SNAPSHOTS AND DISASTER RECOVERY FOR HLI

Abstract

How to guide for the scripts provided with HANA Large Instances for snapshots and disaster recovery failover.

Microsoft

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Version

This document is for the SAP HANA Large Instances scripts **version 3.4**.

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Overview

This document covers the details on the scripts used for the HANA Large Instances. These scripts are tested by Microsoft and serve the following purposes:

1. Storage snapshots status, backup and removal
2. Self Service Disaster Recovery failover

You can follow this document to get "How To" details about those scripts. Since these are custom scripts written for the specific purpose of HANA Large Instances, **DO NOT modify** them unless instructed by the Microsoft Operations team.

Disclaimer: *This guide is derived by testing the set up in the Microsoft HANA Large Instances environment, which successfully works. You are still responsible to monitor and perform restore test to ensure snapshots taken are consistent.*

Terms and Definitions

Let's understand the terms used in this documentation:

- **SID**: A system identifier for HANA system.
- **Multipurpose DR**: A disaster recovery system which has more than one instances configured. One of the instance is the DR for the production SID, other instances are non-production HANA instances.
- **Normal DR**: In opposite to Multi-purpose DR, a disaster recovery system which just has primary SID configured with storage replication running. There is no other workload running while production instance is up and running at primary site.
- **Single SID system**: A system which has only one HANA instance configured.
- **Multi SID system**: A system which has more than one HANA instances configured. Also known in SAP documentation as MCOS deployment.
- **HLI**: SAP HANA Large Instances Unit.
- **DR**: Disaster Recovery.
- **HSR**: HANA System Replication.

What are these scripts?

The script package consists of ten scripts, the details are described as follows:

- **azure_hana_backup.pl:** To execute the storage snapshots on data, shared, logbackups, or the boot volumes.

- **azure_hana_replication_status.pl:** This script provides the basic details around the replication status from the production site to the disaster-recovery site. The script monitors to ensure that the replication is taking place, and it shows the size of the items that are being replicated. It also provides guidance if a replication is taking too long or if the link is down.

- **azure_hana_snapshot_details.pl:** This script provides a list of basic details about all the snapshots, per volume, that exist in your environment. This script can be run on the primary server or on a server unit in the disaster-recovery location. The script provides the following information broken down by each volume that contains snapshots:
    - Size of total snapshots in a volume
    - Each snapshot in that volume includes the following details:
        - Snapshot name
        - Create time
        - Size of the snapshot
        - Frequency of the snapshot
        - HANA Backup ID associated with that snapshot, if relevant

- **azure_hana_snapshot_delete.pl:** This script deletes a storage snapshot or a set of snapshots. You can use either the SAP HANA backup ID as found in HANA Studio or the storage snapshot name. Currently, the backup ID is only tied to the snapshots created for the data, and shared volumes. Otherwise, if the snapshot ID is entered, it seeks all snapshots that match the entered snapshot ID.

- **HANABackupCustomerDetails.txt:** This file is a modifiable configuration file that you need to modify to adapt to your SAP HANA configuration.

- **testHANAConnection.pl:** This script tests the connection to the SAP HANA instance and is required to set up the storage snapshots.

- **testStorageSnapshotConnection.pl:** This script has two purposes. First, it ensures that the HANA Large Instance unit that runs the scripts has access to the assigned storage and to the storage snapshot interface of your HANA Large Instances. The second purpose is to create a temporary snapshot for the HANA instance you are testing. This script should be run for every HANA instance on a server to ensure that the backup scripts function as expected.

- **removeTestStorageSnapshot.pl:** This script deletes the test snapshot as created with the script *testStorageSnapshotConnection.pl*.

- **azure_hana_dr_failover.pl:** Script to initiate a DR Failover into another paired region. The script needs to be executed on the HANA Large Instance **unit in the DR region**, or the unit you want to fail over to. This script stops storage replication from the primary site to the secondary site, restores the latest snapshot on the DR volumes, and provides the mountpoints for the DR volumes.

- **azure_hana_test_dr_failover.pl:** Script to perform a test failover into the DR site. Unlike the azure_hana_dr_failover.pl script, this execution does not interrupt the storage replication from primary to secondary. Instead clones of the replicated storage volumes get created on the DR site and the mountpoints of the cloned volumes are provided. The script needs to be executed on the HANA Large Instance **unit in the DR region.**

How do I get these scripts?

For current HANA installations, the directory of pre-installed scripts is /hana/shared/H80/exe/linuxx86_64/hdb. Although, you must download the most recent version of the scripts from GitHub. Copy the downloaded scripts and the text file to the working directory for hdbsql. Always get the latest version of the scripts package.

Supported Scenarios

The scripts can be executed in the following scenarios.

- Single SID
- Multiple SID
- HSR
- Scale-out
- MDC (Only single tenant supported)
- Single Container
- SUSE Operating System
- RHEL Operating System
- SKU TYPE I
- SKU TYPE II

Important things to remember

- Never modify the scripts unless instructed by the Microsoft Operations.
- When asked to modify the script or a parameter file, always use the Linux text editor such as "vi" and not the Windows editors like notepad. Using Windows editor may corrupt the file format.
- Always use the latest scripts. You can download the latest version from GitHub.
- Use the same version of scripts across the landscape.
- Test the scripts and get comfortable with the parameters required and output of the script before directly using in the production system.
- Don't change the mount point name of the server provisioned by the Microsoft Operations. These scripts rely on these standard mount point names to be available for a successful execution.
- When you setup HANA user for backup (details below in this document), you need to setup backup user for each HANA instances. Create an SAP HANA user account to access HANA instance under the SYSTEMDB (and not in the SID database) for MDC. In the single container environment, it can be setup under the tenant database.
- You need to provide public key for storage access. You do it per node and for each user under which the script is executed.
- The number of snapshots per volume is limited to 250.
- Keep monitoring the space consumed by the storage and if required, delete the old snapshots on a regular basis to avoid storage fill out.
- SAP does not support snapshot on the MDC environment for the following releases. Though snapshot is supported with non-MDC setup for the following releases. The script does not work if you have following HANA releases with MDC setup.
    - HANA 2 SP00
    - HANA 1 SP 12
    - HANA 1 SP11
    - HANA 1 SP10
- For HANA 2 SP1 and later releases: If you have MDC with more than one tenant, snapshot does not work. For single tenant it works fine.
- The script is only supported to run under *root* or *sidadm* user. You must setup a hdbuserstore for the user under which you plan to execute the scripts. You must also provide the public key (ssh) for the user which is used for script execution.
- For DR: Scripts must be tested on DR node before DR is setup.

Scenarios Covered in this document

The following scenarios are covered in this document to illustrate the usage of the scripts.

Snapshots

- What are the prerequisite for the storage snapshot?
- How to setup snapshots?
- How to take snapshots manually?
- How to setup automatic snapshot backup?
- How to monitor the snapshots?
- How to delete a snapshot?
- How to restore a snapshot?
- What are key facts to know about the snapshots?

Note Snapshot is tested for both single SID and multi SID.

Disaster Recovery

- What are the prerequisites for DR setup?
- How to setup a disaster recovery?
- How to monitor the data sync from Primary to DR site?
- How to perform a failover to DR site?

Note DR is tested for single SID failover on a multipurpose DR setup.

Technical Setup

To test and document these scripts, the following set up was used. All the screen shots and information presented, are corresponding to the **version 3.4** of the scripts.

- Operating System: SLES 12 SP2 for SAP
- HANA Large Instances: 2xS192 (four sockets, 2 TB); One for Primary site and second for DR site
  - Primary site HLI unit (sapprdhdb80) has 3 SIDs configured: H80, H81, and H82
  - DR site HLI unit (sapdrhdb80) has 2 SIDs configured: Q85, and H80 (replication from the Primary site)
- HANA Version: HANA 2.0 SP1
- Server Names: sapprdhdb80 (Primary) and sapdrhdb80 (DR node).
  - Note 'prd' and 'dr' in their hostnames.

CAUTION! You may have different screens for operating system or HANA depending on the version you are using. Also, based on your HANA version, the scripts parameter may differ. Refer the script details before using them.

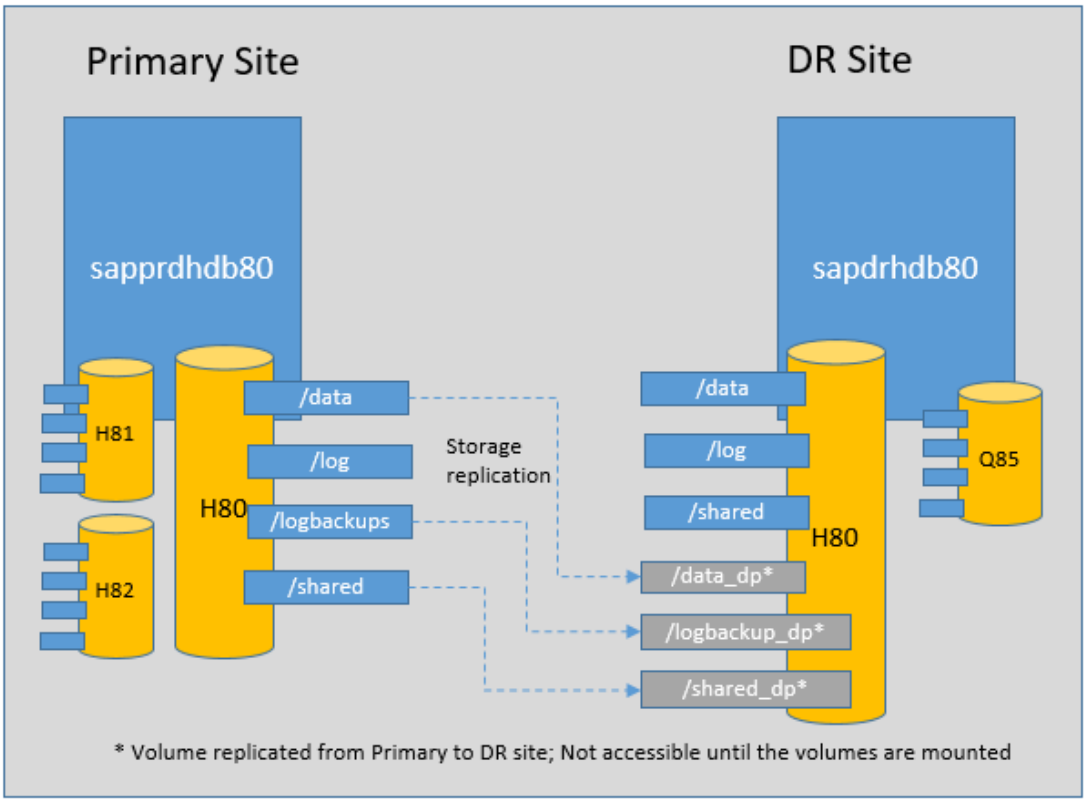


Figure 1: Technical setup

Getting Started

Please follow the guidelines to setup and execute the snapshots and disaster recovery scripts. It is required that you perform the following before you begin with the scripts.

1. OS is patched: Please refer for patching and SMT setup https://docs.microsoft.com/en-us/azure/virtual-machines/workloads/sap/hana-installation#setting-up-smt-server-for-suse-linux
2. Time Synchronization is setup
3. HANA is installed: Please refer for HANA installation instructions: https://blogs.msdn.microsoft.com/saponsqlserver/2017/11/21/sap-netweaver-installation-on-hana-database/ .
4. In this document, we installed HANA 2.0 SP1 with multi SID as following:
    a. **Primary site HLI unit** (sapprdhdb80) has three HANA instances configured with the SIDs: H80, H81, and H82. To install three instances, you need to run the hana installer (hdblcmgui) three times with "new instance" option, and then provide SID information each time for each instance. So, in this example, you run hdblcmgui, three times with H80, H81, and H82 SIDs.
    b. **DR site HLI unit** (sapdrhdb80) has two HANA instances configured: Q85, and H80. To install two instances, you need to run the hana installer (hdblcmgui) two times with "new instance" option, and then provide SID information each time for each instance. So, in this example, you run hdblcmgui, 2 times with H80 and Q85 SIDs.
5. You must provide public key of each node where the scripts are planned to be executed to Microsoft Operations for setup on the storage back-end.
6. Execute the command "ssh -l <Storage User Name eg: clt1h80backup> < Storage IP Address>" from one of the nodes to ensure the connectivity of the node to the storage. You can type "exit" to come out of the storage prompt. You get storage user and storage IP from Microsoft operations at the time of provisioning. Refer section HANABackupCustomerDetails.txt for more details.
7. The following scripts must be executed in the order mentioned below **on their first run**. This is to ensure that platform is ready for snapshot script execution.
    I. testHANAConnection.pl – to verify connectivity to SAP HANA.
    II. testStorageSnapshotConnection.pl - to verify connectivity to Storage.
    III. azure_hana_backup.pl – to run a SAP HANA storage snapshot backup, which confirms all working.

Snapshots

1. What are the prerequisite for the storage snapshot?

To ensure that snapshot script executes successfully, make sure that Perl is installed on the Linux operating system on the HANA Large Instances server. Perl will come pre-installed on your HANA Large Instance unit. To check the perl version, use the following command (cut & paste the command line following the #):

```
Terminal session
# perl –v

This is perl 5, version 18, subversion 2 (v5.18.2) built for x86_64-linux-thread-
multi
```

Perl also requires some specific packages to be installed, these should already have been installed and can be confirmed by running the command following the # character:

```
Terminal session
# perl -MDate::Parse -e 1 ; echo $?
0
# perl -MSys::Hostname -e 1 ; echo $?
0
# perl -MTerm::ANSIColor -e 1 ; echo $?
0
# perl -MTime::HiRes -e 1 ; echo $?
0
# perl -MTime::Piece -e 1 ; echo $?
0
# perl -MIO::Socket::INET -e 1 ; echo $?
0
```

Correct output from the command will be '0'.

2. How to setup snapshots?

Once the prerequisite of the snapshots are met, you can start the process to setup the snapshots. There is no automatic snapshots execution preconfigured on the HANA Large Instances unit. The following steps are needed to set it up.

Please refer (Section: Setting up storage snapshots) for more details on how to complete the following steps (Step1 thru step 6):

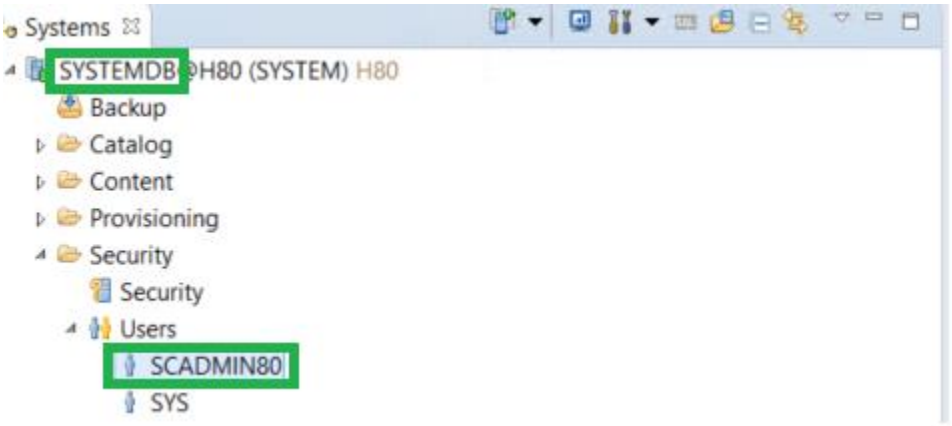
> https://docs.microsoft.com/en-us/azure/virtual-machines/workloads/sap/hana-overview-high-availability-disaster-recovery#backup-and-restore.

Step 1: Install the SAP HANA HDB client on HLI unit. HLI units have no pre-installed HANA server instances or clients. You need to install the HANA Client on the HLI unit.

Step 2: Modify the /etc/ssh/ssh_config to add the line *MACs hmac-sha1*.

Step 3: Create a public key on HLI unit for storage access.

Step 4: Create an SAP HANA user account to access HANA instance under the SYSTEMDB (and not in the SID database) for MDC. In the single container environment, it can be setup under the tenant database.



Step 5: Authorize the SAP HANA account (hdbuserstore setup) to avoid password entry each time.

Step 6: Get the latest scripts from GitHub.

Step7: Modify the file *HANABackupCustomerDetails.txt* to update the parameters for your SAP HANA system.

Before you take snapshots, ensure that all the steps of setup are complete, and *HANABackupCustomerDetails.txt* file is updated with your HANA instance information.

Note	When you setup the HANA user for backup (details below in this document), you need to setup the backup user for each HANA instances. You also need to provide public key for storage access.

3. How to take snapshots manually?

Before you execute the actual scripts *azure_hana_backup.pl*, please run the following scripts and ensure that they get executed successfully. This will ensure that scripts have access to HANA and the underlying storage of the HANA Large Instance unit.

- testHANAConnection.pl
- testStorageSnapshotConnection.pl

To execute the scripts, please refer to section: Scripts Execution and details

4. How to setup automatic snapshot backup?

You schedule an automatic snapshot using a cron job. The example of the *crontab* job is following:

CAUTION	In the example below, some of the lines have been wrapped due to page size.

Terminal session

```
# crontab -l

# __START__ take hana snapshot every 15 minutes for every hour, of every day, of
every month and keep 10.
0,15,30,45 0-23 * * * ( cd /hana/shared/H80/exe/linuxx86_64/hdb;
./azure_hana_backup.pl hana hanasnapshot 15min 10)
# ___END___ hana snapshot
# __START__ take logs snapshot every 5 minutes for every hour, of every day, of
every month, except when data snapshot done and keep 6.
5,15,20,25,35,40,50,55 0-23 * * * ( cd /hana/shared/H80/exe/linuxx86_64/hdb;
./azure_hana_backup.pl logs logssnapshot 3min 6)
# ___END___ logs snapshot
```

- 0,15,30,45: Every 15 minutes
- 0-23: Every hour
- * : Every day
- * : Every month
- * : Every day of the week

You can get more crontab examples here: https://www.thegeekstuff.com/2009/06/15-practical-crontab-examples/.

In the above example, the '15min' is a parameter that is reserved for future development and has no impact on the execution right now. The cron job schedule controls the backup timings. More details are found here: azure_hana_backup.pl.

CAUTION	Customer must monitor the *cron* job to ensure that snapshots are being generated successfully.

5. How to monitor the snapshots?

You must monitor the successful execution of the scripts, a successful snapshot generation, space consumed by snapshots at the volume, and the consistency of the snapshots by restoring then to another system periodically. To get the snapshot details, please execute the script azure_hana_snapshot_details.pl.

6. How to delete a snapshot?

To delete a snapshot, please execute the script azure_hana_snapshot_delete.pl. However, if you had taken a temporary snapshot using a script testStorageSnapshotConnection.pl, you can delete the temporary snapshot(s) using the script removeTestStorageSnapshot.pl.

You can't delete the snapshot from the OS level. You must be using the script removeTestStorageSnapshot.pl to delete the storage snapshot.

CAUTION	Be extra vigilant while deleting a snapshot. Once deleted, you can't recover the deleted snapshots. However, to avoid filling up the storage space, you must keep on cleaning up the old snapshots.

7. How to restore a snapshot?

In this version, there is **NO** restore script provided for the snapshot restore as a self-service (though snapshot restore can be performed as part of the self-service DR scripts). You must contact the Microsoft operations team by opening a service request to restore a desired snapshot from the existing available snapshots. You can open a service request from Azure portal: https://portal.azure.com.

However, if you decide to perform the disaster recover failover, the script azure_hana_dr_failover.pl automatically restores the recent available (/data and /logbackups) snapshots for you.

8. What are key facts to know about the snapshots?

You must be familiar with the key attributes about the storage snapshots:

- **Location of snapshots**: The default location of the hana snapshots is under the .snapshot folder. Please note, **.snapshot** is a read-only hidden folder.
  - /data: /hana/data/<SID>/mnt00001/.snapshot
  - /shared: /hana/shared/<SID>/.snapshot
  - /logbackups: /hana/logbackups/<SID>/.snapshot
  - boot: boot snapshots are **not visible** from OS level
- **Max snapshot:** The hardware can sustain up to 250 snapshots per volume. However, if you setup a cron job with retention parameter specified, the script deletes the older snapshot to retain the number of snapshots you specified.
- **Snapshot name:** The snapshot name is the label provided by the customer.
- **Size of the snapshot:** Depends upon the size/changes on the database level.
- **Log file location:** /hana/shared/<SID>/exe/linuxx86_64/hdb/snapshotLogs and /hana/shared/<SID>/exe/linuxx86_64/hdb/statusLogs.

Disaster Recovery

1. What are the prerequisites for DR setup?

The following pre-requisites must be met before you plan the disaster recovery failover.

- You have a DR node provisioned at the DR site. There are two options for DR. One is normal DR, and other is multipurpose DR (See the definition: Terms and Definitions).
- You have storage replication working. The Microsoft operations team performs the storage replication setup at the time of DR provisioning automatically. You can monitor the storage replication using the script azure_hana_replication_status.pl.
- You have setup and configured storage snapshots at the primary location.

- You have an HANA instance installed at the DR site for the primary with the same SID as the primary instance has.
- You read and understood the DR Failover procedure located at https://docs.microsoft.com/en-us/azure/virtual-machines/workloads/sap/hana-overview-high-availability-disaster-recovery#disaster-recovery-failover-procedure.
- The *HANABackupCustomerDetail.txt* file has been updated with the DR location storage information on the DR server.
- You completed the step 1, 2, 3 and 6 from the section How to Setup Snapshot?

2. How to setup a disaster recovery?

Currently, Microsoft supports storage level replication for DR recovery. There are two ways to setup the DR.

One is normal and **other** is multipurpose. In the normal DR, you have a dedicated instance at the DR location for failover. In the multipurpose DR scenario, you have another QA or development HANA instance running on the HANA large instance unit in the DR site. But you also installed a pre-installed HANA instance that is dormant and has the same SID as the HANA instance you want to failover to that HANA Large Instance unit. Microsoft operations sets up the environment for you including the storage replication based on the input provided in the Service Request Form (SRF) at the time of onboarding.

Also, ensure that all the prerequisites are met for the DR setup.

3. How to monitor the data sync from Primary to DR site?

Microsoft operations team already manage and monitor the DR link from Primary site to the DR site. You can monitor the data replication from your primary server to DR server using the script azure_hana_replication_status.pl.

4. How to perform a failover to DR site?

You perform a failover to DR site, by executing a script azure_hana_dr_failover.pl.

Caution	Perform it only when you are planning to perform the DR exercise or a test. The script execution breaks the storage replication. You must reach out to the Microsoft Operations to set up the replication back. Also, once the replication is re-setup, all the data at DR storage for this SID get initialized. The script that performs the failover is restoring to the most recent storage snapshot that has been replicated. If you need to restore back to an older snapshot, you need to open a support request, so, that operations can work with you to have an earlier snapshot restored in the DR site.

At the high level, here are the steps to follow for failover:

- You must shut down the HANA instance at **primary** site. This is only needed if you are truly doing the failover to DR site so you don't have data inconsistencies.
- Shutdown the HANA instance on the DR node for the production SID.
- Execute the script azure_hana_dr_failover.pl on the DR node with the SID to be recovered
    - The script breaks the storage replication link from the Primary to the DR site
    - The script restores the /data and /logbackups volume only, /shared volume is NOT recovered, but rather it uses the existing /shared for SID at the DR location.
    - Mount the /data and /logbackups volume – ensure to add it to the fstab file
- Restore the HANA SYSTEMDB snapshot. Please note, HANA studio only shows you the latest HANA snapshot available under the storage snapshot restored as part of the script azure_hana_dr_failover.pl execution.
- Recover the tenant database
- Start the HANA instance on the DR site for the Production SID (Example: H80 in this case)
- Perform the testing

Detailed steps can be found at azure_hana_dr_failover.pl.

Scripts Execution and details

HANABackupCustomerDetails.txt

In the following screen, the *HANABackupCustomerDetails.txt* is configured with the three SIDs.

A customer may place a '#' at the beginning of all the lines for a given SID grouping to skip that particular SID, if they wish temporarily. Additionally, a customer may leave SID 2-10 blank if only a single SID is installed on that server. Customer must update the parameter values to their specific environment.

CAUTION	The document may not be altered by deleting fields, deleting additional lines, or modifying the contents of the document. If any alteration occurs, an error is thrown, and the script is halted. However, you may update the information of the parameters values (after the colon ":").

```
HANA Server Name: sapprdhdb80          ← HANA Server Host Name (Case sensitive) *,**
HANA Server IP Address: 172.18.18.50    ← HANA Server IP address (eth0.xx IP) *,**

######***SID #1 Information***#####
SID1: h80                              ← HANA SID (any case is OK)
###Provided by Microsoft Operations###
SID1 Storage Backup Name: clt1h80backup ← Storage backup name (case sensitive) *
SID1 Storage IP Address: 172.18.18.11   ← Storage IP address*
######    Customer Provided    ######
SID1 HANA instance number: 00           ← HANA Instance Number
SID1 HANA HDBuserstore Name: SCADMIN    ← HANA Instance Userstore name
```

*Information provided by Microsoft Service Management during onboarding/handover call, and available in excel file provided during handover. Please open a service request if you need this information again.

** In the case you use the following setup, you must update the hostname and IP address accordingly. **Customer is responsible to enable/disable the script on active/passive node accordingly.**

- Single node: IP and Hostname of the node
- HSR with STONITH: IP and Hostname of the node
- Scale-out (N+N, N+M): Current master node IP and host name
- HSR without STONITH: IP and Hostname of the node
- Multi SID on Single node: Hostname and IP of the node hosting those SIDs

Note	Your storage IP address must be in the same subnet as your server pool. For example, in this case, our server pool subnet is **172.18.18**.0/24 and our assigned storage IP is **172.18.18.11**.

Example complete *HANABackupCustomerDetails.txt* as follows with 3 SIDs configured:

CAUTION	Do NOT copy the output below, it will not be formatted correctly, edit the *HANABackupCustomerDetails.txt* with vi.

Terminal session

```
#  cat HANABackupCustomerDetails.txt
The following document is for all customers using the Azure HANA Backup and Recovery
scripts. Please fill in all necessary
fields for each SID you wish to backup or recover. You may also comment out fields
that you do not wish to backup for a period
of time by adding a # in front of a required field. You also do not need to enter
all SIDs that are contained on a particular server if
there is no need to backup or recover that particular SID. The format below must be
kept for all fields otherwise all scripts will
present an error message and the script will terminate.  You may however delete
additional required fields of any SID Information
Details you will not be using after the last usable SID.  All fields must either be
filled in, commented out, or deleted.

HANA Server Name: sapprdhdb80
HANA Server IP Address: 172.18.18.50

######***SID #1 Information***#####
SID1: h80
###Provided by Microsoft Operations###
SID1 Storage Backup Name: clt1h80backup
SID1 Storage IP Address: 172.18.18.11
######     Customer Provided     ######
SID1 HANA instance number: 00
SID1 HANA HDBuserstore Name: SCADMIN

######***SID #2 Information***#####
SID2: h81
###Provided by Microsoft Operations###
SID2 Storage Backup Name: clt1h81backup
SID2 Storage IP Address: 172.18.18.11
######     Customer Provided     ######
SID2 HANA instance number: 01
SID2 HANA HDBuserstore Name: SCADMIN81

######***SID #3 Information***#####
SID3: h82
###Provided by Microsoft Operations###
SID3 Storage Backup Name: clt1h82backup
SID3 Storage IP Address: 172.18.18.11
######     Customer Provided     ######
SID3 HANA instance number: 01
SID3 HANA HDBuserstore Name: SCADMIN82
```

```
#######***SID #4 Information***#####
SID4:
###Provided by Microsoft Operations###
SID4 Storage Backup Name:
SID4 Storage IP Address:
######     Customer Provided    ######
SID4 HANA instance number:
SID4 HANA HDBuserstore Name:

#######***SID #5 Information***#####
SID5:
###Provided by Microsoft Operations###
SID5 Storage Backup Name:
SID5 Storage IP Address:
######     Customer Provided    ######
SID5 HANA instance number:
SID5 HANA HDBuserstore Name:

#######***SID #6 Information***#####
SID6:
###Provided by Microsoft Operations###
SID6 Storage Backup Name:
SID6 Storage IP Address:
######     Customer Provided    ######
SID6 HANA instance number:
SID6 HANA HDBuserstore Name:

#######***SID #7 Information***#####
SID7:
###Provided by Microsoft Operations###
SID7 Storage Backup Name:
SID7 Storage IP Address:
######     Customer Provided    ######
SID7 HANA instance number:
SID7 HANA HDBuserstore Name:

#######***SID #8 Information***#####
SID8:
###Provided by Microsoft Operations###
SID8 Storage Backup Name:
SID8 Storage IP Address:
######     Customer Provided    ######
SID8 HANA instance number:
SID8 HANA HDBuserstore Name:

#######***SID #9 Information***#####
SID9:
###Provided by Microsoft Operations###
SID9 Storage Backup Name:
SID9 Storage IP Address:
```

```
######     Customer Provided    ######
SID9 HANA instance number:
SID9 HANA HDBuserstore Name:

######***SID #10 Information***#####
SID10:
###Provided by Microsoft Operations###
SID10 Storage Backup Name:
SID10 Storage IP Address:
######     Customer Provided    ######
SID10 HANA instance number:
SID10 HANA HDBuserstore Name:
```

testHANAConnection.pl

This script checks the HANA connectivity for all the HANA instances maintained in the *HANABackupCustomerDetails.txt*. It uses the HDBuserstore to connect to the SYSTEMDB and fetches the SID information.

This script does not require any parameters. Execute the script as following.

In a Multi SID environment (also referred to as MCOS deployment in HANA documentation, you can execute this script under any instance. For example, you can still be under */hana/shared/H80/exe/linuxx86_64/hdb* and run the script and it runs for all the HANA instances mentioned in the *HANABackupCustomerDetails.txt* file.

```
#./ testHANAConnection.pl
```

Output of the script

Terminal session

```
#  ./testHANAConnection.pl
[13/Sep/2018:03:46:35 +0100] Executing Test HANA Connection Script, Version 3.4
[13/Sep/2018:03:46:35 +0100] Verify script -> dc3b28ba0b49e0d431fe6cb3c5aa9cb3
./testHANAConnection.pl

[13/Sep/2018:03:46:35 +0100] HANA Server Name: sapprdhdb80
[13/Sep/2018:03:46:35 +0100] HANA Server IP Address: 172.18.18.50
[13/Sep/2018:03:46:35 +0100] SID1: h80

----- not complete log output, removed additional logging for brevity -----

[13/Sep/2018:03:46:35 +0100] ./hdbsql -n 172.18.18.50 -i 00 -d SYSTEMDB -U SCADMIN
"\s"
[13/Sep/2018:03:46:35 +0100] HANA status check successful.
```

```
[13/Sep/2018:03:46:35 +0100] **********HANA Access
Verified!**********

----- not complete log output, removed additional logging for brevity -----

[13/Sep/2018:03:46:35 +0100] Exiting with return code: 0
[13/Sep/2018:03:46:35 +0100] Command completed successfully.
[13/Sep/2018:03:46:35 +0100] Log file created at ./statusLogs/HANAStatus.2018-09-
13_0346.txt
```

testStorageSnapshotConnection.pl

The script logs in to each IP Address listed on the HANA Backup Customer Details document and verify that it has access to the file systems for each HANA instance installed on the HLI unit. A temporary snapshot is created within each data, shared, log, and logbackups volume to verify snapshot access for each file system.

Before you execute the script *testStorageSnapshotConnection.pl*, please execute the following commands for each storage users. This ensures that the connection to storage is already established.

```
# ssh -l <Storage Backup name> <Storage IP address>  ← actual command
# ssh -l clt1h80backup 172.18.18.11  ← example
```

Note	Your storage IP address must be in the same subnet as your server pool. For example, in this case, our server pool subnet is **172.18.18**.0/24 and our assigned storage IP is **172.18.18.11**.

This script does not require any input parameters. It reads the *HANABackupCustomerDetails.txt* file and connect the storage for each storage user defined.

```
# ./testStorageSnapshotConnection.pl
```

Output of the script

Terminal session

```
#  ./testStorageSnapshotConnection.pl
[13/Sep/2018:03:35:28 +0100] Executing Test Storage Snapshot Script, Version 3.4
[13/Sep/2018:03:35:28 +0100] Verify script -> 265a99f945ca7c4ad436f290827ddd5a
./testStorageSnapshotConnection.pl

[13/Sep/2018:03:35:28 +0100] HANA Server Name: sapprdhdb80
[13/Sep/2018:03:35:28 +0100] HANA Server IP Address: 172.18.18.50
[13/Sep/2018:03:35:28 +0100] SID1: h80
```

```
----- not complete log output, removed additional logging for brevity -----

[13/Sep/2018:03:35:31 +0100] **********************Checking access to Storage***
******************
[13/Sep/2018:03:35:31 +0100] Storage Access successful!!!!!!!!!!!!!

----- not complete log output, removed additional logging for brevity -----

[13/Sep/2018:03:35:37 +0100] Exiting with return code: 0
[13/Sep/2018:03:35:37 +0100] Command completed successfully.
[13/Sep/2018:03:35:37 +0100] Log file created at
./statusLogs/StorageSnapshotStatus.2018-09-13_0335.txt
```

azure_hana_snapshot_details.pl

This script provides the details of the snapshots taken by the script *azure_hana_backup.pl*.

This script does not require any input parameters. It reads the parameters from the *HANABackupCustomerDetails.txt* file.

CAUTION	This script may fail if run while snapshot backups are scheduled with cron. Due to snapshot rotation by the backup scripts, snapshots can disappear as they are rotated out – causing this script to fail.

This script can take a few minutes (the example below takes about 4 minutes) to execute dependent on the number of snapshots already taken, as it processes each one to collect information for display.

Use the following command to execute this script.

```
# ./azure_hana_snapshot_details.pl
```

Output of the command

Terminal session

```
#  ./azure_hana_snapshot_details.pl
[13/Sep/2018:04:22:15 +0100] Executing Azure HANA Snapshot Details Script, Version
3.4
[13/Sep/2018:04:22:15 +0100] Verify script -> e04fa264dcff25b11d5ef6d1755801d2
./azure_hana_snapshot_details.pl

[13/Sep/2018:04:22:15 +0100] HANA Server Name: sapprdhdb80
[13/Sep/2018:04:22:15 +0100] HANA Server IP Address: 172.18.18.50
[13/Sep/2018:04:22:15 +0100] SID1: h80

----- not complete log output, extraneous lines removed for clarity -----
```

```
[13/Sep/2018:04:22:15 +0100] Obtaining Snapshot Details for h80
[13/Sep/2018:04:22:15 +0100] **********Getting list of all customer
volumes**********
[13/Sep/2018:04:22:15 +0100] **********Adding list of snapshots to
volume list**********
[13/Sep/2018:04:22:18 +0100] **********Adding snapshot details to
snapshot list**********
[13/Sep/2018:04:25:50 +0100] **********Displaying Snapshot Details by
Volume**********
[13/Sep/2018:04:25:50 +0100]
************************************************************
[13/Sep/2018:04:25:50 +0100] ****Volume: hana_data_h80_sapprdhdb80_mnt00001_t020_vol
**********
[13/Sep/2018:04:25:50 +0100]
************************************************************
[13/Sep/2018:04:25:50 +0100] Total Snapshot Size:  19.72GB
 [13/Sep/2018:04:25:50 +0100] ------------------------------------------------------
----
[13/Sep/2018:04:25:50 +0100] Snapshot:   oneoff.2018-08-14_1331.0
[13/Sep/2018:04:25:50 +0100] Create Time:   "Tue Aug 14 20:37:50 2018"
[13/Sep/2018:04:25:50 +0100] Size:   27.52GB
[13/Sep/2018:04:25:50 +0100] Frequency:   15min
[13/Sep/2018:04:25:50 +0100] HANA Backup ID:   1534249871085

----- not complete log output, extraneous lines removed for clarity -----

[13/Sep/2018:04:25:52 +0100] Command completed successfully.
[13/Sep/2018:04:25:52 +0100] Log file created at
./snapshotLogs/SnapshotDetails.2018-09-13_0425.txt
```

removeTestStorageSnapshot.pl

This script deletes the temp snapshots taken by the script *testStorageSnapshotConnection.pl*. This script does not delete any other snapshots than the temporary snapshot taken by the script *testStorageSnapshotConnection.pl*.

Note	The test snapshot may be deleted only if one or more than one regular snapshots with the regular backup script have been executed.

This script does not require any input parameters, and you can execute the script as following:

```
# ./removeTestStorageSnapshot.pl
```

Output of the command

Terminal session

```
#  ./removeTestStorageSnapshot.pl
[13/Sep/2018:04:35:08 +0100] Executing Remove Test Storage Snapshot Script, Version
3.4
[13/Sep/2018:04:35:08 +0100] Verify script -> 505b3934f472dd3f0e9b2a6f9dd1f914
./removeTestStorageSnapshot.pl

[13/Sep/2018:04:35:08 +0100] SID1: h80
[13/Sep/2018:04:35:08 +0100] Storage Backup Name: cl25h80backup
[13/Sep/2018:04:35:08 +0100] Storage IP Address: 172.18.18.11
[13/Sep/2018:04:35:08 +0100] HANA Instance Number: 00
[13/Sep/2018:04:35:08 +0100] HANA Userstore Name: SCADMIN

----- not complete log output, extraneous lines removed for clarity -----

[13/Sep/2018:04:35:08 +0100] Checking Snapshot Status for h80
[13/Sep/2018:04:35:08 +0100] **********Checking access to
Storage**********
[13/Sep/2018:04:35:08 +0100] Storage Snapshot Access successful.
[13/Sep/2018:04:35:08 +0100] **********Getting list of volumes that
match HANA instance specified**********
[13/Sep/2018:04:35:08 +0100] Collecting set of volumes hosting HANA matching pattern
*h80* ...
[13/Sep/2018:04:35:09 +0100] Volume show completed successfully.
[13/Sep/2018:04:35:09 +0100] Adding volume
hana_data_h80_apprdhdb80_mnt00001_t020_vol to the snapshot list.
[13/Sep/2018:04:35:09 +0100] Adding volume
hana_data_h80_apprdhdbh80_mnt00001_t020_vol to the snapshot list.

----- not complete log output, extraneous lines removed for clarity -----

[13/Sep/2018:04:35:11 +0100] **********Deleting existing testStorage
snapshots**********

----- not complete log output, extraneous lines removed for clarity -----

[13/Sep/2018:04:35:11 +0100] Removing temp snapshot testStorage.temp on
hana_data_h80_apprdhdb80_mnt00001_t020_vol on SVM 172.18.18.11 ...

----- not complete log output, extraneous lines removed for clarity -----

[13/Sep/2018:04:35:23 +0100] Command completed successfully.
[13/Sep/2018:04:35:23 +0100] Exiting with return code: 0
[13/Sep/2018:04:35:23 +0100] Command completed successfully.
[13/Sep/2018:04:35:23 +0100] Log file created at
./statusLogs/removeTestStorage.2018-09-13_0435.txt
```

azure_hana_backup.pl

Execute this script to perform storage snapshots on either the HANA data/log/shared volumes, the /hana/logbackups volume, or the OS. This script needs the following inputs:

- backup type: This parameter may contain “hana”, “logs”, or “boot”
  - hana = snapshots of the volumes /hana/shared/SID (which contains /usr/sap/SID as well), and /hana/data/SID/mnt0001
  - logs = snapshots of the /hana/logbackups/SID
  - boot = TYPEI (for Type I SKUs) or TYPEII (for Type II SKUs)
- Customer snapshot prefix: Label for the snapshot. It has two purposes. The one purpose for you is to give it a name, so that you know what these snapshots are about. The second purpose is for the script azure_hana_backup.pl to determine the number of storage snapshots that are retained under that specific label. **Only alpha numeric (“A-Z,a-z,0-9”), underscore (“_”) and dash (“-“) characters are allowed.**
- Snapshot frequency: This parameter is reserved for future developments and does not have any impact. We recommend setting it right now to "3min" when executing backups of the type log and "15min", when executing the other backup types
- Retention: The parameter defines the retention of the snapshots indirectly, by defining the number of snapshots with the same snapshot prefix (label) to be kept. If the number of snapshot would exceed this parameter, the oldest snapshot is getting deleted before executing a new snapshot.

! Snapshot backups are very fast, with the following snapshot taking 12 seconds to complete.

With “hana” parameter

```
# ./azure_hana_backup.pl hana Test_HANA_Snapshot 15min 10
```

Output of the command

Terminal session

```
#   ./azure_hana_backup.pl hana Test_HANA_Snapshot 15min 10
[13/Sep/2018:04:41:51 +0100] Executing Azure Hana Backup Script, Version 3.4
[13/Sep/2018:04:41:51 +0100] Verify script -> f6e7ed0d2c1b9f68a8df1159fd37336c
./azure_hana_backup.pl

[13/Sep/2018:04:41:51 +0100] Executing hana backup.
[13/Sep/2018:04:41:51 +0100] HANA Server Name: sapprdhdb80
[13/Sep/2018:04:41:51 +0100] HANA Server IP Address: 172.18.18.50
[13/Sep/2018:04:41:51 +0100] SID1: h80

----- not complete log output, extraneous lines removed for clarity -----
```

```
[13/Sep/2018:04:41:51 +0100] Checking HANA Version with command: "./hdbsql -n
172.18.18.50 -i 00 -U SCADMIN "select version from sys.m_database"" ...
[13/Sep/2018:04:41:51 +0100] Version: 2.00.020.00.1500920972

----- not complete log output, extraneous lines removed for clarity -----

[13/Sep/2018:04:41:51 +0100] HANA Version: 2 Revision Number: 020
[13/Sep/2018:04:41:51 +0100] **********Checking HANA
status**********
[13/Sep/2018:04:41:51 +0100] ./hdbsql -n 172.18.18.50 -i 00 -d SYSTEMDB -U SCADMIN
"\s"
[13/Sep/2018:04:41:51 +0100] HANA status check successful.


[13/Sep/2018:04:41:54 +0100] **********Creating HANA
snapshot**********
[13/Sep/2018:04:41:54 +0100] Creating the HANA snapshot with command: "./hdbsql -n
172.18.18.50 -i 00 -d SYSTEMDB -U SCADMIN "backup data for full system create
snapshot"" ...
[13/Sep/2018:04:41:55 +0100] HANA snapshot created successfully.
[13/Sep/2018:04:41:55 +0100] **********Checking for HANA snapshot and
obtaining ID**********
[13/Sep/2018:04:41:55 +0100] Checking HANA snapshot status with command: "./hdbsql -
n 172.18.18.50 -i 00 -d SYSTEMDB -U SCADMIN "select BACKUP_ID from M_BACKUP_CATALOG
where ENTRY_TYPE_NAME = 'data snapshot' and STATE_NAME = 'prepared'"" ...
[13/Sep/2018:04:41:55 +0100] HANA snapshot backupid discovered:  1536810114823.
[13/Sep/2018:04:41:55 +0100] **********Creating Storage
snapshot**********
[13/Sep/2018:04:41:55 +0100] Verify snapshot Test_HANA_Snapshot.recent creation for
hana_data_h80_sapprdhdb80_mnt00001_t020_vol ...
[13/Sep/2018:04:41:55 +0100] Checking for snapshot at
/hana/data/H80/mnt00001/hdb00001/snapshot_databackup_0_1
[13/Sep/2018:04:41:55 +0100] Snapshot created successfully for volume
hana_data_h80_sapprdhdb80_mnt00001_t020_vol.
[13/Sep/2018:04:41:55 +0100] Verify snapshot Test_HANA_Snapshot.recent creation for
hana_data_h80_sapprdhdbh80_mnt00001_t020_vol ...
[13/Sep/2018:04:41:55 +0100] Checking for snapshot at
/hana/data/H80/mnt00001/hdb00001/snapshot_databackup_0_1
[13/Sep/2018:04:41:55 +0100] Skipping hana_data_h80_sapprdhdbh80_mnt00001_t020_vol
as it was determined to be a non-active HSR Volume.
[13/Sep/2018:04:41:55 +0100] If this volume is not part of an HSR setup, please
contact Microsoft Operations for assistance.
[13/Sep/2018:04:41:55 +0100] Verify snapshot Test_HANA_Snapshot.recent creation for
hana_shared_h80_sapprdhdb80_t020_vol ...
[13/Sep/2018:04:41:55 +0100] Checking for snapshot at
/hana/data/H80/mnt00001/hdb00001/snapshot_databackup_0_1
[13/Sep/2018:04:41:56 +0100] Snapshot created successfully for volume
hana_shared_h80_sapprdhdb80_t020_vol.
[13/Sep/2018:04:41:56 +0100] Verify snapshot Test_HANA_Snapshot.recent creation for
hana_shared_h80_sapprdhdbh80_t020_vol ...
```

```
[13/Sep/2018:04:41:56 +0100] Checking for snapshot at
/hana/data/H80/mnt00001/hdb00001/snapshot_databackup_0_1
[13/Sep/2018:04:41:56 +0100] Skipping hana_shared_h80_sapprdhdbh80_t020_vol as it
was determined to be a non-active HSR Volume.
[13/Sep/2018:04:41:56 +0100] If this volume is not part of an HSR setup, please
contact Microsoft Operations for assistance.
[13/Sep/2018:04:41:56 +0100] **********************Closing HANA
snapshot**********************
[13/Sep/2018:04:41:56 +0100] Closing the HANA snapshot with command: "./hdbsql -n
172.18.18.50 -i 00 -d SYSTEMDB -U SCADMIN "backup data for full system close
snapshot backup_id 1536810114823 SUCCESSFUL 'Storage snapshot successful'"" ...
[13/Sep/2018:04:41:56 +0100] HANA snapshot closed successfully.

----- not complete log output, extraneous lines removed for clarity -----

[13/Sep/2018:04:42:03 +0100] Command completed successfully.
[13/Sep/2018:04:42:03 +0100] Exiting with return code: 0
[13/Sep/2018:04:42:03 +0100] Command completed successfully.
[13/Sep/2018:04:42:03 +0100] Log file created at
./snapshotLogs/azure_backup.Test_HANA_Snapshot.2018-09-13_0442.txt
```

With logs parameter

```
# ./azure_hana_backup.pl logs Test_LOGS_Snapshot 3min 10
```

Output of the command with "logs" parameter

Terminal session

```
#   ./azure_hana_backup.pl logs Test_LOGS_Snapshot 3min 10
[13/Sep/2018:04:51:56 +0100] Executing Azure Hana Backup Script, Version 3.4
[13/Sep/2018:04:51:56 +0100] Verify script -> f6e7ed0d2c1b9f68a8df1159fd37336c
./azure_hana_backup.pl

 [13/Sep/2018:04:51:56 +0100] Executing logs backup.
[13/Sep/2018:04:51:56 +0100] HANA Server Name: sapprdhdb80
[13/Sep/2018:04:51:56 +0100] HANA Server IP Address: 172.18.18.50
[13/Sep/2018:04:51:56 +0100] SID1: h80

----- not complete log output, extraneous lines removed for clarity -----

[13/Sep/2018:04:51:56 +0100] Executing logs Snapshots for h80
[13/Sep/2018:04:51:56 +0100] Detected MDC environment for H80.
```

```
[13/Sep/2018:04:51:56 +0100] Checking HANA Version with command: "./hdbsql -n
172.18.18.50 -i 00 -U SCADMIN "select version from sys.m_database"" ...
[13/Sep/2018:04:51:56 +0100] Version: 2.00.020.00.1500920972

[13/Sep/2018:04:51:56 +0100] HANA Version: 2 Revision Number: 020
[13/Sep/2018:04:51:56 +0100] **********Checking HANA
status**********
[13/Sep/2018:04:51:56 +0100] ./hdbsql -n 172.18.18.50 -i 00 -d SYSTEMDB -U SCADMIN
"\s"
[13/Sep/2018:04:51:56 +0100] HANA status check successful.

----- not complete log output, removed additional logging for brevity -----

[13/Sep/2018:04:51:58 +0100] **********Creating Storage
snapshot**********
[13/Sep/2018:04:51:58 +0100] Verify snapshot Test_LOGS_Snapshot.recent creation for
hana_log_backups_h80_apprdhdb80_t020_vol ...
[13/Sep/2018:04:51:59 +0100] Snapshot created successfully for volume
hana_log_backups_h80_apprdhdb80_t020_vol.

----- not complete log output, removed additional logging for brevity -----

[13/Sep/2018:04:52:02 +0100] Command completed successfully.
[13/Sep/2018:04:52:02 +0100] Exiting with return code: 0
[13/Sep/2018:04:52:02 +0100] Command completed successfully.
[13/Sep/2018:04:52:02 +0100] Log file created at
./snapshotLogs/azure_backup.Test_LOGS_Snapshot.2018-09-13_0452.txt
```

With "boot" parameter

```
# ./azure_hana_backup.pl boot TYPEI Test_BOOT_Snapshot 15min 10
```

- HANA Large Instance Type: There are two valid values with "TYPEI" or "TYPEII" dependent on the HANA Large Instance Unit.
- Refer to the online documentation to confirm the available SKUs
    - https://docs.microsoft.com/en-us/azure/virtual-machines/workloads/sap/hana-available-skus

Output of the command with "boot" parameter (to backup Host OS)

```
Terminal session
#  ./azure_hana_backup.pl boot TYPEI Test_BOOT_Snapshot 15min 10
[13/Sep/2018:04:59:07 +0100] Executing Azure Hana Backup Script, Version 3.4
```

```
[13/Sep/2018:04:59:07 +0100] Verify script -> f6e7ed0d2c1b9f68a8df1159fd37336c
./azure_hana_backup.pl

[13/Sep/2018:04:59:07 +0100] Executing boot backup.
[13/Sep/2018:04:59:07 +0100] HANA Server Name: sapprdhdb80
[13/Sep/2018:04:59:07 +0100] HANA Server IP Address: 172.18.18.50
[13/Sep/2018:04:59:07 +0100] SID1: h80

----- not complete log output, removed additional logging for brevity -----

[13/Sep/2018:04:59:07 +0100] **********Getting list of volumes of boot
volumes**********
[13/Sep/2018:04:59:07 +0100] Volume collection completed successfully.
[13/Sep/2018:04:59:07 +0100] Adding volume t020_sles_boot_vol to the snapshot list.
[13/Sep/2018:04:59:08 +0100] **********Creating Storage
snapshot**********
[13/Sep/2018:04:59:08 +0100] Verify snapshot Test_BOOT_Snapshot.recent creation for
t020_sles_boot_vol ...
[13/Sep/2018:04:59:09 +0100] Snapshot created successfully for volume
t020_sles_boot_vol.

----- not complete log output, removed additional logging for brevity -----

[13/Sep/2018:04:59:11 +0100] Command completed successfully.
[13/Sep/2018:04:59:11 +0100] Exiting with return code: 0
[13/Sep/2018:04:59:11 +0100] Command completed successfully.
[13/Sep/2018:04:59:11 +0100] Log file created at
./snapshotLogs/azure_backup.Test_BOOT_Snapshot.2018-09-13_0459.txt
```

Note	When you execute the script for the first time, it may show some unexpected errors on the Multi SID environment. Just rerun the script again and it should already fix the issue.

azure_hana_snapshot_delete.pl

This script deletes the existing snapshots. You need to provide either the snapshot *backupid* (from HANA studio) or the snapshot name and volume name.

This script does require an input that specifies the SID of the HANA instance you want to delete the snapshot from.

```
# ./azure_hana_snapshot_delete.pl h80
```

Output using the option backupid

Terminal session

```
#  ./azure_hana_snapshot_delete.pl h80
```

```
[13/Sep/2018:05:02:13 +0100] Executing Azure HANA Snapshot Delete Script, Version
3.4
[13/Sep/2018:05:02:13 +0100] Verify script -> a7e483e09e56064a455743965ee5f63c
./azure_hana_snapshot_delete.pl

[13/Sep/2018:05:02:13 +0100] HANA Server Name: sapprdhdb80
[13/Sep/2018:05:02:13 +0100] HANA Server IP Address: 172.18.18.50
[13/Sep/2018:05:02:13 +0100] SID1: h80

----- not complete log output, extraneous lines removed for clarity -----

[13/Sep/2018:05:02:13 +0100] ----------------------Executing Main Code--------------
----------------------
[13/Sep/2018:05:02:13 +0100] This script is intended to delete either a single
snapshot or all snapshots that pertain to a particular HANA storage snapshot by its
HANA Backup ID
found in HANA Studio.  A snapshot cannot be deleted if it is less than an 10 minutes
old as deletion can interfere with replication. Please enter whether you wish to
delete by backupid
or snapshot, and, if by snapshot, enter the volume name and snapshot name where the
snapshot is found.  The azure_hana_snapshot_details script may be used to identify
individual
snapshot names and volume locations.


[13/Sep/2018:05:02:13 +0100] Do you want to delete by snapshot name or by HANA
backup id?
[13/Sep/2018:05:02:13 +0100] Please enter (backupid/snapshot/quit):

backupid
[13/Sep/2018:05:02:18 +0100] Please enter the backup id of the HANA Storage Snapshot
you wish to delete:

1536810114823
[13/Sep/2018:05:02:28 +0100] You have requested to delete all snapshots associated
with HANA Backup ID 1536810114823. Any data that exists solely on these snapshots
are lost forever. Do you wish to proceed (yes/no)?

[13/Sep/2018:05:02:28 +0100] Please enter (yes/no):

yes
[13/Sep/2018:05:03:16 +0100] **********Seeking backup id in found
Storage Snapshots**********
[13/Sep/2018:05:03:16 +0100] Adding Snapshot Test_HANA_Snapshot.2018-09-13_0441.0
from volume hana_data_h80_sapprdhdb80_mnt00001_t020_vol
[13/Sep/2018:05:03:16 +0100] Adding Snapshot Test_HANA_Snapshot.2018-09-13_0441.0
from volume hana_shared_h80_sapprdhdb80_t020_vol
Snapshot time stamp = Thu Sep 13 03:41:55 2018 UTC
Current system time = Thu Sep 13 04:03:17 2018 UTC
[13/Sep/2018:05:03:17 +0100] Snapshot Test_HANA_Snapshot.2018-09-13_0441.0 of volume
hana_data_h80_sapprdhdb80_mnt00001_t020_vol was successfully deleted
```

```
Snapshot time stamp = Thu Sep 13 03:41:56 2018 UTC
Current system time = Thu Sep 13 04:03:18 2018 UTC
[13/Sep/2018:05:03:18 +0100] Snapshot Test_HANA_Snapshot.2018-09-13_0441.0 of volume
hana_shared_h80_apprdhdb80_t020_vol was successfully deleted
[13/Sep/2018:05:03:18 +0100] Command completed successfully.
[13/Sep/2018:05:03:18 +0100] Log file created at
./snapshotLogs/snapshotDelete.h80.2018-09-13_0503.txt
```

Output using the option snapshot name

Terminal session

```
#  ./azure_hana_snapshot_delete.pl h80
[13/Sep/2018:05:09:10 +0100] Executing Azure HANA Snapshot Delete Script, Version
3.4
[13/Sep/2018:05:09:10 +0100] Verify script -> a7e483e09e56064a455743965ee5f63c
./azure_hana_snapshot_delete.pl

[13/Sep/2018:05:09:10 +0100] HANA Server Name: apprdhdb80
[13/Sep/2018:05:09:10 +0100] HANA Server IP Address: 172.18.18.50
[13/Sep/2018:05:09:10 +0100] SID1: h80

----- not complete log output, extraneous lines removed for clarity -----

[13/Sep/2018:05:09:10 +0100] This script is intended to delete either a single
snapshot or all snapshots that pertain to a particular HANA storage snapshot by its
HANA Backup ID
found in HANA Studio.  A snapshot cannot be deleted if it is less than an 10 minutes
old as deletion can interfere with replication. Please enter whether you wish to
delete by backupid
or snapshot, and, if by snapshot, enter the volume name and snapshot name where the
snapshot is found.  The azure_hana_snapshot_details script may be used to identify
individual
snapshot names and volume locations.


[13/Sep/2018:05:09:10 +0100] Do you want to delete by snapshot name or by HANA
backup id?
[13/Sep/2018:05:09:10 +0100] Please enter (backupid/snapshot/quit):

snapshot
[13/Sep/2018:05:09:14 +0100] Please enter the volume location of the snapshot you
wish to delete:

hana_shared_h80_apprdhdb80_t020_vol
[13/Sep/2018:05:10:20 +0100] Volume Location: hana_shared_h80_apprdhdb80_t020_vol
[13/Sep/2018:05:10:20 +0100] Please enter the snapshot you wish to delete:

oneoff.2018-08-14_1331.0
```

```
[13/Sep/2018:05:10:33 +0100] You have requested to delete snapshot oneoff.2018-08-
14_1331.0 from volume hana_shared_h80_sapprdhdb80_t020_vol. Any data that exists
only on this snapshot is lost forever. Do you wish to proceed (yes/no)?
[13/Sep/2018:05:10:33 +0100] Please enter (yes/no):

yes
[13/Sep/2018:05:10:36 +0100] **********Deleting Snapshot oneoff.2018-08-
14_1331.0 from Volume hana_shared_h80_sapprdhdb80_t020_vol**********
Snapshot time stamp = Tue Aug 14 20:37:51 2018 UTC
Current system time = Thu Sep 13 04:10:36 2018 UTC
[13/Sep/2018:05:10:37 +0100] Snapshot oneoff.2018-08-14_1331.0 of volume
hana_shared_h80_sapprdhdb80_t020_vol was successfully deleted
[13/Sep/2018:05:10:37 +0100] Command completed successfully.
[13/Sep/2018:05:10:37 +0100] Log file created at
./snapshotLogs/snapshotDelete.h80.2018-09-13_0510.txt
```

azure_hana_replication_status.pl

This script checks the storage replication status from the primary site to DR location. This script must be executed on the **DR site server**. This script does not require any input to be provided, rather it reads the HANABackupCustomerDetails.txt file.

```
# ./azure_hana_replication_status.pl
```

Output of the script

The following example has broken replication status and, in this scenario, activating DR would likely result in incomplete data at the DR site.

CAUTION	Note the warning in the following example about replication broken for two of the volumes.

Terminal session

```
#  ./azure_hana_replication_status.pl
[13/Sep/2018:06:19:57 +0200] Executing Azure HANA Replication Status Script, Version
3.4
[13/Sep/2018:06:19:57 +0200] Verify script -> 0aa623b340dfa5b101f2d1ff2245653e
./azure_hana_replication_status.pl

[13/Sep/2018:06:19:57 +0200] HANA Server Name: sapdrhdb80
[13/Sep/2018:06:19:57 +0200] HANA Server IP Address: 10.4.0.41
[13/Sep/2018:06:19:57 +0200] SID1: h80

----- not complete log output, extraneous lines removed for clarity -----

[13/Sep/2018:06:19:57 +0200] Checking Relationship Status for h80
```

```
[13/Sep/2018:06:19:57 +0200] **********Getting list of replication
relationships that match HANA instance provided**********
[13/Sep/2018:06:19:57 +0200] Collecting set of relationships hosting HANA matching
pattern *h80* ...
[13/Sep/2018:06:19:57 +0200] Relationship show completed successfully.
[13/Sep/2018:06:19:57 +0200] **********Displaying Relationships by
Volume**********
[13/Sep/2018:06:19:57 +0200] hana_data_h80_sapprdhdb80_mnt00001_t020_xdp
[13/Sep/2018:06:19:57 +0200] --------------------------------------------------
[13/Sep/2018:06:19:57 +0200] Link Status:

[13/Sep/2018:06:19:57 +0200] Broken-Off
[13/Sep/2018:06:19:57 +0200] Please contact Microsoft Operations immediately.
[13/Sep/2018:06:19:57 +0200] Current Replication Activity: Idle
[13/Sep/2018:06:19:57 +0200] Latest Snapshot Replicated: snapmirror.21215d07-2653-
11e8-8e4c-00a098af659c_2157387233.2018-08-22_235503
[13/Sep/2018:06:19:57 +0200] Size of Latest Snapshot Replicated: 2.15KB
[13/Sep/2018:06:19:57 +0200] Current Lag Time between snapshots: -
[13/Sep/2018:06:19:57 +0200]    ***Less than 30 minutes is recommended***
[13/Sep/2018:06:19:57 +0200] **************************************************
 [13/Sep/2018:06:19:57 +0200] hana_log_backups_h80_sapprdhdb80_t020_xdp
[13/Sep/2018:06:19:57 +0200] --------------------------------------------------
[13/Sep/2018:06:19:57 +0200] Link Status:

[13/Sep/2018:06:19:57 +0200] Broken-Off
[13/Sep/2018:06:19:57 +0200] Please contact Microsoft Operations immediately.
[13/Sep/2018:06:19:57 +0200] Current Replication Activity: Idle
[13/Sep/2018:06:19:57 +0200] Latest Snapshot Replicated: snapmirror.21215d07-2653-
11e8-8e4c-00a098af659c_2157387224.2018-08-22_235516
[13/Sep/2018:06:19:57 +0200] Size of Latest Snapshot Replicated: 2.15KB
[13/Sep/2018:06:19:57 +0200] Current Lag Time between snapshots: -
[13/Sep/2018:06:19:57 +0200]    ***Less than 10 minutes is recommended***
[13/Sep/2018:06:19:57 +0200] **************************************************
 [13/Sep/2018:06:19:57 +0200] hana_shared_h80_sapprdhdb80_t020_xdp
[13/Sep/2018:06:19:57 +0200] --------------------------------------------------
[13/Sep/2018:06:19:57 +0200] Link Status:

[13/Sep/2018:06:19:57 +0200] Active
[13/Sep/2018:06:19:57 +0200] Current Replication Activity: Idle
[13/Sep/2018:06:19:57 +0200] Latest Snapshot Replicated: snapmirror.21215d07-2653-
11e8-8e4c-00a098af659c_2157387225.2018-09-13_042000
[13/Sep/2018:06:19:57 +0200] Size of Latest Snapshot Replicated: 65.00MB
[13/Sep/2018:06:19:57 +0200] Current Lag Time between snapshots: 0:1:54
[13/Sep/2018:06:19:57 +0200]    ***Less than 30 minutes is recommended***
 [13/Sep/2018:06:19:57 +0200] **************************************************
[13/Sep/2018:06:19:57 +0200] No data entered for SID2  Skipping!!!
[13/Sep/2018:06:19:57 +0200] No data entered for SID3  Skipping!!!
[13/Sep/2018:06:19:57 +0200] No data entered for SID4  Skipping!!!
[13/Sep/2018:06:19:57 +0200] No data entered for SID5  Skipping!!!
[13/Sep/2018:06:19:57 +0200] No data entered for SID6  Skipping!!!
[13/Sep/2018:06:19:57 +0200] No data entered for SID7  Skipping!!!
```

```
[13/Sep/2018:06:19:57 +0200] No data entered for SID8  Skipping!!!
[13/Sep/2018:06:19:57 +0200] No data entered for SID9  Skipping!!!
[13/Sep/2018:06:19:57 +0200] No data entered for SID10  Skipping!!!
[13/Sep/2018:06:19:57 +0200] Command completed successfully.
[13/Sep/2018:06:19:57 +0200] Exiting with return code: 0
[13/Sep/2018:06:19:57 +0200] Command completed successfully.
[13/Sep/2018:06:19:57 +0200] Log file created at
./snapshotLogs/replicationStatus.2018-09-13_0619.txt
```

This example has successful replication between the Primary site and the DR site, so these systems are ready to support a DR scenario.

Terminal session

```
#  ./azure_hana_replication_status.pl
[14/Sep/2018:08:00:44 +0900] Executing Azure HANA Replication Status Script, Version
3.4
[14/Sep/2018:08:00:44 +0900] Verify script -> 0aa623b340dfa5b101f2d1ff2245653e
./azure_hana_replication_status.pl

[14/Sep/2018:08:00:44 +0900] HANA Server Name: sapdrhdb80
[14/Sep/2018:08:00:44 +0900] HANA Server IP Address: 10.8.0.41
[14/Sep/2018:08:00:44 +0900] SID1: h80
[14/Sep/2018:08:00:44 +0900] Storage Backup Name: clt1h80backup
[14/Sep/2018:08:00:44 +0900] Storage IP Address: 10.8.0.16
[14/Sep/2018:08:00:44 +0900] HANA Instance Number: 00
[14/Sep/2018:08:00:44 +0900] HANA Userstore Name: SCADMIN

----- not complete log output, extraneous lines removed for clarity -----

[14/Sep/2018:08:00:44 +0900] **********Getting list of replication
relationships that match HANA instance provided**********
[14/Sep/2018:08:00:44 +0900] Collecting set of relationships hosting HANA matching
pattern *h80* ...
[14/Sep/2018:08:00:44 +0900] Relationship show completed successfully.
[14/Sep/2018:08:00:44 +0900] **********Displaying Relationships by
Volume**********
[14/Sep/2018:08:00:44 +0900] hana_data_h80_mnt00001_t020_xdp
[14/Sep/2018:08:00:44 +0900] ------------------------------------------------
[14/Sep/2018:08:00:44 +0900] Link Status:
[14/Sep/2018:08:00:44 +0900] Active
[14/Sep/2018:08:00:44 +0900] Current Replication Activity: Idle
[14/Sep/2018:08:00:44 +0900] Latest Snapshot Replicated: snapmirror.eb2eca17-288e-
11e8-9dbe-00a098ba2b93_2155805517.2018-09-13_230000
[14/Sep/2018:08:00:44 +0900] Size of Latest Snapshot Replicated: 67.91MB
[14/Sep/2018:08:00:44 +0900] Current Lag Time between snapshots: 0:1:49
[14/Sep/2018:08:00:44 +0900]    ***Less than 30 minutes is recommended***
[14/Sep/2018:08:00:44 +0900] **********************************************
[14/Sep/2018:08:00:44 +0900] hana_data_h80_mnt00002_t020_xdp
[14/Sep/2018:08:00:44 +0900] ------------------------------------------------
```

```
[14/Sep/2018:08:00:44 +0900] Link Status:

[14/Sep/2018:08:00:44 +0900] Active
[14/Sep/2018:08:00:44 +0900] Current Replication Activity: Idle
[14/Sep/2018:08:00:44 +0900] Latest Snapshot Replicated: snapmirror.eb2eca17-288e-
11e8-9dbe-00a098ba2b93_2155805519.2018-09-13_230000
[14/Sep/2018:08:00:44 +0900] Size of Latest Snapshot Replicated: 1.32MB
[14/Sep/2018:08:00:44 +0900] Current Lag Time between snapshots: 0:1:49
[14/Sep/2018:08:00:44 +0900]    ***Less than 30 minutes is recommended***
[14/Sep/2018:08:00:44 +0900] ************************************************
[14/Sep/2018:08:00:44 +0900] hana_data_h80_mnt00003_t020_xdp
[14/Sep/2018:08:00:44 +0900] ------------------------------------------------
[14/Sep/2018:08:00:44 +0900] Link Status:

[14/Sep/2018:08:00:44 +0900] Active
[14/Sep/2018:08:00:44 +0900] Current Replication Activity: Idle
[14/Sep/2018:08:00:44 +0900] Latest Snapshot Replicated: snapmirror.eb2eca17-288e-
11e8-9dbe-00a098ba2b93_2155805520.2018-09-13_230000
[14/Sep/2018:08:00:44 +0900] Size of Latest Snapshot Replicated: 1.32MB
[14/Sep/2018:08:00:44 +0900] Current Lag Time between snapshots: 0:1:49
[14/Sep/2018:08:00:44 +0900]    ***Less than 30 minutes is recommended***
[14/Sep/2018:08:00:44 +0900] ************************************************
[14/Sep/2018:08:00:44 +0900] hana_log_backups_h80_t020_xdp
[14/Sep/2018:08:00:44 +0900] ------------------------------------------------
[14/Sep/2018:08:00:44 +0900] Link Status:

[14/Sep/2018:08:00:44 +0900] Active
[14/Sep/2018:08:00:44 +0900] Current Replication Activity: Idle
[14/Sep/2018:08:00:44 +0900] Latest Snapshot Replicated: snapmirror.eb2eca17-288e-
11e8-9dbe-00a098ba2b93_2155805518.2018-09-13_225700
[14/Sep/2018:08:00:44 +0900] Size of Latest Snapshot Replicated: 4.13MB
[14/Sep/2018:08:00:44 +0900] Current Lag Time between snapshots: 0:4:49
[14/Sep/2018:08:00:44 +0900]    ***Less than 10 minutes is recommended***
[14/Sep/2018:08:00:44 +0900] ************************************************
[14/Sep/2018:08:00:44 +0900] hana_shared_h80_t020_xdp
[14/Sep/2018:08:00:44 +0900] ------------------------------------------------
[14/Sep/2018:08:00:44 +0900] Link Status:

[14/Sep/2018:08:00:44 +0900] Active
[14/Sep/2018:08:00:44 +0900] Current Replication Activity: Idle
[14/Sep/2018:08:00:44 +0900] Latest Snapshot Replicated: snapmirror.eb2eca17-288e-
11e8-9dbe-00a098ba2b93_2155805485.2018-09-13_230000
[14/Sep/2018:08:00:44 +0900] Size of Latest Snapshot Replicated: 74.93MB
[14/Sep/2018:08:00:44 +0900] Current Lag Time between snapshots: 0:1:49
[14/Sep/2018:08:00:44 +0900]    ***Less than 30 minutes is recommended***
[14/Sep/2018:08:00:44 +0900] ************************************************

----- not complete log output, extraneous lines removed for clarity -----

[14/Sep/2018:08:00:44 +0900] Command completed successfully.
[14/Sep/2018:08:00:44 +0900] Exiting with return code: 0
```

```
[14/Sep/2018:08:00:44 +0900] Command completed successfully.
[14/Sep/2018:08:00:44 +0900] Log file created at
./snapshotLogs/replicationStatus.2018-09-14_0800.txt
```

azure_hana_test_dr_failover.pl

This script is like the "full" DR Failover script, but rather than breaking the replication between the primary site and the disaster recovery site, a clone volume is created out of the disaster recovery volumes which allows the restoration of the most recent snapshot in the DR site. Those cloned volumes are then usable by the customer to test Disaster Recovery without having to execute a complete failover of their HANA environment which breaks the replication agreement between the primary site and the disaster recovery site. When the test script is executed it requires the SID and a contact email for operations to manage the deletion of the clones after 4 weeks.

Each execution of the Test DR command creates a new clone that must be deleted by Microsoft Operations when the test is concluded. Multiple different restore points can be tested in this way, each with their own restoration point. The clone is designated by the time-stamp at when the script was executed and represents the most recent data and logbackups snapshot available when run.

CAUTION! Clone volumes created will be automatically deleted after 4 weeks.

```
# ./azure_hana_test_dr_failover.pl
```

Output of the script (for Scale-Out scenario)

```
Terminal session
#   ./azure_hana_test_dr_failover.pl
[14/Sep/2018:08:58:50 +0900] Executing Azure HANA Test DR Failover Script, Version 3.4
[14/Sep/2018:08:58:50 +0900] Verify script -> 1656f4c73f1224c9b92c06995a96483d
./azure_hana_test_dr_failover.pl

[14/Sep/2018:08:58:50 +0900] ********** Introduction **********
This script is designed for those customers who have previously installed the Production
HANA instance in the Disaster
Recovery Location either as a stand-alone instance or as part of a multi-purpose
environment. This script is intended to
allow the customer to simulate a Disaster Recovery failover without actually requiring a
failover and subsequent
failback.  This script will clone the most recent snapshot for both the Data and Log
Backups filesystems.  Any other
restore points must be handled by Microsoft Operations.  Please enter the HANA <SID> you
wish to restore. This script
```

```
must be executed from the Disaster Recovery location otherwise unintended actions may
occur.  As part of the script
process, a clone is created of the necessary Disaster Recovery volumes for Data and Log
Backups volumes.

Please enter (yes/no):  yes
Proceed with script: yes
Please enter either the HANA SID you wish to restore:   h80
Please enter either the HANA SID you wish to restore:   : h80
Please enter a contact email address for Microsoft Operations to confirm ok to delete
clones:  user@company.com
[14/Sep/2018:08:59:06 +0900] Contact email -> user@company.com
[14/Sep/2018:08:59:06 +0900] Clone expiry date -> 2018-10-12 08:59
[14/Sep/2018:08:59:06 +0900] HANA Server Name: sapdrhdb80
[14/Sep/2018:08:59:06 +0900] HANA Server IP Address: 10.8.0.41
[14/Sep/2018:08:59:06 +0900] SID1: h80
[14/Sep/2018:08:59:06 +0900] Storage Backup Name: clt1h80backup
[14/Sep/2018:08:59:06 +0900] Storage IP Address: 10.8.0.16
[14/Sep/2018:08:59:06 +0900] HANA Instance Number: 00
[14/Sep/2018:08:59:06 +0900] HANA Userstore Name: SCADMIN

----- not complete log output, extraneous lines removed for clarity -----

[14/Sep/2018:08:59:06 +0900] **********Getting list of volumes that match
HANA instance specified**********

----- not complete log output, extraneous lines removed for clarity -----
[14/Sep/2018:08:59:51 +0900] All log volumes have correct snapshot present
[14/Sep/2018:08:59:51 +0900] **********Cloning Snapshots by
Volume**********

----- not complete log output, extraneous lines removed for clarity -----

[14/Sep/2018:09:00:02 +0900] Snapshot cloned for volume
hana_data_h80_mnt00001_t020_xdp_old completed successfully.

----- not complete log output, extraneous lines removed for clarity -----

[14/Sep/2018:09:00:08 +0900] Snapshot cloned for volume hana_data_h80_mnt00002_t020_xdp
completed successfully.

----- not complete log output, extraneous lines removed for clarity -----

[14/Sep/2018:09:00:13 +0900] Snapshot cloned for volume
hana_data_h80_mnt00002_t020_xdp_old completed successfully.

----- not complete log output, extraneous lines removed for clarity -----

[14/Sep/2018:09:00:24 +0900] Snapshot cloned for volume
hana_data_h80_mnt00003_t020_xdp_old completed successfully.
```

```
----- not complete log output, extraneous lines removed for clarity -----

[14/Sep/2018:09:00:35 +0900] Snapshot cloned for volume
hana_log_backups_h80_t020_xdp_old completed successfully.
[14/Sep/2018:09:00:35 +0900] **********All volumes restored
sucessfully**********
[14/Sep/2018:09:00:35 +0900] **********Mounting Dr Volumes by
Volume**********
[14/Sep/2018:09:00:38 +0900] Volume
hana_data_h80_mnt00001_t020_xdp_drclone_20180914_0858 mounted successfully.
[14/Sep/2018:09:00:40 +0900] Volume
hana_data_h80_mnt00001_t020_xdp_old_drclone_20180914_0858 mounted successfully.
[14/Sep/2018:09:00:43 +0900] Volume
hana_data_h80_mnt00002_t020_xdp_drclone_20180914_0858 mounted successfully.
[14/Sep/2018:09:00:46 +0900] Volume
hana_data_h80_mnt00002_t020_xdp_old_drclone_20180914_0858 mounted successfully.
[14/Sep/2018:09:00:48 +0900] Volume
hana_data_h80_mnt00003_t020_xdp_drclone_20180914_0858 mounted successfully.
[14/Sep/2018:09:00:51 +0900] Volume
hana_data_h80_mnt00003_t020_xdp_old_drclone_20180914_0858 mounted successfully.
[14/Sep/2018:09:00:53 +0900] Volume hana_log_backups_h80_t020_xdp_drclone_20180914_0858
mounted successfully.
[14/Sep/2018:09:00:56 +0900] Volume
hana_log_backups_h80_t020_xdp_old_drclone_20180914_0858 mounted successfully.
[14/Sep/2018:09:00:56 +0900] **********Collecting Mount Point
Details**********

----- not complete log output, extraneous lines removed for clarity -----

[14/Sep/2018:09:01:12 +0900] ***** Displaying Mount Points by Volume *****
172.18.20.241:/hana_data_h80_mnt00001_t020_xdp_drclone_20180914_0858
/hana/data/H80/mnt00001   nfs
rw,bg,hard,timeo=600,vers=4,rsize=1048576,wsize=1048576,intr,noatime,lock 0 0
172.18.20.241:/hana_data_h80_mnt00002_t020_xdp_drclone_20180914_0858
/hana/data/H80/mnt00002   nfs
rw,bg,hard,timeo=600,vers=4,rsize=1048576,wsize=1048576,intr,noatime,lock 0 0
172.18.20.241:/hana_data_h80_mnt00003_t020_xdp_drclone_20180914_0858
/hana/data/H80/mnt00003   nfs
rw,bg,hard,timeo=600,vers=4,rsize=1048576,wsize=1048576,intr,noatime,lock 0 0
172.18.20.241:/hana_log_backups_h80_t020_xdp_drclone_20180914_0858
/hana/logbackups/H80   nfs
rw,bg,hard,timeo=600,vers=4,rsize=1048576,wsize=1048576,intr,noatime,lock 0 0
 [14/Sep/2018:09:01:12 +0900]
**************************************************************
[14/Sep/2018:09:01:12 +0900] **********  HANA Test DR Recovery Steps  **********
1. Ensure ALL the target mount points exist (e.g. mkdir /hana/logbackups/H99_SOURCE).
2. Add Mount Point Details into /etc/fstab of DR Server.
3. Mount newly added filesystems.
4. Perform HANA Snapshot Recovery using HANA Studio.
********************************************************************************
 These snapshot copies (clones) are kept for 4 weeks before being automatically removed.
```

```
 Please contact Microsoft Operations to delete them earlier.
[14/Sep/2018:09:01:12 +0900] ************************************************
[14/Sep/2018:09:01:12 +0900] Command completed successfully.
[14/Sep/2018:09:01:12 +0900] Exiting with return code: 0
[14/Sep/2018:09:01:12 +0900] Command completed successfully.
[14/Sep/2018:09:01:12 +0900] Log file created at
./snapshotLogs/testDR.h80.20180914_0858.txt
```

CAUTION! The "Displaying Mount Points by Volume" output is different for the various scenarios.

The following output displays the mounts points by volume for the HSR scenario. Note, there are two mount points for the log backups (one for each HSR node in the primary site), along with the most recent data snapshot from the primary site. This should allow for SAP HANA recovery from the most recent data snapshot and log backups from both nodes of the production site when doing a DR recovery

Terminal session

```
#   ./azure_hana_test_dr_failover.pl
----- not complete log output, extraneous lines removed for clarity -----

[14/Sep/2018:09:01:12 +0900] ***** Displaying Mount Points by Volume *****
172.18.20.241:/hana_data_h80_sapprdhdb80_mnt00001_t020_xdp_drclone_20180914_0858
/hana/data/H80/mnt00001   nfs
rw,bg,hard,timeo=600,vers=4,rsize=1048576,wsize=1048576,intr,noatime,lock 0 0
172.18.20.241:/hana_log_backups_h80_sapprdhdb80_mnt00001_t020_xdp_drclone_20180914_0858
/hana/logbackups/H80_SAPPRDHDB80   nfs
rw,bg,hard,timeo=600,vers=4,rsize=1048576,wsize=1048576,intr,noatime,lock 0 0
172.18.20.241:/hana_log_backups_h80_sapprdhdb81_mnt00001_t020_xdp_drclone_20180914_0858
/hana/logbackups/H80_SAPPRDHDB81   nfs
rw,bg,hard,timeo=600,vers=4,rsize=1048576,wsize=1048576,intr,noatime,lock 0 0
[14/Sep/2018:09:01:12 +0900]
****************************************************************
[14/Sep/2018:09:01:12 +0900] **********  HANA Test DR Recovery Steps  **********
1. Ensure ALL the target mount points exist (e.g. mkdir /hana/logbackups/H99_SOURCE).
2. Add Mount Point Details into /etc/fstab of DR Server.
3. Mount newly added filesystems.
4. Perform HANA Snapshot Recovery using HANA Studio.
********************************************************************************
 These snapshot copies (clones) are kept for 4 weeks before being automatically removed.
 Please contact Microsoft Operations to delete them earlier.
[14/Sep/2018:09:01:12 +0900] ************************************************
[14/Sep/2018:09:01:12 +0900] Command completed successfully.
[14/Sep/2018:09:01:12 +0900] Exiting with return code: 0
[14/Sep/2018:09:01:12 +0900] Command completed successfully.
[14/Sep/2018:09:01:12 +0900] Log file created at
./snapshotLogs/testDR.h80.20180914_0858.txt
```

azure_hana_dr_failover.pl

This script stops storage replication from the primary site to the secondary site, restores the latest snapshot on the DR volumes, and provides the mountpoints for the DR volumes. This script MUST be executed on the DR server ONLY!

You perform a failover to DR site, by executing a script azure_hana_dr_failover.pl. This script requires a SID to be added as a parameter. This is the SID of the HANA instance, which needs to be recovered at the DR site.

Caution	Perform it only when you are planning to perform the DR exercise or a test. Script breaks the replication. You must reach out to the Microsoft Operations to set up the replication back. Also, once the replication is re-setup, all the data at DR storage for this SID get initialized.

At the high level, here are the steps for executing a DR failover:

- You must shut down the HANA instance at **primary** site. This is only needed if you are truly doing the failover to DR site so you don't have data inconsistencies.
- Shutdown the HANA instance on the DR node for the production SID.
- Execute the script azure_hana_dr_failover.pl on the DR node with the SID to be recovered
  - The script breaks the storage replication link from the Primary to the DR site
  - The script restores the /data and /logbackups volume only, /shared volume is NOT recovered, but rather it uses the existing /shared for SID at the DR location.
  - Mount the /data and /logbackups volume – ensure to add it to the fstab file
- Restore the HANA SYSTEMDB snapshot. Please note, HANA studio only shows you the latest HANA snapshot available under the storage snapshot restored as part of the script azure_hana_dr_failover.pl execution.
- Recover the tenant database
- Start the HANA instance on the DR site for the Production SID (Example: H80 in this case)
- Perform the testing

Here are the detailed steps for the failover.

Step1: Get the volume details of the DR node by executing the command "df –h". This is so you can reference it back, if needed, after the failover

Terminal session

```
#  df -h
Filesystem                                          Size  Used Avail Use% Mounted
on
devtmpfs                                            378G  8.0K  378G   1% /dev
```

```
tmpfs                                                    569G     0  569G   0%
/dev/shm
tmpfs                                                    378G   18M  378G   1% /run
tmpfs                                                    378G     0  378G   0%
/sys/fs/cgroup
/dev/mapper/3600a098038304445622b4b584c575a66-part2      47G   20G   28G  42% /
/dev/mapper/3600a098038304445622b4b584c575a66-part1     979M   57M  856M   7% /boot
172.18.20.241:/hana_log_h80_mnt00003_t020_vol           512G  2.1G  510G   1%
/hana/log/H80/mnt00003
172.18.20.241:/hana_log_h80_mnt00001_t020_vol           512G  5.5G  507G   2%
/hana/log/H80/mnt00001
172.18.20.241:/hana_data_h80_mnt00003_t020_vol          1.2T  332M  1.2T   1%
/hana/data/H80/mnt00003
172.18.20.241:/hana_log_h80_mnt00002_t020_vol           512G  2.1G  510G   1%
/hana/log/H80/mnt00002
172.18.20.241:/hana_data_h80_mnt00002_t020_vol          1.2T  300M  1.2T   1%
/hana/data/H80/mnt00002
172.18.20.241:/hana_data_h80_mnt00001_t020_vol          1.2T  6.4G  1.2T   1%
/hana/data/H80/mnt00001
172.18.20.241:/hana_shared_h80_t020_vol/usr_sap_node1   2.7T   11G  2.7T   1%
/usr/sap/H80
tmpfs                                                    76G     0   76G   0%
/run/user/0
172.18.20.241:/hana_shared_h80_t020_vol                 2.7T   11G  2.7T   1%
/hana/shared
172.18.20.241:/hana_data_h80_mnt00001_t020_xdp          1.2T  6.4G  1.2T   1%
/hana/data/H80/mnt00001
172.18.20.241:/hana_data_h80_mnt00002_t020_xdp          1.2T  300M  1.2T   1%
/hana/data/H80/mnt00002
172.18.20.241:/hana_data_h80_mnt00003_t020_xdp          1.2T  332M  1.2T   1%
/hana/data/H80/mnt00003
172.18.20.241:/hana_log_backups_h80_t020_xdp            512G   15G  498G   3%
/hana/logbackups/H80_T250
```

Step2: Shut down the HANA instance on the primary site (The instance which is getting failed over)

Step3: Shut down the HANA instances on the DR site (The instance of the primary SID being failed over)

Step4: Execute the script

```
# ./azure_hana_dr_failover.pl
```

Output of the script

Terminal session

```
#  ./azure_hana_dr_failover.pl
[14/Sep/2018:11:16:08 +0900] Executing Azure HANA DR Failover Script, Version 3.4
[14/Sep/2018:11:16:08 +0900] Verify script -> 52cbc10deccef91601b8dc7d902288c6
./azure_hana_dr_failover.pl
```

```
This script is designed for those customers who have previously installed the
Production HANA instance in the Disaster
Recovery Location either as a stand-alone instance or as part of a multi-purpose
environment. This script should only be
run in the event of a declared disaster by Microsoft or as part of required Disaster
Recovery testing plans. A failback
coordinated with Microsoft Operations is required after this script has been
executed.  WARNING: the failback process
will not necessarily be a quick process and will require multiple steps in
coordination with Microsoft Operations so
this script should not be undertaken lightly.  This script will restore only the
most recent snapshot for both the Data
and Log Backups filesystems.  Any other restore points must be handled by Microsoft
Operations.  Please enter the HANA <
SID> you wish to restore. This script must be executed from the Disaster Recovery
location otherwise unintended actions
may occur.

Please enter (yes/no): yes
Please enter (yes/no): : yes
Please enter either the HANA SID you wish to restore:   h80
Please enter either the HANA SID you wish to restore:   : h80
[14/Sep/2018:11:16:18 +0900] HANA Server Name: sapdrhdb80
[14/Sep/2018:11:16:18 +0900] HANA Server IP Address: 172.18.20.50
[14/Sep/2018:11:16:18 +0900] SID1: h80
[14/Sep/2018:11:16:18 +0900] Storage Backup Name: clt1h80backup
[14/Sep/2018:11:16:18 +0900] Storage IP Address: 172.18.20.16
[14/Sep/2018:11:16:18 +0900] HANA Instance Number: 00
[14/Sep/2018:11:16:18 +0900] HANA Userstore Name: SCADMIN
[14/Sep/2018:11:16:18 +0900] SID2: Omitted
[14/Sep/2018:11:16:18 +0900] Storage Backup Name: Omitted
[14/Sep/2018:11:16:18 +0900] Storage Backup Name: Omitted
[14/Sep/2018:11:16:18 +0900] HANA Instance Number: Omitted
[14/Sep/2018:11:16:18 +0900] HANA Instance Number: Omitted
[14/Sep/2018:11:16:18 +0900] SID3: Omitted
[14/Sep/2018:11:16:18 +0900] Storage Backup Name: Omitted
[14/Sep/2018:11:16:18 +0900] Storage Backup Name: Omitted
[14/Sep/2018:11:16:18 +0900] HANA Instance Number: Omitted
[14/Sep/2018:11:16:18 +0900] HANA Instance Number: Omitted
[14/Sep/2018:11:16:18 +0900] SID4: Omitted
[14/Sep/2018:11:16:18 +0900] Storage Backup Name: Omitted
[14/Sep/2018:11:16:18 +0900] Storage Backup Name: Omitted
[14/Sep/2018:11:16:18 +0900] HANA Instance Number: Omitted
[14/Sep/2018:11:16:18 +0900] HANA Instance Number: Omitted
[14/Sep/2018:11:16:18 +0900] SID5: Omitted
[14/Sep/2018:11:16:18 +0900] Storage Backup Name: Omitted
[14/Sep/2018:11:16:18 +0900] Storage Backup Name: Omitted
[14/Sep/2018:11:16:18 +0900] HANA Instance Number: Omitted
[14/Sep/2018:11:16:18 +0900] HANA Instance Number: Omitted
[14/Sep/2018:11:16:18 +0900] SID6: Omitted
```

```
[14/Sep/2018:11:16:18 +0900] Storage Backup Name: Omitted
[14/Sep/2018:11:16:18 +0900] Storage Backup Name: Omitted
[14/Sep/2018:11:16:18 +0900] HANA Instance Number: Omitted
[14/Sep/2018:11:16:18 +0900] HANA Instance Number: Omitted
[14/Sep/2018:11:16:18 +0900] SID7: Omitted
[14/Sep/2018:11:16:18 +0900] Storage Backup Name: Omitted
[14/Sep/2018:11:16:18 +0900] Storage Backup Name: Omitted
[14/Sep/2018:11:16:18 +0900] HANA Instance Number: Omitted
[14/Sep/2018:11:16:18 +0900] HANA Instance Number: Omitted
[14/Sep/2018:11:16:18 +0900] SID8: Omitted
[14/Sep/2018:11:16:18 +0900] Storage Backup Name: Omitted
[14/Sep/2018:11:16:18 +0900] Storage Backup Name: Omitted
[14/Sep/2018:11:16:18 +0900] HANA Instance Number: Omitted
[14/Sep/2018:11:16:18 +0900] HANA Instance Number: Omitted
[14/Sep/2018:11:16:18 +0900] SID9: Omitted
[14/Sep/2018:11:16:18 +0900] Storage Backup Name: Omitted
[14/Sep/2018:11:16:18 +0900] Storage Backup Name: Omitted
[14/Sep/2018:11:16:18 +0900] HANA Instance Number: Omitted
[14/Sep/2018:11:16:18 +0900] HANA Instance Number: Omitted
[14/Sep/2018:11:16:18 +0900] SID10: Omitted
[14/Sep/2018:11:16:18 +0900] Storage Backup Name: Omitted
[14/Sep/2018:11:16:18 +0900] Storage Backup Name: Omitted
[14/Sep/2018:11:16:18 +0900] HANA Instance Number: Omitted
[14/Sep/2018:11:16:18 +0900] HANA Instance Number: Omitted
[14/Sep/2018:11:16:18 +0900] **********Getting list of volumes that
match HANA instance specified**********
[14/Sep/2018:11:16:18 +0900] Collecting set of volumes hosting HANA matching pattern
*h80* ...

----- not complete log output, extraneous lines removed for clarity -----

[14/Sep/2018:11:17:13 +0900] All log volumes have correct snapshot present
[14/Sep/2018:11:17:13 +0900] **********Breaking Relationships by
Volume**********
[14/Sep/2018:11:17:13 +0900] Volume:   hana_data_h80_mnt00001_t020_xdp   Status:
Snapmirrored     State: Quiesced
[14/Sep/2018:11:17:17 +0900] Relationship broken for volume
hana_data_h80_mnt00001_t020_xdp completed successfully.
[14/Sep/2018:11:17:17 +0900] Volume:   hana_data_h80_mnt00002_t020_xdp   Status:
Snapmirrored     State: Quiesced
[14/Sep/2018:11:17:21 +0900] Relationship broken for volume
hana_data_h80_mnt00002_t020_xdp completed successfully.
[14/Sep/2018:11:17:21 +0900] Volume:   hana_data_h80_mnt00003_t020_xdp   Status:
Snapmirrored     State: Quiesced
[14/Sep/2018:11:17:25 +0900] Relationship broken for volume
hana_data_h80_mnt00003_t020_xdp completed successfully.
[14/Sep/2018:11:17:25 +0900] Volume:   hana_log_backups_h80_t020_xdp   Status:
Snapmirrored     State: Quiesced
[14/Sep/2018:11:17:28 +0900] Relationship broken for volume
hana_log_backups_h80_t020_xdp completed successfully.
```

```
[14/Sep/2018:11:17:28 +0900] **********Restoring Snapshots by
Volume**********

----- not complete log output, extraneous lines removed for clarity -----

[14/Sep/2018:11:17:48 +0900] **********Mounting Dr Volumes by
Volume**********

----- not complete log output, extraneous lines removed for clarity -----

[14/Sep/2018:11:17:53 +0900] **********Collecting Mount Point
Details**********

----- not complete log output, extraneous lines removed for clarity -----

[14/Sep/2018:11:17:54 +0900] Located location of hana_data_h80_mnt00001_t020_xdp
[14/Sep/2018:11:17:54 +0900] Address found of hana_data_h80_mnt00001_t020_xdp
[14/Sep/2018:11:17:54 +0900] Located location of hana_data_h80_mnt00002_t020_xdp
[14/Sep/2018:11:17:56 +0900] Address found of hana_data_h80_mnt00002_t020_xdp
[14/Sep/2018:11:17:54 +0900] Located location of hana_data_h80_mnt00003_t020_xdp
[14/Sep/2018:11:17:54 +0900] Address found of hana_data_h80_mnt00003_t020_xdp
[14/Sep/2018:11:17:54 +0900] Located location of hana_log_backups_h80_t020_xdp
[14/Sep/2018:11:17:54 +0900] Address found of hana_log_backups_h80_t020_xdp
[14/Sep/2018:11:17:55 +0900] ********** Displaying Mount Points by Volume **********
172.18.20.241:/hana_data_h80_mnt00001_t020_xdp   /hana/data/H80/mnt00001   nfs
    rw,bg,hard,timeo=600,vers=4,rsize=1048576,wsize=1048576,intr,noatime,lock 0
0
172.18.20.241:/hana_data_h80_mnt00002_t020_xdp   /hana/data/H80/mnt00002   nfs
    rw,bg,hard,timeo=600,vers=4,rsize=1048576,wsize=1048576,intr,noatime,lock 0
0
172.18.20.241:/hana_data_h80_mnt00003_t020_xdp   /hana/data/H80/mnt00003   nfs
    rw,bg,hard,timeo=600,vers=4,rsize=1048576,wsize=1048576,intr,noatime,lock 0
0
172.18.20.241:/hana_log_backups_h80_t020_xdp   /hana/logbackups/H80_T250   nfs
    rw,bg,hard,timeo=600,vers=4,rsize=1048576,wsize=1048576,intr,noatime,lock 0
0
[14/Sep/2018:11:17:55 +0900] ****************************************************
[14/Sep/2018:11:17:55 +0900] ********** HANA DR Recovery Steps *********
1. Ensure ALL the target mount points exist (e.g. mkdir /hana/logbackups/H99_SOU
RCE).
2. Add Mount Point Details into /etc/fstab of DR Server.
3. Mount newly added filesystems.
4. Perform HANA Snapshot Recovery using HANA Studio.
[14/Sep/2018:11:17:55 +0900] ****************************************
[14/Sep/2018:11:17:55 +0900] Command completed successfully.
[14/Sep/2018:11:17:55 +0900] Log file created at
./snapshotLogs/FullDR.h80.20180914_1116.txt
```

Step5: Execute the command "**umount**" to unmount the necessary mountpoints.

```
# umount  <Mount point>
```

Unmount the data and logbackup mountpoints. Please note, you may have multiple data mountpoint in the scale-out scenario.

Step6: Modify the file **"/etc/fstab**" to comment out the data and logbackups entries for the primary SID (In this example, SID=H80) and add the new mount point entries created from the Primary site DR volumes. The new mount point entries are provided in the script output.

- Comment out the existing mount points running on the DR site:

```
#172.18.20.241:/hana_data_h80_mnt00001_t020_vol       /hana/data/H80/mnt00001       nfs
rw,hard,timeo=600,vers=4,rsize=1048576,wsize=1048576,intr,noatime,lock 0 0
#172.18.20.241:/hana_log_backups_h80_t020   /hana/logbackups/H80   nfs
rw,bg,hard,timeo=600,vers=4,rsize=1048576,wsize=1048576,intr,noatime,lock 0 0
```

- Add the following lines to fstab → this is a same output from the script

```
172.18.20.241:/hana_data_h80_mnt00001_t020_dp   /hana/data/H80/mnt00001   nfs
rw,bg,hard,timeo=600,vers=4,rsize=1048576,wsize=1048576,intr,noatime,lock 0 0
172.18.20.241:/hana_log_backups_h80_t020_dp   /hana/logbackups/H80   nfs
rw,bg,hard,timeo=600,vers=4,rsize=1048576,wsize=1048576,intr,noatime,lock 0 0
```

Step7: Execute the command "**mount –a** "to mount all the mount points

```
# mount -a
```

Terminal session

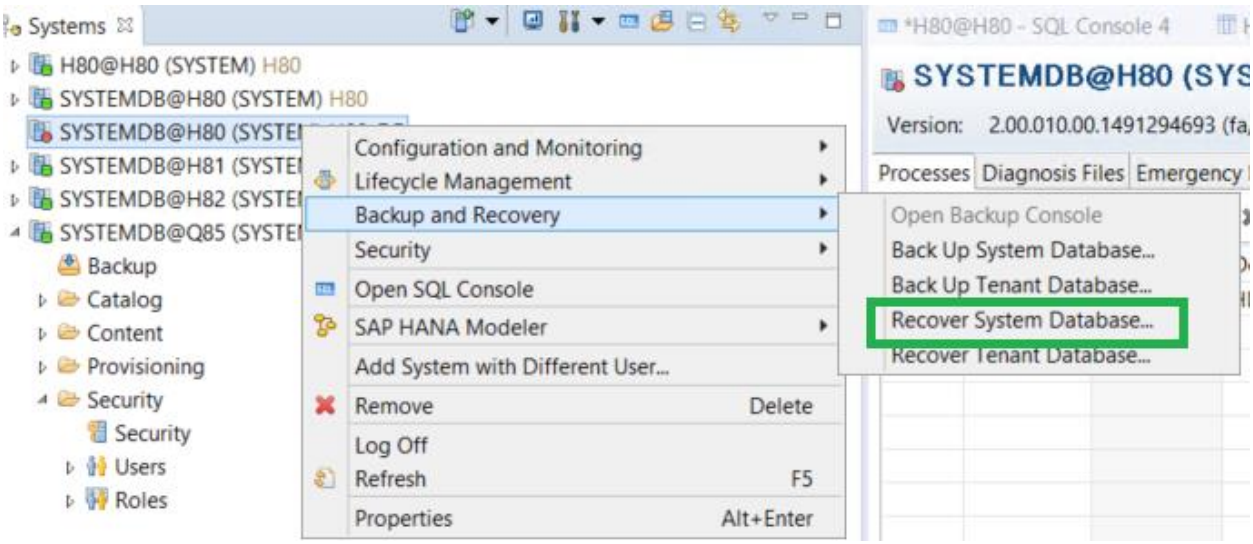
```
#  mount -a
#
```

Now, If you execute “df –h” you should see the *_dp volumes mounted.

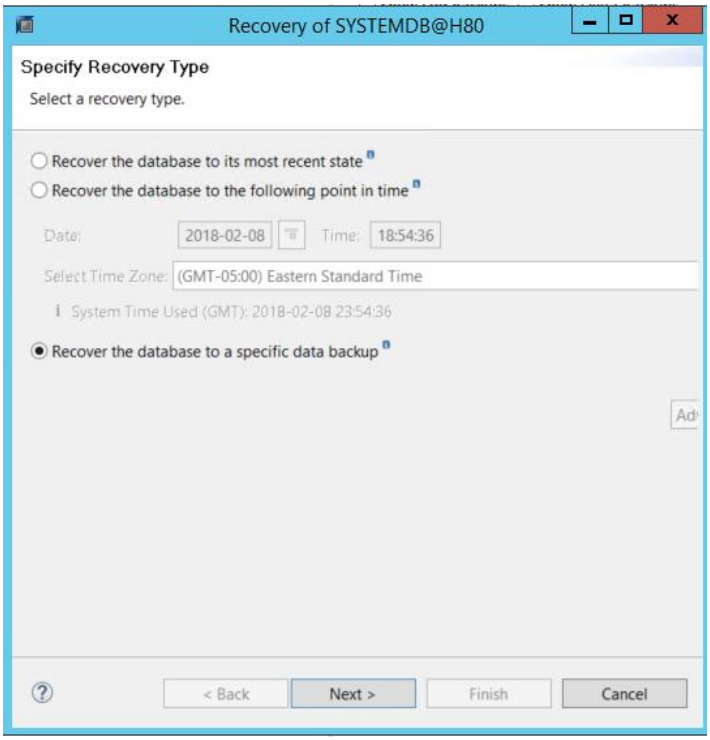
Terminal session

```
#  df -h
Filesystem                                              Size  Used Avail Use% Mounted
on
devtmpfs                                                378G  8.0K  378G   1% /dev
tmpfs                                                   569G     0  569G   0%
/dev/shm
tmpfs                                                   378G   18M  378G   1% /run
tmpfs                                                   378G     0  378G   0%
/sys/fs/cgroup
/dev/mapper/3600a098038304445622b4b584c575a66-part2      47G   20G   28G  42% /
/dev/mapper/3600a098038304445622b4b584c575a66-part1     979M   57M  856M   7% /boot
172.18.20.241:/hana_log_h80_mnt00003_t020_vol           512G  2.1G  510G   1%
/hana/log/H80/mnt00003
172.18.20.241:/hana_log_h80_mnt00001_t020_vol           512G  5.5G  507G   2%
/hana/log/H80/mnt00001
172.18.20.241:/hana_data_h80_mnt00003_t020_vol          1.2T  332M  1.2T   1%
/hana/data/H80/mnt00003
172.18.20.241:/hana_log_h80_mnt00002_t020_vol           512G  2.1G  510G   1%
/hana/log/H80/mnt00002
172.18.20.241:/hana_data_h80_mnt00002_t020_vol          1.2T  300M  1.2T   1%
/hana/data/H80/mnt00002
172.18.20.241:/hana_data_h80_mnt00001_t020_vol          1.2T  6.4G  1.2T   1%
/hana/data/H80/mnt00001
172.18.20.241:/hana_shared_h80_t020_vol/usr_sap_node1   2.7T   11G  2.7T   1%
/usr/sap/H80
tmpfs                                                    76G     0   76G   0%
/run/user/0
172.18.20.241:/hana_shared_h80_t020_vol                 2.7T   11G  2.7T   1%
/hana/shared
172.18.20.241:/hana_data_h80_mnt00001_t020_xdp          1.2T  6.4G  1.2T   1%
/hana/data/H80/mnt00001
172.18.20.241:/hana_data_h80_mnt00002_t020_xdp          1.2T  300M  1.2T   1%
/hana/data/H80/mnt00002
172.18.20.241:/hana_data_h80_mnt00003_t020_xdp          1.2T  332M  1.2T   1%
/hana/data/H80/mnt00003
172.18.20.241:/hana_log_backups_h80_t020_xdp            512G   15G  498G   3%
/hana/logbackups/H80_T250
```

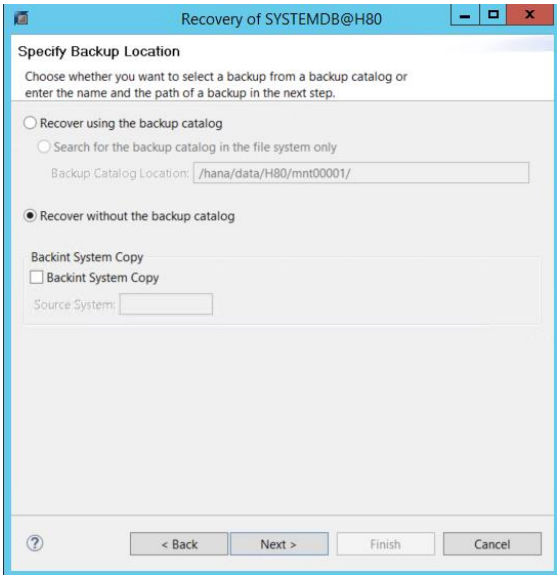
Step8: Recover the SYSTEMDB. From the HANA Studio, right click SYSTEMDB instance and chose “Backup and Recovery”, and then “Recover System Database”



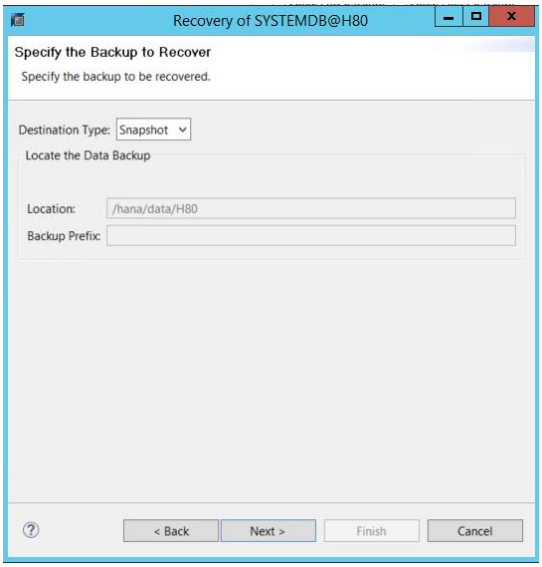
You can choose an option based on your recovery requirements. In this example, “Recover the database to a specific data backup”.



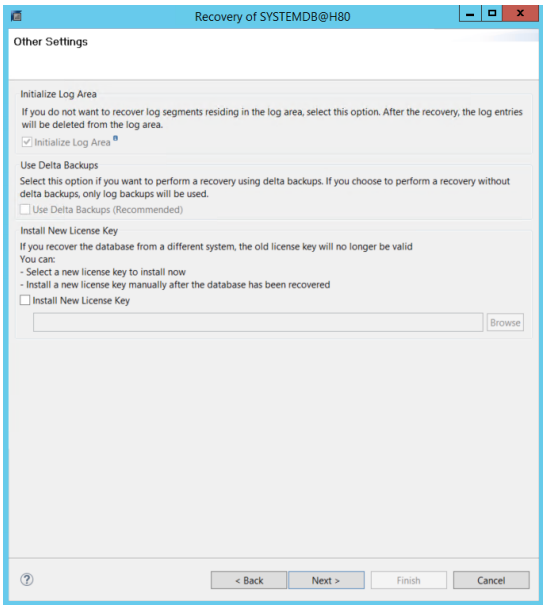
Specify the backup location. In this example, we chose “Recover without the backup catalog”.



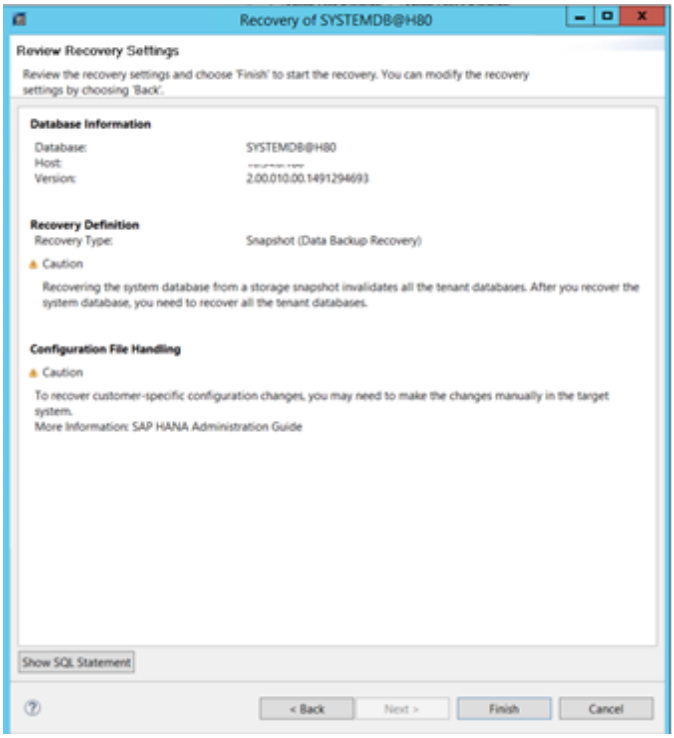
Select the destination type “Snapshot”.



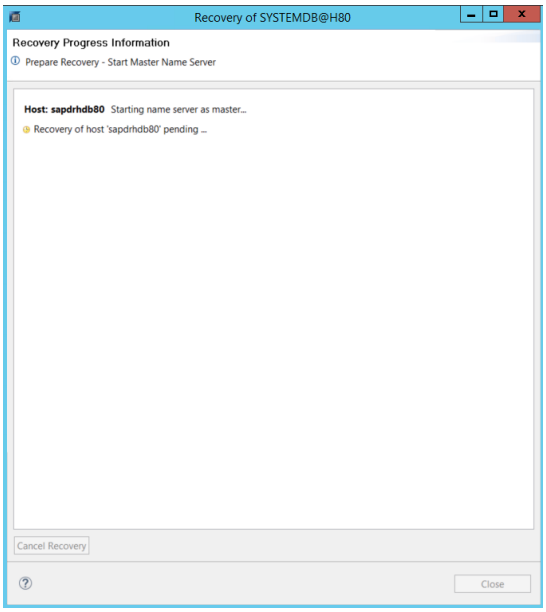
Select the “Initialize Log Area”.

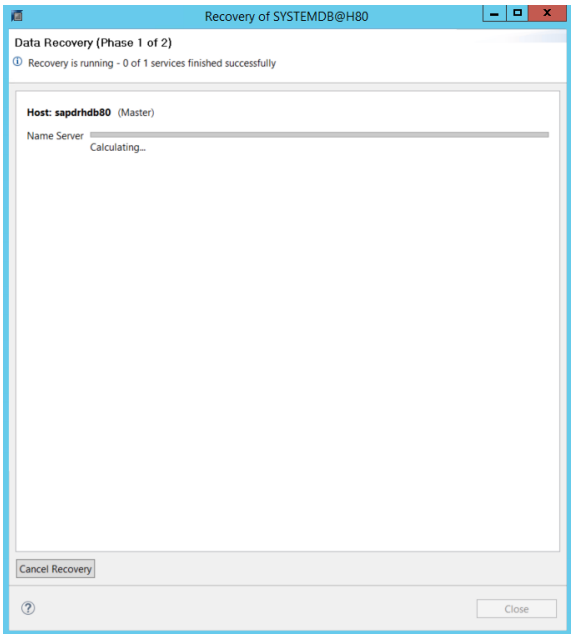


Review the details.

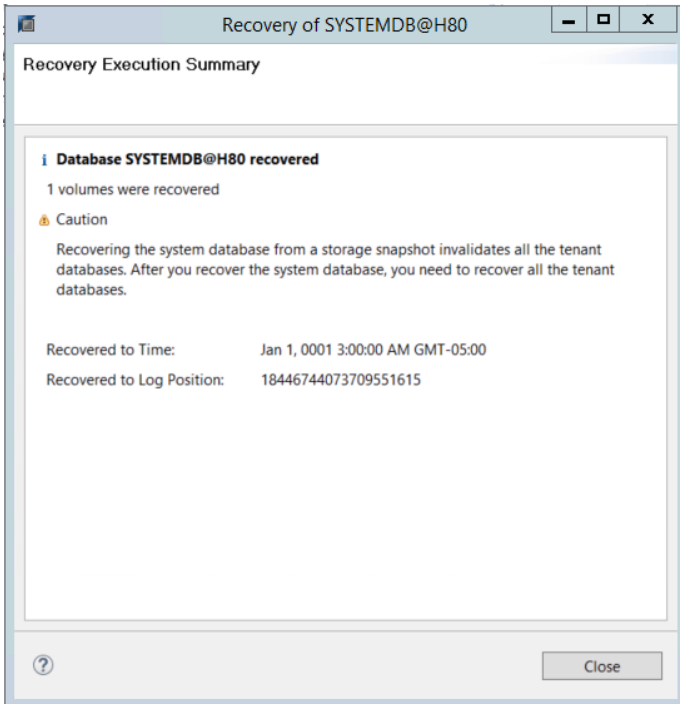


Recovery initiates.

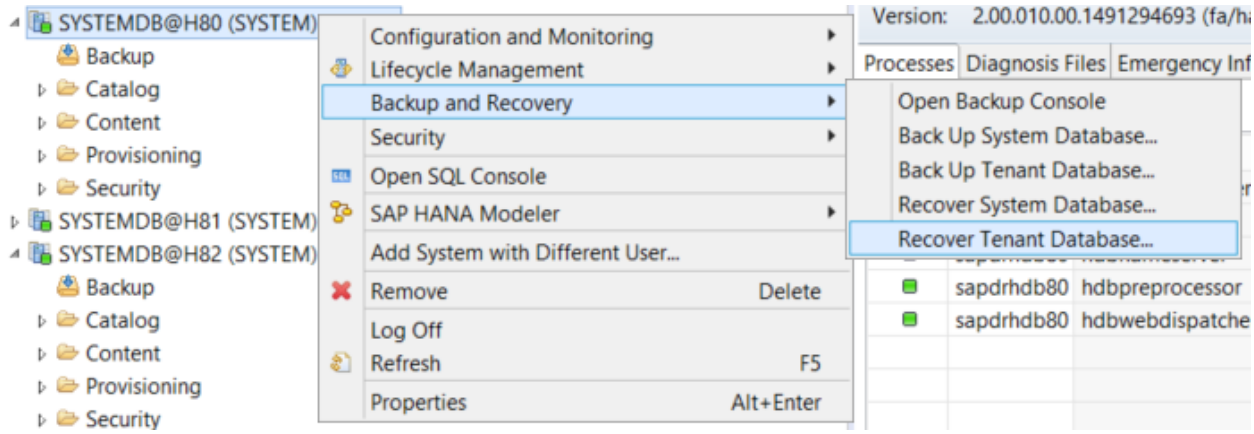




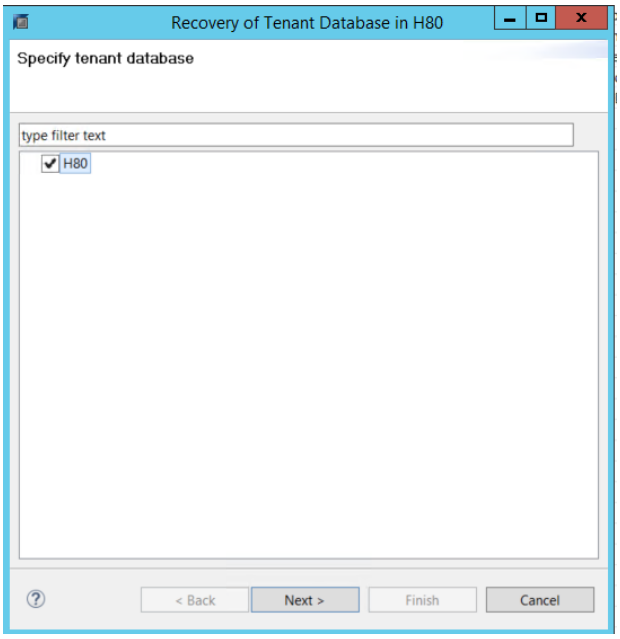
Recovery completed.



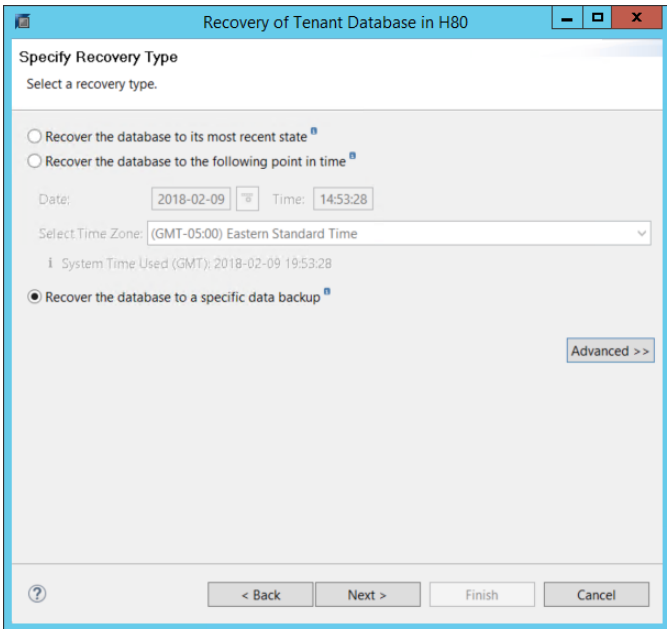
Step9: Recover the tenant database. From the HANA Studio, right click SYSTEMDB instance and chose "Backup and Recovery", and then "Recover Tenant Database".



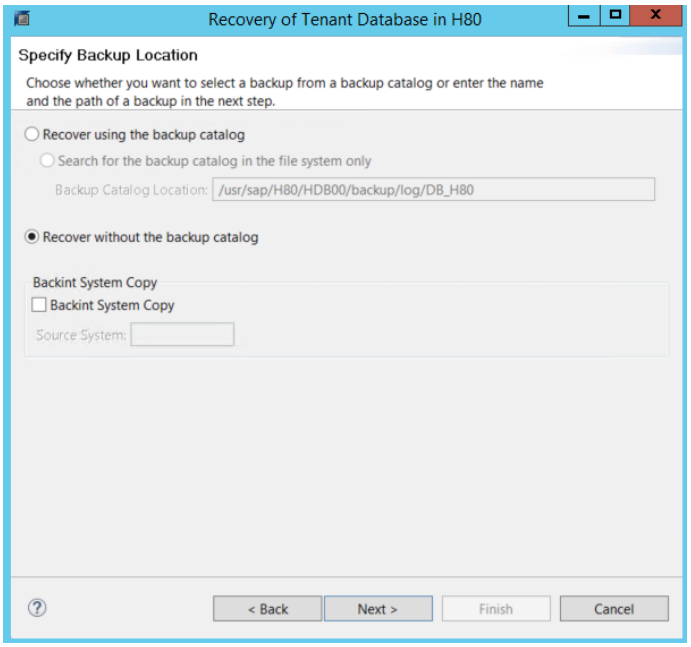
Select the tenant database.



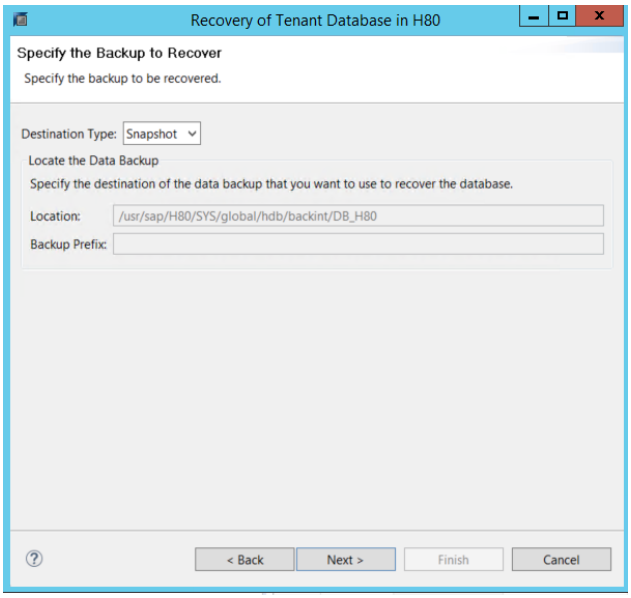
Select the recovery type. In this example, the option “Recover the database to a specific data backup” is selected.



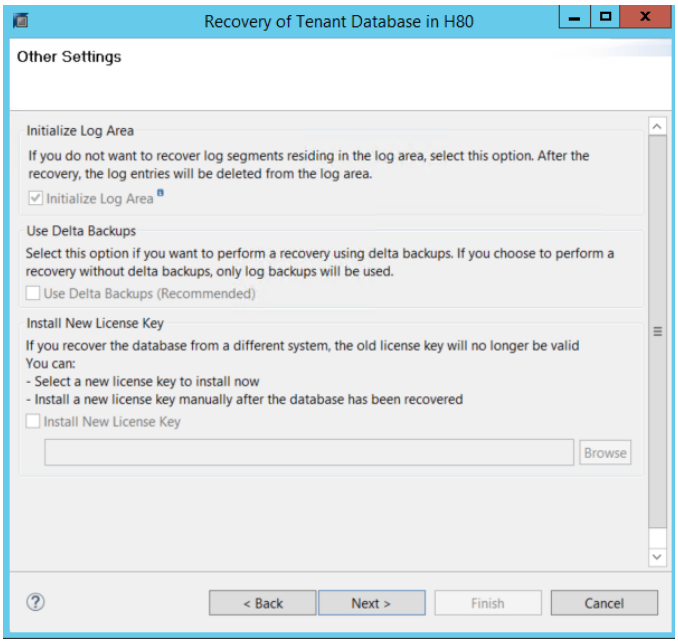
Select the backup location. In this example, the option “Recover without the backup catalog” is selected.



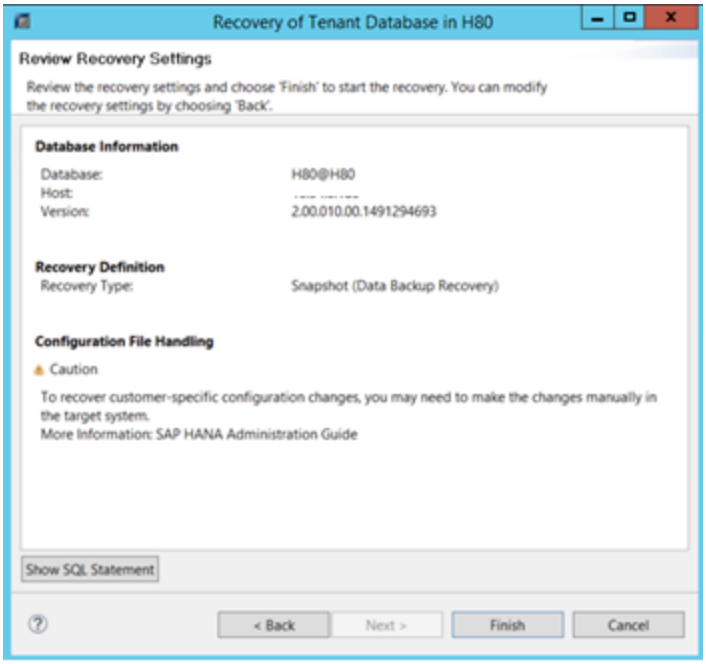
Select the destination type “Snapshot”.

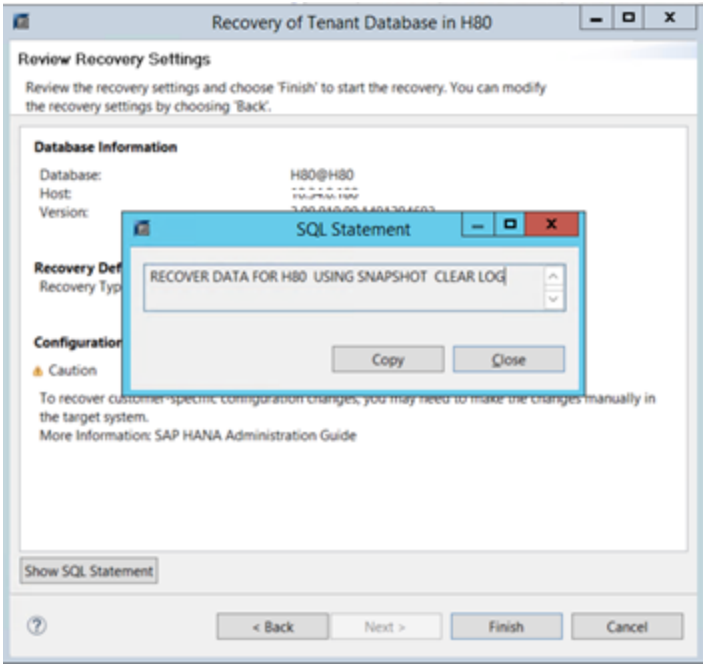


Ensure to select the “Initialize Log Area”. By default, this is selected and grated out.

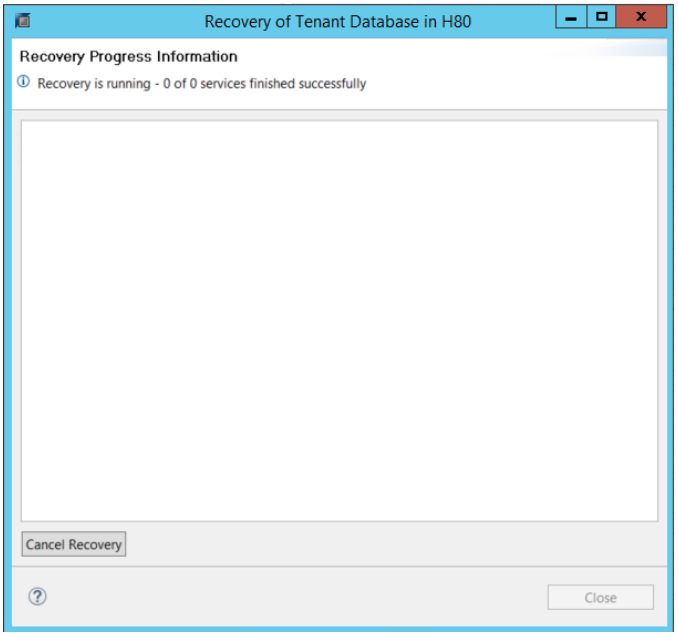


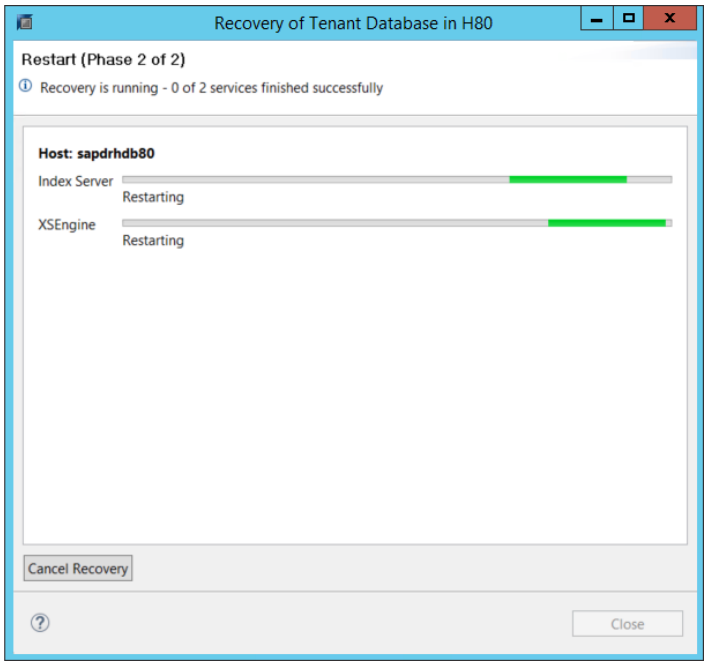
Review the settings.

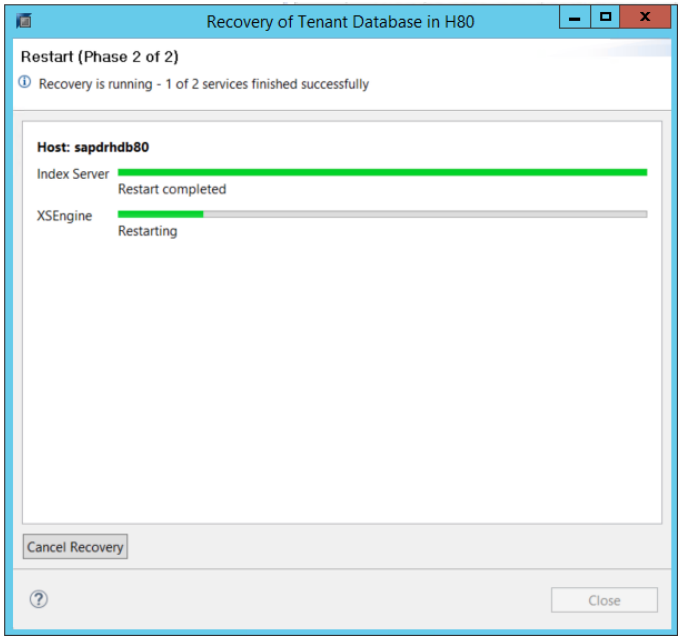




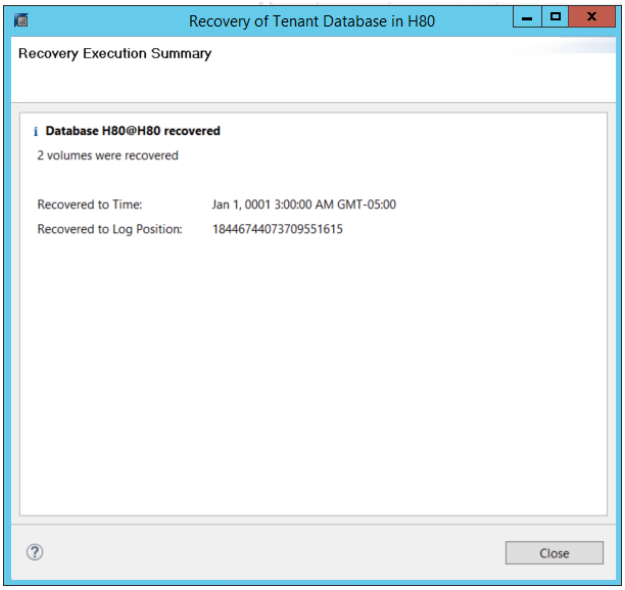
Recovery in progress.







Recovery of the tenant database complete.


Recovery of Tenant Database in H80
Recovery Execution Summary
Database H80@H80 recovered
2 volumes were recovered
Recovered to Time:
Jan 1, 0001 3:00:00 AM GMT-05:00
Recovered to Log Position:
18446744073709551615
Close

Troubleshooting

The following are the common issues that you may encounter while running the scripts. Please follow the resolution instructions mentioned to fix the issue. If you still encounter an issue, please open a Service Request from Azure portal and assign the request into the HANA large Instance queue, and Microsoft Operations team provides the necessary solution.

hdbuserstore location

You are looking to get the hdbuserstore location. It is found under /hana/shared/<SID>/hdbclient

Expected SID Storage Backup Name

You run a script *testHANAConnection.pl* and receive the following error:

```
sapprdhdb80:/hana/shared/H80/exe/linuxx86_64/hdb # ./testHANAConnection.pl
WARNING: Expected SID3 Storage Backup Name:
WARNING: Verify line 34 is correct. Exiting.
```

Solution: Please check if you have the proper SID information updated for each HANA instance you want a snapshot test conducted.

Terminal session

```
[14/Sep/2018:11:46:14 +0900] Checking HANA Status for H80
[14/Sep/2018:11:46:14 +0900] Detected MDC environment for H80.
[14/Sep/2018:11:46:14 +0900] Checking HANA Version with command: "./hdbsql -n
10.8.0.41 -i 00 -U SCADMIN "select version from sys.m_database"" ...
[14/Sep/2018:11:46:14 +0900] WARNING: Please check the following:
[14/Sep/2018:11:46:14 +0900] WARNING: HANA Instance is up and running.
[14/Sep/2018:11:46:14 +0900] WARNING: In an HSR Setup, this script will not function
on current secondary node.
[14/Sep/2018:11:46:14 +0900] WARNING: hdbuserstore user command was executed with
root
[14/Sep/2018:11:46:14 +0900] WARNING: Backup user account created in HANA Studio was
made under SYSTEM
[14/Sep/2018:11:46:14 +0900] WARNING: Backup user account and hdbuserstore user
account are case-sensitive
[14/Sep/2018:11:46:14 +0900] WARNING: The correct host name and port number are used
[14/Sep/2018:11:46:14 +0900] WARNING: The port number in 3(00)15 [for non-MDC] and
3(00)13 [for MDC] corresponds to instance number of 00 when creating hdbuserstore
user account
[14/Sep/2018:11:46:14 +0900] WARNING: **********Exiting
Script**********
[14/Sep/2018:11:46:14 +0900] Exiting with return code: 1
[14/Sep/2018:11:46:14 +0900] Command failed. Please check screen output or created
logs for errors.
[14/Sep/2018:11:46:14 +0900] Log file created at ./statusLogs/HANAStatus.2018-09-
14_1146.txt
```

Also try to run the command below to verify if the hdbsql command is located in the path and it can connect to the HANA Server.

```
sapprdhdb80:/hana/shared/H80/exe/linuxx86_64/hdb #./hdbsql -n 172.18.18.50 -i 00 -d SYSTEMDB -U SCADMIN "\s"
```

In this example, the hdbsql command isn't in the correct location.

```
Terminal session
# ./hdbsql -n 172.18.18.50  -i 00 -U SCADMIN "select version from sys.m_database"
./hdbsql: No such file or directory
```

In this example, the hdbsql command is copied to the correct path, and when run again shows the connection key hasn't been setup correctly with the "hdbuserstore Set" command (refer to SAP HANA documentation for details).

```
Terminal session
# cp /hana/shared/H80/exe/linuxx86_64/hdb/hdbsql .

# ./hdbsql -n 172.18.18.50 -i 00 -U SCADMIN "select version from sys.m_database"
* -10104: Invalid value for KEY (SCADMIN)
```

Storage check status command 'volume show -type RW -fields volume' failed: 65280

The script *testStorageSnapshotConnection.pl* fails with the following error

```
**********Checking access to Storage**********
WARNING: Storage check status command 'volume show -type RW -fields volume' failed: 65280
WARNING: Please check the following:
WARNING: Was publickey sent to Microsoft Service Team?
WARNING: If passphrase entered while using ssh-keygen, publickey must be re-created and passphrase must be left blank for both entries
WARNING: Ensure correct IP address was entered in HANABackupCustomerDetails.txt
WARNING: Ensure correct Storage backup name was entered in HANABackupCustomerDetails.txt
WARNING: Ensure that no modification in format HANABackupCustomerDetails.txt like additional lines, line numbers or spacing
WARNING: **********Exiting Script**********
sapprdhdb80:/hana/shared/H80/exe/linuxx86_64/hdb #
```

Solution: Please ensure that your storage IP address is correct. If still encounter an issue, please confirm the storage IP address with Microsoft operations team.

The authenticity of host '172.18.18.11 (172.18.18.11)' can't be established

You encounter the following message while running the testStorageSnapshotConnection.pl

```
Checking Snapshot Status for h80
**********Checking access to Storage**********
The authenticity of host '172.18.18.11 (172.18.18.11)' can't be established.
ECDSA key fingerprint is SHA256:QxamHRn3ZKbJAKnEimQpVVCknDSO9uB4c9Qd8komDec.
Are you sure you want to continue connecting (yes/no)?
```

Solution: The above error normally shows up when storage user has no access to the underlying storage. To check if you have access to storage using the storage user, please run the following command

```
# ssh -l <StorageBackupname> <Storage IP address>  ← actual command
# ssh -l clt1h80backup 172.18.18.11  ← example
```

Expected output is as following:

Terminal session

```
#   # ssh clt1h80backup@10.8.0.16 "volume show -fields volume"
vserver                          volume
-------------------------------- ------------------------------
osa33-hana-c01v250-client25-nprod hana_data_h80_mnt00001_t020_vol
osa33-hana-c01v250-client25-nprod hana_data_h80_mnt00002_t020_vol
```

Appendix - Changelog

The following lists changes made to the commands to provide new functionality or resolve defects.

Changes after v3.4 release

Published: Tue Oct 16 03:41:00 UTC 2018

azure_hana_backup.pl: updated to v3.4.1) Following fix apply to these scripts.
azure_hana_dr_failover.pl: updated to v3.4.1)
azure_hana_replication_status.pl: updated to v3.4.1)
azure_hana_snapshot_details.pl: updated to v3.4.1)
azure_hana_test_dr_failover.pl: updated to v3.4.1)
removeTestStorageSnapshot.pl: updated to v3.4.1)
testStorageSnapshotConnection.pl: updated to v3.4.1)

- Handle an environment where the HANA SID partially matches the Tenant ID (e.g. SID = H80 and Tenant ID = H800).

Changes in v3.4

ALL *.pl:

- Addition of Common Log Format to start of each line written to the logs when this script is run, for better telemetry.
- Moved $version to just below opening header comment to avoid duplicating the version number in the script and ensure version# is consistent.

azure_hana_backup.pl:

- Retry added to the runSSHDiagCmd function. Will try the to execute the command up to 4 times, with the wait in seconds between each attempt 7, 21, 63 seconds respectively.
- Now tests for HSR setup (new function runCheckHSRStatus), and if detects possibility of two nodes running as primary will exit without snapshot to avoid data snapshot taken on both nodes simultaneously.

azure_hana_test_dr_failover.pl:

- Move the message (“This clone is kept for 4 weeks before it is automatically removed.”) to the end of the output so it becomes part of the steps for customer to follow. Was at the start of the output and scrolled off the screen.
- Modify clone creation to thin provision the clone.
- Prompt for a contact email when doing the Test DR Failover to provide a customer contact to get confirmation it is ok to delete the clone.
- Add the contact email and an expiry date into the clone comment field for automated clone deletion 4 weeks from date of creation (see above).

azure_hana_dr_failover.pl:) Following fixes apply to both scripts.

azure_hana_test_dr_failover.pl:)

- Add capability to run DR failover against Scale-Out nodes.
- Ensure the latest HANA data snapshot volume is presented for recovery.
- Add log_backups volumes from both nodes for DR recovery of HSR configuration.
- Simplify the log backups mount point for non-HSR.
- Reduce display mount point output to only show the recovery volumes.
- Simplify guidance on mounting volumes for recovery when scripts complete.

Changes between release v3.3 and v3.4

Published: Wed Jul 11 03:31:03 UTC 2018

removeTestStorageSnapshot.pl: updated to v3.3.1

- Fix for two variables declared twice in script with "my $<var>" ($filename, $sshCmd), duplicate declarations removed.
- Fix missing my $LOG_CRIT declaration now added.

Published: Fri Jun 1 21:45:00 UTC 2018

azure_hana_backup.pl: updated to v3.3.2

- Fix for hostnames which contain a hyphen (-), this character is not allowed in the volume name, so is converted to underscore (_).
- For HSR HANA installs, restrict the scripts to only run against the volumes associated with the host they are being run from (i.e. where the volume name contains the same hostname).

Published: Wed May 30 01:43:37 UTC 2018

azure_hana_snapshot_delete.pl: updated to v3.3.1

- Fix for time calculation to prevent a snapshot being deleted if it is less than 10 minutes old, all time calculations moved to UTC.

testStorageSnapshotConnection.pl: updated to v3.3.1

- Script would sometimes fail the creation of the OS backups snapshot since a copy of that snapshot already existed with a given timestamp because of the placement of the calls for that script. Moved the OS backup calls to take place before creating snapshots for each of the SIDs.

Published: Mon May 28 07:34:45 UTC 2018

azure_hana_backup.pl: updated to v3.3.1

- Fix for "if ($numKeep le 0 or $numKeep gt 250)" to change string comparison to the correct number comparison (e.g. "if ($numKeep <= 0 or $numKeep > 250)").

Published: Fri May 25 17:00:00 UTC 2018

Script Bundle v3.3 Released