Deployment

In this solution, we provide detailed instructions for deploying and validating a solution that utilizes SnapCenter Plug-in for VMware vSphere, along with BlueXP backup and recovery, to perform the backup and recovery of Windows and Linux virtual machines within a VMware vSphere cluster located in an on-premises data center. The virtual machines in this setup are stored on NFS datastores hosted by an ONTAP A300 storage cluster. Additionally, a separate ONTAP A300 storage cluster serves as a secondary destination for volumes replicated using SnapMirror. Furthermore, object storage hosted on Amazon Web Services and Azure Blob were employed as targets for a third copy of the data.

We will go over creating SnapMirror relationships for secondary copies of our backups managed by SCV and configuration of backup jobs in both SCV and BlueXP backup and recovery.

For detailed information on SnapCenter Plug-in for VMware vSphere refer to the [SnapCenter Plug-in for VMware vSphere documentation](#).

For detailed information on BlueXP backup and recovery refer to the [BlueXP backup and recovery documentation](#).

Establish SnapMirror relationships between ONTAP Clusters

SnapCenter Plug-in for VMware vSphere uses ONTAP SnapMirror technology to manage the transport of secondary SnapMirror and/or SnapVault copies to a secondary ONTAP Cluster.

SCV backup policies have the option of using SnapMirror or SnapVault relationships. The primary difference is that when using the SnapMirror option, the retention schedule configured for backups in the policy will be the same at the primary and secondary locations. SnapVault is designed for archiving and when using this option a separate retention schedule can be established with the SnapMirror relationship for the snapshot copies on the secondary ONTAP storage cluster.

Setting up SnapMirror relationships can be done in BlueXP where many of the steps are automated, or it can be done using System Manager and the ONTAP CLI. All of these methods are discussed below.

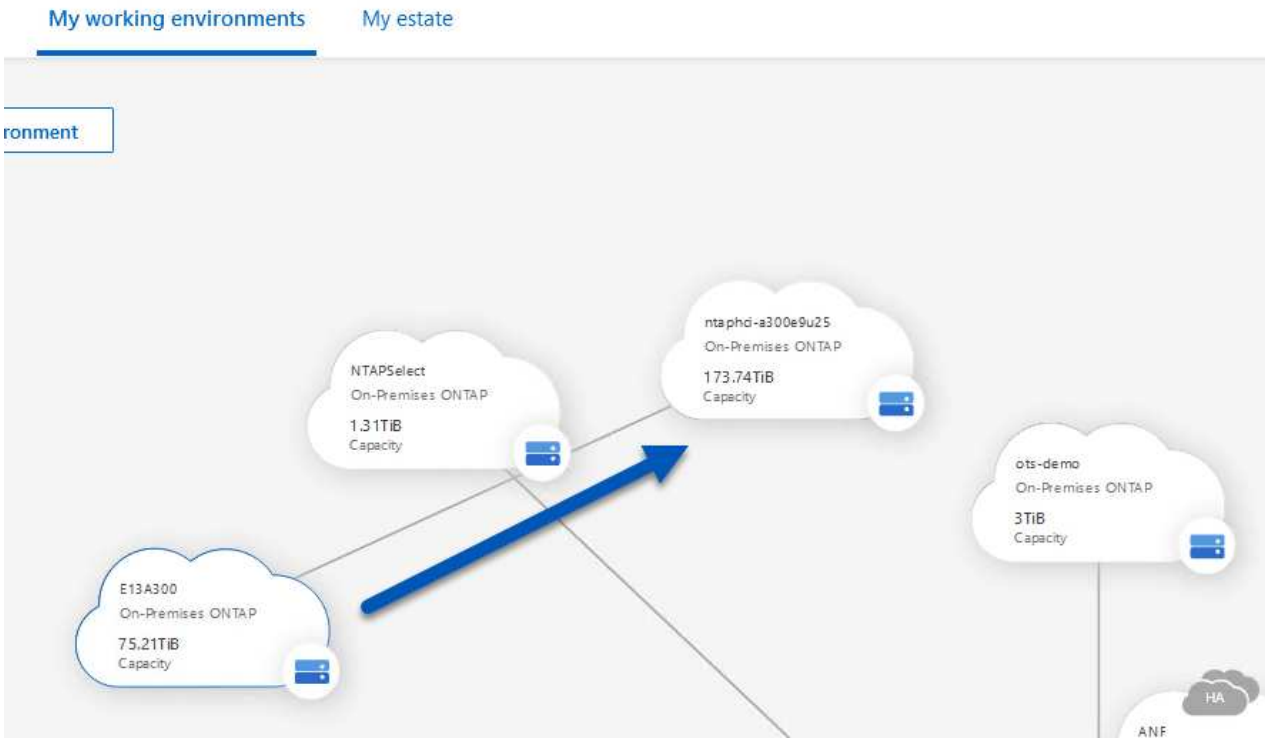
Establish SnapMirror relationships with BlueXP

The following steps must be completed from the BlueXP web console:

Replication setup for primary and secondary ONTAP storage systems

Begin by logging into the BlueXP web console and navigating to the Canvas.

1. Drag and drop the source (primary) ONTAP storage system onto the destination (secondary) ONTAP storage system.



2. From the menu that appears select **Replication**.



3. On the **Destination Peering Setup** page select the destination Intercluster LIFs to be used for the connection between storage systems.

Select the destination LIFs you would like to use for cluster peering setup.
Replication requires an initial connection between the two working environments which is called a cluster peer relationship.
For more information about LIF selections, see Cloud Manager documentation.





| | | | | | |
|--|--|---|---|---|---|
| <input type="checkbox"/> CVO_InterCluster_B ntaphci-a300-02 : a0a-3510 172.21.254.212/24 up | <input type="checkbox"/> CVO_InterCluster_A ntaphci-a300-01 : a0a-3510 172.21.254.211/24 up | <input type="checkbox"/> zoneb-n1 ntaphci-a300-01 : a0a-3484 172.21.228.21/24 up | <input type="checkbox"/> zoneb-n2 ntaphci-a300-02 : a0a-3484 172.21.228.22/24 up | <input checked="" type="checkbox"/> intercluster_node_1 ntaphci-a300-01 : a0a-181 10.61.181.193/24 up | <input checked="" type="checkbox"/> intercluster_node_2 ntaphci-a300-01 : a0a-181 10.61.181.194/24 up |
|--|--|---|---|---|---|

4. On the **Destination Volume Name** page, first select the source volume and then fill out the destination volume name and select the destination SVM and aggregate. Click on **Next** to continue.

Select the volume that you want to replicate

E13A300

288 Volumes

| | |
|--|---|
|  CDM01 ONLINE INFO Storage VM Name: FS02 Tiering Policy: None Volume Type: RW CAPACITY 206 GB Allocated 53.72 MB Disk Used |  Data ONLINE INFO Storage VM Name: FS02 Tiering Policy: None Volume Type: RW CAPACITY 512 GB Allocated 0 GB Disk Used |
|  Demo ONLINE INFO Storage VM Name: zonea Tiering Policy: None Volume Type: RW CAPACITY 250 GB Allocated 1.79 GB Disk Used |  Demo02_01 ONLINE INFO Storage VM Name: Demo Tiering Policy: None Volume Type: RW CAPACITY 500 GB Allocated 34.75 MB Disk Used |

Destination Volume Name

Destination Volume Name

Demo_copy

Destination Storage VM

EHC_NFS

Destination Aggregate

EHCaggr01

5. Choose the max transfer rate for replication to occur at.

Max Transfer Rate

You should limit the transfer rate. An unlimited rate might negatively impact the performance of other applications and it might impact your Internet performance.

- ☒ Limited to: MB/s
- ☐ Unlimited (recommended for DR only machines)

6. Choose the policy that will determine the retention schedule for secondary backups. This policy can be created beforehand (see the manual process below in the **Create a snapshot retention policy** step) or can be changed after the fact if desired.

[↑ Previous Step](#)

Default Policies

Additional Policies

CloudBackupService-1674046623282

Original Policy Name: CloudBackupService-1674046623282

Creates a SnapVault relationship which replicates Snapshot copies with the following labels to the destination volume:
hourly (12), daily (15), weekly (4)
(# of retained Snapshot copies in parenthesis)

CloudBackupService-1674047424679

Custom Policy - No Comment

[More info](#)

CloudBackupService-1674047718637

Custom Policy - No Comment

[More info](#)

7. Finally, review all information and click on the **Go** button to start the replication setup process.

[↑ Previous Step](#)

Review your selection and start the replication process



| | |
|------------------------------------|---------|
| Source Volume Allocated Size: | 250 GB |
| Source Volume Used Size: | 1.79 GB |
| Source Thin Provisioning: | Yes |
| Destination Volume Allocated Size: | 250 GB |
| Destination Thin Provisioning: | No |

| | |
|-------------------------|---------------|
| Destination Aggregate: | EHCaggr01 |
| Destination Storage VM: | EHC_NFS |
| Max Transfer Rate: | 100 MB/s |
| SnapMirror Policy: | Mirror |
| Replication Schedule: | One-time copy |

Establish SnapMirror relationships with System Manager and ONTAP CLI

All required steps for establishing SnapMirror relationships can be accomplished with System Manager or the ONTAP CLI. The following section provides detailed information for both methods:

Record the source and destination Intercluster logical interfaces

For the source and destination ONTAP clusters, you can retrieve the inter-cluster LIF information from System Manager or from the CLI.

1. In ONTAP System Manager, navigate to the Network Overview page and retrieve the IP addresses of Type: Intercluster that are configured to communicate with the AWS VPC where FSx is installed.

| Name | Status | Storage VM | IPspace | Address | Current Node | Current Port | Portset | Protocols | Type | Thr |
|----------------|--------|------------|---------|---------------|--------------|--------------|---------|----------------------|--------------------------------|-----|
| vesam_repo | ✓ | Backup | Default | 10.61.181.179 | E13A300_1 | a0a-181 | | SMB/CIFS, NFS, S3 | Data | 0 |
| CM01 | ✓ | | Default | 10.61.181.180 | E13A300_1 | a0a-181 | | | Cluster/Node Mgmt | 0 |
| HC_N1 | ✓ | | Default | 10.61.181.183 | E13A300_1 | a0a-181 | | | Intercluster/Cluster/Node Mgmt | 0 |
| HC_N2 | ✓ | | Default | 10.61.181.184 | E13A300_2 | a0a-181 | | | Intercluster/Cluster/Node Mgmt | 0 |
| BF_ora_vmn_614 | ✓ | ora_vmn | Default | 10.61.181.185 | E13A300_1 | a0a-181 | | SMB/CIFS, NFS, FL... | Data | 0 |

2. To retrieve the Intercluster IP addresses using the CLI run the following command:

```
ONTAP-Dest::> network interface show -role intercluster
```

Establish cluster peering between ONTAP clusters

To establish cluster peering between ONTAP clusters, a unique passphrase entered at the initiating ONTAP cluster must be confirmed in the other peer cluster.

1. Set up peering on the destination ONTAP cluster using the `cluster peer create` command. When prompted, enter a unique passphrase that is used later on the source cluster to finalize the creation process.

```
ONTAP-Dest::> cluster peer create -address-family ipv4 -peer-addr  
source_intercluster_1, source_intercluster_2  
Enter the passphrase:  
Confirm the passphrase:
```

2. At the source cluster, you can establish the cluster peer relationship using either ONTAP System Manager or the CLI. From ONTAP System Manager, navigate to Protection > Overview and select Peer Cluster.

ONTAP System Manager

DASHBOARD

STORAGE ^

- Overview
- Volumes
- LUNs
- Consistency Groups
- NVMe Namespaces
- Shares
- Buckets
- Qtrees
- Quotas
- Storage VMs
- Tiers

NETWORK ^

- Overview
- Ethernet Ports
- FC Ports

EVENTS & JOBS v

PROTECTION ^

- Overview 1
- Relationships

HOSTS v

Overview

< Intercluster Settings

Network Interfaces

IP ADDRESS

- ✓ 10.61.181.184
- ✓ 172.21.146.217
- ✓ 10.61.181.183
- ✓ 172.21.146.216

Cluster Peers

PEERED CLUSTER NAME

- ✓ FsxId0ae40e08acc0dea67
- ✓ OTS02

Peer Cluster 2

Generate Passphrase

Manage Cluster Peers

Mediator ?

Not configured.

Configure

Storage VM Peers

PEERED STORAGE VMS

- ✓ 3

3. In the Peer Cluster dialog box, fill out the required information:
 - a. Enter the passphrase that was used to establish the peer cluster relationship on the destination ONTAP cluster.
 - b. Select **Yes** to establish an encrypted relationship.
 - c. Enter the intercluster LIF IP address(es) of the destination ONTAP cluster.

d. Click Initiate Cluster Peering to finalize the process.

Peer Cluster ✕

Local

Remote

STORAGE VM PERMISSIONS

All storage VMs (incl... ✕)

Storage VMs created in the future also will be given permissions.

1

PASSPHRASE ?

.....

It cannot be determined from the passphrase whether this relationship was encrypted. Is the relationship encrypted?

2

Yes

No

To generate passphrase, [Launch Remote Cluster](#)

3

Intercluster Network Interfaces IP Addresses

172.30.15.42

172.30.14.28

Cancel

+ Add

4

Initiate Cluster Peering

Cancel

4. Verify the status of the cluster peer relationship from the destination ONTAP cluster with the following command:

```
ONTAP-Dest::> cluster peer show
```

Establish SVM peering relationship

The next step is to set up an SVM relationship between the destination and source storage virtual machines that contain the volumes that will be in SnapMirror relationships.

1. From the source FSx cluster, use the following command from the CLI to create the SVM peer relationship:

```
ONTAP-Dest::> vserver peer create -vserver DestSVM -peer-vserver Backup -peer-cluster OnPremSourceSVM -applications snapmirror
```

2. From the source ONTAP cluster, accept the peering relationship with either ONTAP System Manager or the CLI.
3. From ONTAP System Manager, go to Protection > Overview and select Peer Storage VMs under Storage VM Peers.



4. In the Peer Storage VM's dialog box, fill out the required fields:
 - The source storage VM
 - The destination cluster
 - The destination storage VM



5. Click Peer Storage VMs to complete the SVM peering process.

Create a snapshot retention policy

SnapCenter manages retention schedules for backups that exist as snapshot copies on the primary storage system. This is established when creating a policy in SnapCenter. SnapCenter does not manage retention policies for backups that are retained on secondary storage systems. These policies are managed separately through a SnapMirror policy created on the secondary FSx cluster and associated with the destination volumes that are in a SnapMirror relationship with the source volume.

When creating a SnapCenter policy, you have the option to specify a secondary policy label that is added to the SnapMirror label of each snapshot generated when a SnapCenter backup is taken.



On the secondary storage, these labels are matched to policy rules associated with the destination volume for the purpose of enforcing retention of snapshots.

The following example shows a SnapMirror label that is present on all snapshots generated as part of a policy used for daily backups of our SQL Server database and log volumes.

Select secondary replication options ⓘ

☐ Update SnapMirror after creating a local Snapshot copy.

☒ Update SnapVault after creating a local Snapshot copy.

Secondary policy label

Custom Label ⓘ

sql-daily

Error retry count

3 ⓘ

For more information on creating SnapCenter policies for a SQL Server database, see the [SnapCenter documentation](#).

You must first create a SnapMirror policy with rules that dictate the number of snapshot copies to retain.

1. Create the SnapMirror Policy on the FSx cluster.

```
ONTAP-Dest::> snapmirror policy create -vserver DestSVM -policy  
PolicyName -type mirror-vault -restart always
```

2. Add rules to the policy with SnapMirror labels that match the secondary policy labels specified in the SnapCenter policies.

```
ONTAP-Dest::> snapmirror policy add-rule -vserver DestSVM -policy  
PolicyName -snapmirror-label SnapMirrorLabelName -keep  
#ofSnapshotsToRetain
```

The following script provides an example of a rule that could be added to a policy:

```
ONTAP-Dest::> snapmirror policy add-rule -vserver sql_svm_dest  
-policy Async_SnapCenter_SQL -snapmirror-label sql-ondemand -keep 15
```



Create additional rules for each SnapMirror label and the number of snapshots to be retained (retention period).

Create destination volumes

To create a destination volume on ONTAP that will be the recipient of snapshot copies from our source volumes, run the following command on the destination ONTAP cluster:

```
ONTAP-Dest::> volume create -vserver DestSVM -volume DestVolName  
-aggregate DestAggrName -size VolSize -type DP
```

Create the SnapMirror relationships between source and destination volumes

To create a SnapMirror relationship between a source and destination volume, run the following command on the destination ONTAP cluster:

```
ONTAP-Dest::> snapmirror create -source-path  
OnPremSourceSVM:OnPremSourceVol -destination-path DestSVM:DestVol -type  
XDP -policy PolicyName
```

Initialize the SnapMirror relationships

Initialize the SnapMirror relationship. This process initiates a new snapshot generated from the source volume and copies it to the destination volume.

To create a volume, run the following command on the destination ONTAP cluster:

```
ONTAP-Dest::> snapmirror initialize -destination-path DestSVM:DestVol
```

Configure the SnapCenter Plug-in for VMware vSphere

Once installed, the SnapCenter Plug-in for VMware vSphere can be accessed from the vCenter Server Appliance Management interface. SCV will manage backups for the NFS datastores mounted to the ESXi hosts and that contain the Windows and Linux VMs.

Review the [Data protection workflow](#) section of the SCV documentation for more information on the steps involved in configuring backups.

To configure backups of your virtual machines and datastores the following steps will need to be completed from the plug-in interface.

Discovery ONTAP storage systems

Discover the ONTAP storage clusters to be used for both primary and secondary backups.

1. In the SnapCenter Plug-in for VMware vSphere navigate to **Storage Systems** in the left-hand menu and click on the **Add** button.

SnapCenter Plug-in for VMware vSphere **INSTANCE 10.61.181.201:8080** ▾

Dashboard

Settings

Resource Groups

Policies

Storage Systems

Guest File Restore

>>

Storage Systems

+ Add

Edit

Delete

Export

| Name | Display Name |
|----------------|--------------|
| 10.61.181.180 | E13A300 |
| Anthos | Anthos |
| Backup | Backup |
| Demo | Demo |
| 172.21.146.131 | FS02 |
| 172.21.146.155 | FS03 |

2. Fill out the credentials and platform type for the primary ONTAP storage system and click on **Add**.

Add Storage System

| | |
|---|--|
| Storage System | <input type="text" value="10.61.185.145"/> |
| Platform | <input type="text" value="All Flash FAS"/> |
| Authentication Method | <input checked="" type="radio"/> Credentials <input type="radio"/> Certificate |
| Username | <input type="text" value="admin"/> |
| Password | <input type="password" value="••••••••"/> |
| Protocol | <input type="text" value="HTTPS"/> |
| Port | <input type="text" value="443"/> |
| Timeout | <input type="text" value="60"/> <input type="text" value="Seconds"/> |
| <input type="checkbox"/> Preferred IP | <input type="text" value="Preferred IP"/> |
| Event Management System(EMS) & AutoSupport Setting | |
| <input type="checkbox"/> Log Snapcenter server events to syslog | |
| <input type="checkbox"/> Send AutoSupport Notification for failed operation to storage system | |

3. Repeat this procedure for the secondary ONTAP storage system.

Create SCV backup policies

Policies specify the retention period, frequency and replication options for the backups managed by SCV.

Review the [Create backup policies for VMs and datastores](#) section of the documentation for more information.

To create backup policies complete the following steps:

- 1. In the SnapCenter Plug-in for VMware vSphere navigate to **Policies** in the left-hand menu and click on the **Create** button.



- 2. Specify a name for the policy, retention period, frequency and replication options, and snapshot label.

New Backup Policy

| | | |
|-------------|---|---------------------|
| Name | <input type="text" value="Daily"/> | |
| Description | <input type="text" value="description"/> | |
| Retention | <div>Days to keep ▾</div> | <div>30 ▴ ▾</div> ⓘ |
| Frequency | <div>Daily ▾</div> | |
| Replication | <div><input type="checkbox"/> Update SnapMirror after backup ⓘ</div> <div><input checked="" type="checkbox"/> Update SnapVault after backup ⓘ</div> <div>Snapshot label <input type="text" value="Daily"/></div> | |
| Advanced ▾ | <div><input checked="" type="checkbox"/> VM consistency ⓘ</div> <div><input type="checkbox"/> Include datastores with independent disks</div> <div>Scripts ⓘ</div> <div><div><input type="text" value="Enter script path"/></div></div> | |



When creating a policy in the SnapCenter Plug-in you will see options for SnapMirror and SnapVault. If you choose SnapMirror, the retention schedule specified in the policy will be the same for both the primary and secondary snapshots. If you choose SnapVault, the retention schedule for the secondary snapshot will be based on a separate schedule implemented with the SnapMirror relationship. This is useful when you wish longer retention periods for secondary backups.



Snapshot labels are useful in that they can be used to enact policies with a specific retention period for the SnapVault copies replicated to the secondary ONTAP cluster. When SCV is used with BlueXP Backup and Restore, the Snapshot label field must either be blank or match the label specified in the BlueXP backup policy.

3. Repeat the procedure for each policy required. For example, separate policies for daily, weekly, and monthly backups.

Create resource groups

Resource groups contain the datastores and virtual machines to be included in a backup job, along with the associated policy and backup schedule.

Review the [Create resource groups](#) section of the documentation for more information.

To create resource groups complete the following steps.

1. In the SnapCenter Plug-in for VMware vSphere navigate to **Resource Groups** in the left-hand menu and click on the **Create** button.



2. In the Create Resource Group wizard, enter a name and description for the group, as well as information required to receive notifications. Click on **Next**
3. On the next page select the datastores and virtual machines that wish to be included in the backup job and then click on **Next**.

Create Resource Group

1. General info & notification

2. Resource

3. Spanning disks

4. Policies

5. Schedules

6. Summary

Scope:

Datastores

Datacenter:

Datastores
Virtual Machines
Tags
Folders

Entity name

Available entities

Demo
DemoDS
destination
esxi7-hc-01 Local
esxi7-hc-02 Local
esxi7-hc-03 Local
esxi7-hc-04 Local

Selected entities

NFS_SCV
NFS_WKLD



You have the option to select specific VMs or entire datastores. Regardless of which you choose, the entire volume (and datastore) is backed up since the backup is the result of taking a snapshot of the underlying volume. In most cases, it is easiest to choose the entire datastore. However, if you wish to limit the list of available VMs when restoring, you can choose only a subset of VMs for backup.

4. Choose options for spanning datastores for VMs with VMDKs that reside on multiple datastores and then click on **Next**.

Create Resource Group

✓ 1. General info & notification

✓ 2. Resource

3. Spanning disks

4. Policies

5. Schedules

6. Summary

☒ Always exclude all spanning datastores

This means that only the datastores directly added to the resource group and the primary datastore of VMs directly added to the resource group will be backed up

☐ Always include all spanning datastores

All datastores spanned by all included VMs are included in this backup

☐ Manually select the spanning datastores to be included

You will need to modify the list every time new VMs are added

There are no spanned entities in the selected virtual entities list.



BlueXP backup and recovery does not currently support backing up VMs with VMDKs that span multiple datastores.

5. On the next page select the policies that will be associated with the resource group and click on **Next**.

Create Resource Group

✓ 1. General info & notification

✓ 2. Resource

✓ 3. Spanning disks

4. Policies

5. Schedules

6. Summary

+ Create

| <input type="checkbox"/> | Name | VM Consistent | Include independent di... | Schedule |
|-------------------------------------|-----------|---------------|---------------------------|----------------|
| <input checked="" type="checkbox"/> | Daily | No | No | Daily |
| <input type="checkbox"/> | FCD | No | Yes | On Demand Only |
| <input type="checkbox"/> | Monthly | No | No | Monthly |
| <input type="checkbox"/> | On Demand | No | No | On Demand Only |
| <input type="checkbox"/> | Weekly | No | No | Weekly |



When backing up SCV managed snapshots to object storage using BlueXP backup and recovery, each resource group can only be associated with a single policy.

6. Select a schedule that will determine at what times the backups will run. Click on **Next**.

Create Resource Group

✓ 1. General info & notification

✓ 2. Resource

✓ 3. Spanning disks

✓ 4. Policies

✓ 5. Schedules

✓ 6. Summary

Daily



Type

Daily

Every

1

Day(s)

Starting

06/23/2023



At

07



00



PM



7. Finally, review the summary page and then on **Finish** to complete the resource group creation.

Run a backup job

In this final step, run a backup job and monitor its progress. At least one backup job must be successfully completed in SCV before resources can be discovered from BlueXP backup and recovery.

1. In the SnapCenter Plug-in for VMware vSphere navigate to **Resource Groups** in the left-hand menu.
2. To initiate a backup job, select the desired resource group and click the **Run Now** button.

SnapCenter Plug-in for VMware vSphere **INSTANCE 10.61.181.201:8080** ▾

Dashboard

Settings

Resource Groups

Policies

Storage Systems

Guest File Restore

>>

Resource Groups

+ Create

✎ Edit

✖ Delete

▶ Run Now

⏸ Suspend

| Name | Description |
|--------------------|-------------|
| Win01 | |
| SMBC | |
| Oracle_Servers | |
| Demo | |
| SQL_Servers_Daily | |
| SQL_Servers_Weekly | |

3. To monitor the backup job, navigate to **Dashboard** on the left hand menu. Under **Recent Job Activities** click on the Job ID number to monitor the job progress.

Job Details : 2614

✓ Validate Retention Settings

✓ Quiescing Applications

✓ Retrieving Metadata

✓ Creating Snapshot copy

✓ Unquiescing Applications

✓ Registering Backup

✓ Backup Retention

✓ Clean Backup Cache

✓ Send EMS Messages

▶ (Job 2616)SnapVault Update

▶ Running, Start Time: 07/31/2023 07:24:40 PM.

↺

×

CLOSE

DOWNLOAD JOB LOGS

Configure Backups to Object Storage in BlueXP backup and recovery

For BlueXP to manage the data infrastructure effectively, it requires the prior installation of a Connector. The Connector executes the actions involved in discovering resources and managing data operations.

For more information on the BlueXP Connector refer to [Learn about Connectors](#) in the BlueXP documentation.

Once the connector is installed for the cloud provider being utilized, a graphic representation of the object storage will be viewable from the Canvas.

To configure BlueXP backup and recovery to backup data managed by SCV on-premises, complete the following steps:

Add working environments to the Canvas

The first step is to add the on-premises ONTAP storage systems to BlueXP

1. From the Canvas select **Add Working Environment** to begin.



2. Select **On-Premises** from the choice of locations and then click on the **Discover** button.



3. Fill out the credentials for the ONTAP storage system and click the **Discover** button to add the working environment.

ONTAP Cluster IP

10.61.181.180

User Name

admin

Password

••••••••



Discover on-premises SCV appliance and vCenter

To discover the on-premises datastore and virtual machine resources, add info for the SCV data broker and credentials for the vCenter management appliance.

1. From the BlueXP left-hand menu selection **Protection > Backup and recovery > Virtual Machines**



2. From the Virtual Machines main screen access the **Settings** drop down menu and select **SnapCenter Plug-in for VMware vSphere**.




- Click on the **Register** button and then enter the IP address and port number for the SnapCenter Plug-in appliance and the username and password for the vCenter management appliance. Click on the **Register** button to begin the discovery process.


Register SnapCenter Plug-in for VMware vSphere


| | |
|--|--|
| SnapCenter Plug-in for VMware vSphere | Username |
| <input type="text" value="10.61.181.201"/> | <input type="text" value="administrator@vsphere.local"/> |
| Port | Password |
| <input type="text" value="8144"/> | <input type="password" value="••••••••"/> |


- The progress of jobs can be monitored from the Job Monitoring tab.

Job Name: Discover Virtual Resources from SnapCenter Plugin for VMWare vSphere
Job Id: 559167ba-8876-45db-9131-b918a165d0a1


Other
Job Type


Jul 31 2023, 9:18:22 pm
Start Time


Jul 31 2023, 9:18:26 pm
End Time


Success
Job Status

Sub-Jobs(2) Collapse All ^

| Job Name | Job ID | Start Time | End Time | Duration |
|---|--------------------------|-------------------------|-------------------------|-----------|
| Discover Virtual Resources from SnapCenter Plu... | 559167ba-8876-45db-... | Jul 31 2023, 9:18:22 pm | Jul 31 2023, 9:18:26 pm | 4 Seconds |
| Discovering Virtual Resources | 99446761-f997-4c80-8... | Jul 31 2023, 9:18:22 pm | Jul 31 2023, 9:18:24 pm | 2 Seconds |
| Registering Datastores | b7ab4195-1ee5-40ff-9a... | Jul 31 2023, 9:18:24 pm | Jul 31 2023, 9:18:26 pm | 2 Seconds |

- Once discovery is complete you will be able to view the datastores and virtual machines across all discovered SCV appliances.

image::bxp-scv-hybrid-23.png[View available resources]

Create BlueXP backup policies

In BlueXP backup and recovery for virtual machines, create policies to specify the retention period, backup source and the archival policy.

For more information on creating policies refer to [Create a policy to back up datastores](#).

1. From the BlueXP backup and recovery for virtual machines main page, access the **Settings** drop down menu and select **Policies**.



2. Click on **Create Policy** to access the **Create Policy for Hybrid Backup** window.
 - a. Add a name for the policy
 - b. Select the desired retention period
 - c. Select if backups will be sourced from the primary or secondary on-premises ONTAP storage system
 - d. Optionally, specify after what period of time backups will be tiered to archival storage for additional cost savings.

Create Policy for Hybrid Backup

Policy Details

Policy Name
12 week - daily backups

Retention ⓘ

☒ Daily ^

Backups to retain
84

SnapMirror Label
Daily

☐ Weekly Setup Retention Weekly ▼

☐ Monthly Setup Retention Monthly ▼

Backup Source

☒ Primary

☐ Secondary

Archival Policy ⓘ

Backups reside in standard storage for frequently accessed data. Optionally, you can tier backups to archival storage for further cost optimization.

☐ Tier Backups to Archival

Archival After (Days)

Cancel Create



The SnapMirror Label entered here is used to identify which backups to apply the policy too. The label name must match the label name in the corresponding on-premises SCV policy.

3. Click on **Create** to complete the policy creation.

Backup datastores to Amazon Web Services

The final step is to activate data protection for the individual datastores and virtual machines. The following steps outline how to activate backups to AWS.

For more information refer to [Back up datastores to Amazon Web Services](#).

1. From the BlueXP backup and recovery for virtual machines main page, access the settings drop down for the datastore to be backed up and select **Activate Backup**.



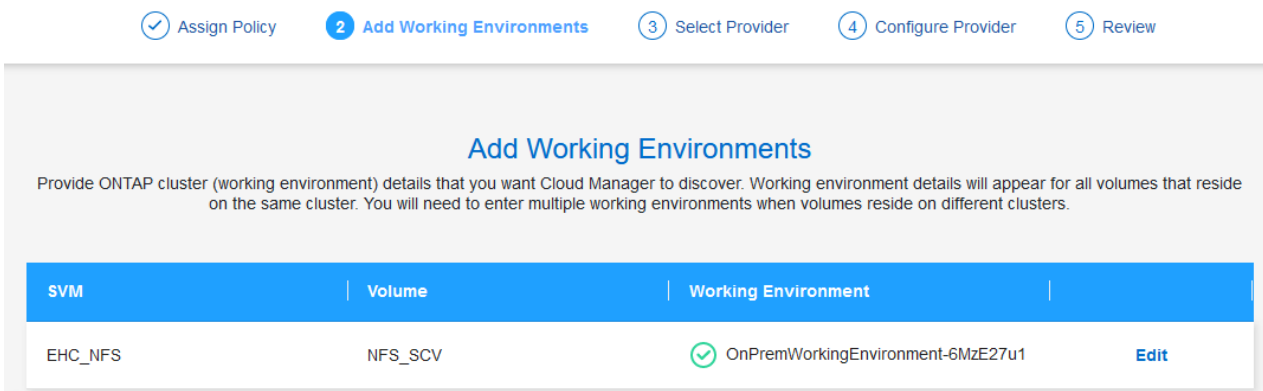
| Datastore | Datastore Type | vCenter | Policy Name | Protection Status |
|-----------|----------------|--------------------------|------------------|-------------------|
| NFS_SCV | NFS | vcsa7-hc.sddc.netapp.com | | Unprotected |
| OTS_DS01 | NFS | 172.21.254.160 | 1 Year Daily LTR | Protected |
| SCV_WKLD | NFS | vcsa7-hc.sddc.netapp.com | 1 Year Daily LTR | Protected |

2. Assign the policy to be used for the data protection operation and click on **Next**.



| Policy Name | SnapMirror Label | Retention Count | Backup Source | Archival Policy |
|-------------------|------------------|-----------------|---------------|-----------------|
| 5 Year Daily LTR | daily | daily : 1830 | Primary | Not Active |
| 5 Year Daily LTR | daily | daily : 1830 | Primary | Not Active |
| 7 Year Weekly LTR | weekly | weekly : 370 | Primary | Not Active |

3. At the **Add Working Environments** page the datastore and working environment with a check mark should appear if the working environment has been previously discovered. If the working environment has not been previously discovered you can add it here. Click on **Next** to continue.



| SVM | Volume | Working Environment |
|---------|---------|-----------------------------------|
| EHC_NFS | NFS_SCV | OnPremWorkingEnvironment-6MzE27u1 |

4. At the **Select Provider** page click on AWS and then click on the **Next** button to continue.

Progress bar: 1 Assign Policy, 2 Add Working Environments, 3 **Select Provider**, 4 Configure Provider, 5 Review

Select Provider


Amazon Web Services


Microsoft Azure


Google Cloud Platform


StorageGRID

5. Fill out the provider specific credential information for AWS including the AWS access key and secret key, region, and archival tier to be used. Also, select the ONTAP IP space for the on-premises ONTAP storage system. Click on **Next**.

Progress bar: 1 Assign Policy, 2 Add Working Environments, 3 Select Provider, 4 **Configure Provider**, 5 Review

Configure Provider

Cloud Manager needs the following details to connect with the cloud provider.

| Provider Information | Location and Connectivity |
|---|---|
| <p>AWS Account</p> <div></div> | <p>Region</p> <div>US East (N. Virginia)</div> |
| <p>AWS Access Key</p> <div>Enter AWS Access Key</div> <p>Required</p> | <p>IP space for Environment</p> <p>OnPremWorkingEnvironment-6MzE27u1</p> <div>Default</div> |
| <p>AWS Secret Key</p> <div>Enter AWS Secret Key</div> <p>Required</p> | <p>Archival Tier</p> <div>Glacier</div> |

6. Finally, review the backup job details and click on the **Activate Backup** button to initiate data protection of the datastore.

Review

| | |
|--------------------------|--|
| Policy | 5 Year Daily LTR |
| SVM | EHC_NFS |
| Volumes | NFS_SCV |
| Working Environment | OnPremWorkingEnvironment-6MzE27u1 |
| Backup Source | Primary |
| Cloud Service Provider | AWS |
| AWS Account | [REDACTED] |
| AWS Access Key | [REDACTED] |
| Region | US East (N. Virginia) |
| IP space | Default |
| Tier Backups to Archival | No |

[Previous](#)[Activate Backup](#)

At this point data transfer may not immediately begin. BlueXP backup and recovery scans for any outstanding snapshots every hour and then transfers them to object storage.

Restoring Virtual Machines in the case of data loss

Ensuring the safeguarding of your data is only one aspect of comprehensive data protection. Equally crucial is the ability to promptly restore data from any location in the event of data loss or a ransomware attack. This capability is vital for maintaining seamless business operations and meeting recovery point objectives.

NetApp offers a highly adaptable 3-2-1 strategy, providing customized control over retention schedules at the

primary, secondary, and object storage locations. This strategy provides the flexibility to tailor data protection approaches to specific needs.

This section provides an overview of the data restoration process from both the SnapCenter Plug-in for VMware vSphere and BlueXP backup and recovery for virtual machines.

Restoring Virtual Machines from SnapCenter Plug-in for VMware vSphere

For this solution virtual machines were restored to original and alternate locations. Not all aspects of SCV's data restoration capabilities will be covered in this solution. For in depth information on all that SCV has to offer refer to the [Restore VMs from backups](#) in the product documentation.

Restore virtual machines from SCV

Complete the following steps to restore a virtual machine restore from primary or secondary storage.

1. From the vCenter client navigate to **Inventory > Storage** and click on the datastore that contains the virtual machines you wish to restore.
2. From the **Configure** tab click on **Backups** to access the list of available backups.



3. Click on a backup to access the list of VMs and then select a VM to restore. Click on **Restore**.



4. From the Restore wizard select to restore the entire virtual machine or a specific VMDK. Select to install to the original location or alternate location, provide VM name after restore, and destination datastore. Click **Next**.

Restore



✓ 1. Select scope

2. Select location

3. Summary

Restore scope

Entire virtual machine

Restart VM

☐

Restore Location

☐ Original Location

(This will restore the entire VM to the original Hypervisor with the original settings. Existing VM will be unregistered and replaced with this VM.)

☒ Alternate Location

(This will create a new VM on selected vCenter and Hypervisor with the customized settings.)

Destination vCenter Server

10.61.181.210

Destination ESXi host

esxi7-hc-04.sddc.netapp.com

Network

Management 181

VM name after restore

SQL_SRV_08_restored

Select Datastore:

NFS_SCV

BACK

NEXT

FINISH

CANCEL

5. Choose to backup from the primary or secondary storage location.

Restore



✓ 1. Select scope

2. Select location

3. Summary

| Destination datastore | Locations |
|-----------------------|-----------------------------------|
| SCV_DEMO | (Primary) SCV:SCV_DEMO |
| | (Primary) SCV:SCV_DEMO |
| | (Secondary) EHC_NFS:SCV_DEMO_dest |
| | |
| | |
| | |
| | |

6. Finally, review a summary of the backup job and click on Finish to begin the restore process.

Restoring Virtual Machines from BlueXP backup and recovery for virtual machines

BlueXP backup and recovery for virtual machines allows restores of virtual machines to their original location. Restore functions are accessed through the BlueXP web console.

For more information refer to [Restore virtual machines data from the cloud](#).

Restore virtual machines from BlueXP backup and recovery

To restore a virtual machine from BlueXP backup and recovery, complete the following steps.

1. Navigate to **Protection > Backup and recovery > Virtual Machines** and click on Virtual Machines to view the list of virtual machines available to be restored.



2. Access the settings drop down menu for the VM to be restored and select



3. Select the backup to restore from and click on **Next**.



4. Review a summary of the backup job and click on **Restore** to start the restore process.
5. Monitor the progress of the restore job from the **Job Monitoring** tab.

[Volumes](#)
[Restore](#)
[Applications](#)
[Virtual Machines](#)
[Kubernetes](#)
[Job Monitoring](#)
[Reports](#)

restore 17 files from Cloud

Job Name: Restore 17 files from Cloud
 Job Id: ec567065-dcf4-4174-b7ef-b27e6620fdbf

Restore Files
Job Type

NFS_SQL
Restore Content

17 Files
Content Files

NFS_SQL
Restore to

In Progress
Job Status

Expand All

Restore Content

| | | | | | |
|--|--------------------------------------|----------------------|------------------------|---|--|
| | ots-demo Working Environment Name | NAS_VOLS SVM Name | NFS_SQL Volume Name | SQL_Servers_Daily_07-31-2023_... Backup Name | Jul 31 2023, 7:24:03 pm Backup Time |
|--|--------------------------------------|----------------------|------------------------|---|--|

Restore from

| | | | | |
|--|-----------------|---------------------|----------------------------|---|
| | AWS Provider | us-east-1 Region | 982589175402 Account ID | netapp-backup-d56250b0-24ad... Bucket/Container Name |
|--|-----------------|---------------------|----------------------------|---|

Conclusion

The 3-2-1 backup strategy, when implemented with SnapCenter Plug-in for VMware vSphere and BlueXP backup and recovery for virtual machines, offers a robust, reliable, and cost-effective solution for data protection. This strategy not only ensures data redundancy and accessibility but also provides the flexibility of restoring data from any location and from both on-premises ONTAP storage systems and cloud based object storage.

The use case presented in this documentation focuses on proven data protection technologies that highlight the integration between NetApp, VMware, and the leading cloud providers. The SnapCenter Plug-in for VMware vSphere provides seamless integration with VMware vSphere, allowing for efficient and centralized management of data protection operations. This integration streamlines the backup and recovery processes for virtual machines, enabling easy scheduling, monitoring, and flexible restore operations within the VMware ecosystem. BlueXP backup and recovery for virtual machines provides the one (1) in 3-2-1 by providing secure, air-gapped backups of virtual machine data to cloud based object storage. The intuitive interface and logical workflow provide a secure platform for long-term archival of critical data.

Additional Information

To learn more about the technologies presented in this solution refer to the following additional information.

- [SnapCenter Plug-in for VMware vSphere documentation](#)
- [BlueXP documentation](#)

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