Technical Report

Optimizing SAP Lifecycle Management with NetApp Solutions for SAP HANA

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Abstract

This technical report describes the optimization of SAP lifecycle management with NetApp® storage technology and software integration products.

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1 Introduction

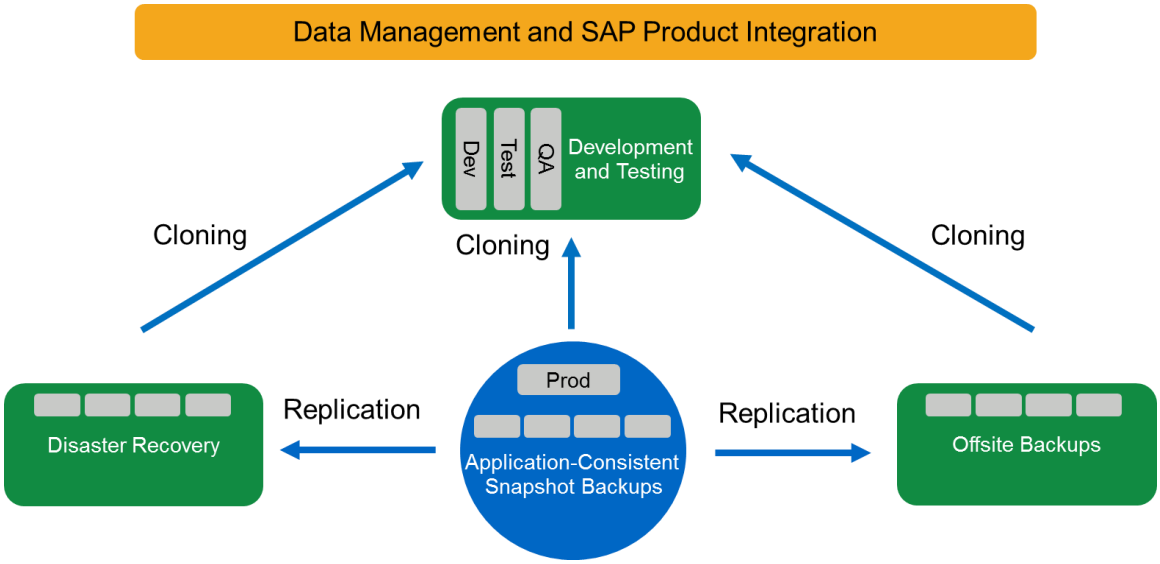
In today's dynamic business environment, companies must provide ongoing innovation and react quickly to changing markets. Under these competitive circumstances, companies who have implemented greater flexibility in their work processes can adapt to market demands more effectively.

Changing market demands also affect a company's SAP environments such that they require regular integrations, changes, and updates, and IT departments must implement these changes with fewer resources and over shorter time periods. Minimizing risk when deploying those changes requires thorough testing with quality assurance (QA) or test systems with actual production data.

Traditional SAP lifecycle-management approaches to QA and test-system provisioning are primarily based on manual processes. These manual processes are often error-prone and time-consuming, delaying innovation and the response to business requirements.

NetApp solutions for optimizing SAP lifecycle management are integrated into SAP HANA database and lifecycle management tools, combining efficient application data protection with the flexible provisioning of SAP test systems, as is shown in Figure 1.

Figure 1) Optimizing SAP lifecycle management by product integration.



1.1 The Core: Application-Consistent NetApp Snapshot Backups

The ability to create application-consistent NetApp Snapshot® backups on the storage layer is the core for all operations described in this document. Storage-based Snapshot backups are created by using the NetApp Snap Creator® plug-in for SAP HANA and interfaces provided by the SAP HANA database. Snap Creator registers Snapshot backups in the SAP HANA backup catalog so that the backups are visible within SAP HANA Studio and can be selected for restore and recovery operations.

Storage-based Snapshot backups provide significant advantages when compared with traditional backup approaches, including rapid backup and restore processes (less than a minute), no performance drain on HANA database servers, and no network load during the backup process.

1.2 Options: Data Protection: Off-Site Backups and/or Disaster Recovery

Application-consistent Snapshot backups can be replicated on the storage layer to an off-site backup site or a disaster recovery site controlled by Snap Creator. Replication is based on block changes and is

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therefore space and bandwidth efficient. In addition, different backup retention policies can be defined for backups on the primary and off-site backup sites.

1.3 Flexibility: Use Any Production Snapshot Copy for SAP System Provisioning

NetApp technology and software integration allows you to use any existing Snapshot copy of the production system as a source for an SAP system copy. This storage can be either the same storage that is used for the SAP production systems, the storage that is used for off-site backups, or the storage at the disaster recovery site. This flexibility allows you to separate development and test systems from production if required and also cover other situations, such as the testing of disaster recovery scenarios at the disaster recovery site.

1.4 Integration: Data Protection and Efficient SAP System Provisioning

There are various scenarios and use cases for the provisioning of SAP test systems and also different requirements for the level of automation. NetApp software products for SAP integrate into database and lifecycle management products from SAP to support different scenarios and levels of automation.

NetApp Snap Creator with the plug-in for SAP HANA is used to provision the required storage volumes based on an application-consistent Snapshot backup. SAP HANA Studio, SAP HANA Database Lifecycle Manager (HDBLCM), or SAP Software Provisioning Manager (SWPM) is used to perform the required changes on the target system to which the provisioned storage volumes have been attached. Depending on the use case, including SAP system copy, system clone, or system refresh, additional manual steps, such as SAP postprocessing, are required. More details are covered in the section “SAP System Copy Scenarios.”

A fully automated, end-to-end provision of SAP test systems can be performed by using SAP Landscape Virtualization Management (LVM). NetApp Storage Services Connector (SSC) integrates into SAP LVM and provides the required operations for SAP LVM at the storage layer.

NetApp Snap Creator and NetApp SSC support storage cloning used for disaster recovery or off-site backup at either the production storage or storage system level, as is shown in Figure 2.

1.5 Technology: Rapid, Space-Efficient Provisioning Based on Storage Cloning

NetApp FlexClone® copies provide space-efficient volume clones directly at the storage level in a manner completely transparent to the user. FlexClone copies are based on Snapshot copies and can be created in a matter of seconds without interrupting operations at the source volume. Because data is not copied but rather is referenced in place, the amount of storage required is limited to data that is changed at the source and the target system.

Figure 2 shows an architecture overview.

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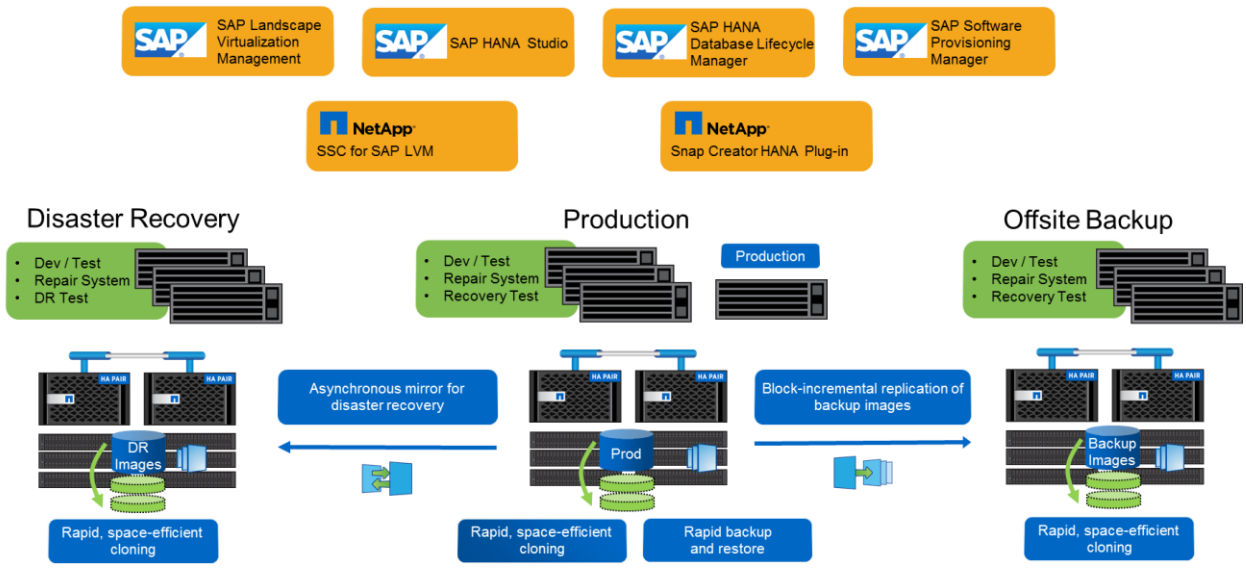
Figure 2) Architecture overview.



2 SAP System Copy Scenarios

SAP offers different products that can be used to clone, copy, or refresh SAP systems.

- **SAP HANA Studio**. Used to recover a target system from a storage Snapshot backup of a source system and change the system identifier (SID) of the target database during the recovery process. The target HANA database and the SAP application software have to be installed before a refresh can be executed. From the storage perspective, a Snapshot backup of the source data volumes is required. SAP postprocessing is not covered by SAP HANA Studio.
- **SAP HANA Database Lifecycle Manager**. Used to change the SID, instance number, and host name of an SAP HANA database. In this scenario, storage Snapshot backups of all volumes of the source system (data, log, and shared) are created, and FlexClone volumes are attached to the target system. The HANA database does not have to be preinstalled. HDBLCM performs all the required changes on the host, the profiles, and the database itself.
- **SAP Software Provisioning Manager.** Used to change the SID, instance number, and host name of an SAP system and HANA database, including the SAP application software. In this scenario, storage Snapshot backups of all volumes of the source system, HANA database volumes, and the SAP application software volumes are attached to the target system. No software must be preinstalled at the target system. SAP postprocessing is not covered by SWPM.
- **SAP Landscape Virtualization Management.** Provides end-to-end workflow automation to clone, copy, or refresh SAP systems. SAP LVM uses SWPM functionality and adds automated SAP processing. NetApp SSC integrates into SAP LVM to automate all required tasks at the storage layer.

Table 1 summarizes the different scenarios and key characteristics.

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Table 1) Overview: SAP system copy scenarios

	SAP System Refresh or HANA Database Refresh	Setup of New HANA Databases Based on Data from Source System	Setup of New SAP Systems and HANA Databases Based on Data from Source System	End-to-end Automated Setup of New SAP Systems and HANA Databases Based on Data from Source System
SAP tool or product	SAP HANA Studio	SAP HDBLCM	SAP SWPM	SAP LVM
NetApp software integration	Snap Creator HANA plug-in	Snap Creator HANA plug-in	Snap Creator HANA plug-in	NetApp SSC
HANA software must be preinstalled	Yes	No	No	No
SAP software must be preinstalled	Yes	N/A	No	No
Automated SAP postprocessing	No	N/A	No	Yes
Storage volumes that are cloned	HANA database data volume only	All HANA database volumes	All HANA databases and all SAP volumes	All HANA databases and all SAP volumes

2.1 SAP System Refresh with SAP HANA Studio

Figure 3 shows the workflow for an SAP system refresh with SAP HANA Studio. The SAP system PNW and the HANA database P01 are used as the source system for the refresh process. The target SAP system QNW and the target SAP HANA database Q01 must be preinstalled at the target system with the corresponding SAP installation software.

The NetApp Snap Creator HANA plug-in is configured to create storage-based Snapshot backups of the source HANA database, as is shown in step 3 of Figure 3. Snap Creator is also used to provision the FlexClone copy based on the selected storage Snapshot copy and to mount this volume at the target system, as is shown in steps 4 and 5.

Finally, with SAP HANA Studio, the SID of the target system is adapted during the recovery process. When the recovery is finished, the SAP system can be started, and the SAP postprocessing must be executed. A detailed description of this process can be found in the section “SAP System Refresh with SAP HANA Studio.”

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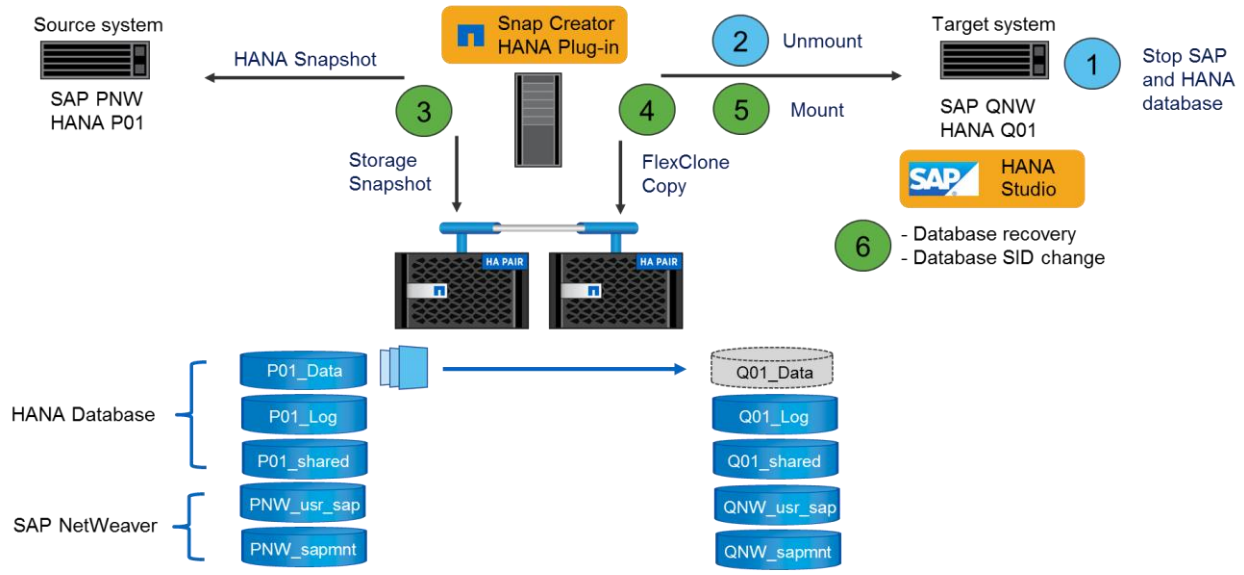
Figure 3) SAP system refresh with SAP HANA Studio.



2.2 SAP HANA Database Copy with SAP HANA Database Lifecycle Manager

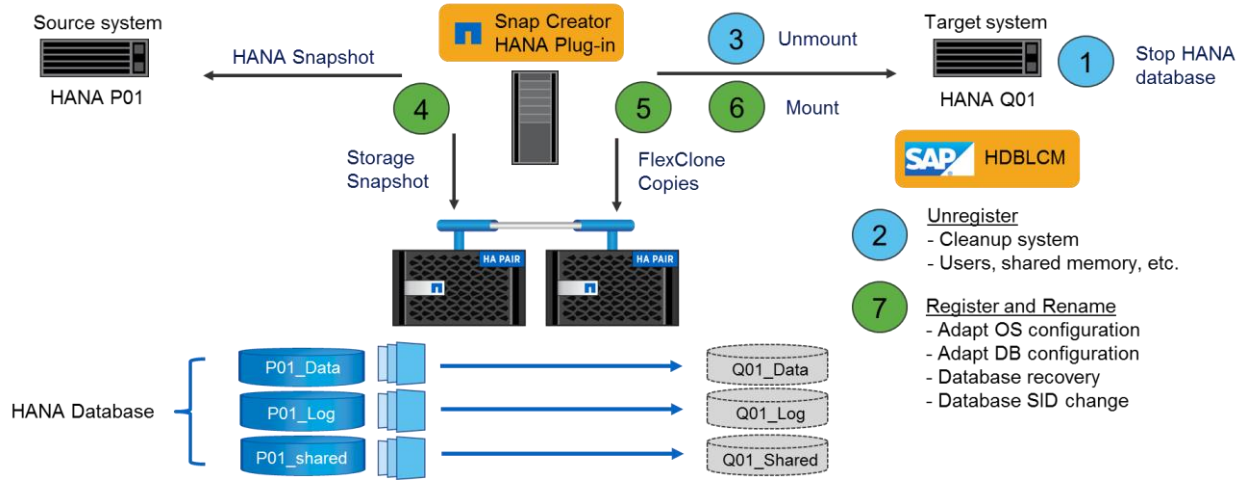
Figure 4 shows the workflow for the setup of a new SAP HANA database, based on data from a source system using SAP HANA database lifecycle manager.

The HANA database P01 is used as the source system for the copy process. The target SAP HANA database should be Q01. At the target system, the SAP host agent must be installed before the first copy process can be executed.

The NetApp Snap Creator HANA plug-in is configured to create storage-based Snapshot backups of the source HANA database, as is shown in step 4 of Figure 4. Snap Creator is also used to provision the FlexClone copies based on the selected storage Snapshot copy and to mount the volumes on the target system, as is shown in steps 5 and 6.

HDBLCM is used to adapt the operating system (OS) and database configuration, to change the SID, and to recover the database at the target system. A detailed description can be found in the section “Database Copy with SAP HANA Database Lifecycle Manager.”

Figure 4) Provisioning a new HANA database with SAP HDBLCM.



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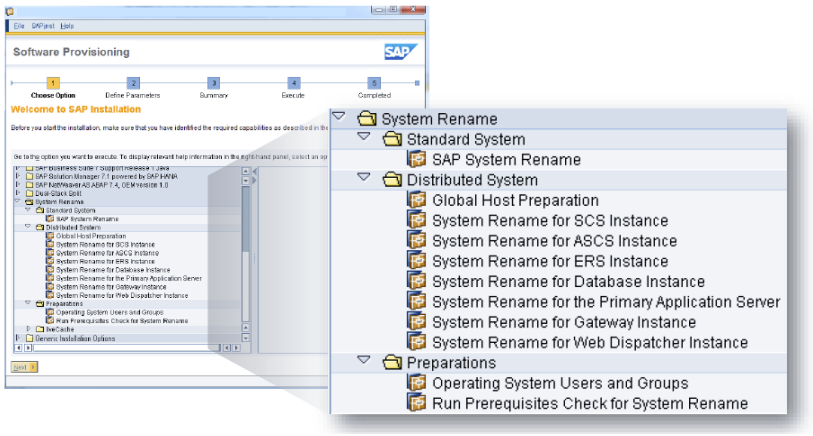
2.3 SAP System and SAP HANA Database Copy with SAP SWPM

Figure 6 shows the workflow for an SAP system copy with SAP SWPM. The SAP system PNW and the HANA database P01 are used as the source system for the copy process. There is no need to do any preinstallation at the target system.

The NetApp Snap Creator HANA plug-in is configured to create storage-based Snapshot backups of the source HANA database, as is shown in step 1 of Figure 6. Snap Creator is also used to provision the FlexClone copies based on the selected storage Snapshot copy and to mount the volumes at the target system, as is shown in step 2.

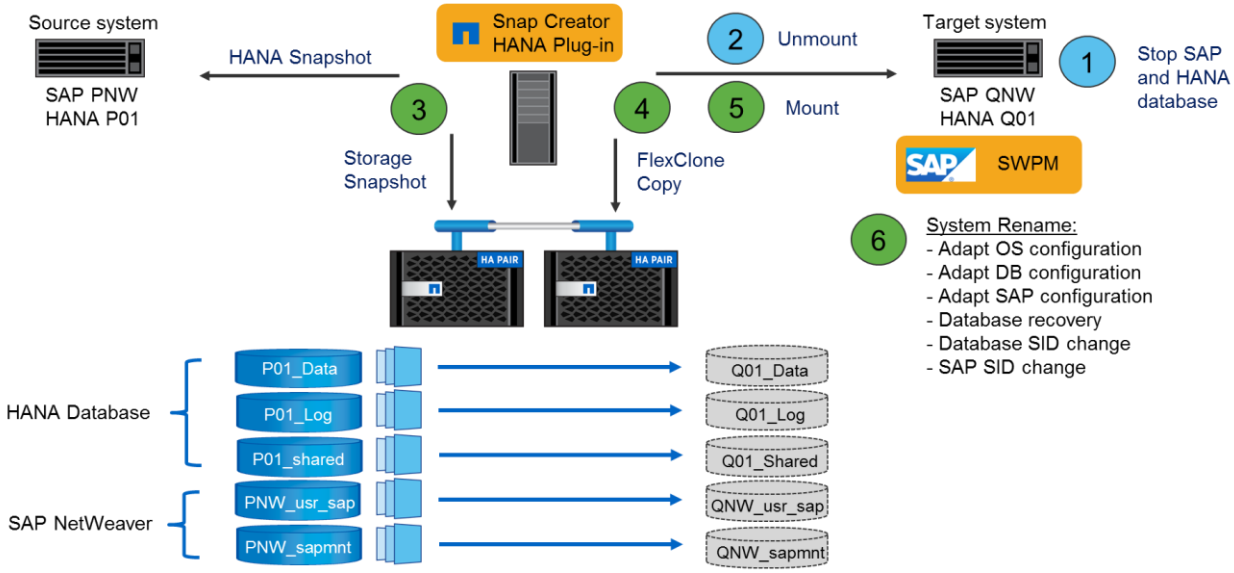
Finally, SAP SWPM is used to execute all the required changes at the OS, database, and SAP layers by using the System Rename dialog, as is shown in Figure 5.

Figure 5) SWPM system rename.



SAP postprocessing is not performed by SWPM and must be performed manually. A detailed description of SAP system copy with SAP SWPM is not covered in this document.

Figure 6) Provisioning of a new SAP system and HANA database with SAP SWPM.



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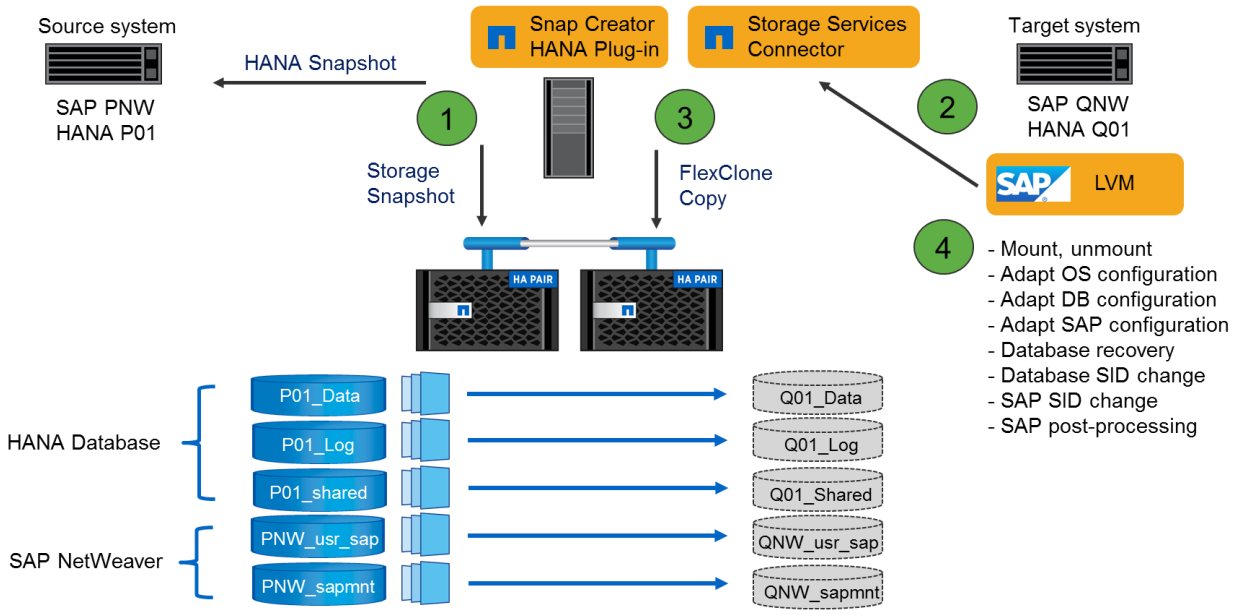
2.4 SAP System and SAP HANA Database Copy with SAP LVM

Figure 7 shows the workflow for an SAP system copy with SAP LVM. The SAP system PNW and the HANA database P01 are used as the source system for the copy process. There is no need to do any preinstallation at the target system.

The NetApp Snap Creator HANA plug-in is configured to create storage-based Snapshot backups of the source HANA database, as is shown in step 1 of Figure 6. A system copy can be created either by using an existing Snapshot backup or by creating a new on-demand backup with SAP LVM.

NetApp SSC is the software integration into SAP LVM, which executes all required storage commands for Snapshot copies and cloning, for example. SAP LVM controls the mount commands at the target system and also executes all of the required changes at the OS, database, and SAP layers. SAP LVM also automates SAP postprocessing and thus offers end-to-end automation.

Figure 7) Provisioning of a new SAP system and HANA database with SAP LVM.



For a detailed description of SAP system copy with SAP LVM, refer to TR-4018: Integrating NetApp FAS with SAP Landscape Virtualization Management.

3 Snap Creator and HANA Plug-In Configuration

Figure 8 shows the lab setup used for this document. The source system for the SAP system copy is PNW with the SAP HANA database P01. The target system is QNW with the HANA database Q01. Both systems have been installed with HDBLCM and SWPM.

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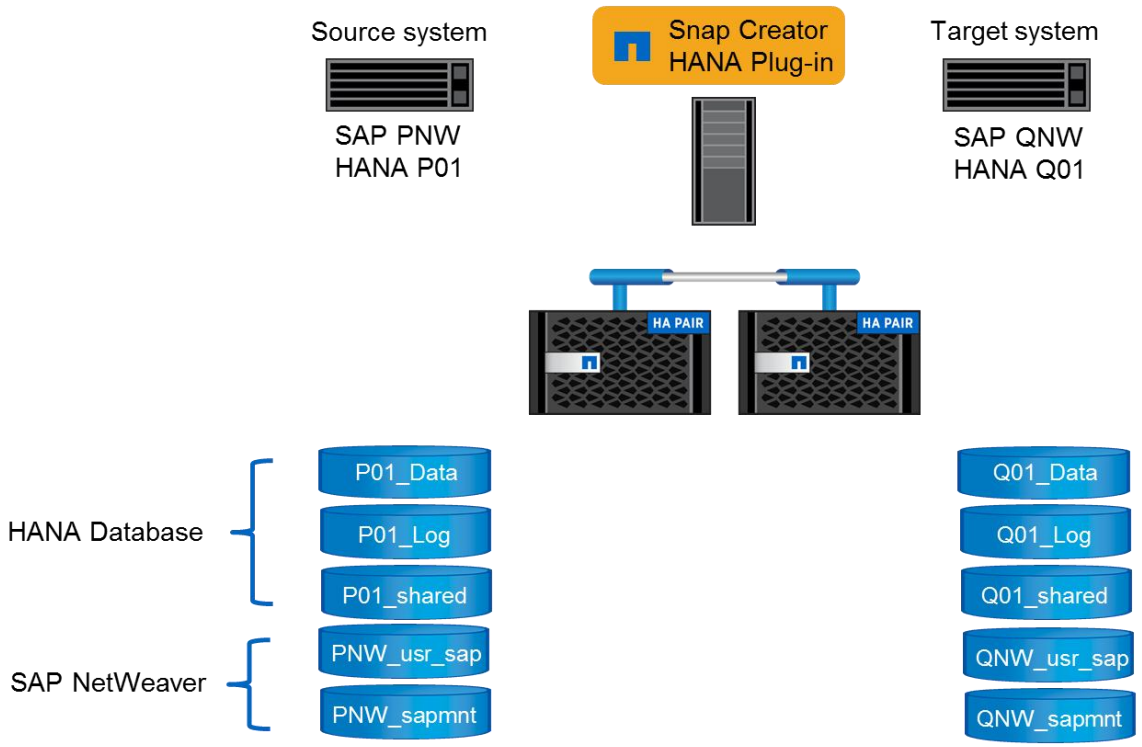
Figure 8) Lab setup.



Snap Creator is used to create storage-based Snapshot backups of the system P01.

A detailed description of how to configure Snap Creator and the SAP HANA plug-in can be found in TR-4313: SAP HANA Backup and Recovery Using Snap Creator.

4 SAP System Refresh with SAP HANA Studio

To refresh the target SAP system with HANA Studio, complete the following steps:

1. Stop the target SAP system and the target HANA database.
2. With Snap Creator, unmount the FlexClone volume from the target system and delete the volume at the storage layer.
3. With Snap Creator, create a new storage-based Snapshot backup of the source system. This backup is only required if an existing Snapshot backup cannot be used.
4. With Snap Creator, create a new FlexClone volume based on a selected Snapshot backup of the data volume of the source system.
5. Mount the FlexClone volume at the target system.
6. Change the SID and recover the HANA database by using SAP HANA Studio.

Figure 9 shows the workflow of the SAP system refresh with SAP HANA Studio.

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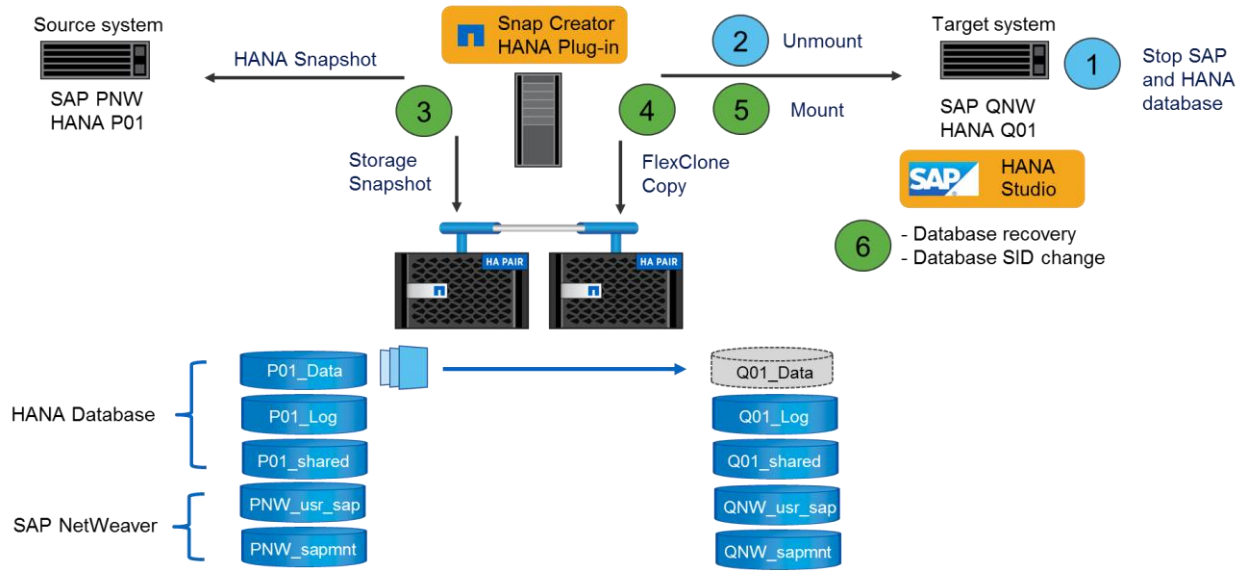
Figure 9) SAP system refresh with SAP HANA Studio.



4.1 Configuration for Creation of FlexClone Volumes

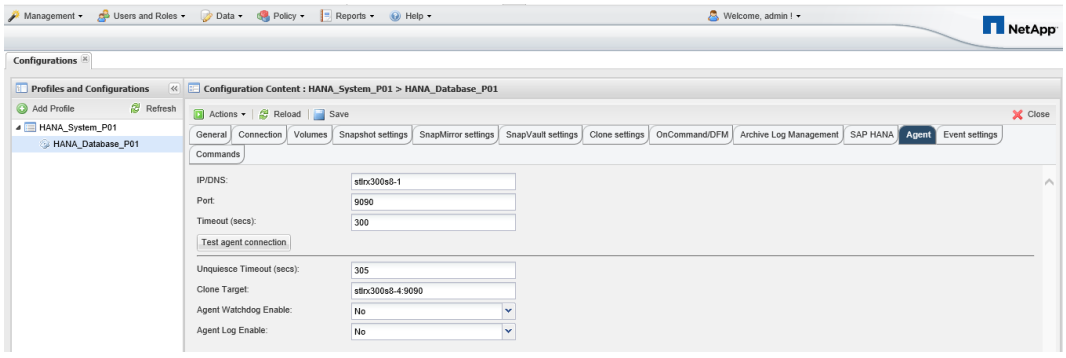
To use Snap Creator to provision a FlexClone volume of the data volume, the Snap Creator software must be installed on the target system, and the Snap Creator Agent must be started.

The configuration is done with the following steps:

1. Configure the agent within the Snap Creator configuration.
2. Configure mount and umount commands within the Snap Creator configuration file.
3. Create mount and umount scripts accessible at the target system.

Within the Snap Creator configuration for system P01 in the agent configuration, the target system agent and port must be included as the clone target, as is shown in Figure 10.

Figure 10) Target system agent configuration.



Within the configuration file of the source system P01 on the Snap Creator server host, the mount and umount commands must be defined, as is shown later in this document. When the `CLONETARGET` parameter is added as a prefix to the mount and umount command, the commands are executed at the target system.

```
stlrx300s8-1: # vi
/opt/NetApp/SnapCreator/scServer4.1.1/engine/configs/HANA_System_P01/HANA_Database_P01.conf
```

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```
……..
……..
#########################################################################################################
########################
#     APP Commands                                                                                      #
#########################################################################################################
########################
APP_QUIESCE_CMD01=
MOUNT_CMD01=CLONETARGET:/mnt/hwval/System-Copy/mount-Q01.sh HANA_Database_P01 $VOLUMES $SNAP_TIME
APP_UNQUIESCE_CMD01=
ARCHIVE_CMD01=
UMOUNT_CMD01=CLONETARGET:/mnt/hwval/System-Copy/umount-Q01.sh
……..
……..
```

The following examples depict the mount and umount scripts that must be available at the target system.

Mount Script

```
stlrx300s8-4:/hana/data/Q01 # cat /mnt/hwval/System-Copy/mount-Q01.sh

#!/bin/bash
STORAGE="192.168.173.101"
SOURCE_VOLUME=`echo $2 | awk -F ":" '{print $2}'`
PREFIX="cl"
SNAP_TIME=$3
CONFIG_NAME=$1

MOUNT_OPTIONS="-t nfs -o
rw,vers=3,hard,timeo=600,rsize=65536,wsize=65536,intr,actimeo=0,noatime,nolock"
MOUNT_POINT="/hana/data/Q01/mnt00001"

MOUNT_CMD="mount $MOUNT_OPTIONS $STORAGE":/"$PREFIX"_"$CONFIG_NAME"_"$SOURCE_VOLUME"_"$SNAP_TIME
$MOUNT_POINT"
echo $MOUNT_CMD >> /tmp/mount-Q01.txt

$MOUNT_CMD
exit $?
```

Umount Script

```
stlrx300s8-4:/mnt/hwval/System-Copy # cat /mnt/hwval/System-Copy/umount-Q01.sh

#!/bin/bash

MOUNT_POINT="/hana/data/Q01/mnt00001"

MOUNT_CMD="umount $MOUNT_POINT"
echo $MOUNT_CMD >> /tmp/mount-Q01.txt

$MOUNT_CMD
exit $?
```

4.2 Unmount FlexClone Volume from theTarget System

Before starting the umount operation with Snap Creator, the SAP system and the HANA database must be stopped. In the list of backups in the Snap Creator GUI, the backup used for the previous SAP system copy is shown as “busy, vclone,” as is shown in Figure 11.

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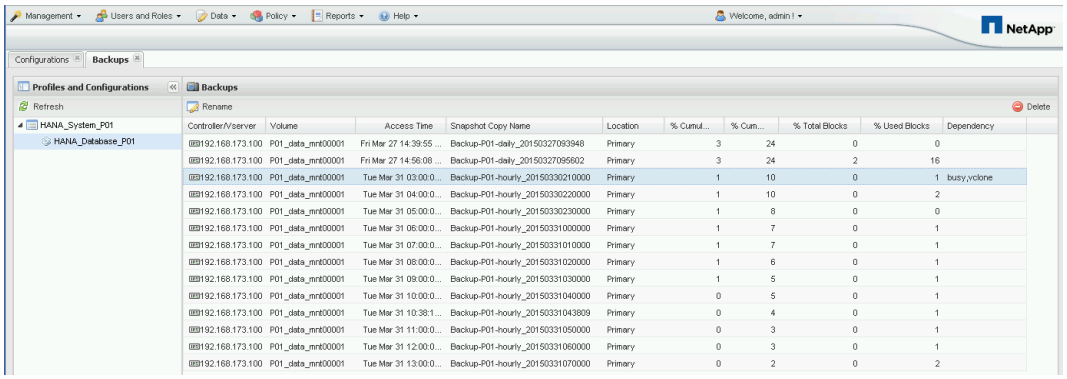
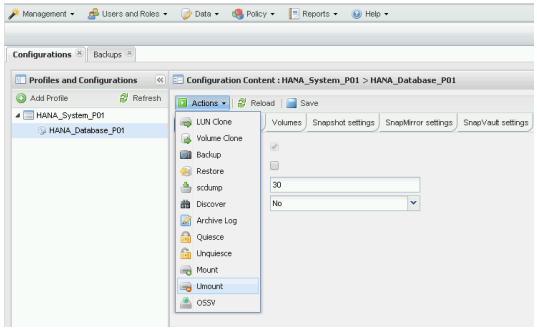
Figure 11) Snap Creator list of backups from source system.



To unmount the FlexClone copy from the target system, complete the following steps:

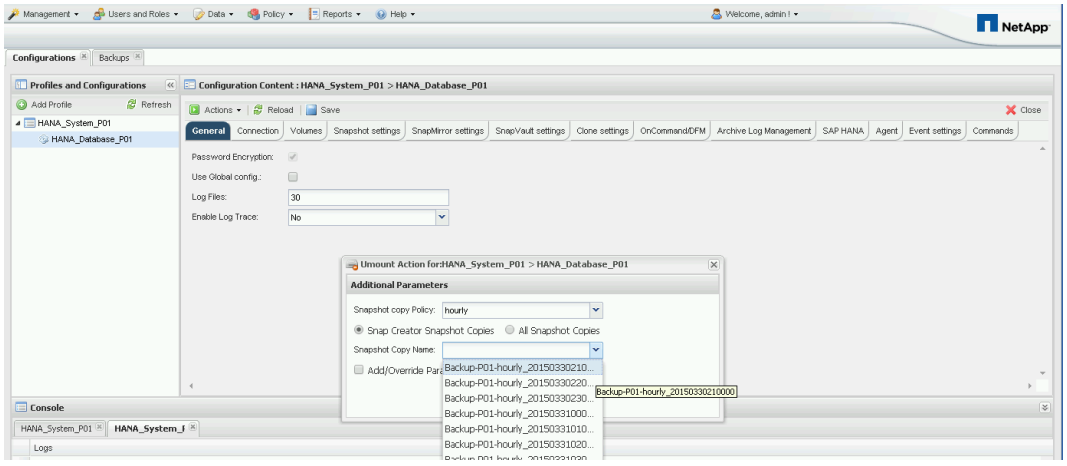
1. Under the Configuration tab, select Actions > Umount.

Figure 12) Snap Creator: Actions > Umount.



2. Select the Snapshot copy that has been used to create SAP system copy, as is shown in Figure 13.

Figure 13) Select Snapshot copy for umount action.



3. Figure 14 shows the log output of the umount operation with Snap Creator. The umount script that has been configured previously is executed at the target system. When the umount script finishes successfully, the FlexClone volume is deleted at the storage system.

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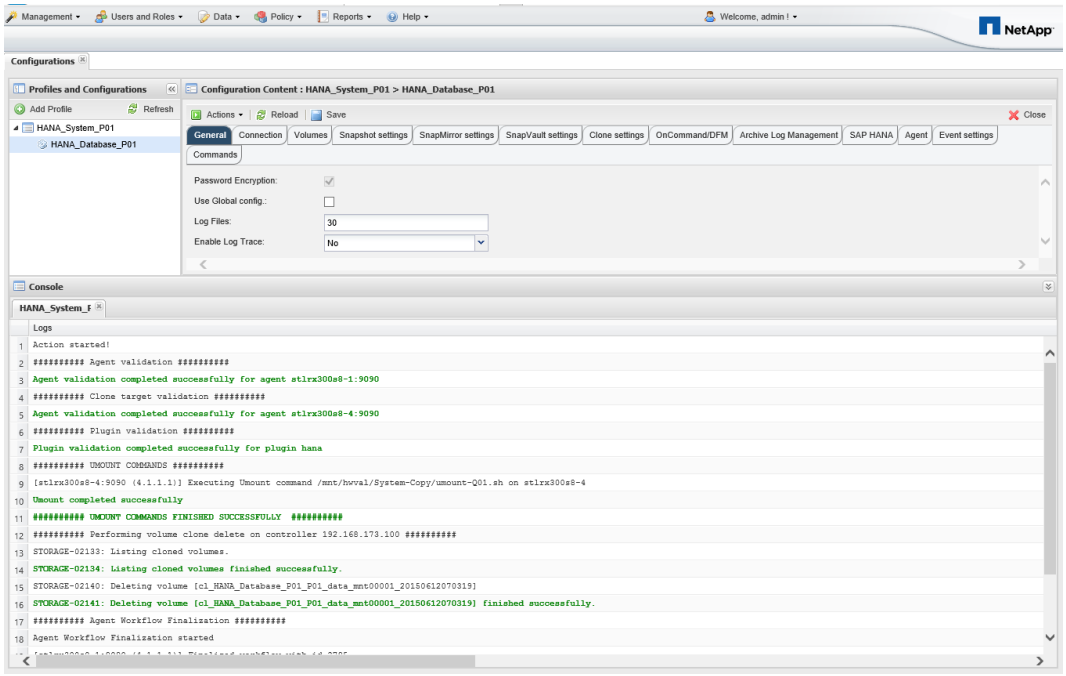
Figure 14) Snap Creator log output for umount operation.



4. After the umount operation, the data volume of the HANA database is no longer mounted at the target system. All other volumes for the SAP system QNW and the HANA database are still mounted.

```
stlrx300s8-4:/mnt/hwval/temp/systemcopy # df
Filesystem                              1K-blocks      Used Available Use% Mounted on
/dev/sda2                               285762056   6186556 278414232   3% /
udev                                     66043020       312  66042708   1% /dev
tmpfs                                   100663296       792 100662504   1% /dev/shm
192.168.173.101:/hana_shared           1073741824 536620864 537120960  50% /hana/shared
192.168.173.101:/Q01_usr_sap             52428800       256  52428544   1% /usr/sap/Q01
192.168.173.101:/QNW_usr_sap             52428800   2538752  49890048   5% /usr/sap/QNW
192.168.173.101:/trans                   52428800       256  52428544   1% /usr/sap/trans
192.168.173.104:/Q01_log_mnt00001       155713536   4379840 151333696   3% /hana/log/Q01/mnt00001
192.168.173.101:/QNW_sapmnt              52428800    839232  51589568   2% /sapmnt/QNW
192.168.173.101:/log_backup             104857600   3828736 101028864   4% /mnt/log_backup
stlrx300s8-4:/mnt/hwval/temp/systemcopy #
```

4.3 Create and Mount FlexClone Copy on the Target System

To create and mount a FlexClone copy on the target system, complete the following steps:

1. Under the Configuration tab, select Actions > Mount.

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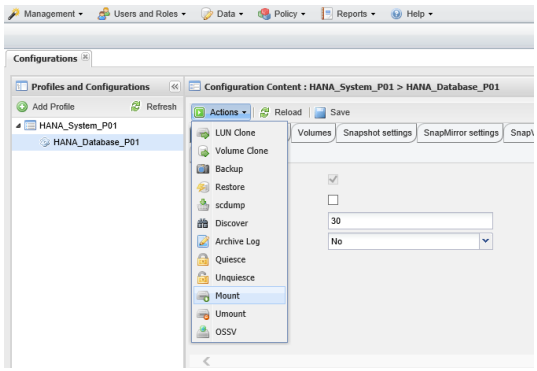
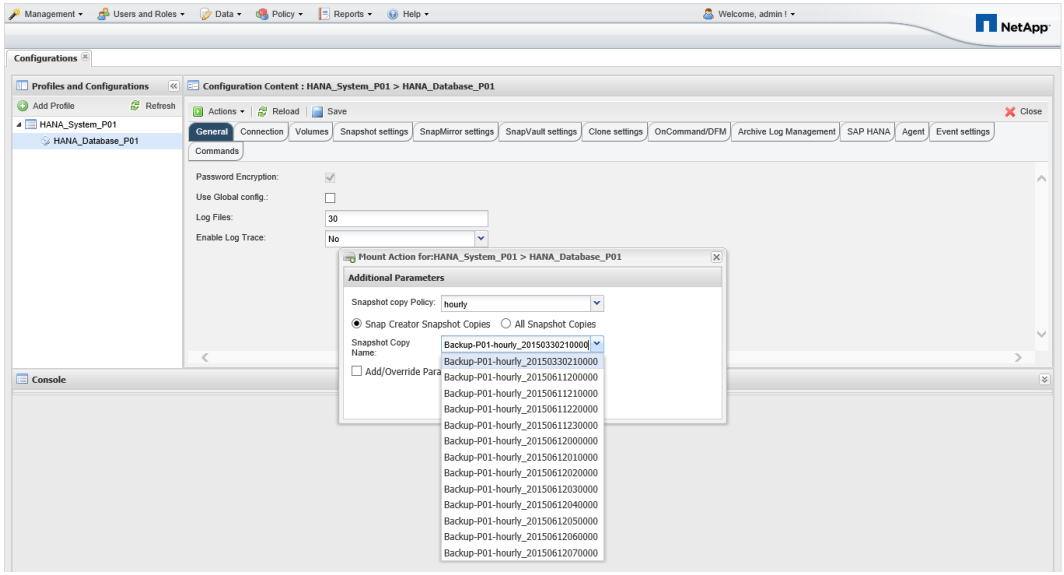
Figure 15) Snap Creator: Actions > Mount.



2. Select the Snapshot backup to refresh the target system.

Figure 16) Snapshot selection in mount operation.



3. Figure 17 shows the log output of the umount operation with Snap Creator. After creating the FlexClone volume based on the selected Snapshot backup, the mount script configured previously is executed at the target system.

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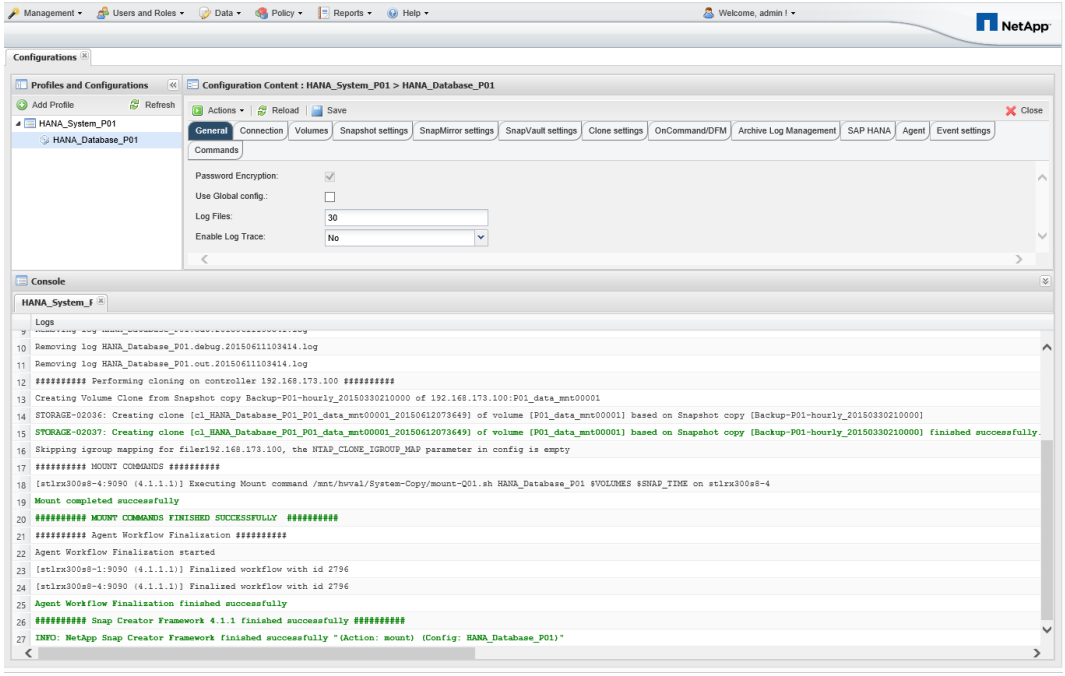
Figure 17) Snap Creator log output for mount operation.



4. After the mount operation, the data volume of the HANA database is mounted at the target system.

```
stlrx300s8-4:/hana/data/Q01 # df
Filesystem                                      1K-blocks      Used Available Use% Mounted on
/dev/sda2                                       285762056   6664152 277936636   3% /
udev                                             66043020       312  66042708   1% /dev
tmpfs                                           100663296       788 100662508   1% /dev/shm
192.168.173.101:/hana_shared                   1073741824 530215424 543526400  50% /hana/shared
192.168.173.101:/Q01_usr_sap                     52428800       320  52428480   1% /usr/sap/Q01
192.168.173.101:/QNW_usr_sap                     52428800   2550400  49878400   5% /usr/sap/QNW
192.168.173.101:/trans                           52428800       256  52428544   1% /usr/sap/trans
192.168.173.104:/Q01_log_mnt00001               155713536   4380224 151333312   3% /hana/log/Q01/mnt00001
192.168.173.101:/QNW_sapmnt                      52428800    839488  51589312   2% /sapmnt/QNW
192.168.173.101:/log_backup                     104857600   5267200  99590400   6% /mnt/log_backup
192.168.173.101:/cl_HANA_Database_P01_P01_data_mnt00001_20150331094218  157286400  14620544
142665856  10% /hana/data/Q01/mnt00001
stlrx300s8-4:/hana/data/Q01 #
```

5. The recovery of the target SAP HANA database Q01 can now be started in SAP HANA Studio by selecting Recover System.

4.4 Recover System with SAP HANA Studio

SAP HANA Studio is used to recover the system and change the SID of the database from P01 to Q01. To perform this process, complete the following steps:

Note: To expand automation, use the CLI for recovery and include the statement `HDBSettings.sh recoverSys.py [<parameter>]` in the mount script. For more information, refer to the SAP HANA Administration Guide.

1. Within HANA Studio, select Backup and Recovery > Recover System.

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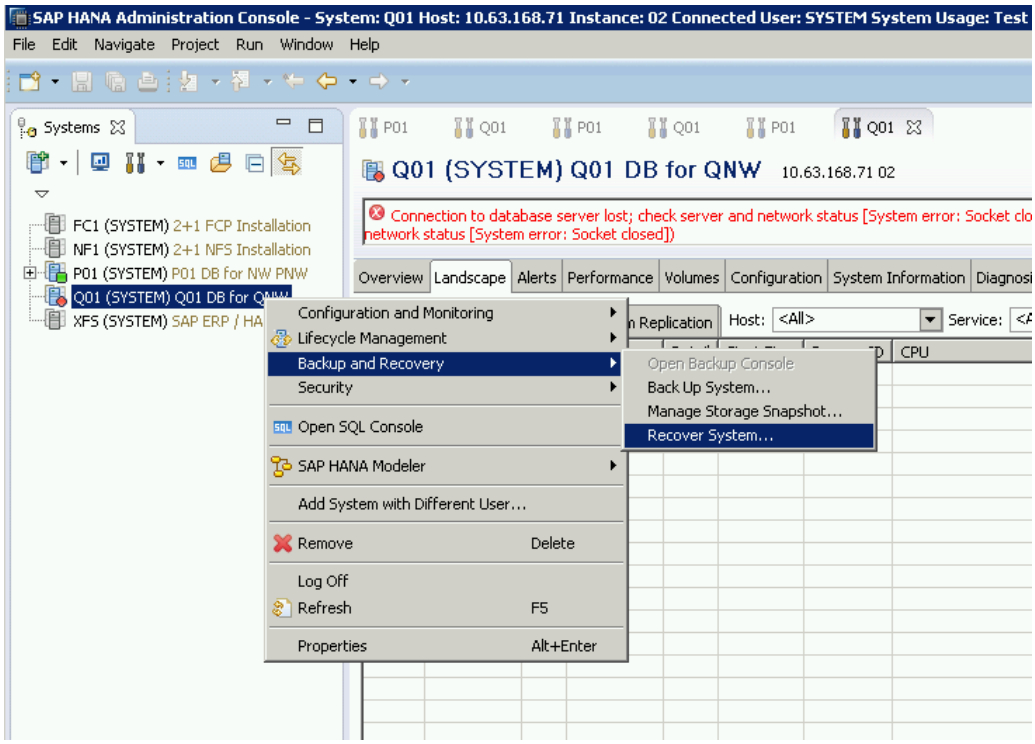
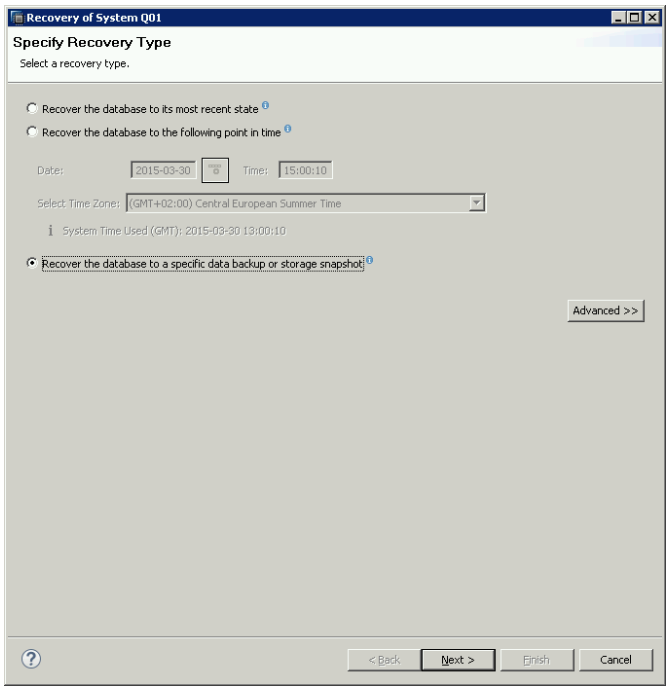
Figure 18) Recovery of target database.



2. Select Recover Database to a Specific Data Backup or Storage Snapshot to recover the system to the point in time when the backup was created.

   Note: A forward recovery using log backups of the source system is also possible.

Figure 19) Specify recovery type.



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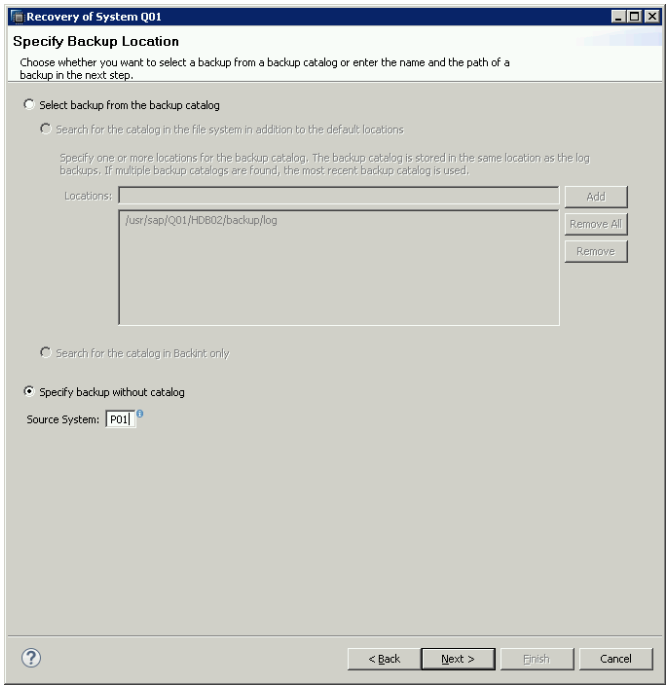
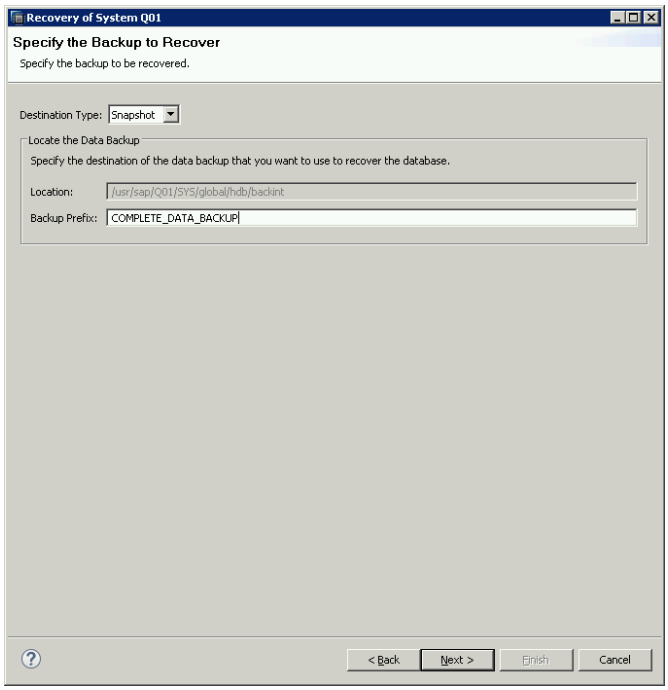
3. Select Specify Backup Without Backup Catalog and input the SID of the source system.

Figure 20) Specify backup location.



4. Select Destination Type: Snapshot. The backup prefix is irrelevant and need not be adjusted.

Figure 21) Backup destination type.



5. Provide a valid HANA database license for the target system Q01.

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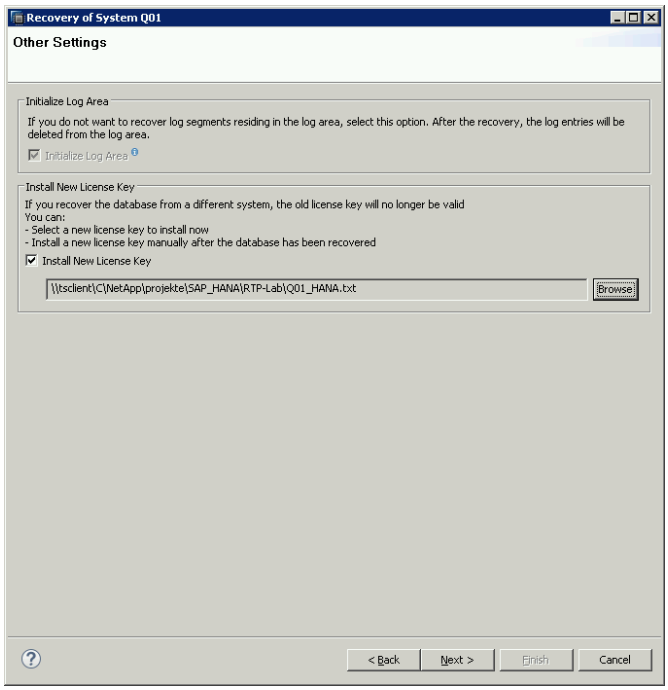
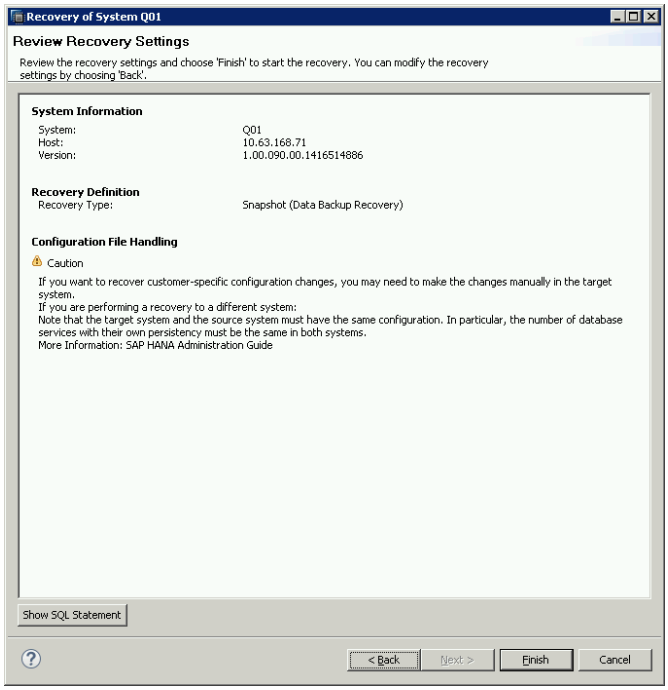
Figure 22) Install new license key.



6. Click Finish to start the recovery process.

Figure 23) Recovery settings.



When the recovery finishes, the SAP HANA database is up and running.

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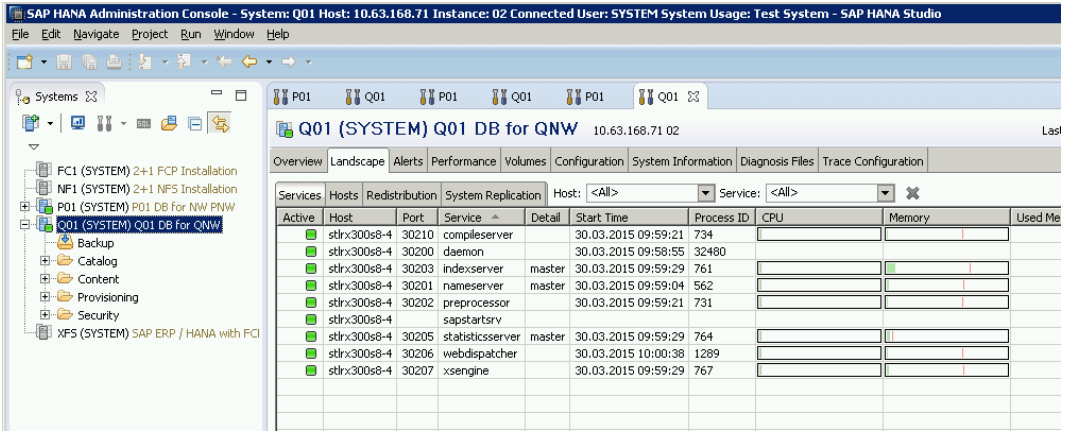
Figure 24) Target SAP HANA database Q01.



The SAP system QNW can now be started.

```
stlrx300s8-4:/mnt/hwval/temp/systemcopy # su - qnwadm -c "startsap r3"
Checking HDB Database
Database is running
-----------------------------------------
Starting Startup Agent sapstartsrv
OK
Instance Service on host stlrx300s8-4 started
-----------------------------------------
starting SAP Instance ASCS04
Startup-Log is written to /home/qnwadm/startsap_ASCS04.log
-----------------------------------------
/usr/sap/QNW/ASCS04/exe/sapcontrol -prot NI_HTTP -nr 04 -function Start
Instance on host stlrx300s8-4 started
Starting Startup Agent sapstartsrv
OK
Instance Service on host stlrx300s8-4 started
-----------------------------------------
starting SAP Instance DVEBMGS03
Startup-Log is written to /home/qnwadm/startsap_DVEBMGS03.log
-----------------------------------------
/usr/sap/QNW/DVEBMGS03/exe/sapcontrol -prot NI_HTTP -nr 03 -function Start
Instance on host stlrx300s8-4 started
stlrx300s8-4:/mnt/hwval/temp/systemcopy #
```

5 Database Copy with SAP HANA Database Lifecycle Manager

HDBLCM allows you to create a copy of an SAP HANA database without the need to preinstall any SAP software on the target system.

To create a database copy with HDBLCM, complete the following steps (for the initial copy, steps 1 to 3 are not required).

1. Stop the target HANA database.
2. Unregister the HANA target database with HDBLCM.
3. With Snap Creator, unmount the FlexClone volumes from the target system and delete the volume at the storage layer.
4. With Snap Creator, create a new storage-based Snapshot backup of the source system. This backup is only required if an existing Snapshot backup was not used.
5. With Snap Creator, create new FlexClone volumes based on a selected Snapshot backup of the source system.

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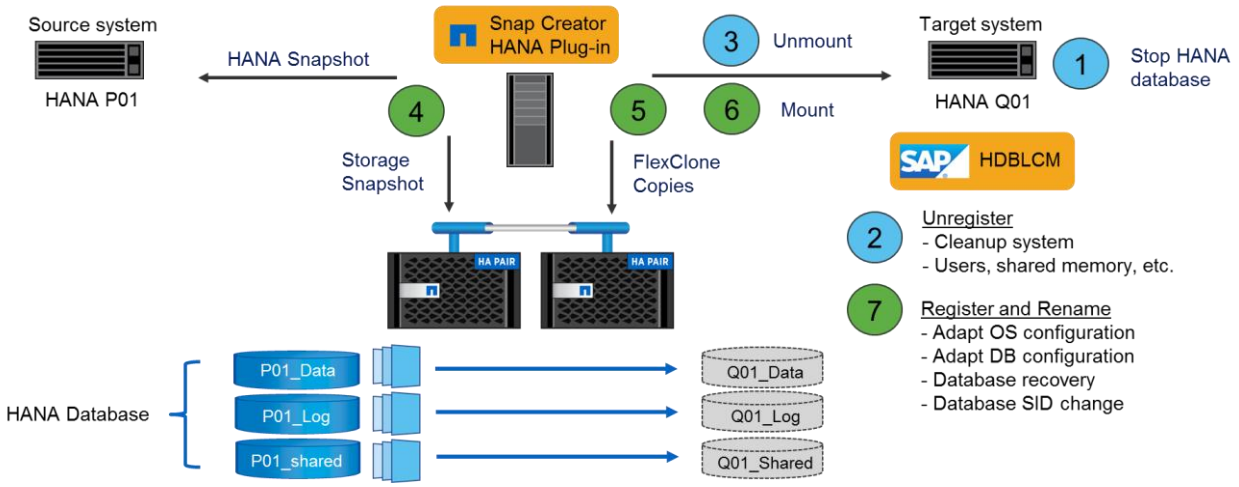
6. With Snap Creator, mount the FlexClone volumes on the target system.
7. Register and rename the target database with HDBLCM.

Figure 25 shows the workflow of database copy with HDBLCM.

Figure 25) Provisioning of a new HANA database with SAP HDBLCM.



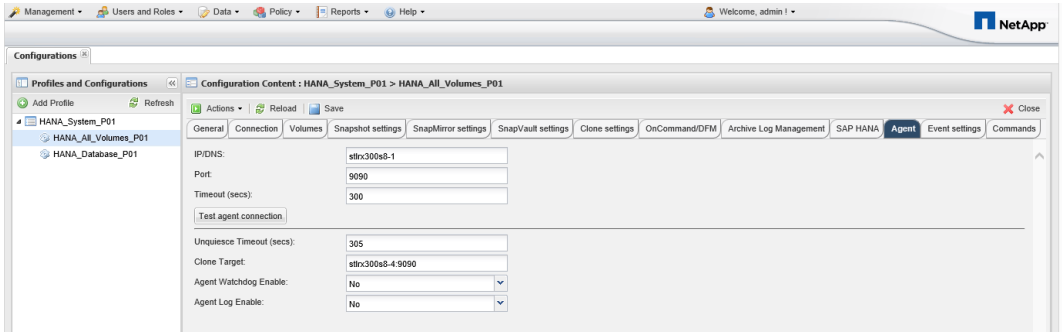
5.1 Configuration for Creation of FlexClone Volumes

To use Snap Creator to provision FlexClone copies of the data, log, and shared volumes, you must install Snap Creator software on the target system and start the Snap Creator Agent.

To perform configuration, complete the following steps:

1. Configure the agent within the Snap Creator configuration of the source system.
2. Configure the mount and umount commands within the Snap Creator configuration file.
3. Create mount and umount scripts that are accessible at the target system.
4. Include the target system agent and port as the clone target within the Snap Creator configuration for system P01 in the agent configuration, as is shown in Figure 26.

Figure 26) Target system agent configuration.



5. Define the mount and umount commands within the configuration file of the source system P01 on the host where the Snap Creator server is installed,, as is shown in the following commands. When the `CLONETARGET` parameter is added in front of the mount and umount commands, the commands are executed at the target system.

```
stlrx300s8-1: # vi
/opt/NetApp/SnapCreator/scServer4.1.1/engine/configs/HANA_System_P01/HANA_All_Volumes_P01.conf
```

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```
……..
……..
#########################################################################################################
########################
#     APP Commands
#
#########################################################################################################
########################
UMOUNT_CMD01=CLONETARGET:/mnt/hwval/System-Copy/umount-all-Q01.sh
ARCHIVE_CMD01=
APP_UNQUIESCE_CMD01=
MOUNT_CMD01=CLONETARGET:/mnt/hwval/System-Copy/mount-all-Q01.sh HANA_All_Volumes_P01 $VOLUMES
$SNAP_TIME
APP_QUIESCE_CMD01=……..
……..
```

The following are examples for mount and umount scripts. The scripts must be created at the target system.

Mount Script

```
stlrx300s8-4:/mnt/hwval/System-Copy # cat mount-all-Q01.sh
#!/bin/bash

STORAGE="192.168.173.101"
SOURCE_VOLUME1="hana_shared"
MOUNT_POINT1="/hana/shared/Q01"
SOURCE_VOLUME2="P01_log_mnt00001"
MOUNT_POINT2="/hana/log/Q01/mnt00001"
SOURCE_VOLUME3="P01_data_mnt00001"
MOUNT_POINT3="/hana/data/Q01/mnt00001"
PREFIX="cl"
SNAP_TIME=$3
CONFIG_NAME=$1
MOUNT_OPTIONS="-t nfs -o
rw,vers=3,hard,timeo=600,rsize=65536,wsize=65536,intr,actimeo=0,noatime,nolock"

MOUNT_CMD1="mount $MOUNT_OPTIONS
$STORAGE":/"$PREFIX"_"$CONFIG_NAME"_"$SOURCE_VOLUME1"_"$SNAP_TIME"/P01" $MOUNT_POINT1"
echo $MOUNT_CMD1 >> /tmp/mount-Q01.txt
MOUNT_CMD2="mount $MOUNT_OPTIONS
$STORAGE":/"$PREFIX"_"$CONFIG_NAME"_"$SOURCE_VOLUME2"_"$SNAP_TIME $MOUNT_POINT2"
echo $MOUNT_CMD2 >> /tmp/mount-Q01.txt
MOUNT_CMD3="mount $MOUNT_OPTIONS
$STORAGE":/"$PREFIX"_"$CONFIG_NAME"_"$SOURCE_VOLUME3"_"$SNAP_TIME $MOUNT_POINT3"
echo $MOUNT_CMD3 >> /tmp/mount-Q01.txt

$MOUNT_CMD1
if [ $? -gt 0 ]
then
   exit 1
fi
$MOUNT_CMD2
if [ $? -gt 0 ]
then
   exit 1
fi
$MOUNT_CMD3
if [ $? -gt 0 ]
then
   exit 1
fi

exit 0
stlrx300s8-4:/mnt/hwval/System-Copy #
```

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Note: In the lab setup used, the `/hana/shared` volume is used for multiple HANA databases. Therefore the subdirectory P01 in the `/hana/shared` volume is mounted to `/hana/shared/Q01`.

Umount Script

```
stlrx300s8-4:/mnt/hwval/System-Copy # cat umount-all-Q01.sh
#!/bin/bash

MOUNT_POINT1="/hana/data/Q01/mnt00001"
MOUNT_POINT2="/hana/log/Q01/mnt00001"
MOUNT_POINT3="/hana/shared/Q01/"

MOUNT_CMD="umount $MOUNT_POINT1 $MOUNT_POINT2 $MOUNT_POINT3"
echo $MOUNT_CMD >> /tmp/mount-all-Q01.txt

$MOUNT_CMD
exit $?
stlrx300s8-4:/mnt/hwval/System-Copy #
```

At the target host, the mount and umount commands must be added to the configuration file `/opt/NetApp/SnapCreator/scAgent4.1.1/etc/allowed_commands.config`.

```
command: /mnt/hwval/System-Copy/mount-all-Q01.sh
command: /mnt/hwval/System-Copy/umount-all-Q01.sh
```

5.2 Unregister the Target SAP HANA Database with HDBLCM

The unregister operation within HDBLCM is used to perform system cleanup at the target system. This operation includes user configuration, shared memory, `sapstartsrv` configuration, and so on. To perform the unregister operation, complete the following steps:

1. Before starting the unregister operation with HDBLCM, stop the HANA database. All HDBLCM operations can be executed with the CLI, the GUI, or in batch mode.

Note: For further automation, use the HDBLCM CLI to unregister the database and include the statement in the umount script. More information can be found in the SAP HANA Administration guide.

2. The following documentation uses the HDBLCM GUI, which is started with `/hana/shared/Q01/hdblcm/hdblcmgui`. After the GUI has started, select Unregister the SAP HANA System.

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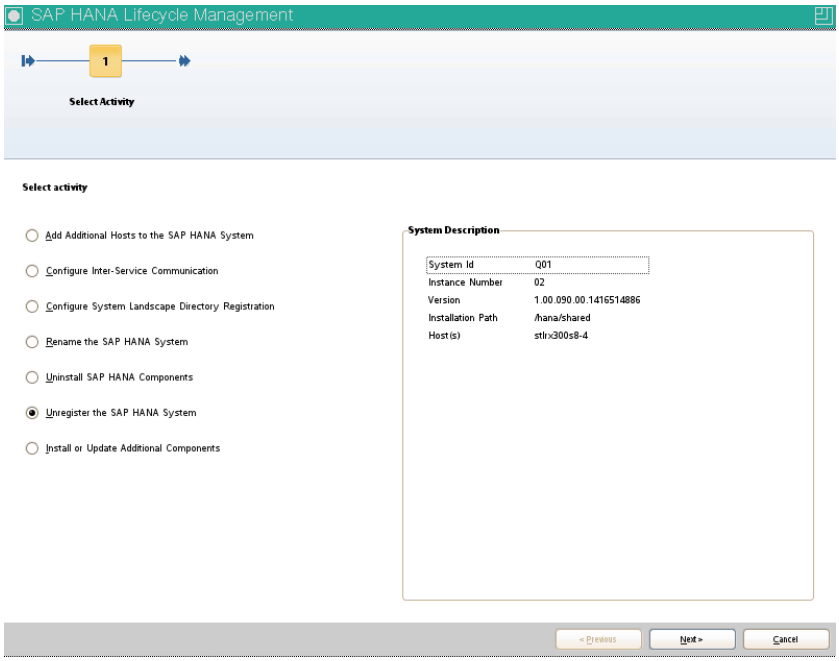
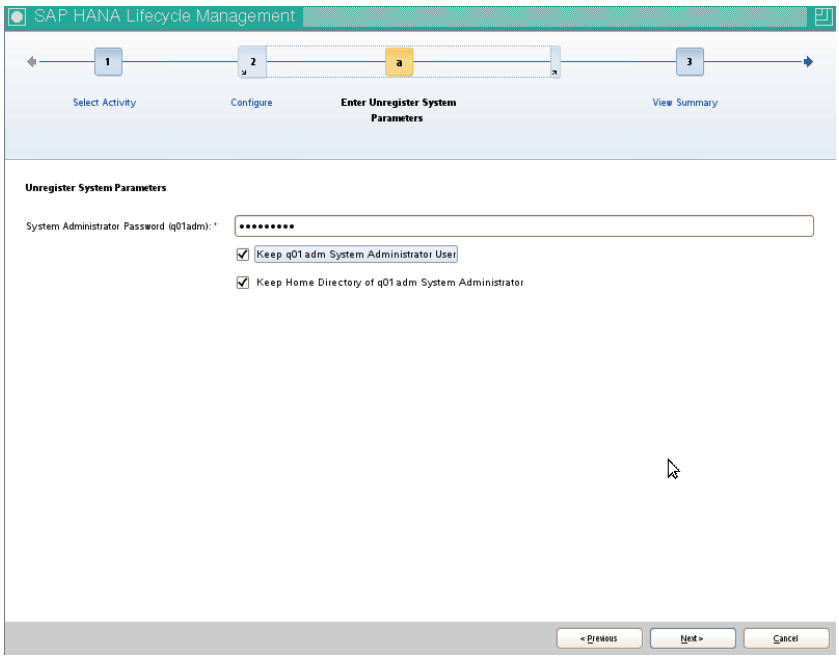
Figure 27) HDBLCM main menu.



3. Provide the credentials for the <SID>adm user.

Figure 28) Credential information.



4. Click Run to start the unregister process.

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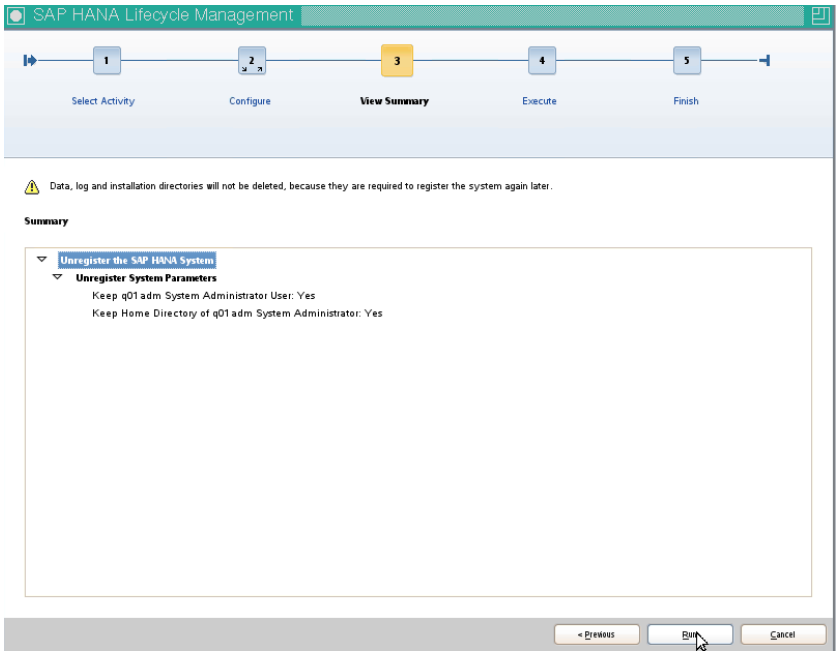
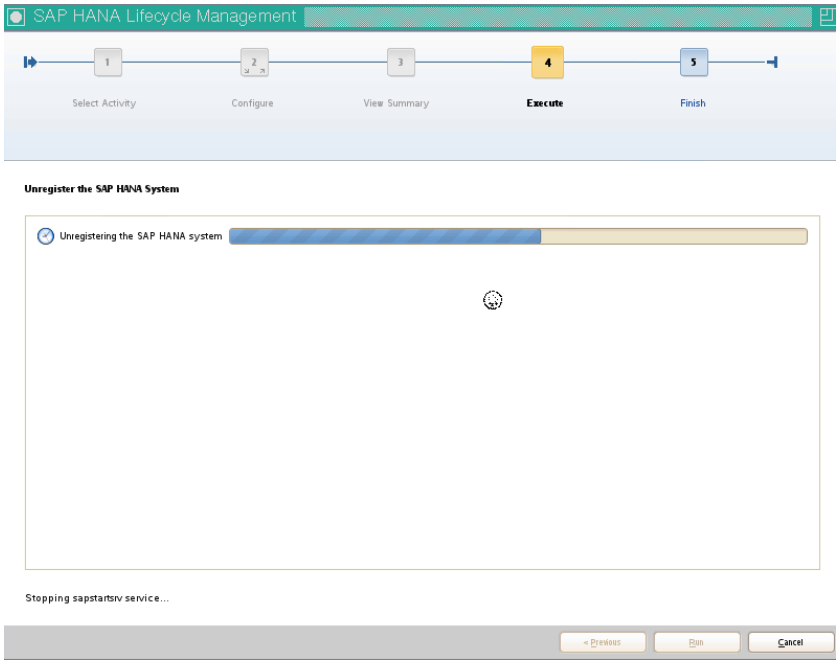
Figure 29) Summary system parameters.



5. The unregister process runs.

Figure 30) Unregister process.



6. The unregister process finishes.

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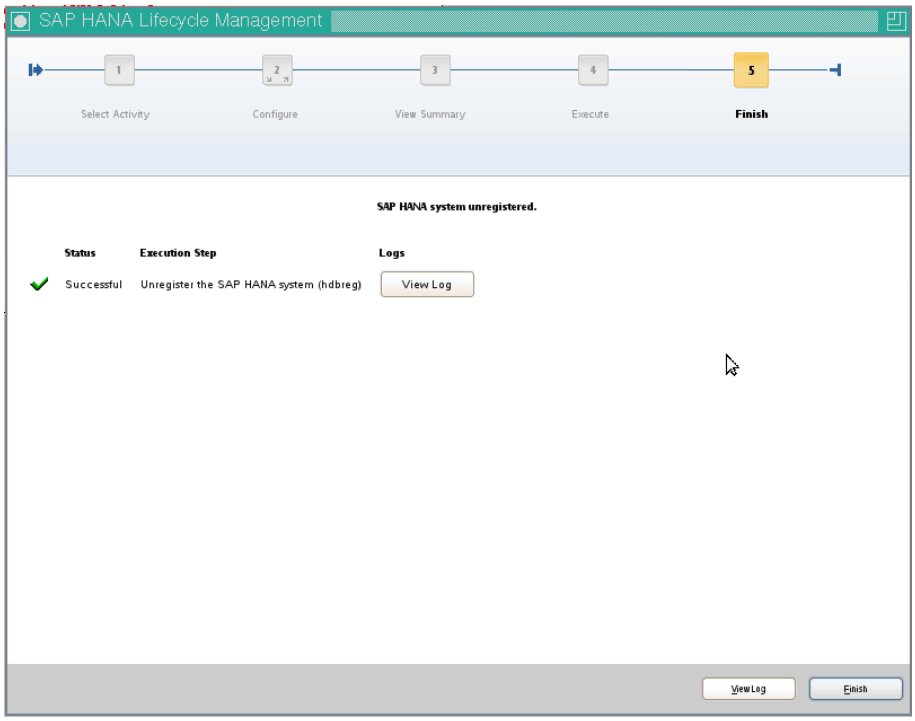
Figure 31) SAP HANA system unregistered.

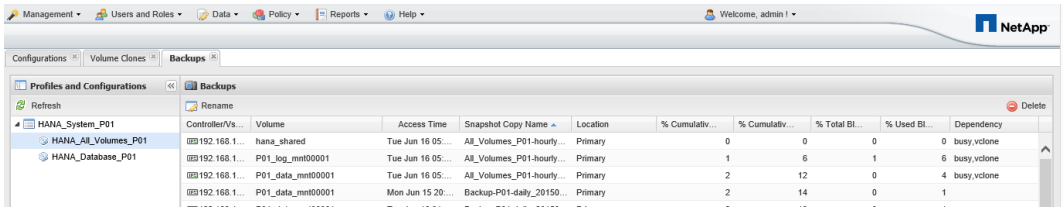


5.3 Unmount FlexClone Copy from the Target System

Before the umount operation with Snap Creator is started, the HANA database must be stopped and unregistered. Also make sure that there are no processes on the mount points, or the umount operation fails.

Within the list of backups in the Snap Creator GUI, the backup that has been used for the SAP system copy shows three Snapshot copies as “busy, vclone,” as is shown in Figure 32.

Figure 32) Snap Creator list of backups.



1. Under the Configuration tab, select Actions > Umount.

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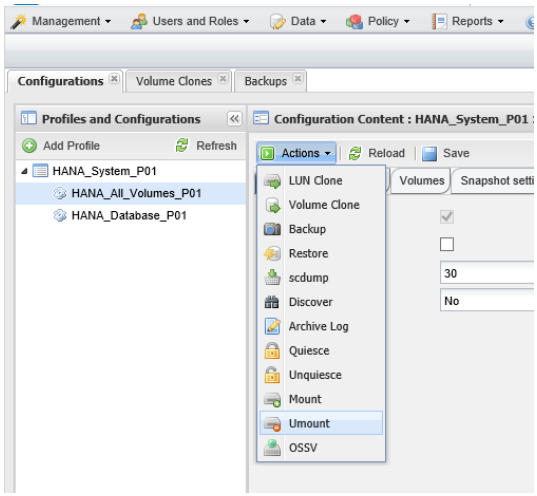
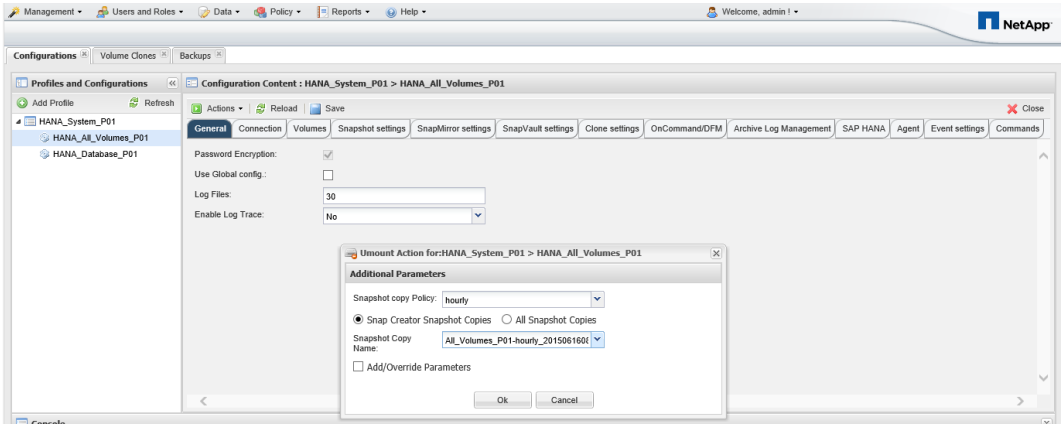
Figure 33) Snap Creator Actions > Umount.



2. Select the Snapshot copy that has been used to create the SAP system copy, as is shown in Figure 34.

Figure 34) Select Snapshot copy for umount action.



3. Figure 35 shows the log output of the umount operation with Snap Creator. The umount script that has been configured previously is executed at the target system. When the umount script finishes successfully, the FlexClone volume is deleted at the storage system.

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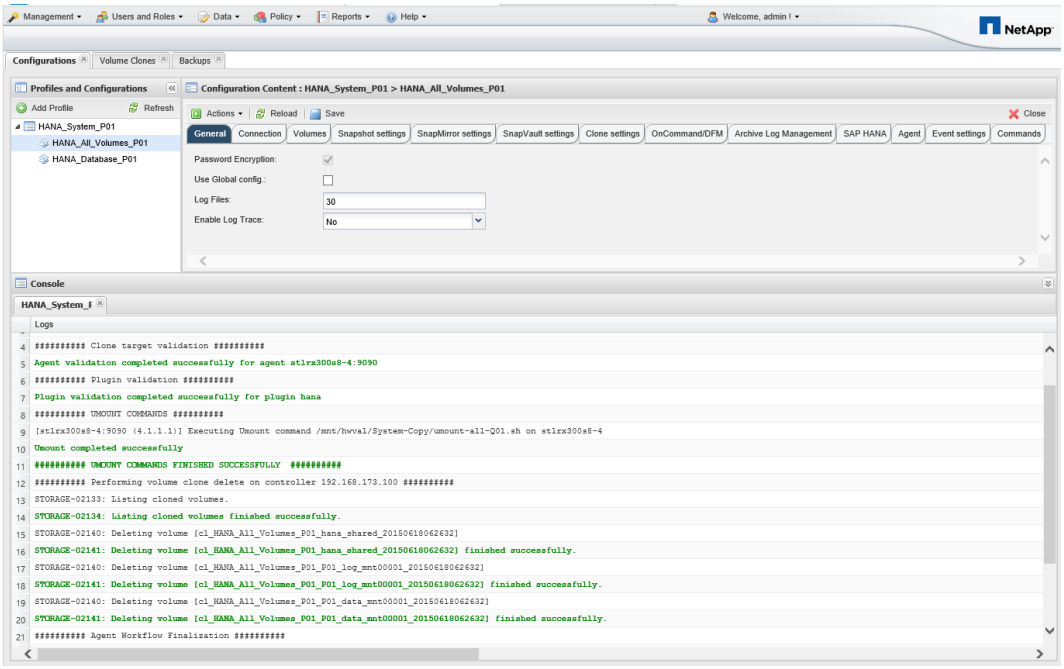
Figure 35) Snap Creator log output for umount operation.



4. After the umount operation, the HANA database volumes are no longer mounted at the target system.

```
stlrx300s8-4:~ # df
Filesystem                              1K-blocks      Used  Available Use% Mounted on
/dev/sda2                               285762056   6692620  277908168   3% /
udev                                    66043020        848   66042172   1% /dev
tmpfs                                   100663296        724  100662572   1% /dev/shm
192.168.173.103:/hwval                  498073600 159367616  338705984  32% /mnt/hwval
192.168.173.101:/log_backup             314572800 183637120  130935680  59% /mnt/log_backup
stlrx300s8-4:~ #
```

5.4 Create FlexClone Copies and Mount Them at the Target System

To create FlexClone copies and mount them on the target system, complete the following steps:

1. In Snap Creator under the Configuration tab, go to Actions > Mount.

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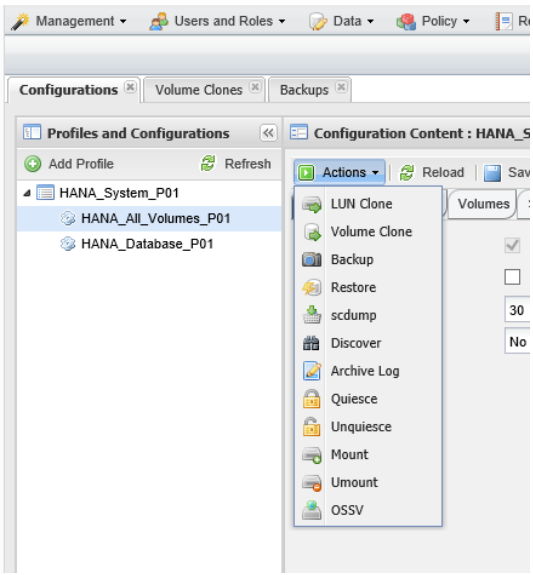
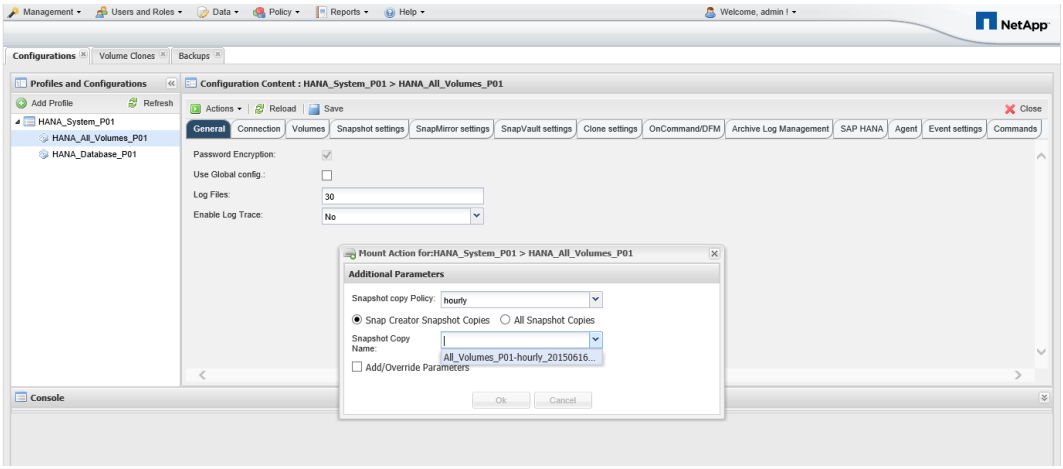
Figure 36) Snap Creator: Actions > Mount.



2. Select the Snapshot backup to refresh the target system.

Figure 37) Snapshot selection in mount operation.



3. Figure 38 shows the log output of the umount operation with Snap Creator. After the FlexClone volumes are created based on the selected Snapshot backup, the previously configured mount script is executed at the target system.

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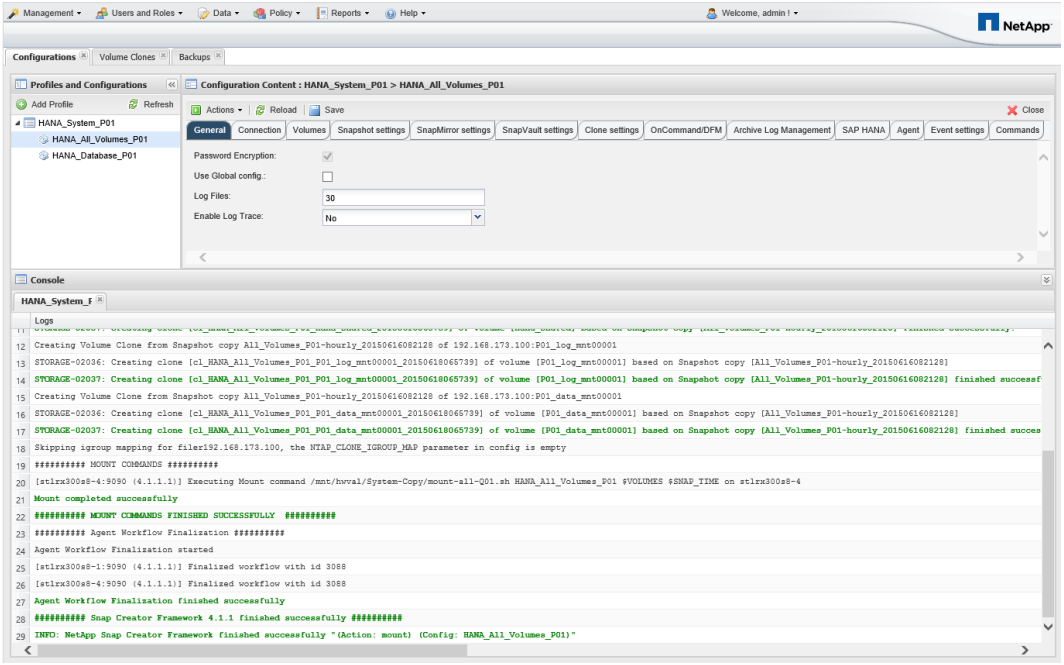
Figure 38) Snap Creator log output for mount operation.



4. After the mount operation, all HANA database volumes are mounted at the target system.

```
stlrx300s8-4:~ # df
Filesystem                                                                    1K-blocks       Used
Available Use% Mounted on
/dev/sda2                                                                     285762056    6692672
277908116   3% /
udev                                                                           66043020        848
66042172   1% /dev
tmpfs                                                                         100663296        724
100662572   1% /dev/shm
192.168.173.103:/hwval                                                        498073600 159367680
338705920  32% /mnt/hwval
192.168.173.101:/log_backup                                                   314572800 183637120
130935680  59% /mnt/log_backup
192.168.173.101:/cl_HANA_All_Volumes_P01_hana_shared_20150618065739/P01   1073741824 802214592
271527232  75% /hana/shared/Q01
192.168.173.101:/cl_HANA_All_Volumes_P01_P01_log_mnt00001_20150618065739   157286400  22563072
134723328  15% /hana/log/Q01/mnt00001
192.168.173.101:/cl_HANA_All_Volumes_P01_P01_data_mnt00001_20150618065739  157286400  17755392
139531008  12% /hana/data/Q01/mnt00001
stlrx300s8-4:~ #
```

5. The register and rename operations with HDBLCM can be started.

5.5 Register and Rename SAP HANA Database with HDBLCM

The register and rename activity within HDBLCM is used to do all required configurations and changes so that the cloned system runs with the SID Q01 at the target system.

Note: For further automation, use the HDBLCM CLI to unregister the database and include the statement in the mount script. More information can be found in the SAP HANA Administration guide.

To register and rename an SAP HANA database with HDBLCM, complete the following steps:

1. Start the HDBLCM GUI with `/hana/shared/Q01/hdblcm/hdblcmgui`.
2. Select Register and Rename SAP HANA System.

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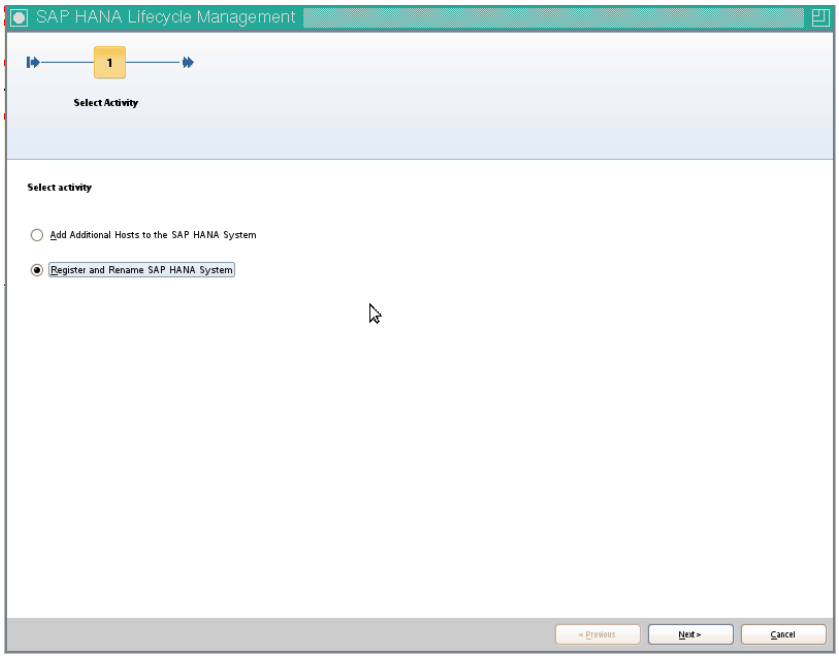
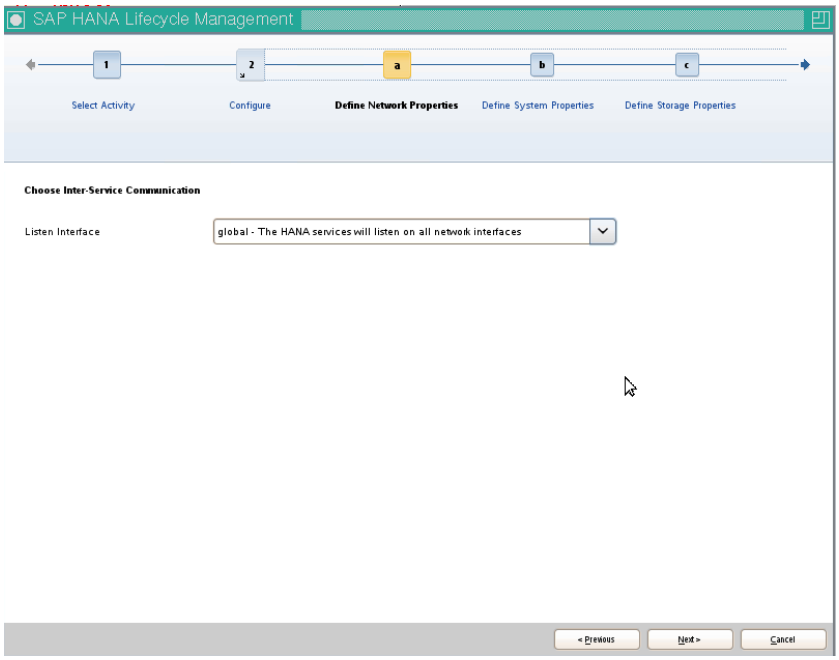
Figure 39) Register and rename.



3. Select the interservice communication.

Figure 40) Interservice communication.



4. Configure the system properties. The target instance number and system usage fields are initialized with values from the source system. The host name fields are initialized with the host name of the target system.

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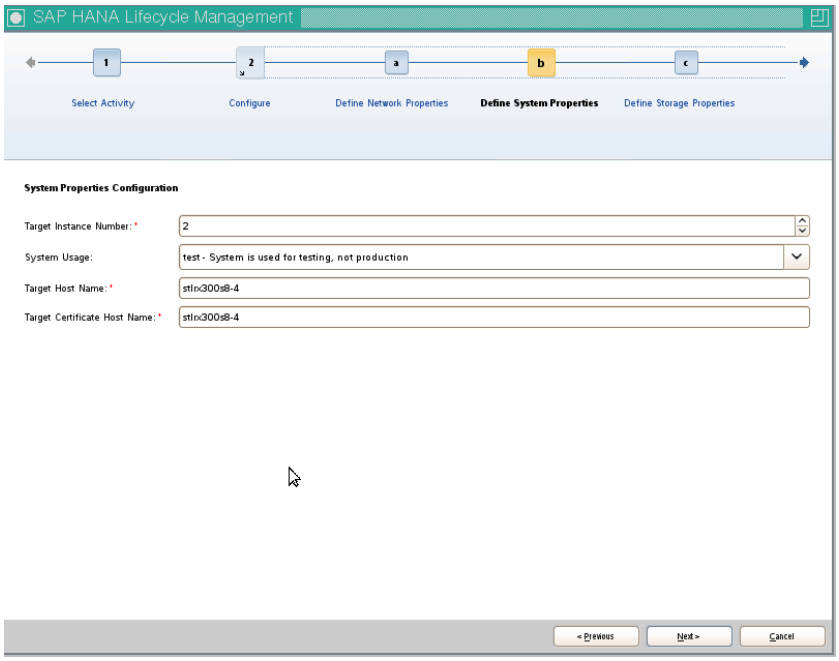
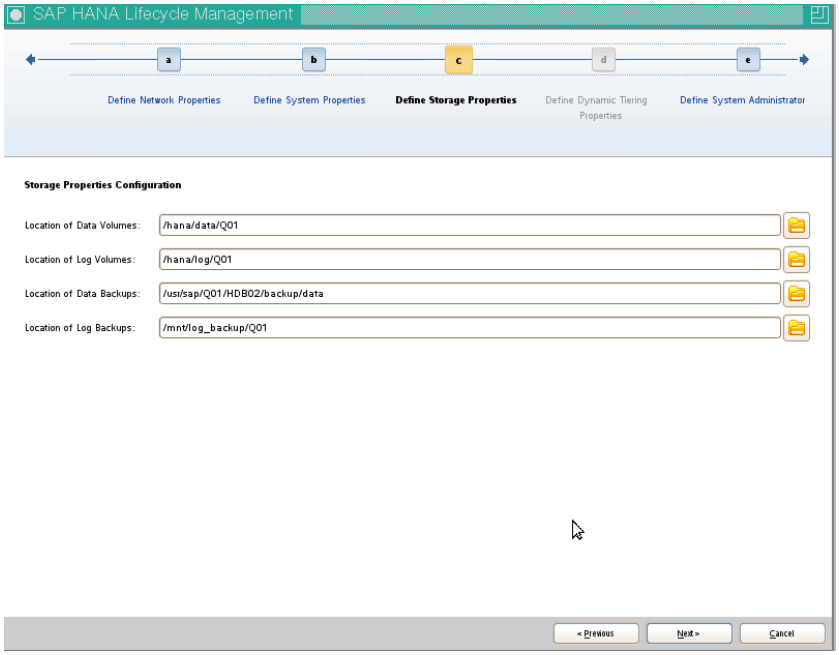
Figure 41) Configure system properties.



5. Configure the storage properties. All fields are initialized with values from the source system and P01 is substituted with Q01. If different locations for data and log backups are required, those fields must be adapted.

Figure 42) Configure storage properties.



6. Enter the <SID>adm credentials. These credentials are for q01adm in our example.

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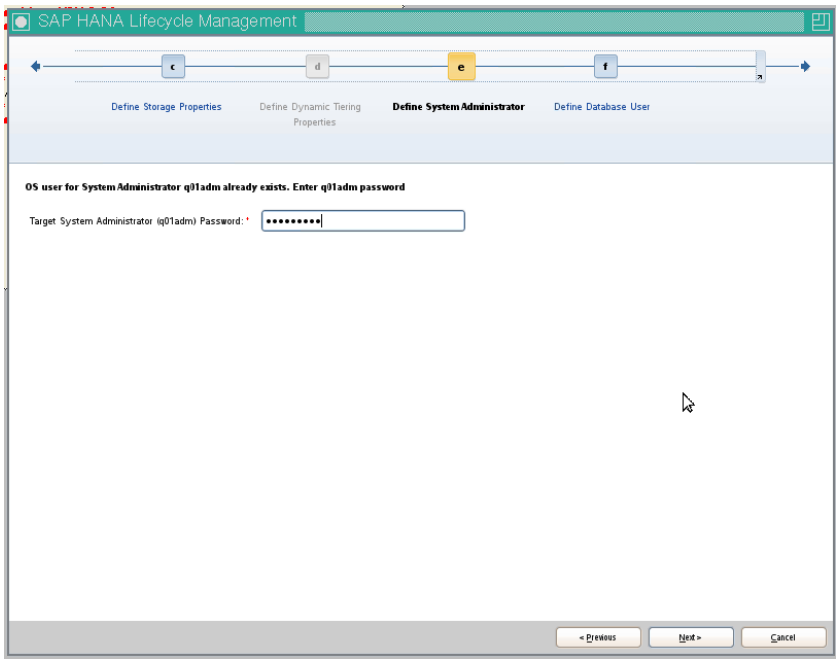
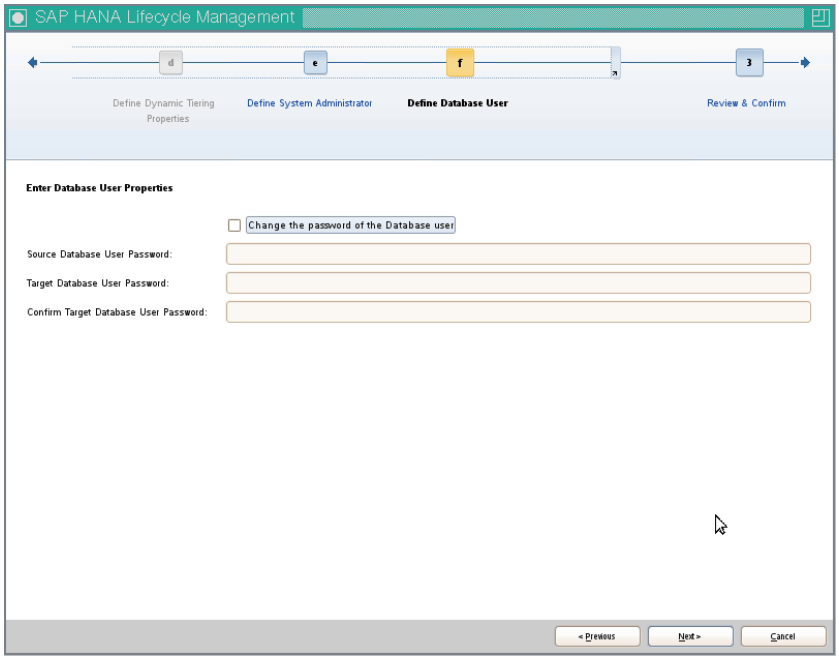
Figure 43) Enter <SID>adm credentials.



7. Adapt the database password if required.

Figure 44) Adapt database password.



8. Click Rename to start the rename process.

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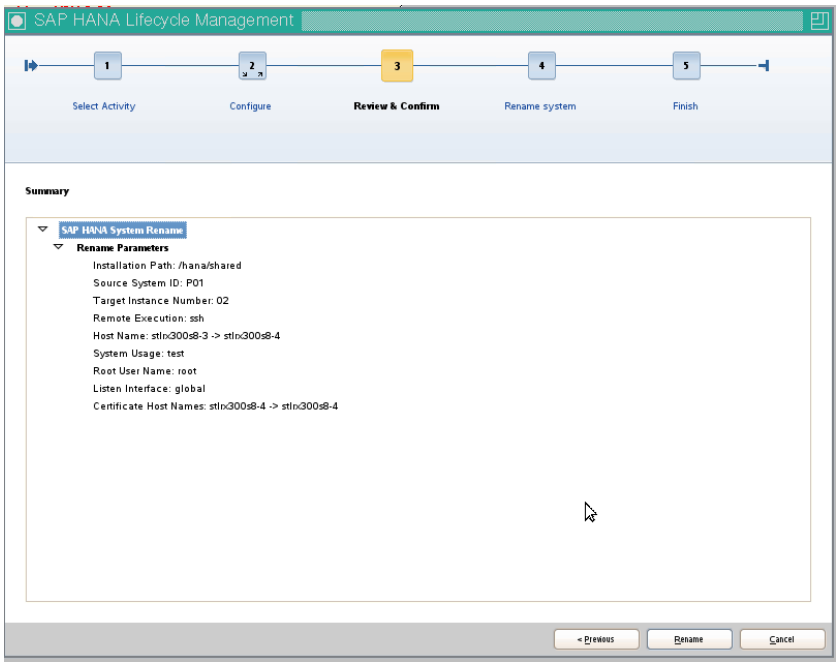
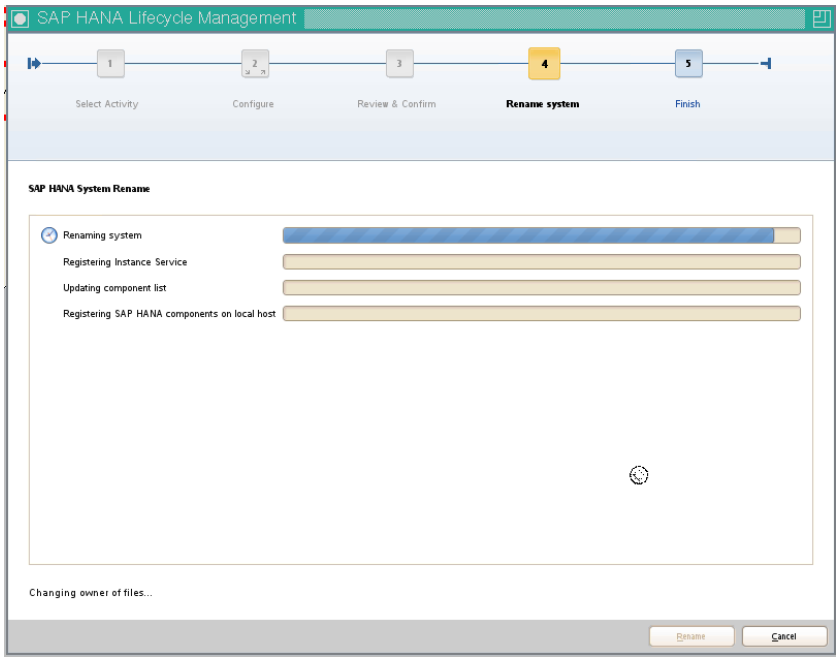
Figure 45) Summary screen.



9. The SAP HANA system rename process runs.

Figure 46) SAP HANA system rename.



10. The SAP HANA system rename process finishes.

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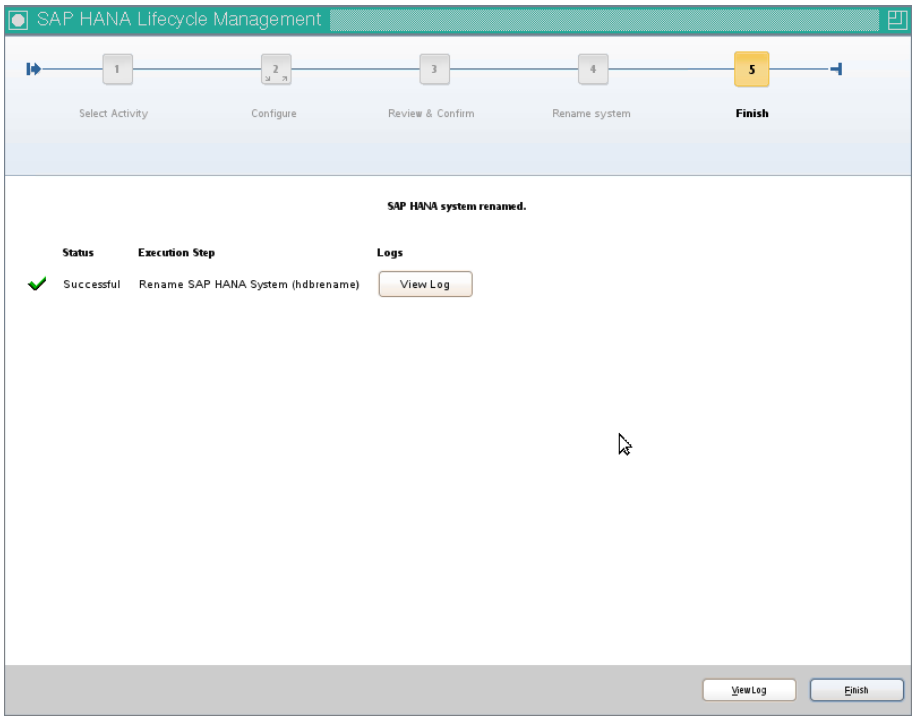
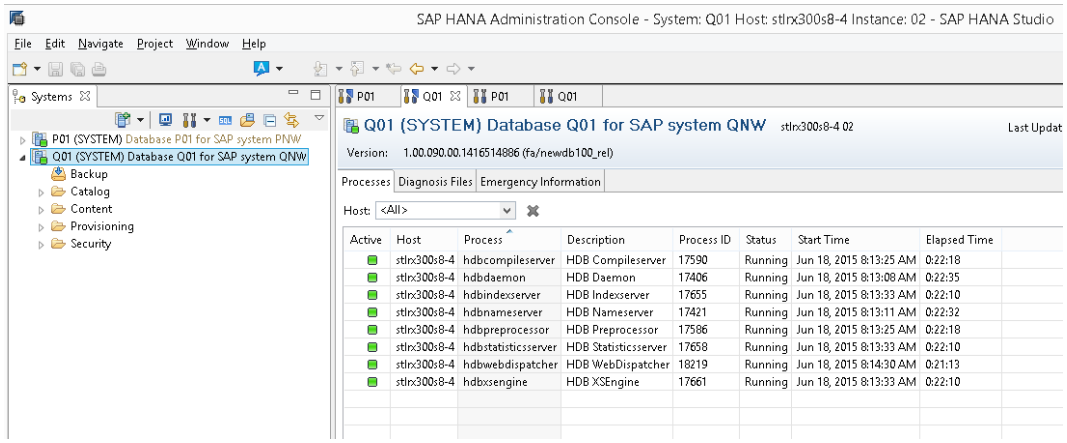
Figure 47) SAP HANA system renamed.



11. After the rename process is finished, the target HANA database is up and running, as is shown in Figure 48.

Figure 48) Target HANA system.



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References

The following references were used in this TR:

- TR-4018: Integrating NetApp FAS with SAP Landscape Virtualization Management
  https://fieldportal.netapp.com/DirectLink.aspx?documentID=71289&contentID=74829

Version History

Version	Date	Document Version History
Version 1.0	July 2015	Initial version

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