

ANF Cross-Region Replication with SAP HANA

NetApp Solutions SAP

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ANF Cross-Region Replication with SAP HANA

ANF Cross-Region Replication with SAP HANA

Application agnostic information on Cross-Region Replication can be found at Azure NetApp Files documentation | Microsoft Docs in the concepts and how- to guide sections.

Configuration options for Cross-Region Replication with SAP HANA

The following figure shows the volume replication relationships for an SAP HANA system using ANF Cross-Region Replication. With ANF Cross-Region Replication, the HANA data and the HANA shared volume must be replicated. If only the HANA data volume is replicated, typical RPO values are in the range of one day. If lower RPO values are required, the HANA log backups must be also replicated for forward recovery.



The term "log backup" used in this document includes the log backup and the HANA backup catalog backup. The HANA backup catalog is required to execute forward recovery operations.



The following description and the lab setup focus on the HANA database. Other shared files, for example the SAP transport directory would be protected and replicated in the same way as the HANA shared volume.

To enable HANA save-point recovery or forward recovery using the log backups, application-consistent data Snapshot backups must be created at the primary site for the HANA data volume. This can be done for example with the ANF backup tool AzAcSnap (see also What is Azure Application Consistent Snapshot tool for Azure NetApp Files | Microsoft Docs). The Snapshot backups created at the primary site are then replicated to the DR site.

In the case of a disaster failover, the replication relationship must be broken, the volumes must be mounted to the DR production server, and the HANA database must be recovered, either to the last HANA save point or with forward recovery using the replicated log backups. The chapter Disaster recovery failover, describes the required steps.

The following figure depicts the HANA configuration options for cross-region replication.



With the current version of Cross-Region Replication, only fixed schedules can be selected, and the actual replication update time cannot be defined by the user. Available schedules are daily, hourly and every 10 minutes. Using these schedule options, two different configurations make sense depending on the RPO requirements: data volume replication without log backup replication and log backup replication with different schedules, either hourly or every 10 minutes. The lowest achievable RPO is around 20 minutes. The following table summarizes the configuration options and the resulting RPO and RTO values.

	Data volume replication	Data and log backup volume replication	Data and log backup volume replication
CRR schedule data volume	Daily	Daily	Daily
CRR schedule log backup volume	n/a	Hourly	10 min
Max RPO	24 hours + Snapshot schedule (e.g., 6 hours)	1 hour	2 x 10 min
Max RTO	Primarily defined by HANA startup time	HANA startup time + recovery time	HANA startup time + recovery time
Forward recovery	NA	Logs for the last 24 hours + Snapshot schedule (e.g., 6 hours)	Logs for the last 24 hours + Snapshot schedule (e.g., 6 hours)

Requirements and best practices

Microsoft Azure does not guarantee the availability of a specific virtual machine (VM) type upon creation or when starting a deallocated VM. Specifically, in case of a region failure, many clients might require additional VMs at the disaster recovery region. It is therefore recommended to actively use a VM with the required size for disaster failover as a test or

QA system at the disaster recovery region to have the required VM type allocated.

For cost optimization it makes sense to use an ANF capacity pool with a lower performance tier during normal operation. The data replication does not require high performance and could therefore use a capacity pool with a standard performance tier. For disaster recovery testing, or if a disaster failover is required, the volumes must be moved to a capacity pool with a high-performance tier.

If a second capacity pool is not an option, the replication target volumes should be configured based on capacity requirements and not on performance requirements during normal operations. The quota or the throughput (for manual QoS) can then be adapted for disaster recovery testing in the case of disaster failover.

Further information can be found at Requirements and considerations for using Azure NetApp Files volume cross-region replication | Microsoft Docs.

Lab setup

Solution validation has been performed with an SAP HANA single-host system. The Microsoft AzAcSnap Snapshot backup tool for ANF has been used to configure HANA application-consistent Snapshot backups. A daily data volume, hourly log backup, and shared volume replication were all configured. Disaster recover testing and failover was validated with a save point as well as with forward recovery operations.

The following software versions have been used in the lab setup:

- Single host SAP HANA 2.0 SPS5 system with a single tenant
- SUSE SLES for SAP 15 SP1
- AzAcSnap 5.0

A single capacity pool with manual QoS has been configured at the DR site.

The following figure depicts the lab setup.



Snapshot backup configuration with AzAcSnap

At the primary site, AzAcSnap was configured to create application-consistent Snapshot backups of the HANA system PR1. These Snapshot backups are available at the ANF data volume of the PR1 HANA system, and they are also registered in the SAP HANA backup catalog, as shown in the following two figures. Snapshot backups were scheduled for every 4 hours.

With the replication of the data volume using ANF Cross-Region Replication, these Snapshot backups are replicated to the disaster recovery site and can be used to recover the HANA database.

The following figure shows the Snapshot backups of the HANA data volume.

BR1-data-mnt00001 (saponanf/sap-pool1/PR1-data-mnt00001) | Snapshots X Volume Search (Ctrl+/) ~ + Add snapshot 🕐 Refresh Overview Activity log Name ↑↓ Location ↑↓ Created ΛJ Access control (IAM) azacsnap_2021-02-12T145015-1799555Z ... East US 02/12/2021, 03:49:48 PM Tags azacsnap_2021-02-12T145227-1245630Z East US 02/12/2021, 03:51:24 PM ... Settings azacsnap_2021-02-12T145828-3863442Z ... 02/12/2021, 03:58:01 PM East US Properties azacsnap_2021-02-16T134021-9431230Z 02/16/2021, 02:39:18 PM ... East US 🔒 Locks azacsnap_2021-02-16T134917-6284160Z 02/16/2021.02:48:55 PM ... East US azacsnap_2021-02-16T135737-3778546Z East US 02/16/2021, 02:56:32 PM ... Storage service azacsnap_2021-02-16T160002-1354654Z ... East US 02/16/2021.04:59:40 PM Mount instructions azacsnap_2021-02-16T200002-0790339Z ... East US 02/16/2021, 08:59:42 PM Export policy azacsnap_2021-02-17T000002-1753859Z 02/17/2021, 12:59:32 AM ... Snapshots East US azacsnap_2021-02-17T040001-5454808Z ... East US 02/17/2021, 04:59:31 AM Replication B azacsnap_2021-02-17T080002-2933611Z ... 02/17/2021, 08:59:40 AM East US Monitoring

Metrics

1-data-mnt00001)

The following figure shows the SAP HANA backup catalog.

Help														
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							Location: Host Ser ym-pr1 na	/ha rvice meser	ana/data/PR1/mnt0 Size rver 3.13 GB	Name hdb00001	Source volume	EBID azacsnap 2021-02-12T14501	1	6 2

Configuration steps for ANF Cross-Region Replication

A few preparation steps must be performed at the disaster recovery site before volume replication can be configured.

- A NetApp account must be available and configured with the same Azure subscription as the source.
- A capacity pool must be available and configured using the above NetApp account.
- A virtual network must be available and configured.
- Within the virtual network, a delegated subnet must be available and configured for use with ANF.

Protection volumes can now be created for the HANA data, the HANA shared and the HANA log backup volume. The following table shows the configured destination volumes in our lab setup.



To achieve the best latency, the volumes must be placed close to the VMs that run the SAP HANA in case of a disaster failover. Therefore, the same pinning process is required for the DR volumes as for any other SAP HANA production system.

HANA volume	Source	Destination	Replication schedule
HANA data volume	PR1-data-mnt00001	PR1-data-mnt00001-sm- dest	Daily
HANA shared volume	PR1-shared	PR1-shared-sm-dest	Hourly
HANA log/catalog backup volume	hanabackup	hanabackup-sm-dest	Hourly

For each volume, the following steps must be performed:

- 1. Create a new protection volume at the DR site:
 - a. Provide the volume name, capacity pool, quota, and network information.
 - b. Provide the protocol and volume access information.
 - c. Provide the source volume ID and a replication schedule.
 - d. Create a target volume.
- 2. Authorize replication at the source volume.
 - Provide the target volume ID.

The following screenshots show the configuration steps in detail.

At the disaster recovery site, a new protection volume is created by selecting volumes and clicking Add Data Replication. Within the Basics tab, you must provide the volume name, capacity pool and network information.



The quota of the volume can be set based on capacity requirements, because volume performance does not have an effect on the replication process. In the case of a disaster recovery failover, the quota must be adjusted to fulfill the real performance requirements.



If the capacity pool has been configured with manual QoS, you can configure the throughput in addition to the capacity requirements. Same as above, you can configure the throughput with a low value during normal operation and increase it in case of a disaster recovery failover.

Create a new protection volume

Basics Protocol Replication Tags Review + create

This page will help you create an Azure NetApp Files volume in your subscription and enable you to access the volume from within your virtual network. Learn more about Azure NetApp Files

Volume details		
Volume name *	PR1-data-mnt00001-sm-dest	~
Capacity pool * 🥡	dr-sap-pool1	~
Available quota (GiB) 🛈	4096	
		4 TiB
Quota (GiB) * 🕕	500	
		500 GiB
Virtual network * 🛈	dr-vnet (10.2.0.0/16,10.0.2.0/24)	\checkmark
	Create new	
Delegated subnet * (i)	default (10.0.2.0/28)	\sim
	Create new	
Show advanced section		

Next : Protocol >

< Previous



Review + create

The protocol must be the same as the protocol used for the source volume.

In the Protocol tab, you must provide the network protocol, the network path, and the export policy.

Create a new protection volume

Access Protocol type		3 🔘 Dual-protocol (N	FSv3 and SMB)		
Configuration					
-ile path * 🕥	PR1-data-mnt000	01-sm-dest			
/ersions *	NFSv4.1				\sim
	O Enabled	Disabled			
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Within the Replication tab, you must configure the source volume ID and the replication schedule. For data volume replication, we configured a daily replication schedule for our lab setup.



The source volume ID can be copied from the Properties screen of the source volume.

Create a new protection volume

Basics Protocol Replication T	ags Review + create
Source volume ID (i)	/subscriptions/28cfc403-f3f6-4b07-9847-4eb16109e870/resourceGroups/rg 🗸
Replication schedule (i)	Daily
	Every 10 minutes
	Hourly
	Daily

Review + create

< Previous

Next : Tags >

As a final step, you must authorize replication at the source volume by providing the ID of the target volume.



You can copy the destination volume ID from the Properties screen of the destination volume.

-data-mnt00001)

Authorize

×

Volume		
P Search (Ctrl+/)	« 🔗 Authorize	
Overview		• opdate the replication schedule
Activity log	You don't have any data protection volumes. Click Add data protection to get started.	Destination volume id ①
Access control (IAM)		ol1/volumes/PR1-data-mnt00001-sm-de-/
🛷 Tags		
Settings		
III Properties		
🔒 Locks		
Storage service		
Mount instructions		
Export policy		
(D) Snapshots		
Replication		

The same steps must be performed for the HANA shared and the log backup volume.

PR1-data-mnt00001 (saponanf/sap-pool1/PR1-data-mnt00001) | Replicatio

Monitoring ANF Cross-Region Replication

The following three screenshots show the replication status for the data, log backup, and shared volumes.

The volume replication lag time is a useful value to understand RPO expectations. For example, the log backup volume replication shows a maximum lag time of 58 minutes, which means that the maximum RPO has the same value.

The transfer duration and transfer size provide valuable information on bandwidth requirements and change the rate of the replicated volume.

The following screenshot shows the replication status of HANA data volume.

me > Azure NetApp Files > dr-saponanf > PR1-data-mnt0001-sm-dest (dr-saponanf/dr-sap-pool-premium/PR1-data-mnt0001-sm-dest)

P	PR1-data-mnt0001-sm-dest	(dr-saponanf/dr-sap-poo	ol-premium/PR1-dat	a-mnt0001-sm-dest)	Replication
4_	Volume				

A REAL PLAN	Volume replication lag time	\$	Is volume replication transferring	\$	Volume replication progress
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	2.08days		60		
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	33.33hours		50		1431MiB
] LOCKS	27.7 shours		40		
orage service	15.57baurs		30		9.54Mi8
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The following screenshot shows the replication status of HANA log backup volume.

> Azure NetApp Files > dr-saponanf > hanabackup-sm-dest (dr-saponanf/dr-sap-pool-premium/hanabackup-sm-dest)

hanabackup-sm-dest (dr-saponanf/dr-sap-pool-premium/hanabackup-sm-dest) | Replication

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Overview			W.I
Activity log	volume replication lag time		volume replication progress
Access control (IAM)			
🗳 Tags	58.33min	0.5	14.968
Settings	50min	0.3	11.186/8
Properties	41.67min	0.25	9.31GiB
🔒 Locks	33.33min	02	7.45GIB
Storage service	25min	0.15	5,59Gi8
Mount instructions			3.73G/8
Evport policy	8.33min	0.05	1.86GI8
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Support + troubleshooting	10zec	11.44MiB	18.63GIB
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The following screenshot shows the replication status of HANA shared volume.

me > Azure NetApp Files > dr-saponanf > PR1-shared-sm-dest (dr-saponanf/dr-sap-pool-premium/PR1-shared-sm-dest)

PR1-shared-sm-dest (dr-saponanf/dr-sap-pool-premium/PR1-shared-sm-dest) | Replication

Activity log	Volume replication lag time	Is volume replication transferring	Volume replication progress
Access control (IAM)		_100	1008
Tags	58.33min	90	908
	50min	80	808
Settings	41.67min	60	608
Properties	33.33min	50	508
🔒 Locks	25min	40	408
Storage service	1567min	30	308
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Replication Monitoring Metrics Automation Tasks (preview) Export template Support + troubleshooting New support request	Volume replication last transfer duration	Volume replication last transfer size	Volume replication total transfer Volume replication total transfer

Replicated snapshot backups

With each replication update from the source to the target volume, all block changes that happened between the last and the current update are replicated to the target volume. This also includes the snapshots, which have been created at the source volume. The following screenshot shows the snapshots available at the target volume. As already discussed, each of the snapshots created by the AzAcSnap tool are application-consistent images of the HANA database that can be used to execute either a savepoint or a forward recovery.



Within the source and the target volume, SnapMirror Snapshot copies are created as well, which are used for resync and replication update operations. These Snapshot copies are not application consistent from the HANA database perspective; only the application-consistent snapshots created via AzaCSnap can be used for HANA recovery operations.

me > Azure NetApp Files > dr-saponanf > PR1-data-mnt0001-sm-dest (dr-saponanf/dr-sap-pool-premium/PR1-data-mnt0001-sm-dest)

D PR1-data-mnt0001-sm-dest (dr-saponanf/dr-sap-pool-premium/PR1-data-mnt0001-sm-dest) | Snapshots

Overview

Cverview	-				
Activity log	D Search snapshots				
	Name 1	℃↓ Location	¢1	, Created	†↓
R Access control (IAM)	(D) azacsnap_2021-02-18T120002-2150721Z	West US		02/18/2021, 01:00:05 PM	
Tags	(L) azacsnap_2021-02-18T160002-1442691Z	West US		02/18/2021, 05:00:49 PM	
Settings	[U] azacsnap_2021-02-18T200002-0758687Z	West US		02/18/2021, 09:00:05 PM	
III Properties	[U] azacsnap_2021-02-19T000002-0039686Z	West US		02/19/2021, 01:00:05 AM	
🔒 Locks	B azacsnap_2021-02-19T040001-8773748Z	West US		02/19/2021, 05:00:06 AM	
Storage service	B azacsnap_2021-02-19T080001-5198653Z	West US		02/19/2021, 09:00:05 AM	***
Mount instructions	B azacsnap_2021-02-19T120002-1495322Z	West US		02/19/2021, 01:00:06 PM	
Export policy	[B] azacsnap_2021-02-19T160002-3698678Z	West US		02/19/2021, 05:00:05 PM	
(C) Snapshots	[B] azacsnap_2021-02-22T120002-3145398Z	West US		02/22/2021, 01:00:06 PM	
P Replication	[B] snapmirror.b1e8e48d-7114-11eb-b147-d039ea1e211e_2155791247.2021-02-22_143159	West US		02/22/2021, 03:32:00 PM	· · · ·
Monitoring	[B] azacsnap_2021-02-22T160002-0144647Z	West US		02/22/2021, 05:00:05 PM	
of Matrice	[U] azacsnap_2021-02-22T200002-0649581Z	West US		02/22/2021, 09:00:05 PM	5
in means	B azacsnap_2021-02-23T000002-0311379Z	West US		02/23/2021, 01:00:05 AM	
Automation	Snapmirror.b1e8e48d-7114-11eb-b147-d039ea1e211e_2155791247.2021-02-23_001000	West US		02/23/2021, 01:10:00 AM	
D					

Automation 🖧 Tasks (preview)

Export template

Support + troubleshooting

R New support request

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