



Using Veeam Replication and Azure NetApp Files datastore for disaster recovery to Azure VMware Solution

NetApp Solutions

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Overview

Azure NetApp Files (ANF) datastores decouples storage from compute and unlocks the flexibility needed for any organisation to take their workloads to the cloud. It provides customers with flexible, high-performance storage infrastructure that scales independently of compute resources. Azure NetApp Files datastore's simplifies and optimizes the deployment alongside Azure VMware Solution (AVS) as a disaster recovery site for on premises VMWare environments.

Azure NetApp Files (ANF) volume based NFS datastores can be used to replicate data from on-premises using any validated third-party solution that provides VM replication capability. By adding Azure NetApp Files datastores, it will enable cost optimised deployment vs building an Azure VMware Solution SDDC with enormous amount of ESXi hosts to accommodate the storage. This approach is called a "Pilot Light Cluster". A pilot light cluster is a minimal AVS host configuration (3 x AVS nodes) along with Azure NetApp Files Datastore capacity.

The objective is to maintain a low-cost infrastructure with all the core components to handle a failover. A pilot light cluster can scale out and provision more AVS hosts if a failover does occur. And once the failover is complete and normal operations are restored, the pilot light cluster can scale back down to low-cost mode of operations.

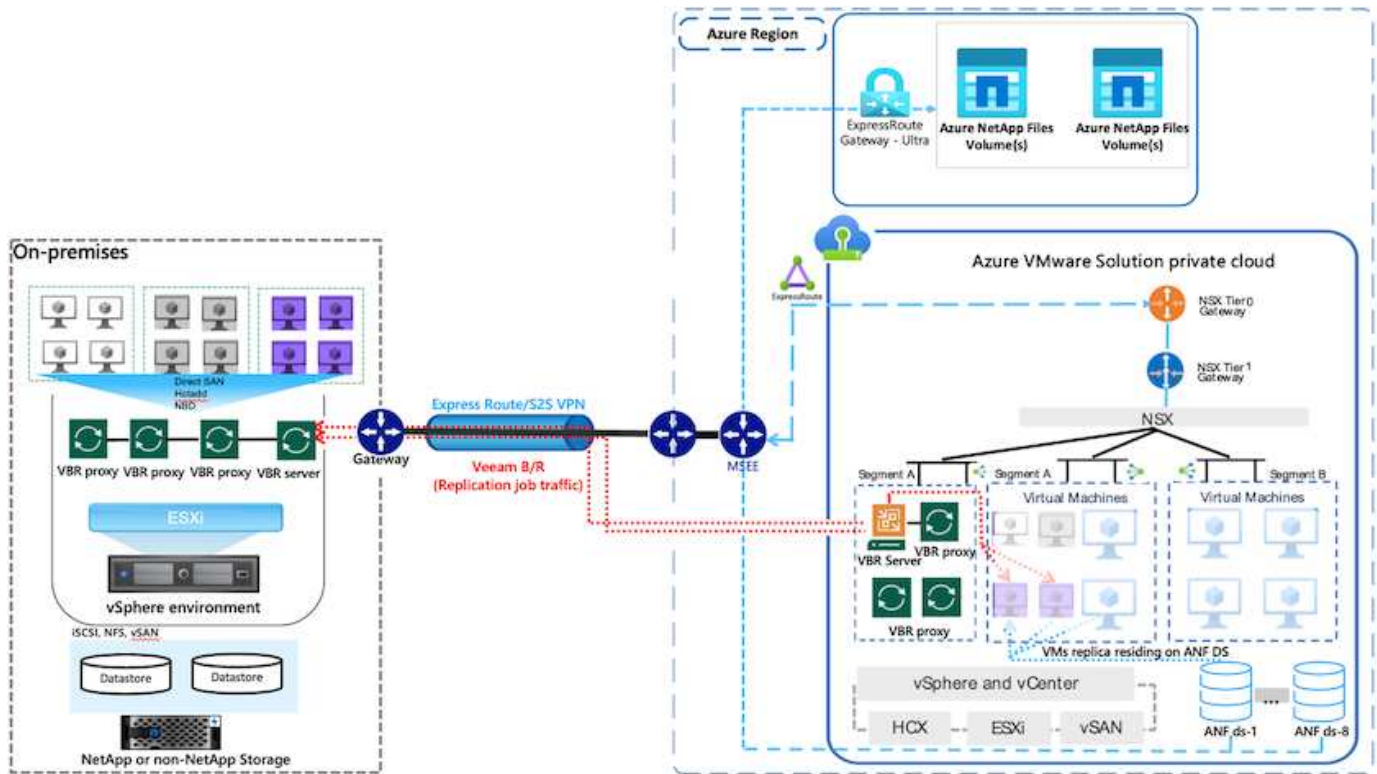
Purposes of this document

This article describes how to use Azure NetApp Files datastore with Veeam Backup and replication to set up disaster recovery for on-premises VMware VMs to (AVS) using the Veeam VM replication software functionality.

Veeam Backup & Replication is a backup and replication application for virtual environments. When virtual machines are replicated, Veeam Backup & Replication is replicated from on AVS, the software will create an exact copy of the VMs in the native VMware vSphere format on the target AVS SDDC cluster. Veeam Backup & Replication will keep the copy synchronized with the original VM. Replication provides the best recovery time objective (RTO) as there is a mounted copy of a VM at the DR site in a ready-to-start state.

This replication mechanism ensures that the workloads can quickly start in a AVS SDDC in the case of a disaster event. The Veeam Backup & Replication software also optimizes traffic transmission for replication over WAN and slow connections. In addition, it also filters out duplicate data blocks, zero data blocks, swap files, and "excluded VM guest OS files". The software will also compress the replica traffic. To prevent replication jobs from consuming the entire network bandwidth, WAN accelerators and network throttling rules can be utilized.

The replication process in Veeam Backup & Replication is job driven which means replication is performed by configuring replication jobs. In the case of a disaster event, failover can be triggered to recover the VMs by failing over to its replica copy. When failover is performed, a replicated VM takes over the role of the original VM. Failover can be performed to the latest state of a replica or to any of its good known restore points. This enables ransomware recovery or isolated testing as needed. Veeam Backup & Replication offers multiple options to handle different disaster recovery scenarios.



Solution Deployment

High level steps

1. Veeam Backup and Replication software is running in an on-premises environment with appropriate network connectivity.
2. [Deploy Azure VMware Solution \(AVS\)](#) private cloud and [attach Azure NetApp Files datastores](#) to Azure VMware Solution hosts.

A pilot-light environment set up with a minimal configuration can be used for DR purposes. VMs will fail over to this cluster in the event of an incident, and additional nodes can be added).

3. Set up replication job to create VM replicas using Veeam Backup and Replication.
4. Create failover plan and perform failover.
5. Switch back to production VMs once the disaster event is complete and primary site is Up.

Pre-requisites for Veeam VM Replication to AVS and ANF datastores

1. Ensure the Veeam Backup & Replication backup VM is connected to the source as well as the target AVS SDDC clusters.
2. The backup server must be able to resolve short names and connect to source and target vCenters.
3. The target Azure NetApp Files datastore must have enough free space to store VMDKs of replicated VMs.

For additional information, refer to "Considerations and Limitations" covered [here](#).

Deployment Details

Step 1: Replicate VMs

Veeam Backup & Replication leverages VMware vSphere snapshot capabilities. During replication, Veeam Backup & Replication requests VMware vSphere to create a VM snapshot. The VM snapshot is the point-in-time copy of a VM that includes virtual disks, system state, configuration and metadata. Veeam Backup & Replication uses the snapshot as a source of data for replication.

To replicate VMs, follow the below steps:

1. Open the Veeam Backup & Replication Console.
2. On the Home view. Right click the jobs node and select Replication Job > Virtual machine.
3. Specify a job name and select the appropriate advanced control checkbox. Click Next.
 - Select the Replica seeding check box if connectivity between on-premises and Azure has restricted bandwidth.
 - *Select the Network remapping (for AVS SDDC sites with different networks) check box if segments on Azure VMware Solution SDDC do not match that of on-premises site networks.
 - If the IP addressing scheme in on-premises production site differs from the scheme in the target AVS site, select the Replica re-IP (for DR sites with different IP addressing scheme) check box.

Name
Specify the name and description for this job, and provide information on your DR site.

Name
Virtual Machines
Destination
Network
Job Settings
Data Transfer
Guest Processing
Schedule
Summary

Name:
AVS_20230522_RepJob01

Description:
Created by VEEAMBKPSRV05\Administrator at 5/21/2023 10:52 PM.

Show advanced controls:

- ☐ Replica seeding (for low bandwidth DR sites)
- ☒ Network remapping (for DR sites with different virtual networks)
- ☐ Replica re-IP (for DR sites with different IP addressing scheme)

☒ **High priority**
Backup infrastructure resources are offered to high priority jobs first. Use this option for jobs sensitive to the start time, or jobs with strict RPO requirements.

< Previous **Next >** Finish Cancel

4. Select the VMs to be replicated to Azure NetApp Files datastore attached to a Azure VMware Solution SDDC in the **Virtual Machines*** step. The Virtual machines can be placed on vSAN to fill the available vSAN datastore capacity. In a pilot light cluster, the usable capacity of a 3-node cluster will be limited. The rest of the data can be easily placed on Azure NetApp Files datastores so that the VMs can be recovered, and cluster can be expanded to meet the CPU/mem requirements. Click **Add**, then in the **Add Object** window select the necessary VMs or VM containers and click **Add**. Click **Next**.

Virtual Machines
Select one or more VMs to replicate. Use exclusion settings to exclude specific VMs and virtual disks from replication.

Virtual machines to replicate:

Name	Type	Size
TestVeeam21	Virtual Machine	873 MB
TestVeeam22	Virtual Machine	890 MB
TestVeeam23	Virtual Machine	883 MB
TestVeeam24	Virtual Machine	879 MB
TestVeeam25	Virtual Machine	885 MB
TestVeeam26	Virtual Machine	883 MB
TestVeeam27	Virtual Machine	879 MB
TestVeeam28	Virtual Machine	880 MB
TestVeeam29	Virtual Machine	878 MB
TestVeeam30	Virtual Machine	876 MB
TestVeeam31	Virtual Machine	888 MB
TestVeeam32	Virtual Machine	881 MB
TestVeeam33	Virtual Machine	877 MB
TestVeeam34	Virtual Machine	875 MB
TestVeeam35	Virtual Machine	882 MB
WinSQL401	Virtual Machine	20.3 GB
WinSQL405	Virtual Machine	24.2 GB

Buttons: Add..., Remove, Exclusions..., Source..., Up, Down, Recalculate, Total size: 120 GB

Navigation: < Previous, **Next >**, Finish, Cancel

- After that, select the destination as Azure VMware Solution SDDC cluster / host and the appropriate resource pool, VM folder and FSx for ONTAP datastore for VM replicas. Then click **Next**.

Edit Replication Job [AVS_20230522_RepJob01]

Destination
Specify where replicas should be created in the DR site.

Host or cluster:
Cluster-1 Choose...


Resource pool:
Resources Choose...
[Pick resource pool](#) for selected replicas

VM folder:
vm Choose...
[Pick VM folder](#) for selected replicas

Datastore:
ds001 [152.6 GB free] ds001 is an ANF Datastore Choose...
[Pick datastore](#) for selected virtual disks

Navigation: < Previous, **Next >**, Finish, Cancel

6. In the next step, create the mapping between source and destination virtual network as needed.

 **Network**
Select how virtual networks map to each other between production and DR sites.

Name	Source network	Target network
Virtual Machines	VM_3508 (vDS-Switch0)	SepSeg
Destination	VM_3510 (vDS-Switch0)	SegmentTemp
Network		
Job Settings		
Data Transfer		
Guest Processing		
Schedule		
Summary		

Buttons: Add... Edit... Remove

Navigation: < Previous Next > Finish Cancel

7. In the **Job Settings** step, specify the backup repository that will store metadata for VM replicas, retention policy and so on.
8. Update the **Source** and **Target** proxy servers in the **Data Transfer** step and leave **Automatic** selection (default) and keep **Direct** option selected and click **Next**.
9. At the **Guest Processing** step, select **Enable application-aware processing** option as needed. Click **Next**.

Guest Processing
Choose guest OS processing options available for running VMs.

Name

Virtual Machines

Destination

Network

Job Settings

Data Transfer

Guest Processing

Schedule

Summary

☐ **Enable application-aware processing**
Detects and prepares applications for consistent backup, performs transaction logs processing, and configures the OS to perform required application restore steps upon first boot.

Customize application handling options for individual machines and applications **Applications...**

Guest interaction proxy:
Automatic selection **Choose...**

Guest OS credentials:
 Add...

Manage accounts

Customize guest OS credentials for individual machines and operating systems **Credentials...**

Verify network connectivity and credentials for each machine included in the job **Test Now**

< Previous **Next >** **Finish** **Cancel**

10. Choose the replication schedule to run the replication job to run on a regular basis.

Schedule
Specify the job scheduling options. If you do not set the schedule, the job will need to be controlled manually.

Name

Virtual Machines

Destination

Network

Job Settings

Data Transfer

Guest Processing

Schedule

Summary

☒ **Run the job automatically**

☒ **Daily at this time:** 10:00 PM Everyday **Days...**

☐ **Monthly at this time:** 10:00 PM Fourth Saturday **Months...**

☐ **Periodically every:** 1 Hours **Schedule...**

☐ **After this job:** Replication Job 2 (Created by VEEAMBKPSRV05\Administrator at 6/6/)

Automatic retry

☒ **Retry failed items processing:** 3 times

Wait before each retry attempt for: 10 minutes

Backup window

☐ **Terminate job if it exceeds allowed backup window** **Window...**

If the job does not complete within allocated backup window, it will be terminated to prevent snapshot commit during production hours.

< Previous **Apply** **Finish** **Cancel**

11. At the **Summary** step of the wizard, review details of the replication job. To start the job right after the wizard is closed, select the **Run the job when I click Finish** check box, otherwise leave the check box unselected. Then click **Finish** to close the wizard.

Summary
The job's settings have been saved successfully. Click Finish to exit the wizard.

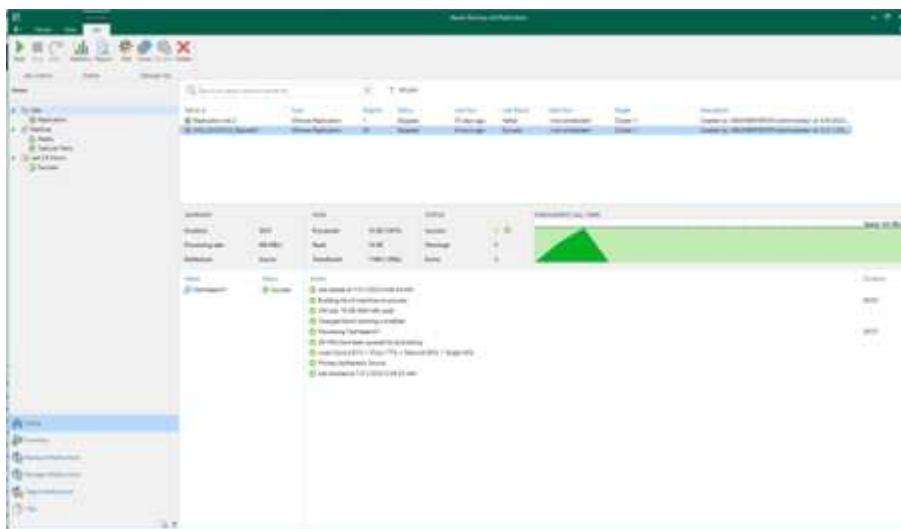
Name
Virtual Machines
Destination
Network
Job Settings
Data Transfer
Guest Processing
Schedule
Summary

Summary:
Name: AVS_20230522_RepJob01
Type: VMware Replication
Source items:
TestVeeam21 (a300-vcsa05.ehcdc.com)
TestVeeam22 (a300-vcsa05.ehcdc.com)
TestVeeam23 (a300-vcsa05.ehcdc.com)
TestVeeam24 (a300-vcsa05.ehcdc.com)
TestVeeam25 (a300-vcsa05.ehcdc.com)
TestVeeam26 (a300-vcsa05.ehcdc.com)
TestVeeam27 (a300-vcsa05.ehcdc.com)
TestVeeam28 (a300-vcsa05.ehcdc.com)
TestVeeam29 (a300-vcsa05.ehcdc.com)
TestVeeam30 (a300-vcsa05.ehcdc.com)
TestVeeam31 (a300-vcsa05.ehcdc.com)
TestVeeam32 (a300-vcsa05.ehcdc.com)
TestVeeam33 (a300-vcsa05.ehcdc.com)
TestVeeam34 (a300-vcsa05.ehcdc.com)
TestVeeam35 (a300-vcsa05.ehcdc.com)
WinSQL401 (a300-vcsa05.ehcdc.com)
WinSQL405 (a300-vcsa05.ehcdc.com)
WinSQL404 (a300-vcsa05.ehcdc.com)
WinSQL402 (a300-vcsa05.ehcdc.com)

☐ Run the job when I click Finish

< Previous Next > **Finish** Cancel

Once the replication job starts, the VMs with the suffix specified will be populated on the destination AVS SDDC cluster / host.



For additional information for Veeam replication, refer [How Replication Works](#)

Step 2: Create a failover plan

When the initial replication or seeding is complete, create the failover plan. Failover plan helps in performing failover for dependent VMs one by one or as a group automatically. Failover plan is the blueprint for the order in which the VMs are processed including the boot delays. The failover plan also helps to ensure that critical dependant VMs are already running.

To create the plan, navigate to the new sub section called **Replicas** and select **Failover Plan**. Choose the appropriate VMs. Veeam Backup & Replication will look for the closest restore points to this point in time and use them to start VM replicas.



The failover plan can only be added once the initial replication is complete and the VM replicas are in Ready state.



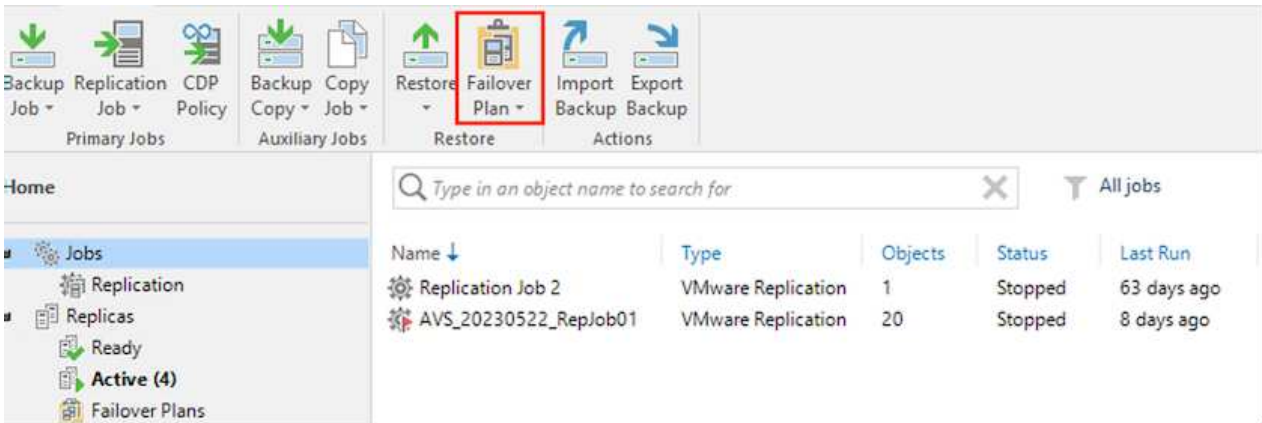
The maximum number of VMs that can be started simultaneously when running a failover plan is 10



During the failover process, the source VMs will not be powered off


To create the **Failover Plan**, do the following:

1. On the Home view. Right click the Replicas node and select Failover Plans > Failover Plan > VMware vSphere.



2. Next provide a name and a description to the plan. Pre and Post-failover script can be added as required. For instance, run a script to shutdown VMs before starting the replicated VMs.

Edit Failover Plan [ANF_AVS_FP01] ✕

 **General**
Type in name and description for this failover plan, and optionally specify scripts to trigger before and after the failover.

General
Virtual Machines
Summary

Name:
ANF_AVS_FP01

Description:
Created by VEEAMBKPSRV05\Administrator at 5/24/2023 9:08 AM.


☐ Pre-failover script:
 Browse...

☐ Post-failover script:
 Browse...

< Previous Next > Finish Cancel

3. Add the VMs to the plan and modify the VM boot order and boot delays to meet the application dependencies.

Edit Failover Plan [ANF_AVS_FP01]



Virtual Machines
Add virtual machines to be failed over as a part of this plan. Use VM order and delays to ensure all application dependencies are met.

General

Virtual Machines

Summary

Virtual machines:

Name	Delay	Replica state
TestVeeam21	2 sec	63 days ago (5:52 AM T...
TestVeeam23	2 sec	7 days ago (10:12 AM T...
TestVeeam24	2 sec	7 days ago (10:20 AM T...
TestVeeam22	2 sec	7 days ago (10:10 AM T...
WinSQL401	2 sec	7 days ago (3:52 AM Tu...
WinSQL405	2 sec	8 days ago (4:05 PM Mo...
TestVeeam25	2 sec	7 days ago (10:14 AM T...
TestVeeam26	2 sec	7 days ago (10:17 AM T...
TestVeeam27	2 sec	7 days ago (10:18 AM T...
TestVeeam28	2 sec	7 days ago (10:14 AM T...
TestVeeam29	2 sec	7 days ago (10:18 AM T...
TestVeeam30	2 sec	7 days ago (10:15 AM T...
TestVeeam31	2 sec	7 days ago (10:21 AM T...
TestVeeam32	2 sec	7 days ago (10:13 AM T...
TestVeeam33	2 sec	7 days ago (10:15 AM T...
TestVeeam34	2 sec	7 days ago (10:14 AM T...
TestVeeam35	2 sec	7 days ago (10:20 AM T...

Add VM

Remove

Set Delay...

Up

Down

< Previous

Apply

Finish

Cancel

For additional information for creating replication jobs, refer [Creating Replication Jobs](#).

Step 3: Run the failover plan

During failover, the source VM in the production site is switched over to its replica at the disaster recovery site. As part of the failover process, Veeam Backup & Replication restores the VM replica to the required restore point and moves all I/O activities from the source VM to its replica. Replicas can be used not only in case of a disaster, but also to simulate DR drills. During failover simulation, the source VM remains running. Once all the necessary tests have been conducted, you can undo the failover and return to normal operations.

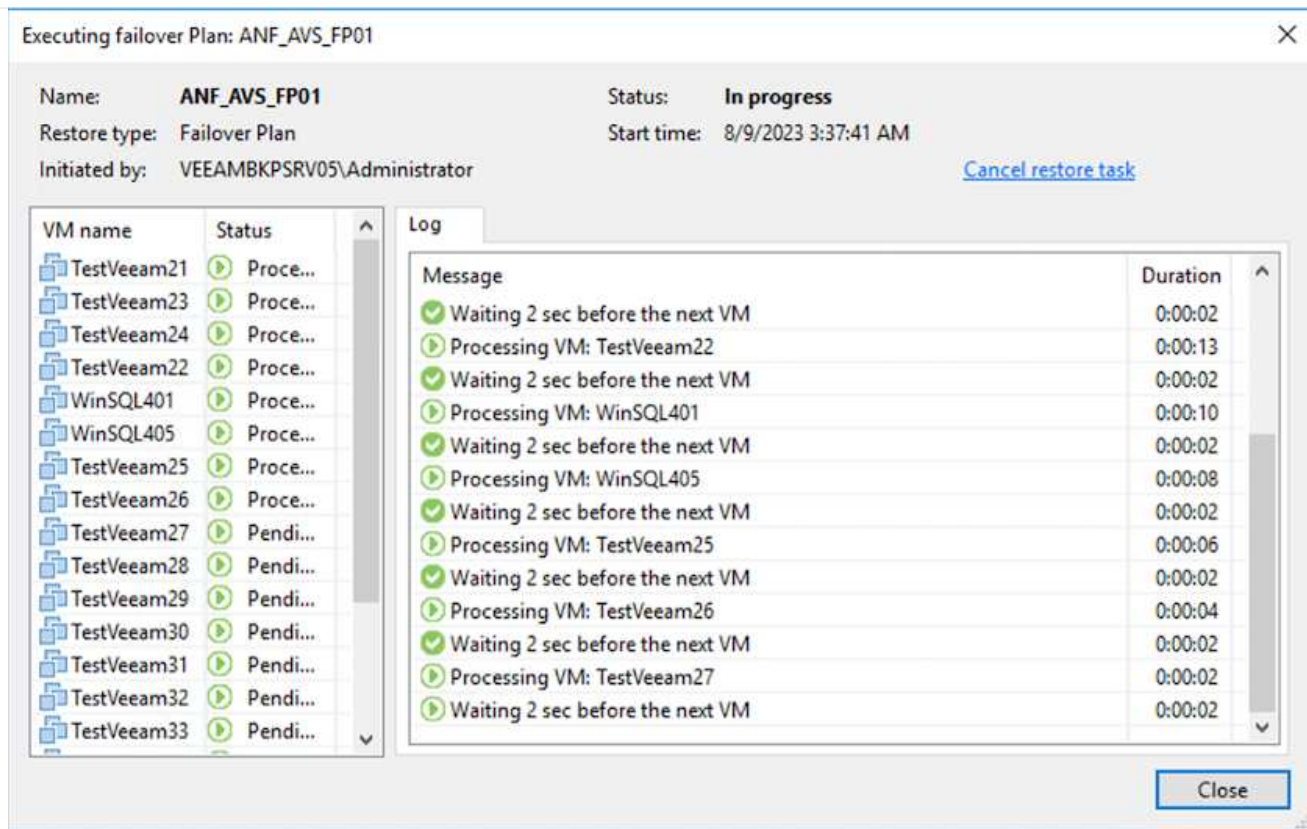


Make sure network segmentation is in place to avoid IP conflicts during failover.

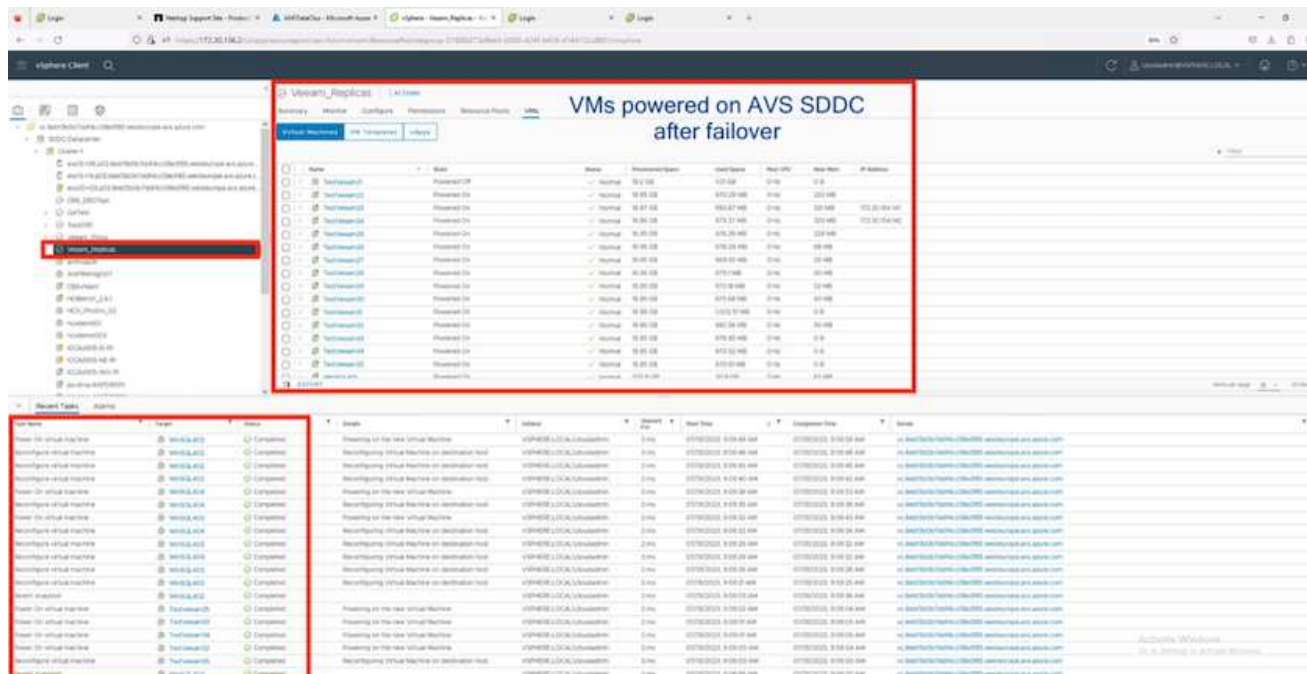
To start the failover plan, simply click in **Failover Plans** tab and right click on your failover plan. Select ***Start**. This will failover using the latest restore points of VM replicas. To fail over to specific restore points of VM replicas, select **Start to**.

The screenshot shows the Veeam Backup & Replication interface. At the top, there is a toolbar with icons for Start, Start to..., Retry, Undo, Statistics, Edit, and Delete. Below the toolbar, the 'Home' tab is selected, and the 'Failover Plans' section is highlighted in the left sidebar. The main area displays a table of failover plans. The first plan, 'ANF_AVS_FP01', is selected, and a context menu is open over it. The menu options are Start, Start to..., Undo, Statistics, Delete, and Edit... The 'Start' and 'Start to...' options are highlighted with red boxes.

Name	Platform	Status	Number of VMs
ANF_AVS_FP01	VMware	Completed	20



The state of the VM replica changes from Ready to Failover and VMs will start on the destination Azure VMware Solution (AVS) SDDC cluster / host.



Once the failover is complete, the status of the VMs will change to "Failover".

The screenshot shows the Veeam Backup and Replication console. The left sidebar contains navigation links: Home, Replication, Ready, Active (19), Failover Plans, Last 24 Hours, Success, and Warning. The main pane displays a table of replication jobs. The 'Status' column for all jobs is 'Failover'. The 'Original Location' and 'Replica Location' columns show the source and target environments, respectively. The 'Platform' column indicates that all replicas are on a VMware platform.

Name	Job Name	Type	Status	Creation Time	Retention Period	Original Location	Replica Location	Platform
TestVeeam02	AVS_20230522_RepJob01	Regular	Failover	6/6/2023 5:53 AM	3	a200-vcsa05.ehdc.com/Cluster05	172.30.156.2/Cluster-1	VMware
TestVeeam03	AVS_20230522_RepJob01	Regular	Failover	6/6/2023 5:52 AM	4	a200-vcsa05.ehdc.com/Cluster05	172.30.156.2/Cluster-1	VMware
TestVeeam04	AVS_20230522_RepJob01	Regular	Failover	6/6/2023 5:52 AM	3	a200-vcsa05.ehdc.com/Cluster05	172.30.156.2/Cluster-1	VMware
TestVeeam05	AVS_20230522_RepJob01	Regular	Failover	6/6/2023 7:48 AM	4	a200-vcsa05.ehdc.com/Cluster05	172.30.156.2/Cluster-1	VMware
TestVeeam06	AVS_20230522_RepJob01	Regular	Failover	6/6/2023 10:44 AM	3	a200-vcsa05.ehdc.com/Cluster05	172.30.156.2/Cluster-1	VMware
TestVeeam07	AVS_20230522_RepJob01	Regular	Failover	6/6/2023 12:19 PM	3	a200-vcsa05.ehdc.com/Cluster05	172.30.156.2/Cluster-1	VMware
TestVeeam08	AVS_20230522_RepJob01	Regular	Failover	6/6/2023 1:07 PM	3	a200-vcsa05.ehdc.com/Cluster05	172.30.156.2/Cluster-1	VMware
TestVeeam09	AVS_20230522_RepJob01	Regular	Failover	6/6/2023 1:16 PM	3	a200-vcsa05.ehdc.com/Cluster05	172.30.156.2/Cluster-1	VMware
TestVeeam10	AVS_20230522_RepJob01	Regular	Failover	6/6/2023 2:24 PM	3	a200-vcsa05.ehdc.com/Cluster05	172.30.156.2/Cluster-1	VMware
TestVeeam11	AVS_20230522_RepJob01	Regular	Failover	7/31/2023 4:43 AM	3	a200-vcsa05.ehdc.com/Cluster05	172.30.156.2/Cluster-1	VMware
TestVeeam12	AVS_20230522_RepJob01	Regular	Failover	6/6/2023 8:31 PM	3	a200-vcsa05.ehdc.com/Cluster05	172.30.156.2/Cluster-1	VMware
TestVeeam13	AVS_20230522_RepJob01	Regular	Failover	6/6/2023 3:31 PM	4	a200-vcsa05.ehdc.com/Cluster05	172.30.156.2/Cluster-1	VMware
TestVeeam14	AVS_20230522_RepJob01	Regular	Failover	6/6/2023 4:31 PM	4	a200-vcsa05.ehdc.com/Cluster05	172.30.156.2/Cluster-1	VMware
TestVeeam15	AVS_20230522_RepJob01	Regular	Failover	6/6/2023 5:30 PM	3	a200-vcsa05.ehdc.com/Cluster05	172.30.156.2/Cluster-1	VMware
WinSQL401	AVS_20230522_RepJob01	Regular	Failover	6/6/2023 6:52 AM	5	a200-vcsa05.ehdc.com/Cluster05	172.30.156.2/Cluster-1	VMware
WinSQL402	AVS_20230522_RepJob01	Regular	Failover	6/7/2023 6:11 AM	3	a200-vcsa05.ehdc.com/Cluster05	172.30.156.2/Cluster-1	VMware
WinSQL403	AVS_20230522_RepJob01	Regular	Failover	6/7/2023 11:08 AM	3	a200-vcsa05.ehdc.com/Cluster05	172.30.156.2/Cluster-1	VMware
WinSQL404	AVS_20230522_RepJob01	Regular	Failover	6/6/2023 6:29 PM	5	a200-vcsa05.ehdc.com/Cluster05	172.30.156.2/Cluster-1	VMware
WinSQL405	AVS_20230522_RepJob01	Regular	Failover	6/6/2023 7:50 AM	3	a200-vcsa05.ehdc.com/Cluster05	172.30.156.2/Cluster-1	VMware



Veeam Backup & Replication stops all replication activities for the source VM until its replica is returned to the Ready state.

For detailed information about failover plans, refer [Failover Plans](#).

Step 4: Failback to the Production site

When the failover plan is running, it is considered as an intermediate step and needs to be finalized based on the requirement. The options include the following:

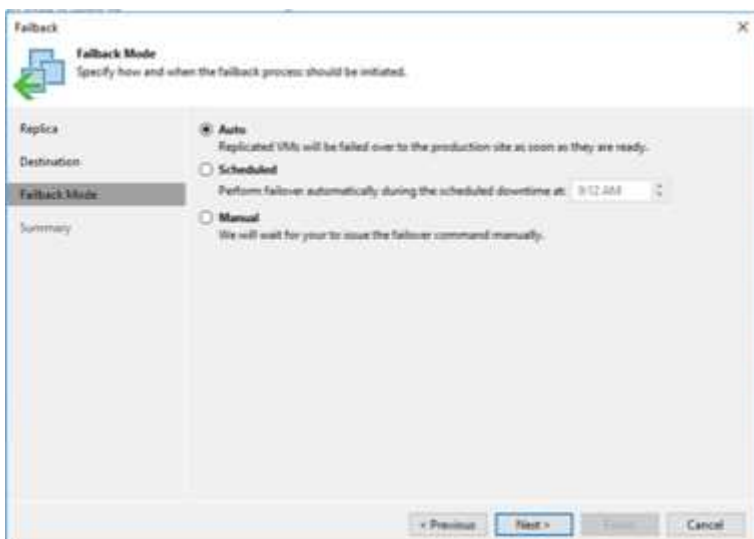
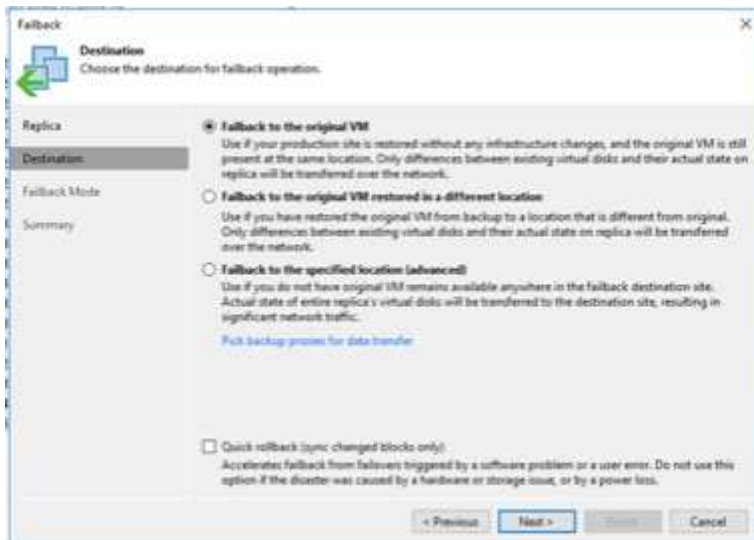
- **Failback to production** - switch back to the original VM and transfer all changes that took place while the VM replica was running to the original VM.

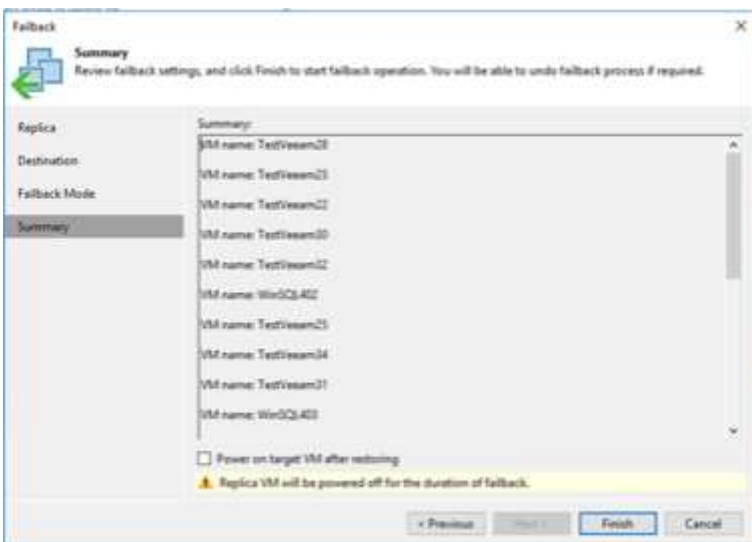
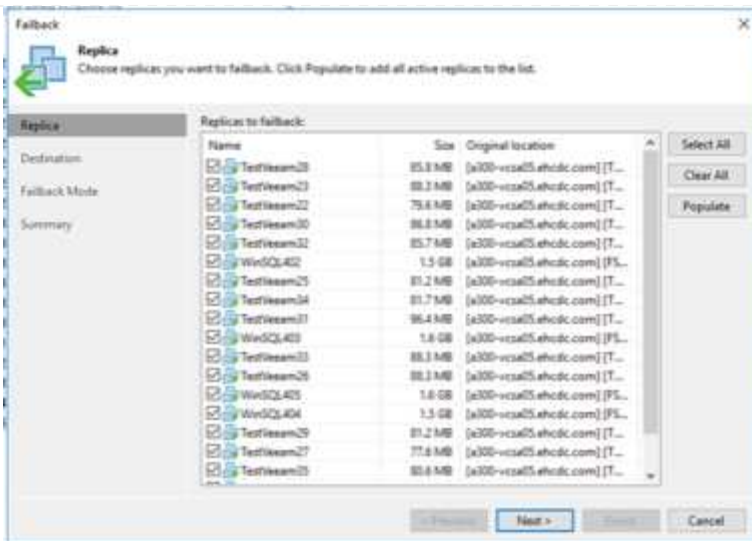


When you perform failback, changes are only transferred but not published. Choose **Commit failback** (once the original VM is confirmed to work as expected) or **Undo failback** to get back to the VM replica. If the original VM is not working as expected.

- **Undo failover** - switch back to the original VM and discard all changes made to the VM replica while it was running.
- **Permanent Failover** - permanently switch from the original VM to a VM replica and use this replica as the original VM.

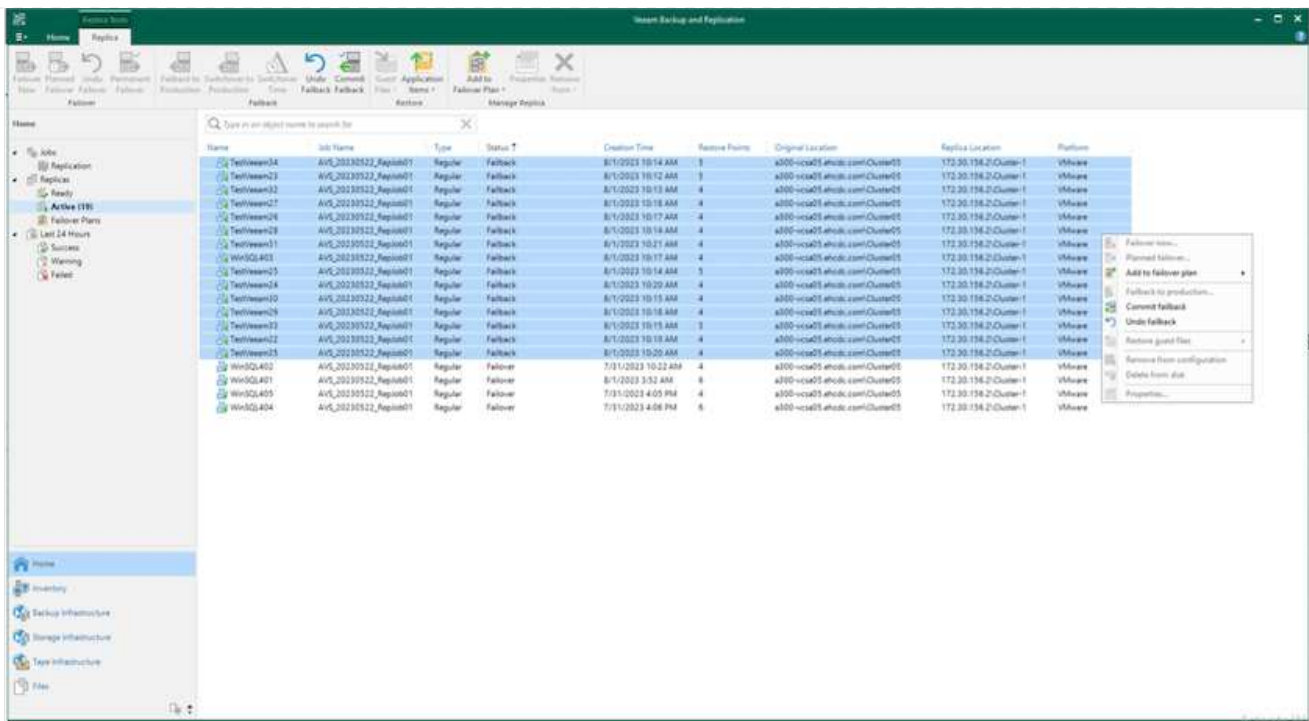
In this demo, Failback to production was chosen. Failback to the original VM was selected during the Destination step of the wizard and “Power on VM after restoring” check box was enabled.



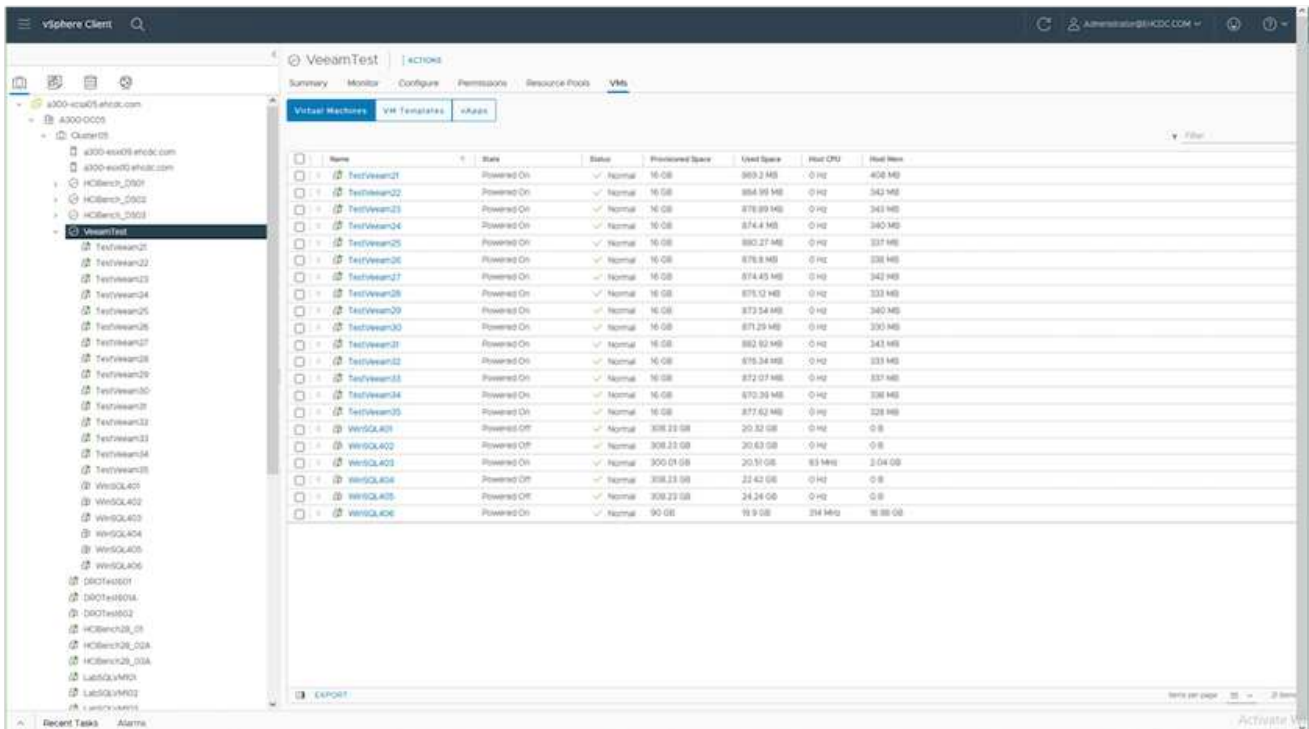


Failback commit is one of the ways to finalize failback operation. When failback is committed, it confirms that the changes sent to the VM which is failed back (the production VM) are working as expected. After the commit operation, Veeam Backup & Replication resumes replication activities for the production VM.

For detailed information about the failback process, refer Veeam documentation for [Failover and Failback for replication](#).



After failback to production is successful, the VMs are all restored back to the original production site.



Conclusion

Azure NetApp Files datastore capability enables Veeam or any validated third-party tool to provide a low-cost DR solution by leveraging Pilot light clusters instead of standing up a large cluster only to accommodate VM replicas. This provides an efficacious way to handle a tailored, customized disaster recovery plan and to reuse existing backup products in house for DR, enabling cloud-based disaster recovery by exiting on-premises DR

datacenters. It is possible to failover by clicking a button in case of disaster or to failover automatically if a disaster occurs.

To learn more about this process, feel free to follow the detailed walkthrough video.

<https://netapp.hosted.panopto.com/Panopto/Pages/Embed.aspx?id=2855e0d5-97e7-430f-944a-b061015e9278>

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