



Backup replication with SnapVault

NetApp solutions for SAP

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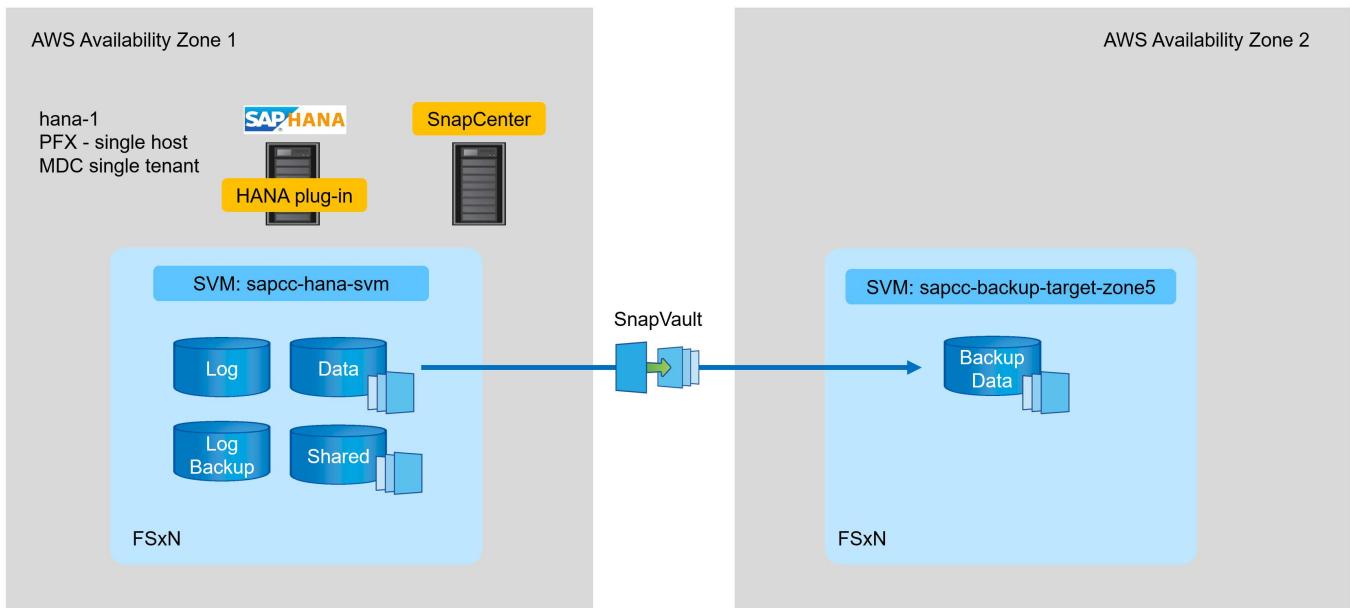
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Backup replication with SnapVault

Overview - Backup replication with SnapVault

In our lab setup, we use a second FSX for ONTAP file system in a second AWS availability zone to showcase the backup replication for the HANA data volume.

As discussed in chapter “[Data protection strategy](#)”, the replication target must be a second FSx for ONTAP file system in another availability zone to be protected from a failure of the primary FSx for ONTAP file system. Also, the HANA shared volume should be replicated to the secondary FSx for ONTAP file system.



Overview of configuration steps

There are a couple of configuration steps that you must execute on the FSx for ONTAP layer. You can do this either with NetApp Cloud Manager or the FSx for ONTAP command line.

1. Peer FSx for ONTAP file systems. FSx for ONTAP file systems must be peered to allow replication between each other.
2. Peer SVMs. SVMs must be peered to allow replication between each other.
3. Create a target volume. Create a volume at the target SVM with volume type **DP**. Type **DP** is required to be used as a replication target volume.
4. Create a SnapMirror policy. This is used to create a policy for replication with type **vault**.
 - a. Add a rule to policy. The rule contains the SnapMirror label and the retention for backups at the secondary site. You must configure the same SnapMirror label later in the SnapCenter policy so that SnapCenter creates Snapshot backups at the source volume containing this label.
5. Create a SnapMirror relationship. Defines the replication relationship between the source and target volume and attaches a policy.
6. Initialize SnapMirror. This starts the initial replication in which the complete source data is transferred to the target volume.

When volume replication configuration is complete, you must configure the backup replication in SnapCenter as follows:

1. Add the target SVM to SnapCenter.
2. Create a new SnapCenter policy for Snapshot backup and SnapVault replication.
3. Add the policy to HANA resource protection.
4. You can now execute backups with the new policy.

The following chapters describe the individual steps in more detail.

Configure replication relationships on FSx for ONTAP file systems

You can find additional information about SnapMirror configuration options in the ONTAP documentation at [SnapMirror replication workflow \(netapp.com\)](https://www.netapp.com).

- Source FSx for ONTAP file system: FsxId00fa9e3c784b6abbb
- Source SVM: sapcc-hana-svm
- Target FSx for ONTAP file system: FsxId05f7f00af49dc7a3e
- Target SVM: sapcc-backup-target-zone5

Peer FSx for ONTAP file systems

```
FsxId00fa9e3c784b6abbb::> network interface show -role intercluster
      Logical      Status      Network          Current      Current
  Is
Vserver      Interface  Admin/Oper Address/Mask      Node      Port
Home
-----
-----
FsxId00fa9e3c784b6abbb
      inter_1      up/up      10.1.1.57/24
FsxId00fa9e3c784b6abbb-01
                           e0e
true
      inter_2      up/up      10.1.2.7/24
FsxId00fa9e3c784b6abbb-02
                           e0e
true
2 entries were displayed.
```

```

FsxId05f7f00af49dc7a3e::> network interface show -role intercluster
      Logical      Status      Network      Current      Current
  Is
Vserver      Interface  Admin/Oper Address/Mask      Node      Port
Home
-----
-----
FsxId05f7f00af49dc7a3e
      inter_1      up/up      10.1.2.144/24
FsxId05f7f00af49dc7a3e-01
                           e0e
true
      inter_2      up/up      10.1.2.69/24
FsxId05f7f00af49dc7a3e-02
                           e0e
true
2 entries were displayed.

```

```

FsxId05f7f00af49dc7a3e::> cluster peer create -address-family ipv4 -peer
-addr 10.1.1.57, 10.1.2.7

```

Notice: Use a generated passphrase or choose a passphrase of 8 or more characters. To ensure the authenticity of the peering relationship, use a phrase or sequence of characters that would be hard to guess.

Enter the passphrase:

Confirm the passphrase:

Notice: Now use the same passphrase in the "cluster peer create" command in the other cluster.



peer-addrs are cluster IPs of the destination cluster.

```

FsxId00fa9e3c784b6abbb::> cluster peer create -address-family ipv4 -peer
-addrs 10.1.2.144, 10.1.2.69
Notice: Use a generated passphrase or choose a passphrase of 8 or more
characters. To ensure the authenticity of the peering relationship, use a
phrase or sequence of characters that would be hard to guess.
Enter the passphrase:
Confirm the passphrase:
FsxId00fa9e3c784b6abbb::>
FsxId00fa9e3c784b6abbb::> cluster peer show
Peer Cluster Name           Cluster Serial Number Availability
Authentication
-----
-----
FsxId05f7f00af49dc7a3e     1-80-000011           Available      ok

```

Peer SVMs

```

FsxId05f7f00af49dc7a3e::> vserver peer create -vserver sapcc-backup-
target-zone5 -peer-vserver sapcc-hana-svm -peer-cluster
FsxId00fa9e3c784b6abbb -applications snapmirror
Info: [Job 41] 'vserver peer create' job queued

```

```

FsxId00fa9e3c784b6abbb::> vserver peer accept -vserver sapcc-hana-svm
-peer-vserver sapcc-backup-target-zone5
Info: [Job 960] 'vserver peer accept' job queued

```

```

FsxId05f7f00af49dc7a3e::> vserver peer show
          Peer          Peer          Peering
Remote
Vserver      Vserver      State      Peer Cluster      Applications
Vserver
-----
sapcc-backup-target-zone5
          peer-source-cluster
          peered          FsxId00fa9e3c784b6abbb
                           snapmirror
sapcc-hana-svm

```

Create a target volume

You must create the target volume with the type DP to flag it as a replication target.

```
FsxId05f7f00af49dc7a3e::> volume create -vserver sapcc-backup-target-zone5  
-volume PFX_data_mnt00001 -aggregate aggr1 -size 100GB -state online  
-policy default -type DP -autosize-mode grow_shrink -snapshot-policy none  
-foreground true -tiering-policy all -anti-ransomware-state disabled  
[Job 42] Job succeeded: Successful
```

Create a SnapMirror policy

The SnapMirror policy and the added rule define the retention and the Snapmirror label to identify Snapshots that should be replicated. When creating the SnapCenter policy later, you must use the same label.

```
FsxId05f7f00af49dc7a3e::> snapmirror policy create -policy snapcenter-  
policy -tries 8 -transfer-priority normal -ignore-atime false -restart  
always -type vault -vserver sapcc-backup-target-zone5
```

```
FsxId05f7f00af49dc7a3e::> snapmirror policy add-rule -vserver sapcc-  
backup-target-zone5 -policy snapcenter-policy -snapmirror-label  
snapcenter -keep 14
```

```
FsxId00fa9e3c784b6abbb::> snapmirror policy showVserver Policy  
Policy Number Transfer  
Name Name Type Of Rules Tries Priority Comment  
-----  
FsxId00fa9e3c784b6abbb  
snapcenter-policy vault 1 8 normal -  
SnapMirror Label: snapcenter Keep: 14  
Total Keep: 14
```

Create SnapMirror relationship

Now the relation between the source and target volume is defined as well as the type XDP and the policy we created earlier.

```
FsxId05f7f00af49dc7a3e::> snapmirror create -source-path sapcc-hana-svm:PFX_data_mnt00001 -destination-path sapcc-backup-target-zone5:PFX_data_mnt00001 -vserver sapcc-backup-target-zone5 -throttle unlimited -identity-preserve false -type XDP -policy snapcenter-policy
Operation succeeded: snapmirror create for the relationship with destination "sapcc-backup-target-zone5:PFX_data_mnt00001".
```

Initialize SnapMirror

With this command, the initial replication starts. This is a full transfer of all data from the source volume to the target volume.

```
FsxId05f7f00af49dc7a3e::> snapmirror initialize -destination-path sapcc-backup-target-zone5:PFX_data_mnt00001 -source-path sapcc-hana-svm:PFX_data_mnt00001
Operation is queued: snapmirror initialize of destination "sapcc-backup-target-zone5:PFX_data_mnt00001".
```

You can check the status of the replication with the `snapmirror show` command.

```
FsxId05f7f00af49dc7a3e::> snapmirror show

Progress
Source          Destination  Mirror  Relationship  Total
Last
Path           Type    Path      State   Status      Progress  Healthy
Updated

sapcc-hana-svm:PFX_data_mnt00001
          XDP    sapcc-backup-target-zone5:PFX_data_mnt00001
                           Uninitialized
                           Transferring   1009MB   true
02/24 12:34:28
```

```
FsxId05f7f00af49dc7a3e::> snapmirror show

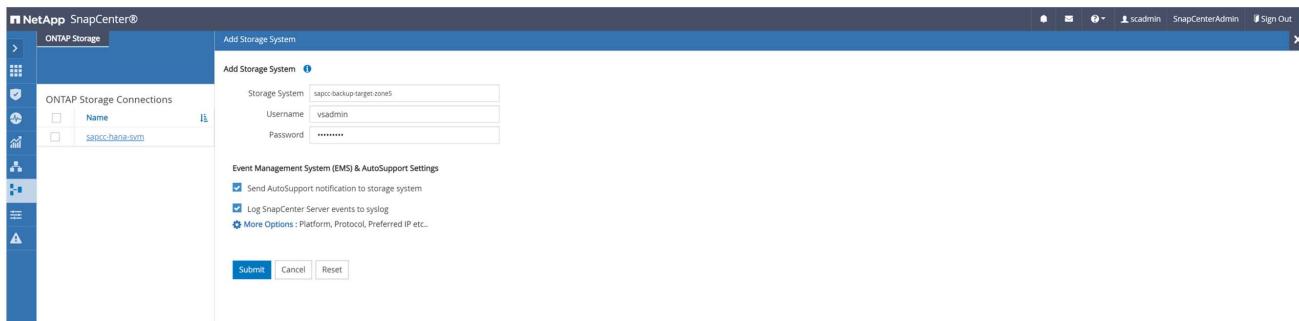
Progress
Source           Destination Mirror  Relationship  Total
Last
Path            Type    Path        State    Status      Progress  Healthy
Updated

sapcc-hana-svm:PXF_data_mnt00001
    XDP    sapcc-backup-target-zone5:PXF_data_mnt00001
                    Snapmirrored
                    Idle           -           true        -
```

Add a backup SVM to SnapCenter

To add a backup SVM to SnapCenter, follow these steps:

1. Configure the SVM where the SnapVault target volume is located in SnapCenter.



2. On the More Options window, select All Flash FAS as the platform and select Secondary.

More Options X

Platform	All Flash FAS	<input checked="" type="checkbox"/> Secondary i
Protocol	HTTPS	
Port	443	
Timeout	60	seconds i
<input type="checkbox"/> Preferred IP	i	

Save Cancel

The SVM is now available in SnapCenter.

Name	IP	Cluster Name	User Name	Platform	Controller License
sapcc-backup-target-zone5	10.1.2.31		vsadmin	AFF	Not applicable
sapcc-hana-svm	198.19.255.9		vsadmin	AFF	✓

Create a new SnapCenter policy for backup replication

You must configure a policy for the backup replication as follows:

1. Provide a name for the policy.

Name	Backup Type	Schedule Type	Replication
BlockIntegrityCheck	File Based Backup	Weekly	<input checked="" type="checkbox"/>
LocalSnap	Data Backup	Hourly	

2. Select Snapshot backup and a schedule frequency. Daily is typically used for backup replication.

New SAP HANA Backup Policy

1 Name Provide a policy name

2 Settings Policy name: LocalSnapAndSnapVault i

3 Retention Details: Replication to backup volume

4 Replication

5 Summary

3. Select the retention for the Snapshot backups.

New SAP HANA Backup Policy

1 Name Select backup settings

2 Settings Backup Type: Snapshot Based File-Based i

3 Retention

4 Replication

5 Summary

Schedule Frequency

Select how often you want the schedules to occur in the policy. The specific times are set at backup job creation enabling you to stagger your start times.

On demand
 Hourly
 Daily
 Weekly
 Monthly

This is the retention for the daily Snapshot backups taken at the primary storage. The retention for secondary backups at the SnapVault target has already been configured previously using the add rule command at the ONTAP level. See “Configure replication relationships on FSx for ONTAP file systems” (xref).

New SAP HANA Backup Policy

1 Name Retention settings

2 Settings

3 Retention Daily retention settings

Total Snapshot copies to keep: i

Keep Snapshot copies for: days

4 Replication

5 Summary

4. Select the Update SnapVault field and provide a custom label.

This label must match the SnapMirror label provided in the add rule command at ONTAP level.

New SAP HANA Backup Policy

1 Name Select secondary replication options *i*

2 Settings Update SnapMirror after creating a local Snapshot copy.

3 Retention Update SnapVault after creating a local Snapshot copy.

4 Replication Secondary policy label *i*
snapcenter

5 Summary Error retry count *i*

New SAP HANA Backup Policy

1 Name Summary

2 Settings Policy name LocalSnapAndSnapVault

3 Retention Details Replication to backup volume

4 Replication Backup Type Snapshot Based Backup

5 Summary Schedule Type Daily

Daily backup retention Total backup copies to retain : 3

Replication SnapVault enabled , Secondary policy label: Custom Label : snapcenter , Error retry count: 3

The new SnapCenter policy is now configured.

Name	Backup Type	Schedule Type	Replication
BlockIntegrityCheck	File Based Backup	Weekly	
LocalSnap	Data Backup	Hourly	
LocalSnapAndSnapVault	Data Backup	Daily	SnapVault

Add a policy to resource protection

You must add the new policy to the HANA resource protection configuration, as shown in the following figure.

Resource Application Settings Policies Notification Summary

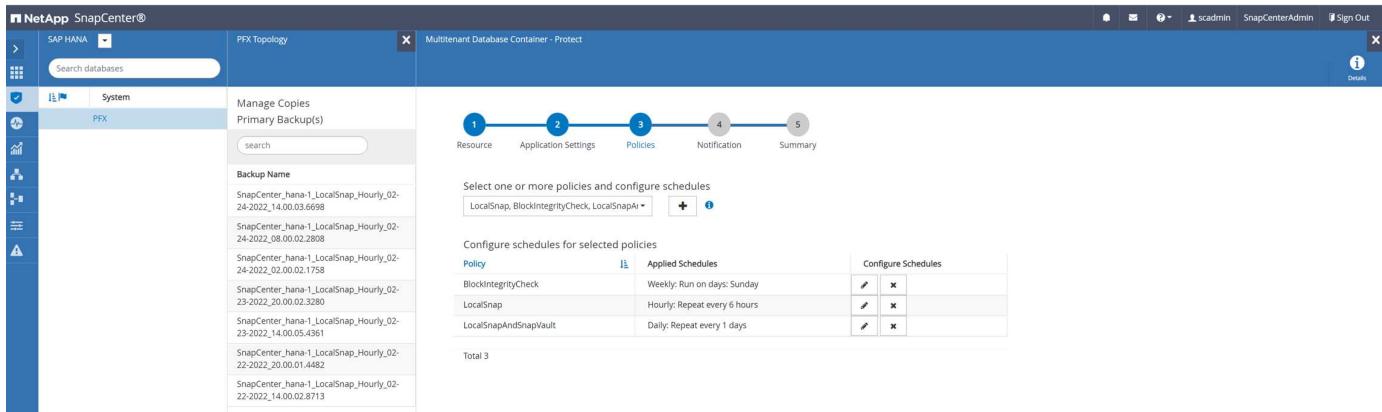
Select one or more policies and configure schedules

LocalSnap, BlockIntegrityCheck

BlockIntegrityCheck: Weekly: Run on days: Sunday

LocalSnap: Hourly: Repeat every 6 hours

A daily schedule is defined in our setup.

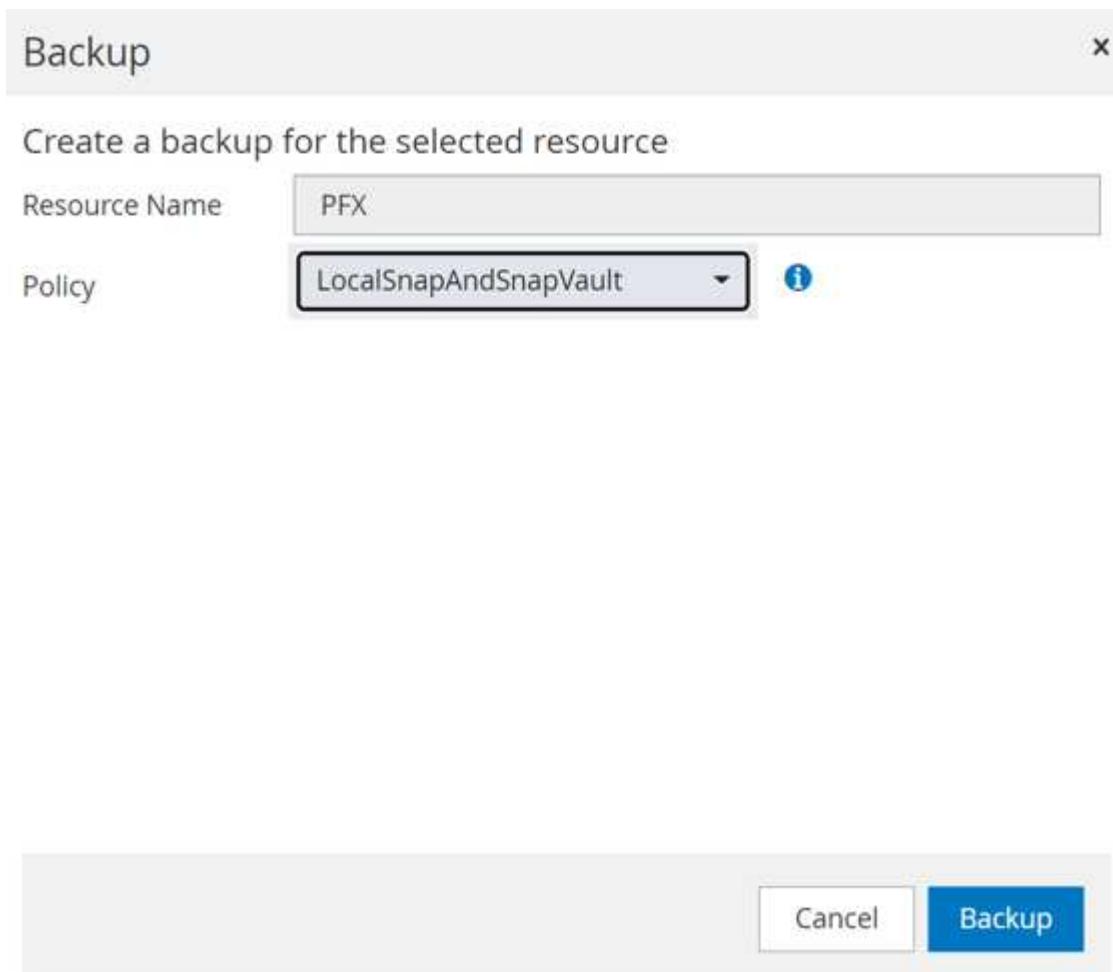


The screenshot shows the NetApp SnapCenter interface. The left sidebar has a 'SAP HANA' dropdown and a 'Search databases' input field. The main area is titled 'Multitenant Database Container - Protect'. A navigation bar at the top has five steps: 'Resource' (1), 'Application Settings' (2), 'Policies' (3), 'Notification' (4), and 'Summary' (5). The 'Policies' step is active. A sub-section titled 'Select one or more policies and configure schedules' shows a dropdown menu with 'LocalSnap, BlockIntegrityCheck, LocalSnap4' and a '+' button. Below this is a table titled 'Configure schedules for selected policies' with columns 'Policy', 'Applied Schedules', and 'Configure Schedules'. It lists three policies: 'BlockIntegrityCheck' (Weekly: Run on days: Sunday), 'LocalSnap' (Hourly: Repeat every 6 hours), and 'LocalSnapAndSnapVault' (Daily: Repeat every 1 days). A 'Total 3' summary is at the bottom.

Create a backup with replication

A backup is created in the same way as with a local Snapshot copy.

To create a backup with replication, select the policy that includes the backup replication and click Backup.



The screenshot shows a 'Backup' dialog box. The title bar says 'Backup' and has a close button. The main area is titled 'Create a backup for the selected resource'. It has two input fields: 'Resource Name' with 'PFX' and 'Policy' with a dropdown menu showing 'LocalSnapAndSnapVault'. To the right of the policy dropdown is an information icon (i). At the bottom right of the dialog are 'Cancel' and 'Backup' buttons, with 'Backup' being the primary button.

Within the SnapCenter job log, you can see the Secondary Update step, which initiates a SnapVault update operation. Replication changed blocks from the source volume to the target volume.

Job Details X

Backup of Resource Group 'hana-1_hana_MDC_PFX' with policy 'LocalSnapAndSnapVault'

- ✓ ▾ Backup of Resource Group 'hana-1_hana_MDC_PFX' with policy 'LocalSnapAndSnapVault'
- ✓ ▾ hana-1
- ✓ ▾ Backup
 - ▶ Validate Dataset Parameters
 - ▶ Validate Plugin Parameters
 - ▶ Complete Application Discovery
 - ▶ Initialize Filesystem Plugin
 - ▶ Discover Filesystem Resources
 - ▶ Validate Retention Settings
 - ▶ Quiesce Application
 - ▶ Quiesce Filesystem
 - ▶ Create Snapshot
 - ▶ UnQuiesce Filesystem
 - ▶ UnQuiesce Application
 - ▶ Get Snapshot Details
 - ▶ Get Filesystem Meta Data
 - ▶ Finalize Filesystem Plugin
 - ▶ Collect Autosupport data
 - ✓ ▾ Secondary Update
 - ▶ Register Backup and Apply Retention
 - ▶ Register Snapshot attributes
 - ▶ Application Clean-Up
 - ▶ Data Collection
 - ▶ Agent Finalize Workflow
 - ✓ ▾ (Job 49) SnapVault update

Task Name: Secondary Update Start Time: 02/24/2022 3:14:37 PM End Time: 02/24/2022 3:14:46 PM

[View Logs](#) [Cancel Job](#) [Close](#)

On the FSx for ONTAP file system, a Snapshot on the source volume is created using the SnapMirror label,

snapshot, as configured in the SnapCenter policy.

```
FsxId00fa9e3c784b6abbb::> snapshot show -vserver sapcc-hana-svm -volume
PFX_data_mnt00001 -fields snapmirror-label
vserver           volume           snapshot
snapmirror-label
-----
-----
-----
sapcc-hana-svm PFX_data_mnt00001 SnapCenter_hana-1_LocalSnap_Hourly_03-31-
2022_13.10.26.5482 -
sapcc-hana-svm PFX_data_mnt00001 SnapCenter_hana-1_LocalSnap_Hourly_03-31-
2022_14.00.05.2023 -
sapcc-hana-svm PFX_data_mnt00001 SnapCenter_hana-1_LocalSnap_Hourly_04-05-
2022_08.00.06.3380 -
sapcc-hana-svm PFX_data_mnt00001 SnapCenter_hana-1_LocalSnap_Hourly_04-05-
2022_14.00.01.6482 -
sapcc-hana-svm PFX_data_mnt00001 SnapCenter_hana-1_LocalSnap_Hourly_04-14-
2022_20.00.05.0316 -
sapcc-hana-svm PFX_data_mnt00001 SnapCenter_hana-1_LocalSnap_Hourly_04-28-
2022_08.00.06.3629 -
sapcc-hana-svm PFX_data_mnt00001 SnapCenter_hana-1_LocalSnap_Hourly_04-28-
2022_14.00.01.7275 -
sapcc-hana-svm PFX_data_mnt00001 SnapCenter_hana-
1_LocalSnapAndSnapVault_Daily_04-28-2022_16.21.41.5853

snapcenter
8 entries were displayed.
```

At the target volume, a Snapshot copy with the same name is created.

```
FsxId05f7f00af49dc7a3e::> snapshot show -vserver sapcc-backup-target-zone5
-volume PFX_data_mnt00001 -fields snapmirror-label
vserver           volume           snapshot
snapmirror-label
-----
-----
-----
sapcc-backup-target-zone5 PFX_data_mnt00001 SnapCenter_hana-
1_LocalSnapAndSnapVault_Daily_04-28-2022_16.21.41.5853 snapcenter
FsxId05f7f00af49dc7a3e::>
```

The new Snapshot backup is also listed in the HANA backup catalog.

Backup Catalog

Database: SYSTEMDB

Show Log Backups Show Delta Backups

Status	Started	Duration	Size	Backup Type	Destination Ty...
Green	Apr 28, 2022, 4:22:06 PM	00h 00m 15s	5.50 GB	Data Backup	Snapshot
Green	Apr 28, 2022, 2:00:26 PM	00h 00m 15s	5.50 GB	Data Backup	Snapshot
Green	Apr 28, 2022, 8:00:35 AM	00h 00m 15s	5.50 GB	Data Backup	Snapshot
Green	Apr 15, 2022, 5:00:44 PM	00h 06m 59s	5.50 GB	Data Backup	Snapshot
Green	Apr 14, 2022, 8:00:32 PM	00h 00m 16s	5.50 GB	Data Backup	Snapshot
Green	Apr 5, 2022, 2:00:29 PM	00h 00m 15s	5.50 GB	Data Backup	Snapshot
Green	Apr 5, 2022, 8:00:39 AM	00h 00m 15s	5.50 GB	Data Backup	Snapshot
Green	Mar 31, 2022, 2:00:29 PM	00h 00m 15s	5.50 GB	Data Backup	Snapshot
Green	Mar 31, 2022, 1:10:57 PM	00h 00m 16s	5.50 GB	Data Backup	Snapshot
Green	Feb 22, 2022, 12:55:21 PM	00h 00m 21s	3.56 GB	Data Backup	File

Backup Details

ID: 1651162926424

Status: Successful

Backup Type: Data Backup

Destination Type: Snapshot

Started: Apr 28, 2022, 4:22:06 PM (UTC)

Finished: Apr 28, 2022, 4:22:21 PM (UTC)

Duration: 00h 00m 15s

Size: 5.50 GB

Throughput: n.a.

System ID:

Comment: SnapCenter_hana-1_LocalSnapAndSnapVault_Daily_04-28-2022_16.21.41.5853

Additional Information: <ok>

Location: /hana/data/PFX/mnt00001/

Host	Service	Size	Name	Source Type	EBID	...
hana-1	nameserver	5.50 GB	hdb00001	volume	SnapCent...	

In SnapCenter, you can list the replicated backups by clicking Vault Copies in the topology view.

Restore and recover from secondary storage

To restore and recover from secondary storage, follow these steps:

To retrieve the list of all the backups on the secondary storage, in the SnapCenter Topology view, click Vault Copies, then select a backup and click Restore.

The restore dialog shows the secondary locations.

- 1 Restore scope
- 2 Recovery scope
- 3 PreOps
- 4 PostOps
- 5 Notification
- 6 Summary

Select the restore types

Complete Resource i

Tenant Database

Choose archive location

sapcc-hana-svm:PFX_data_mnt0001

sapcc-backup-target-zone5:PFX_data_mnt00 ▾

⚠ The newer tenants added on the host after the backup was created cannot be restored and will be lost after restore operation. x

⚠ Configure an SMTP Server to send email notifications for Restore jobs by going to [Settings>Global Settings>Notification Server Settings](#). x

Previous

Next

Further restore and recovery steps are identical to those previously covered for a Snapshot backup at the primary storage.

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