SAP HANA DBA's Guide to the Actifio Virtual Data Pipeline

actifio

Actifio 8.1.6

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Contents

Preface

The information presented in this guide is intended for users who are familiar with basic Actifio processes and procedures as described in ***Getting Started with Actifio Copy Data Management*** and who are qualified to administer SAP HANA databases.

Your Actifio appliance's Documentation Library contains detailed, step-by-step, application-specific instructions on how to protect and access your data. Each guide is in PDF format and may be viewed online, downloaded, or printed on demand. The following guides will be of particular interest:

- ***Introducing Actifio Copy Data Management***
- ***Connecting Hosts to Actifio Appliances***

The ActifioNOW Customer Portal

During the configuration and initialization of your Actifio appliance your Actifio representative provided you with a user name and password for the ActifioNOW customer portal.

From the customer portal you can obtain detailed reports about your Actifio appliance as well as search the portal's knowledge base for answers to specific questions.

To log into the ActifioNOW customer portal:

1. Go to: **https://now.actifio.com**
2. When prompted, enter the user name and password provided by your Actifio representative.

Actifio Support Centers

To contact an Actifio support representative, you can:

- Send email to: support@actifio.com
- Call:

  From anywhere: +1.315.261.7501

  US Toll-Free: +1.855.392.6810

  Australia: 0011 800-16165656

  Germany: 00 800-16165656

  New Zealand: 00 800-16165656

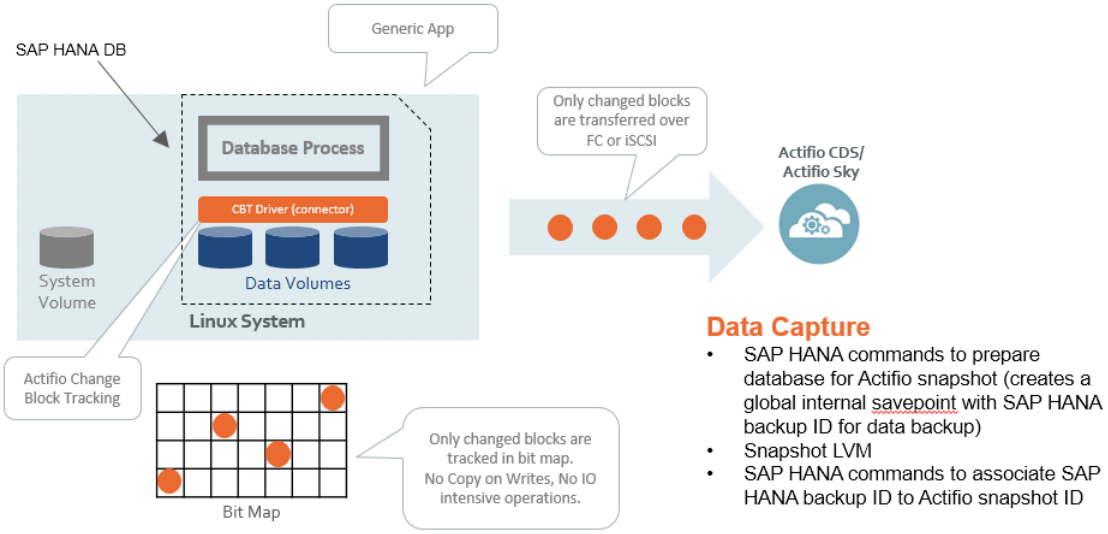
  UK: 0 800-0155019

1 SAP HANA DBA's Introduction to Actifio Copy Data Management

This chapter introduces Actifio concepts and the procedures used to capture and access databases. It includes:

Actifio Data Virtualization

An Actifio appliance is a highly scalable copy data management platform that virtualizes application data to improve the resiliency, agility, and cloud mobility of your business. It works by virtualizing data in much the same way other technologies have virtualized servers and networks. This enables you to capture data from production systems, manage it in the most efficient way possible, and use virtual copies of the data however they are needed.



SAP HANA for LVM with Linux Change Block Tracking

Application data is captured at the block level, in application native format, according to a specified SLA. A Golden copy of that data is created and stored once, and is then updated incrementally with only the changed blocks of data in an "incremental forever" model. Unlimited virtual copies of the data can be made available instantly for use, without proliferating physical copies and taking up additional storage infrastructure.

Capturing Data

Capturing data consists of four simple steps:

1. Add servers that host databases.
2. Discover the database.
3. Define Actifio Policy Templates and Resource Profiles according to your RPOs and RTOs.
4. Assign Actifio Policy Templates and Resource Profiles to discovered databases.

The Actifio Connector

The Actifio Connector is used to capture selected databases. The Actifio Connector is a small-footprint, lightweight service that can be installed on either virtual or physical servers.

Specifically, the Actifio Connector:

- Discovers the application to which data and log volumes will be added.
- Uses Linux changed block tracking to capture data at block level in incremental forever fashion.
- Identifies changes to database data for Actifio's incremental forever capture strategy.

Replicating Data

Data can be replicated to a second Actifio appliance or to the cloud for recovery, disaster recovery, or test/development purposes.

Data replication has traditionally been an inhibitor to efficient data management in a geographically distributed environment. Actifio replication addresses these issues with a global deduplication and compression approach that:

- Drives down overall network usage.
- Eliminates the need for a dedicated WAN accelerator/optimizer.
- Does not require storage array vendor licenses as data is sent from one Actifio appliance to another.
- Is heterogeneous from any supported array to any supported array: Tier 1 to Tier 2 and/or Vendor A to Vendor B.
- Preserves write-order, even across multiple LUNs.
- Is fully integrated with VMware Site Recovery Manager (SRM) and Actifio Resiliency Director.
- Encrypts data using the AES-256 encryption standard. Authentication between Actifio appliances is performed using 1024-bit certificates.

Replication is controlled by Actifio Policy Template policies:

- Production to Mirror policies have several options to replicate data to a second Actifio appliance.
- Dedup Backup to Dedup DR policies use a fixed, Actifio proprietary replication engine to replicate data to a second Actifio appliance. In addition, Dedup Backup to Dedup DR policies allow you to replicate data to two locations.
- Production to Vault policies use a fixed, Actifio proprietary replication engine to replicate data to the cloud.

Accessing Data

The Actifio appliance can instantly present a copy of the database rolled forward to a specific point of time. The roll forward operation is performed from the Actifio Desktop (user interface).

Access options include:

Mounts

LiveClones

Restores

Workflows

Mounts

The Actifio mount function provides instant access to data without moving data. Captured copies of databases can be rolled forward via the Actifio user interface and mounted on any database server. Application Aware mounts are described in To mount the database image as a virtual application (an application aware mount) to a new target: on page 37.

LiveClones

The LiveClone is an independent copy of data that can be refreshed when the source data changes. The advantage of LiveClones is that they are independent copies of data that can be incrementally refreshed and masked before being made available to users. This allows teams such as development and test to ensure they are working on the latest set of data without having to manually manage the data and not access or interfere with the production environment.

Restores

The restore function reverts the production data to a specified point in time. Restore operations actually move data. Typically restore operations are performed to restore a database to a valid state after a massive data corruption or storage array failure. The amount of time required to complete a restore operation depends on the amount of data involved. Restores are described in Chapter 8, Restoring and Recovering an SAP HANA Database.

Workflows

While SLAs govern the automated *capture* of a production database, Workflows automate *access* to the captured database.

Workflows are built with captured data. Workflows can present data as either a direct mount or as a LiveClone:

- Direct mounts (standard or application aware) work well for data that does not need to be masked prior to being presented. A mounted copy of data can be refreshed manually or on automatically on a schedule. Direct mounts allow you to instantly access captured data without actually moving the data.
- A LiveClone is a copy of your production data that can be updated manually or on a scheduled basis. You can mask sensitive data in a LiveClone prior to making it available to users.

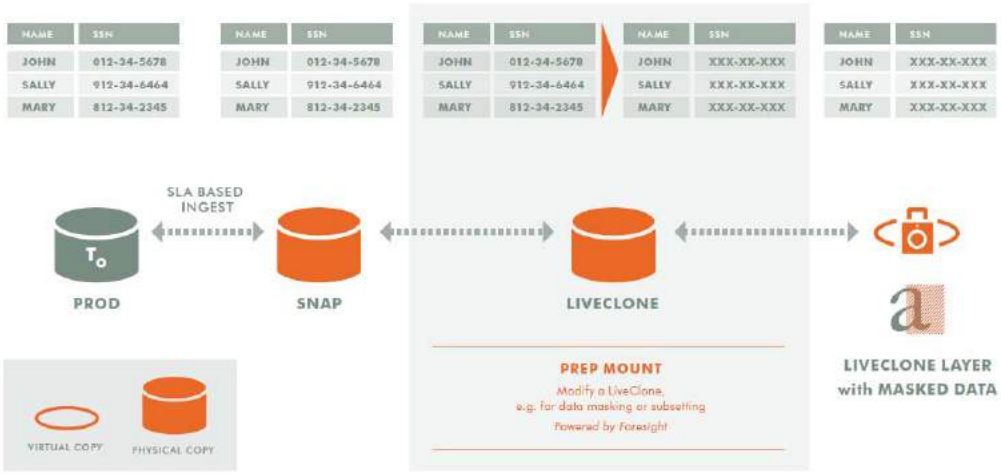
Combining Actifio's automated data capture and access control with Workflows and their optional data masking capabilities allows you to create self-provisioning environments. Now, instead of having to wait for DBAs to update test and development environments, users can provision their own environments almost instantly.

For example, an Actifio administrator can create an SLA Template Policy that captures data according to a specified schedule. Optionally, the administrator can mark the captured production data as sensitive and only accessible by users with the proper access rights.

After access rights have been defined and data has been captured, the administrator can create a Workflow that:

- Makes the captured data available as a LiveClone or as a direct mount
- Updates the LiveClone or mountable data on a scheduled or on-demand basis
- (Optional) Automatically applies scripts to the LiveClone's data after each update. This is useful for masking sensitive data.

Once the Workflow completes, users with proper access can provision their environments with the LiveClone or mountable data via the Actifio Desktop.



Workflow With Masked Social Security Data

Introduction to Actifio SAP HANA Administration

Actifio can virtualize and protect:

- **Single Container system (HANA 1.0) Dedicated**: In single-container system the system database and tenant database are perceived as a single unit and are therefore administered as one.
- **MDC: Multiple-Container Systems (HANA 2.0)**: Multiple isolated databases in a single SAP HANA system. These are referred to as multi-tenant database containers. A multiple-container system always has exactly one system database used for central system administration, and any number of multi-tenant databases (including zero), also called tenant databases.

Actifio Support for SAP HANA Configurations

Configurations	SAP Storage Snapshot API	SAP File-Based API (hdbsql): Actifio Block Mapping	SAP File-Based API (hdbsql): Actifio NFS Mapping
Single Container System (HANA 1.0)	Yes (preferred)	Yes	Yes
MDC: Multiple-Container Systems (HANA 2.0) with one tenant database	Yes (preferred)	Yes	Yes
MDC: Multiple-Container Systems (HANA 2.0) with more than one tenant database		Yes	Yes
Scale-Out MDC: Multiple-Container Systems (HANA 2.0) with one or more tenant databases			Yes
Scale-Out MDC Local HA (N Active Host + 1 or More Standby Nodes)			Yes

Notes

- SAP storage snapshot API - leverages Actifio CBT with incremental-forever and instant mount
- SAP file-based API - traditional backup with weekly full, daily incremental & copy-based restore
- NFS mapping is always to all HANA nodes
- HANA log backup is handled automatically in all options and integrated with database backup policies

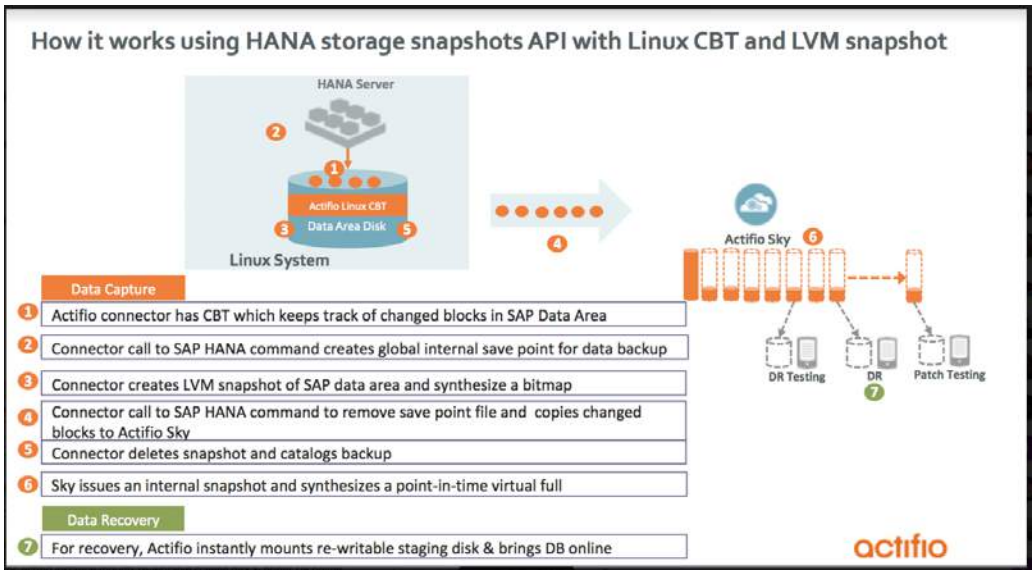
SAP HANA Backup Methods

Actifio offers these methods of protecting SAP HANA databases:

- Block-Based LVM Snapshot with CBT Integrated with SAP HANA Database Storage Snapshot API
- File-Based Backup Integrated with HANA Traditional Backup API
- SAP HANA Log Backup

Block-Based LVM Snapshot with CBT Integrated with SAP HANA Database Storage Snapshot API

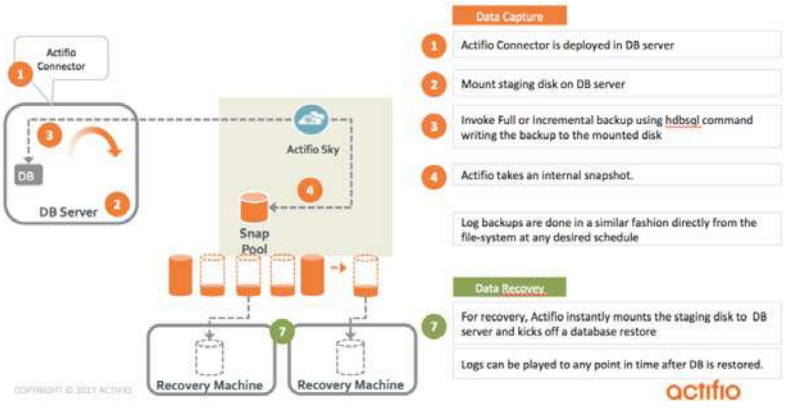
The SAP HANA database creates a database internal snapshot based on a system wide save point executed during the PREPARE step. The database internal snapshot is stored in the data volumes area.



How it Works Using HANA Storage Snapshot API with Linux CBT and LVM Snapshot

File-Based Backup Integrated with HANA Traditional Backup API

This provides the full and incremental backups of the data area, which is in backup format. The recovery API recovers the data area by overwriting the data area. When the data area is backed up, the entire payload data from all server nodes of the SAP HANA database instance is backed up. This applies in both single-host and multi-host environments.



How it Works Using HANA File-Based (hdbsql API) Traditional Backup

SAP HANA Log Backup

Log backups start automatically if the parameters enable_auto_log_backup and log_mode = normal have been configured. During a log backup, the payload of the log segments is copied from the log area to the location specified by the parameter basepath_logbackup.

References

1. Category > Administration Guide: http://help.sap.com/hana_platform
2. Storage Snapshots: https://help.sap.com/saphelp_hanaplatform/helpdata/en/ac/114d4b34d542b99bc390b34f8ef375/content.htm
3. 1642148 - FAQ: SAP HANA Database Backup & Recovery: https://launchpad.support.sap.com/#/notes/1642148/E
4. Create a homogeneous copy of an SAP HANA database by recovering an existing database to a different database:

   `https://help.sap.com/saphelp_hanaplatform/helpdata/en/ea/70213a0e114ec29724e4a10b6bb176/content.htm?frameset=/en/ca/c903c28b0e4301b39814ef41dbf568/frameset.htm&current_toc=/en/00/0ca1e3486640ef8b884cdf1a050fbb/plain.htm&node_id=773&show_children=false`

2 Preparing the SAP HANA 1.0 Database

Prerequisites

- All the configured services (see SAP Note 1697613 and SAP Note 1649519) such as nameserver, indexserver, etc. must be running. You can check this in the Overview of SAP HANA studio -> Operational State: All Services are started.
- Make sure log_mode for database is set to normal. (Check under HANA Studio configuration tab.)
- Use a SAP HANA hdbuserstore key to execute Backup and Recovery instead of a user name and password to communicate with HANA database using the SAP HANA Secure User Store. For HANA 1.0 userstore key needs to be created for a single container under database.

Preparing the HANA 1.0 database requires:

Creating the Database User Account on page 9

Get the SQL Port ID on page 11

Adding SAP HANA Hdbuserstore Key in SAP HANA 1.0 (single container system) on page 11

Creating the Database User Account

Make sure to create this user account under a single container database. Make sure to provide BACKUP ADMIN and CATALOG READ to back up the user created under database.

Naming Convention for Database User Account

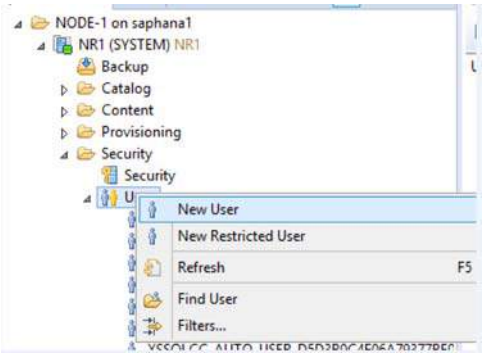
Actifio standard naming convention is DATABASE BACKUP USERNAME: Choose a database user name based on company's standard. Make sure to create this user account under SYSTEMDB.

For example if the DATABASE BACKUP USERNAME is ACTBACKUP then this must be created under SYSTEMDB.

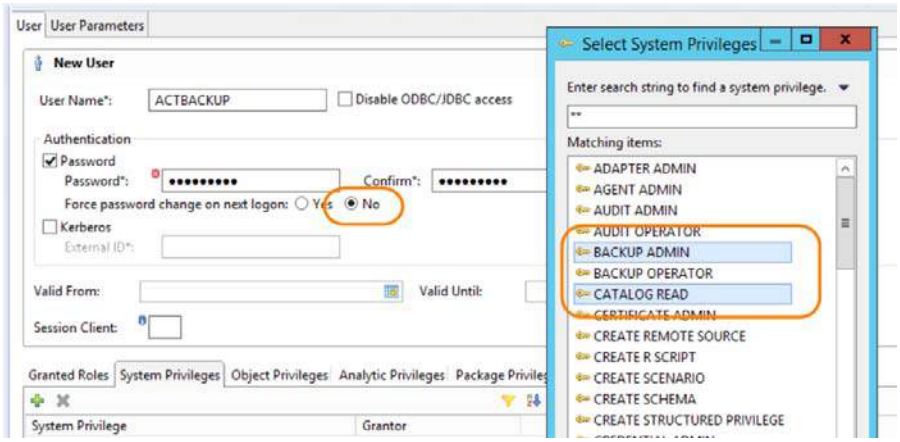
Procedure

To create the user:

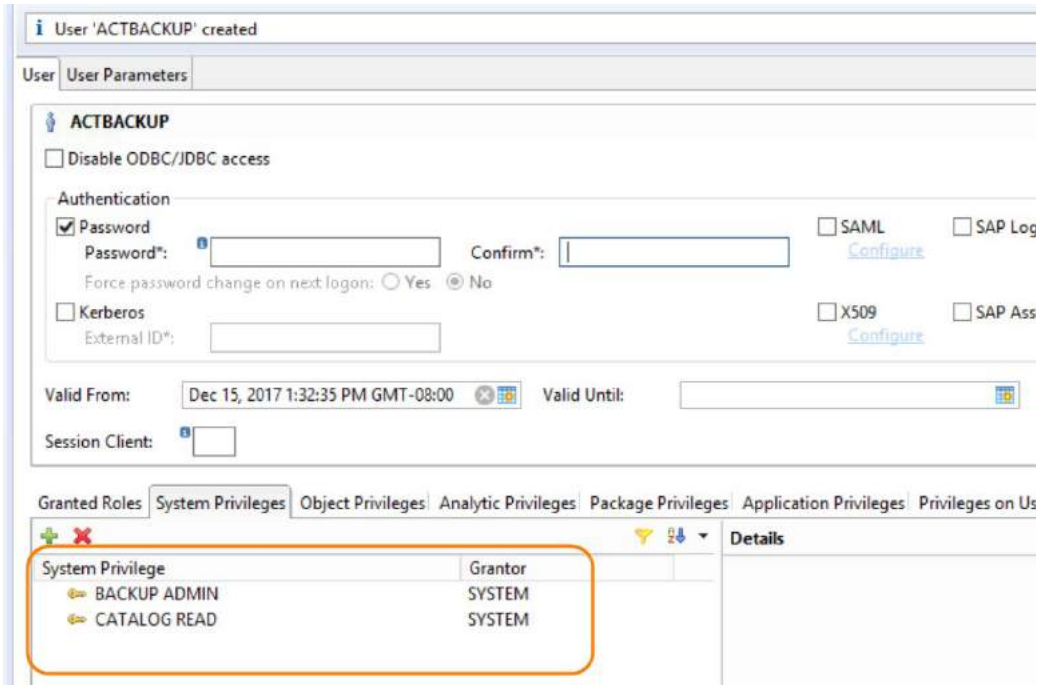
1. From SAP HANA Studio go to System > Security > Users > New User.



2. Assign a user name and a password.
3. Select Force password change on next logon to No.
4. Click on the System Privilege tab and assign privilege by selecting BACKUP ADMIN and CATALOG READ.

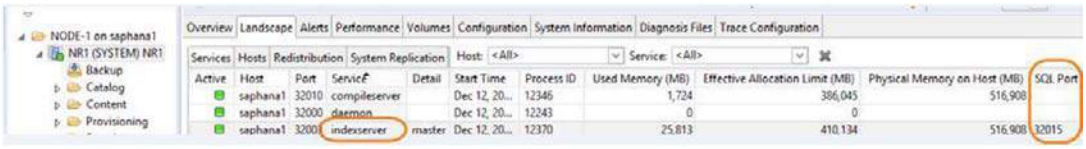


You will get a User Created message and the System Privileges will show the user has been granted BACKUP ADMIN and CATALOG READ privileges.



Get the SQL Port ID

For a HANA 1.0 single container system, get the SQL PORT from HANA Studio. At System > Landscape, get the value of SQL Port for indexserver. In the example below, 32015 is the SQL port, and the instance number here is 20.



Adding SAP HANA Hdbuserstore Key in SAP HANA 1.0 (single container system)

To communicate with HANA database, use a SAP HANA hdbuserstore key instead of a user name and password. Create the hdbuserstore key using the SAP HANA Secure User Store.

Hdbuserstore Key Naming Convention

For SYSTEMDB set the key name = DATABASE BACKUP USERNAME.

For example:

DATABASE BACKUP USERNAME = ACTBACKUP

Set SYSTEMDB key name = ACTBACKUP

Procedure

To create the SAP HANA hdbuserstore key:

1. Open the putty window to the HANA database server and login to <sid>adm by su to <sid>adm.
2. `cd exe`
3. Create entries in the hdbuserstore by calling:

   `# ./hdbuserstore SET <key_name> <server>:<port> <DB_user_name> <DB_user_password>`

   The <port> is the SQL port of the systemdb or tenant database, see above.

   For example:

- DATABASE Backup username from above: ACTBACKUP
- KEY NAME: ACTBACKUP (same as database backup username)
- SQL Port from above: 32015
- Hostname : saphana3

  `./hdbuseratore SET ACTBACKUP saphana3:32015 ACTBACKUP <database backup user password **********>`

4. Check the keystore: `./hdbuserstore list`

3 Preparing a HANA 2.0 Database

Prerequisites

- All the configured services (see SAP Note 1697613 and SAP Note 1649519) such as nameserver, indexserver, etc. must be running. You can check this in the Overview of SAP HANA studio -> Operational State: All Services are started.
- Make sure log_mode for database is set to normal. (Check under HANA Studio configuration tab.)
- Use a SAP HANA hdbuserstore key to execute Backup and Recovery instead of a user name and password to communicate with HANA database using the SAP HANA Secure User Store. For HANA 2.0 userstore key needs to be created for SYSTEMDB and all tenant db.
- Create the database user account and hdbuserstore key names in accordance with the company's naming convention. Make sure to create this user account under SYSTEMDB and all tenant databases.

This includes:

Creating the System Database and Tenant Database Users

Creating the System Database User Account from HANA STUDIO

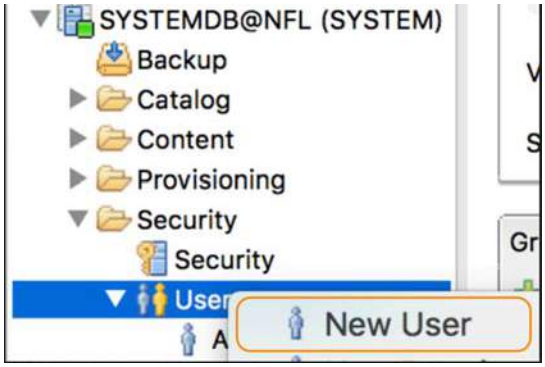
Naming convention for database user account

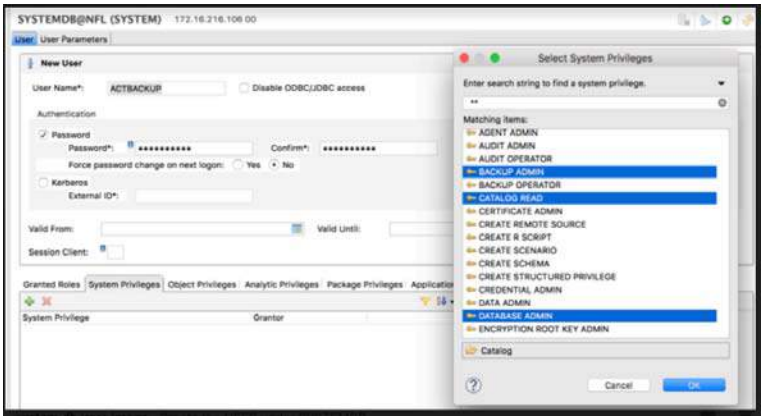
Choose a database user name based on company's standard. Make sure to create this user account under single container database. Make sure to provide BACKUP ADMIN, CATALOG READ, and DATABASE ADMIN the to backup user created under database.

Procedure

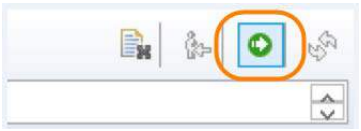
To create the system database user account:

1. Create the USER under SYSTEMDB
    - Assign a User Name and a Password.
    - Select Force password change on next logon to No.
    - Click on the System Privilege tab and assign privileges by selecting BACKUP ADMIN, CATALOG READ, and DATABASE ADMIN
    - From SAP HANA Studio SYSTEMDB, go to System > Security > Users > New User.

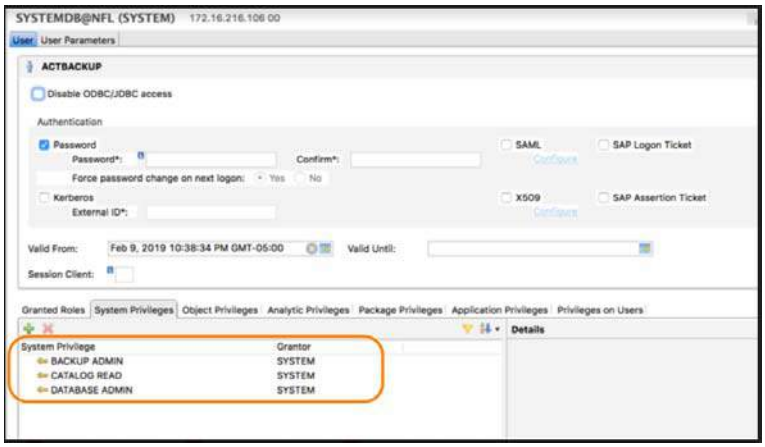




2. Deploy the newly created user by clicking the green arrow in the top right corner



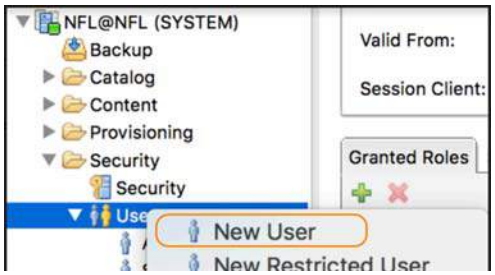
You will get a User Created message and the System Privileges will show the user has been granted BACKUP ADMIN, CATALOG READ, and DATABASE ADMIN privileges.

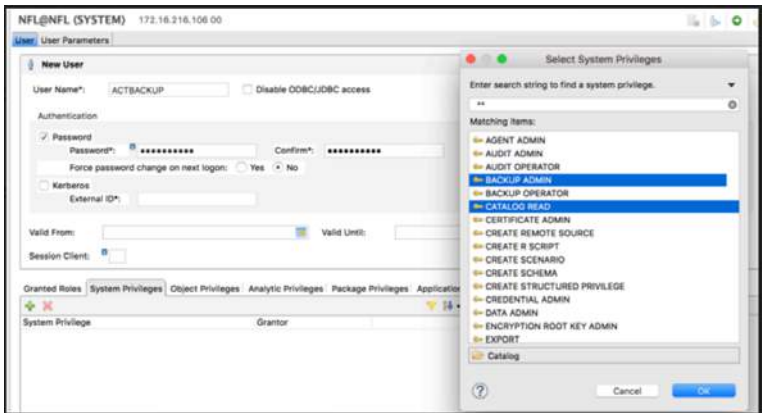


Creating the User under the Tenant DB

To create the tenant database user account:

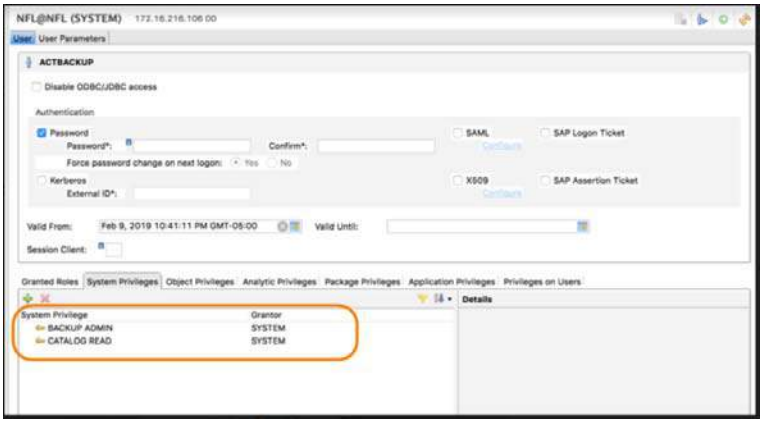
1. Create the USER under TENANTDB
   - Assign a User Name and a Password.
   - Select Force password change on next logon to No.
   - Click on the System Privilege tab and assign privileges by selecting BACKUP ADMIN, CATALOG READ, and DATABASE ADMIN
   - From SAP HANA Studio SYSTEMDB, go to TENANTDB > Security > Users > New User.





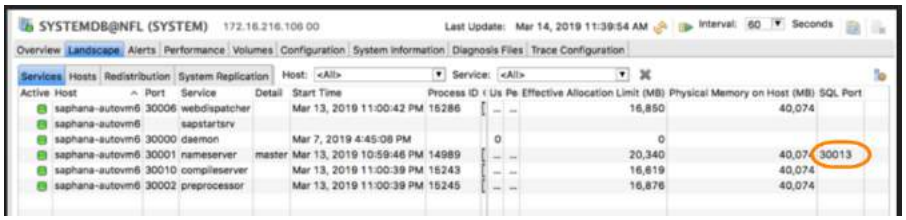
2. Deploy the newly created user by clicking the green arrow in the top right corner

You will get a User Created message and the System Privileges will show the user has been granted BACKUP ADMIN and CATALOG READ privileges.



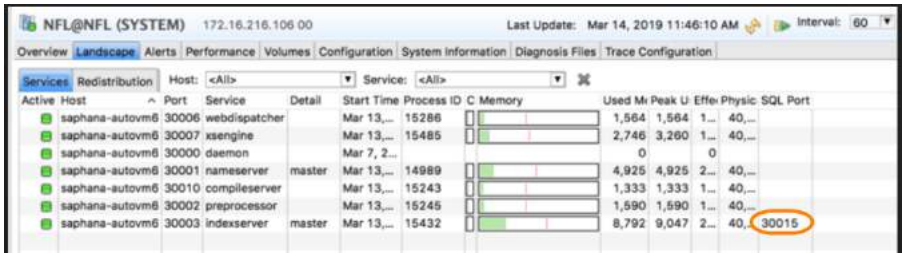
Getting the Instance and SQL Port Numbers

SYSTEMDB: From SYSTEMDB go to System > Landscape and get the value of SQL port for the nameserver. In the example below, 30013 is the SQL port, and the instance number is 00.



TENANT DB: From HANA Studio. At tenantdb-System > Landscape, get the value of SQL Port for indexserver. The <port> is the SQL port of the specific tenant database, i.e. 3<instance>15

In the example below, 30015 is the SQL port, and the instance number here is 00.



Creating the SAP HANA Hdbuserstore Key

Use a SAP HANA hdbuserstore key to execute Backup and Recovery instead of a user name and password to communicate with HANA database using the SAP HANA Secure User Store. For HANA 2.0 userstore key needs to be created for SYSTEMDB and all tenant db.

This includes:

Creating the SAP HANA Hdbuserstore Key for the System Database and Each Tenant Database in a Single Node System on page 16

Creating the SAP HANA Hdbuserstore Key for the System Database and each Tenant Database in a Scale-Out Multi-Node SAP HANA System on page 17

Hdbuserstore Key Naming Convention

For SYSTEMDB set the key name = DATABASE BACKUP USERNAME.

For TENANTDB set the key name = DATABASE BACKUP USERNAME<TENANT DB NAME>.

For example:

DATABASE BACKUP USERNAME = ACTBACKUP across SYSTEMDB and all TENANT DB

Set SYSTEMDB key name = ACTBACKUP

For tenant TDB, set TENANTDB key name = ACTBACKUPTDB

For tenant SDB, set TENANTDB key name = ACTBACKUPSDB

Creating the SAP HANA Hdbuserstore Key for the System Database and Each Tenant Database in a Single Node System

1. Open the putty window to the HANA database server and login to <sid>adm by su to <sid>adm.
2. `cd exe`
3. Create entries in hdbuserstore by calling:

   `# ./hdbuserstore SET <key_name> <server>:<port> <DB_user_name> <DB_user_password>`

   The <port> is the SQL port of the systemdb or tenant database.
4. Check the keystore: `./hdbuserstore list`

Example

Creating a SYSTEMDB hdbuserstore key:

```
./hdbuserstore SET ACTBACKUP saphana3:30013 ACTBACKUP <database backup user password
********************>
```

Where:

- SYSTEM DB DATABASE (Backup username from above): ACTBACKUP
- KEY NAME (same as DATABASE backup username): ACTBACKUP
- SQL Port (for systemdb from above): 30013
- Hostname: saphana3

Example

Creating a TENANTDB hdbuserstore key:

```
./hdbuserstore SET ACTBACKUPTBD saphana3:30015 ACTBACKUP <database backup user
password ********************>
```

Where:

- TENANT DB DATABASE Backup username from above: ACTBACKUP
- KEY NAME (systemdb key name postfix tenant db name): ACTBACKUPTDB
- SQL Port (for tenant db from above): 30015
- Hostname: saphana3

Creating the SAP HANA Hdbuserstore Key for the System Database and each Tenant Database in a Scale-Out Multi-Node SAP HANA System

For a three node scale-out system with server 1, server 2, and server 3:

1. Open the putty window to each HANA database server and login to <sid>adm by su to <sid>adm.
2. `cd exe`
3. On each of the HANA scale-out nodes, create entries in Hdbuserstore by running the command below:

   ```
   # ./hdbuserstore SET <key_name> "<server 1>:<port>;<server 2>:<port>;<server
   3>:<port>" <DB_user_name> <DB_user_password>
   ```

   Where the <port> is the SQL port of the systemdb or tenant database.
4. Check the keystore: `./Hdbuserstore list`

Example, SYSTEMDB hdbuserstore key

Where:

- SYSTEM DB DATABASE Backup username from above: ACTBACKUP
- KEY NAME: ACTBACKUP (same as DATABASE backup username)
- SQL Port for systemdb from above: 30013
- Hostname : saphana1, saphana 2, saphana 3

```
./hdbuseratore SET ACTBACKUP “saphana1:30013; saphana2:30013; saphana3:30013”
ACTBACKUP <database backup user password **********>
```

Example, TENANTDB (TDB) hdbuserstore key

TENANT DB DATABASE Backup username from above: ACTBACKUP

KEY NAME: ACTBACKUPTDB (systemdb key name postfix tenant db name)

SQL Port for tenant db from above: 30015

Hostname : saphana1, saphana2, saphana3

```
./hdbuseratore SET ACTBACKUPTDB “saphana1:30015; saphana2:30015; saphana3:30015”
ACTBACKUP <database backup user password **********>
```

4 Adding a SAP HANA Database Host and Discovering the Database

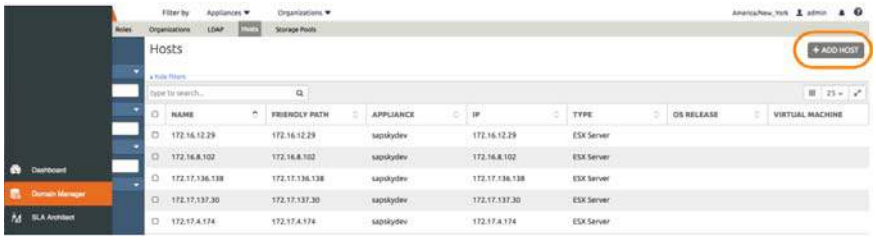
Before you can protect a SAP HANA database, you must add the host and discover the database. This requires:

1. Adding the Host from the Domain Manager on page 19
2. Discovering the HANA Database Application from the Application Manager on page 21
3. Finding the Discovered HANA Database in the Application Manager on page 22

Adding the Host from the Domain Manager

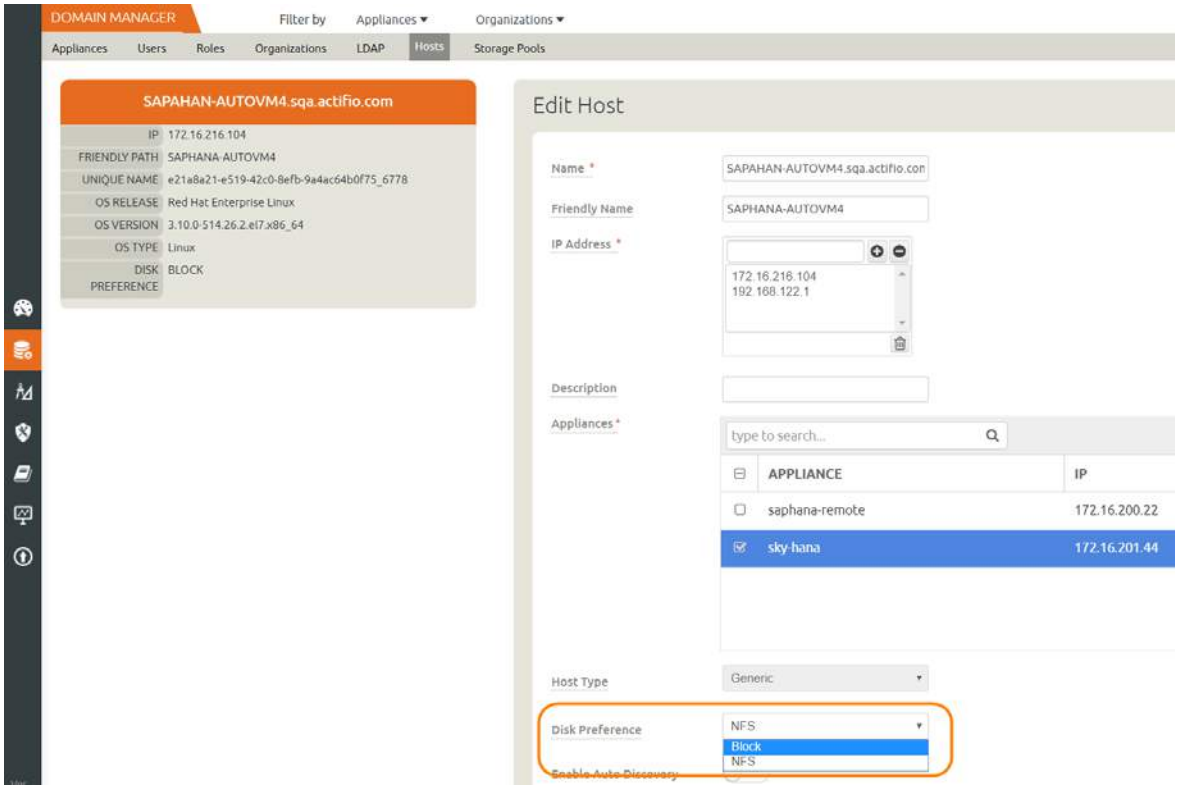
Add the host to Domain Manager. If the host is already added then edit the host and make sure to set the Disk Preference correctly.

1. From the AGM Domain Manager, Hosts tab, click +Add Host.



2. On the Add Host page:
   - Name: Provide the HANA database server name.
   - IP Address: Provide the HANA database server IP and click the + sign on the right corner.
   - Appliances: Select the check box for the appliance.
   - Host Type: Make sure this is Generic.
   - Click Add at bottom right to add the host.

   The Host will get added.
3. Right-click the host and select Edit.
4. On the Edit Host page: Select the disk preference:
   - For block-based backup with CBT: select **Block**
   - For file-based backup with Full+Incremental file system backup: select **NFS**

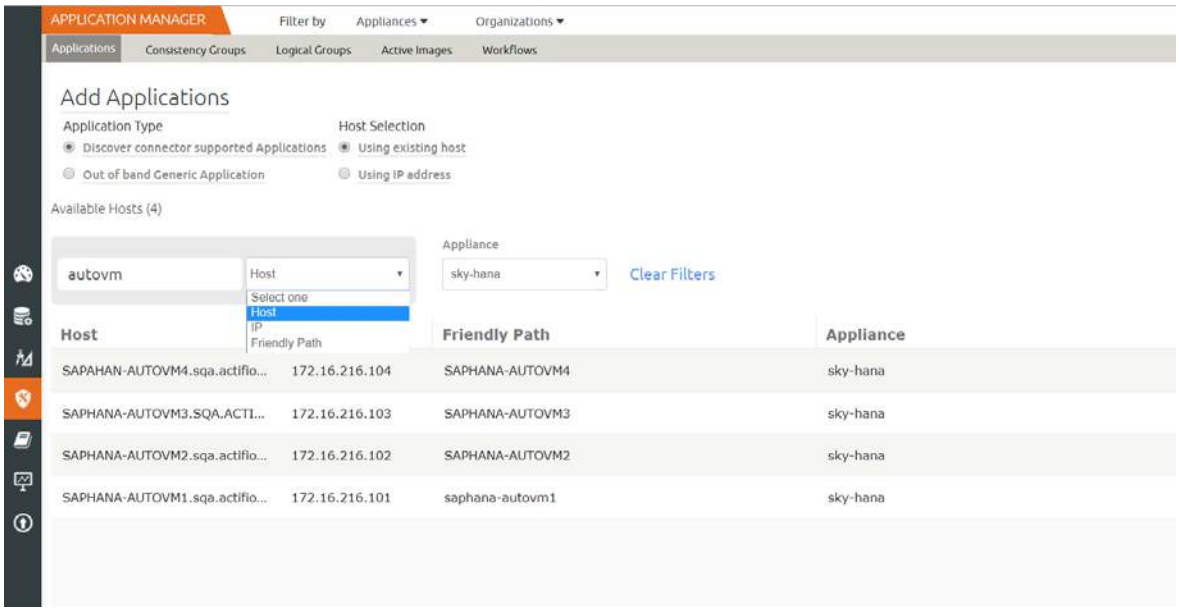


5. Select save at the bottom of Edit Host page

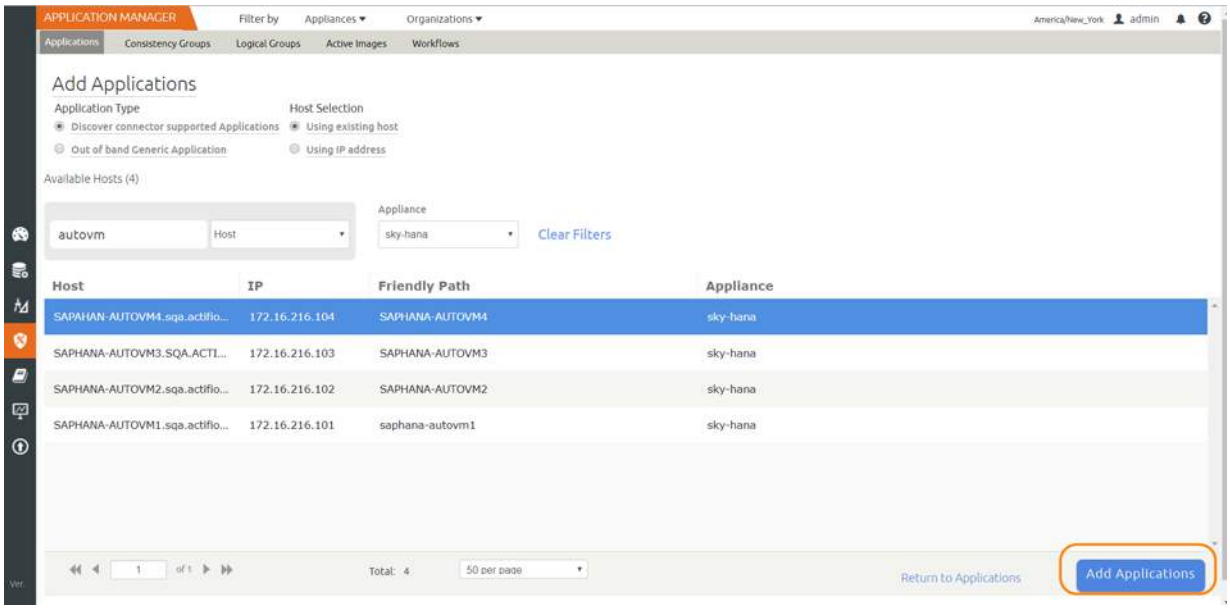
Discovering the HANA Database Application from the Application Manager

To discover the HANA database:

1. From the AGM Application Manager, Applications tab, select Add Application in the upper right corner.
2. On the Add Application page, select Discover connector supported applications and Using existing host, then select the HANA database host. If you have many hosts, you can use the search feature or use the filter to see only hosts that are managed by a specific Actifio appliance.



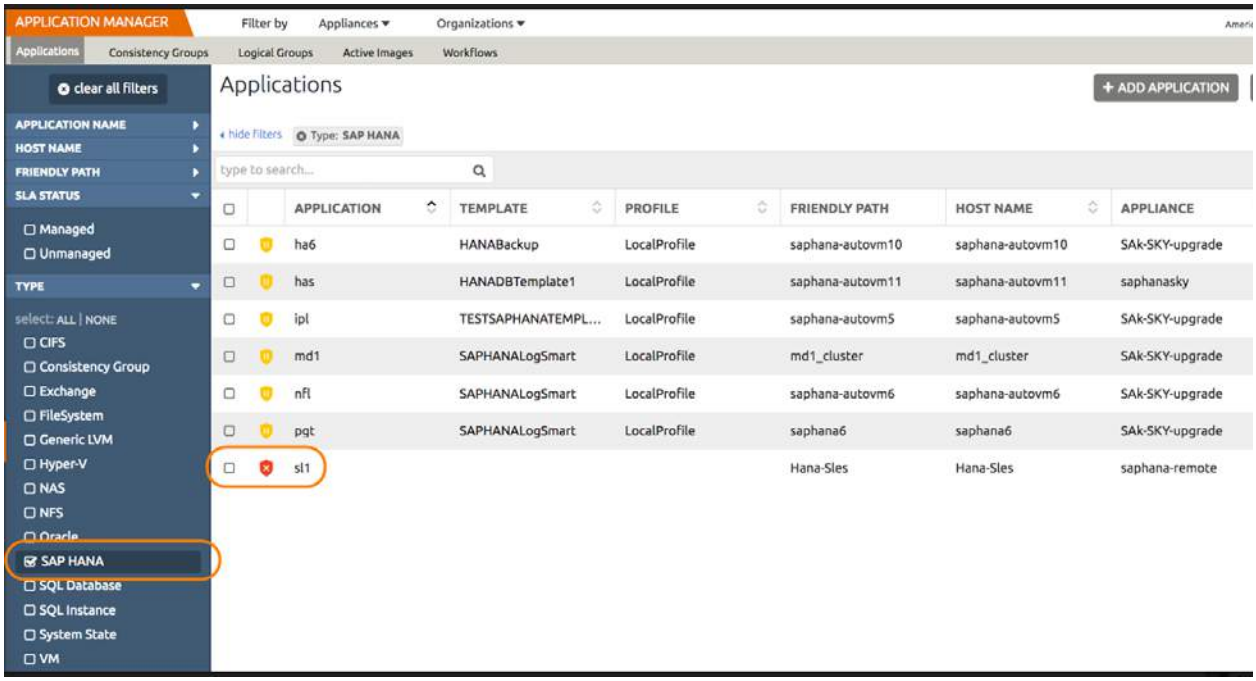
3. Select the host and click Add Applications in the bottom right corner. This will run the discovery on the HANA database host and will discover all HANA databases running on it.



Finding the Discovered HANA Database in the Application Manager

To find the newly-discovered database, go to the AGM Application Manager Applications tab. All applications known to the AGM of all types are listed. Use the Type application filter on left pane to show only SAP HANA databases.

The new HANA database will appear in the list as unmanaged (the red shield icon).



5 Configuring the SAP HANA Backup Method

You can back up the database:

- Using Block-Based Database Storage Snapshots with CBT
- Using File-Based Traditional Backup and Recovery in NFS

Setting	Block-Based LVM Snapshot with CBT	File-Based Backup in NFS
Percentage of Reserve Space in Volume Group	This is needed for LVM snapshot temporary space. Recommended value is 20%	Not applicable
Backup Capture Method	Use Changed block tracking based backup	Use full+incremental filesystem backup
Force Full Filesystem Backup	Not applicable	Use for an ad hoc full backup
Database Filesystem Staging Disk Size in GB	Not applicable	Use the default calculation: (database size * 1.5)+ 10%. The disks will grow dynamically.
Log Backup Staging Disk Size in GB	By default Actifio calculates this as daily log generation * retention of log backup SLA plus 20% buffer. Default is recommended. Providing a value will override the default calculation and the log disk will not grow dynamically. This will become a fixed size	
Retention of Production DB Logs in Days	This value is used to purge the HANA log backup from basepath_logbackup destination. Based on this setting the last data backup id will be selected (CURRENT_TIMESTAMP, - the # days set) and the log will be purged older than the data backup id. Default value is 0 days. With default value all logs prior to last data backup will be purged.	
HANA DB User Store Key	This is the SAP HANA hdbuserstore key for the system database created in earlier. This field is mandatory.	
Script Timeout	This value is applied to internal backup and recovery scripts called by connector. Default value is recommended.	

File-based backup also requires that the CLI command DB dump schedule be configured. See ***Actifio CLI Reference***.

Whichever method you select, you must:

Ensure that the Disk Preference on the Host is Set Correctly on page 24
Ensure that the Backup Capture Method in the Application Settings is Set Correctly on page 26

Ensure that the Disk Preference on the Host is Set Correctly

Choose between:

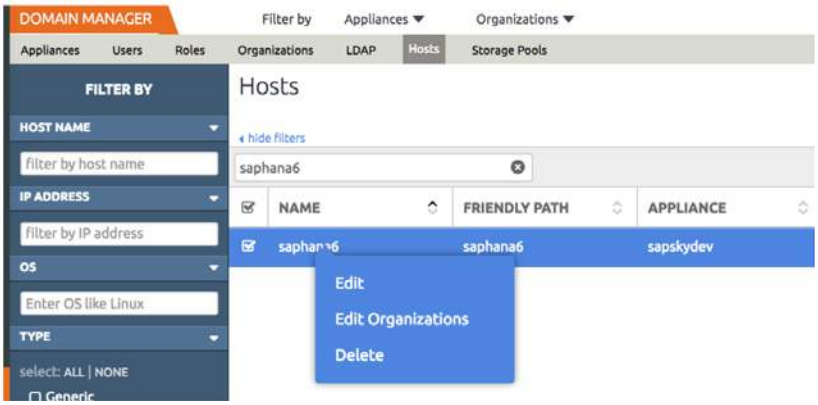
Setting Disk Preference for Block-Based Database Storage Snapshots with CBT on page 24

Setting Disk Preference for File-Based Traditional Backup and Recovery in NFS on page 25

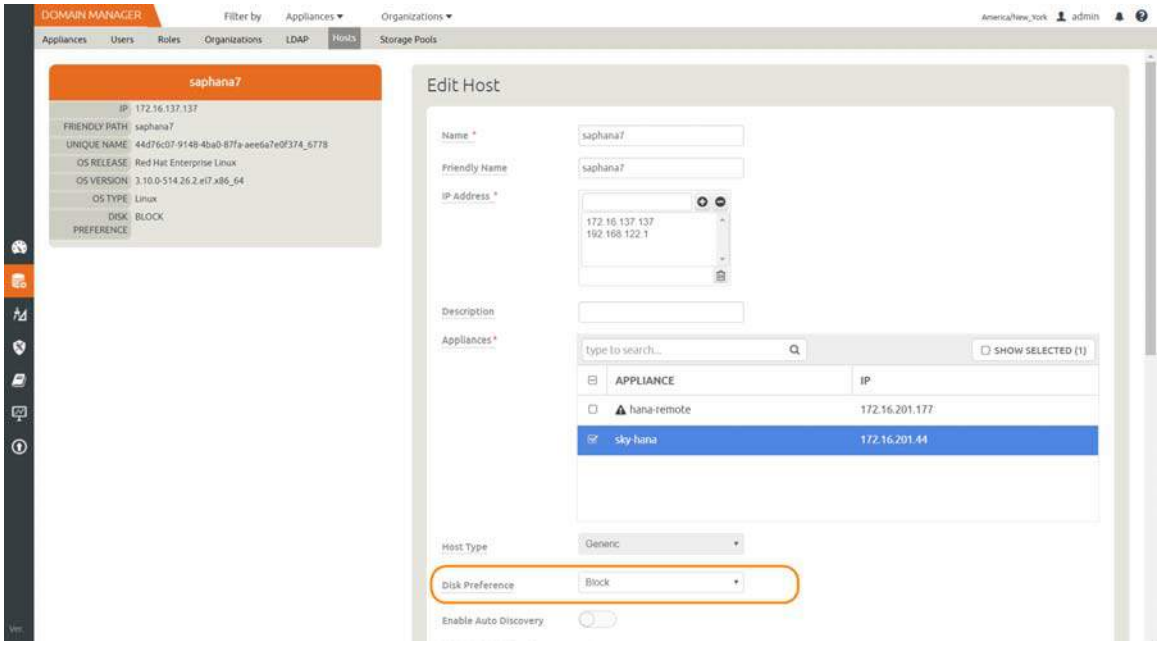
Setting Disk Preference for Block-Based Database Storage Snapshots with CBT

To set disk preference for block-based database storage snapshots with CBT:

1. From AGM Domain Manager, Hosts tab, right-click the host and select Edit.



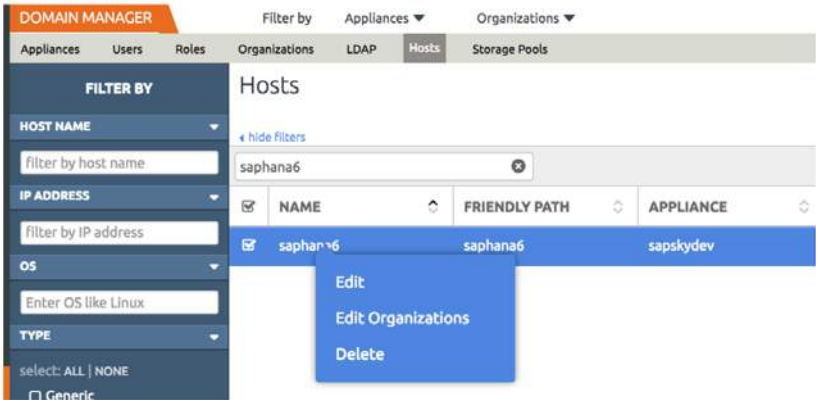
2. In the Edit Host pane, set Disk Preference to *Block* and click Save at the bottom of the page.



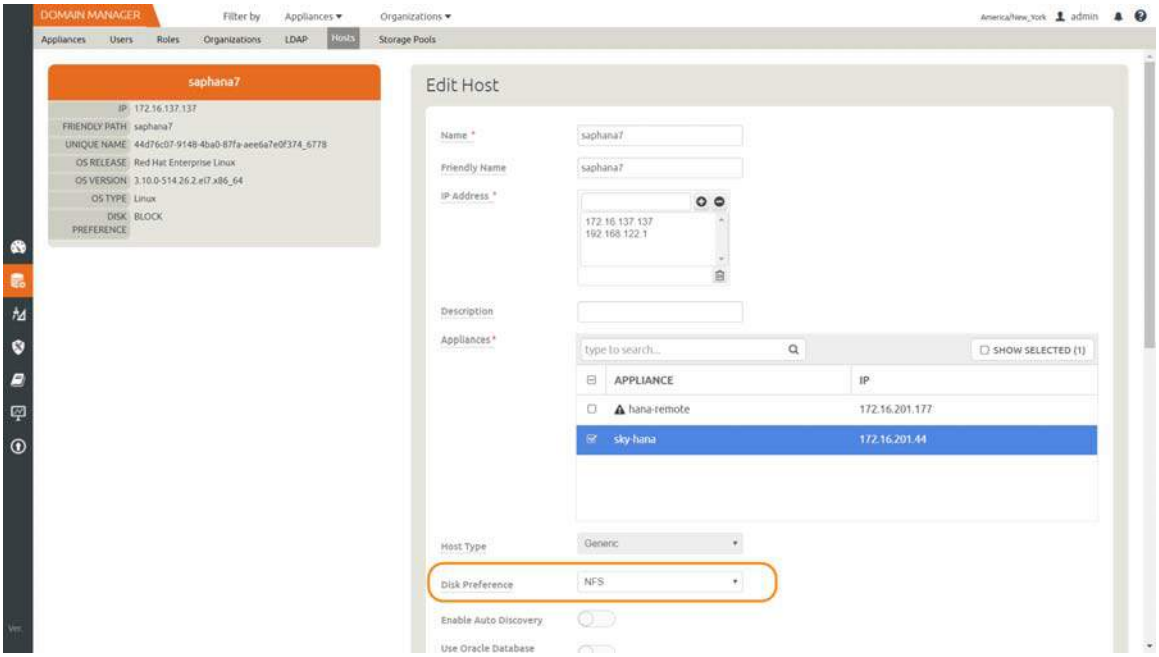
Setting Disk Preference for File-Based Traditional Backup and Recovery in NFS

To set disk preference for File-Based Traditional Backup and Recovery in NFS:

1. From AGM Domain Manager, right-click the host and select Edit.



2. In the Edit Host pane, set Disk Preference to *NFS* and click Save at the bottom of the page.



Ensure that the Backup Capture Method in the Application Settings is Set Correctly

Choose between:

Setting Backup Capture Method for Block-Based Database Storage Snapshots with CBT on page 26

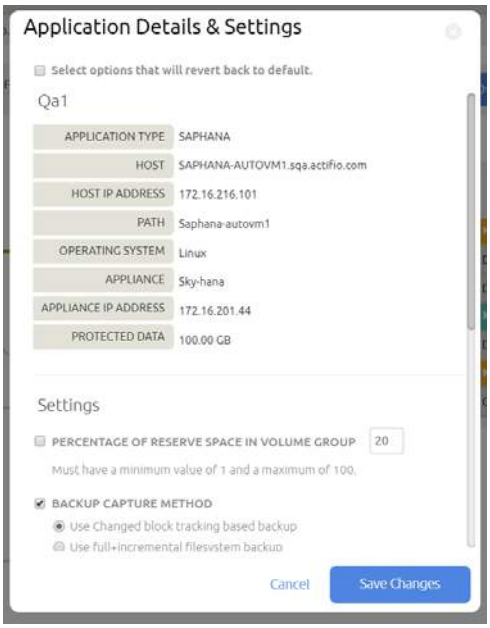
Setting Backup Capture Method for File-Based Backup and Recovery in NFS on page 27

Setting Backup Capture Method for Block-Based Database Storage Snapshots with CBT

To set the backup capture method for block-based database storage snapshots with CBT:

1. Go to the Application Manager. In the Applications tab, right-click the application and select Manage SLA. At the top of the page, click the blue Details & Settings link.

2. Set the Backup Capture Method to Use Changed block tracking based backup and click Save Changes. For details on the other settings, see Configuring the SAP HANA Backup Method on page 23.

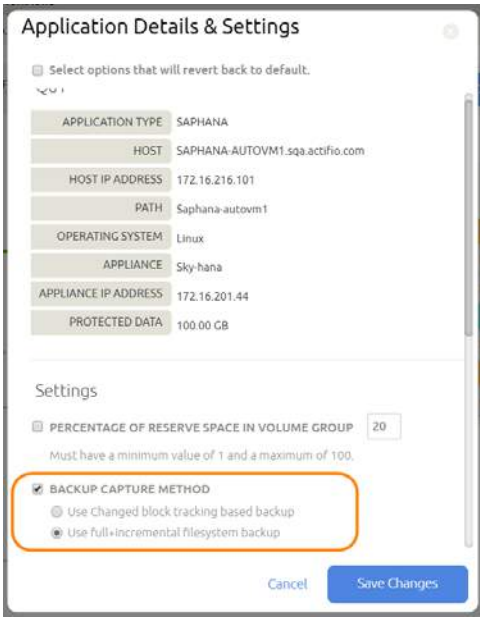


Setting Backup Capture Method for File-Based Backup and Recovery in NFS

To set the backup capture method for file-based backup and recovery in NFS:

1. Go to the Application Manager. In the Applications tab, right-click the application and select Manage SLA. At the top of the page, click the blue Details & Settings link.

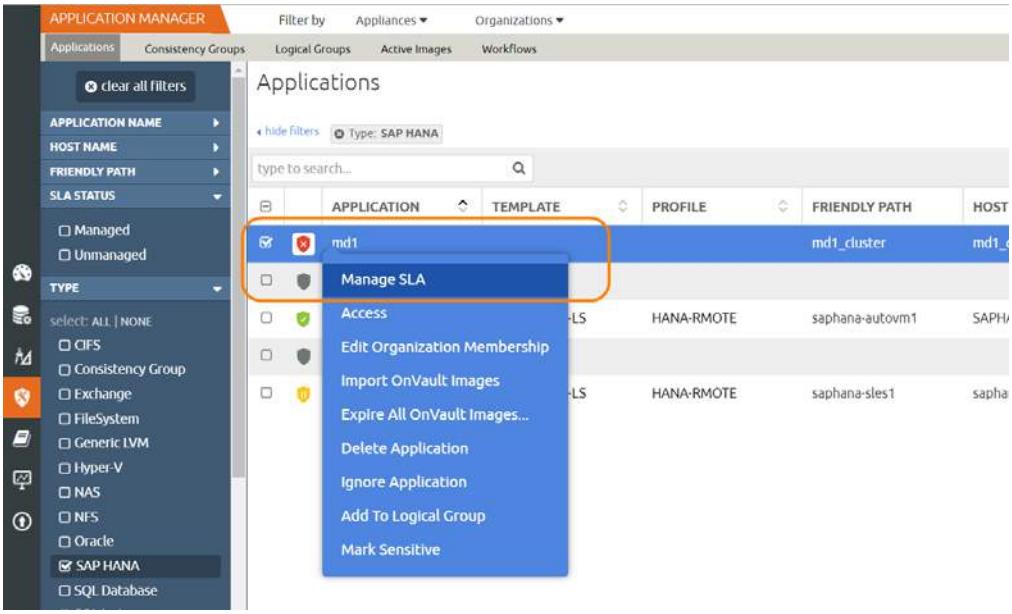
2. Set the Backup Capture Method to Use full+incremental filesystem backup and click Save Changes. For details on the other settings, see Configuring the SAP HANA Backup Method on page 23.



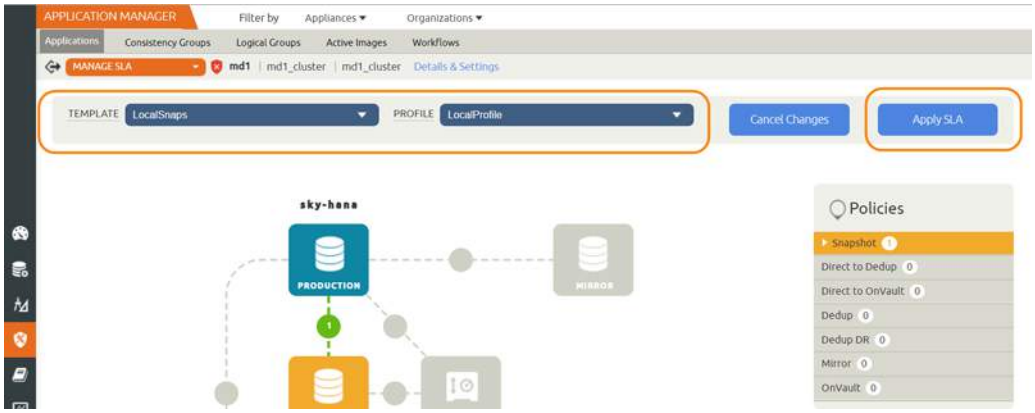
6 Protecting the HANA Database

To protect the database:

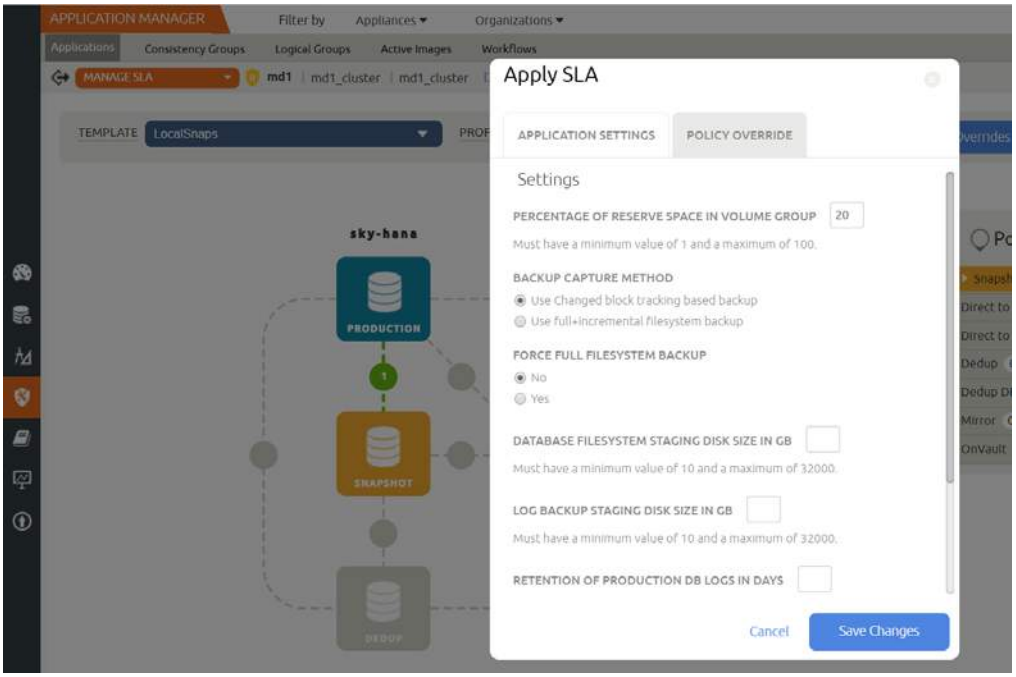
1. Right-click the HANA database and select Manage SLA.



2. On the Manage SLA page, select your desired template from Choose a template and profile, then click Apply SLA.



3. On the Apply SLA page, fill in the required field based on type of backup as detailed in Configuring the SAP HANA Backup Method on page 23. Click Save Changes.



The database will be protected when the snapshot job runs according to the schedule in the template. After the first successful snapshot job, the database will appear in the Application Manager as protected, with a green shield icon.

7 Protecting SAP HANA Database Logs

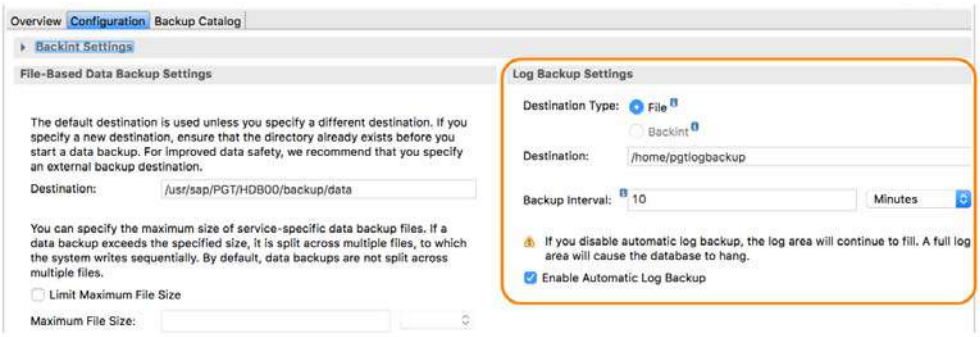
There are two parts to configuring protection of SAP HANA database logs:

Setting up the Log Mode and Log Backup in HANA Studio on page 31

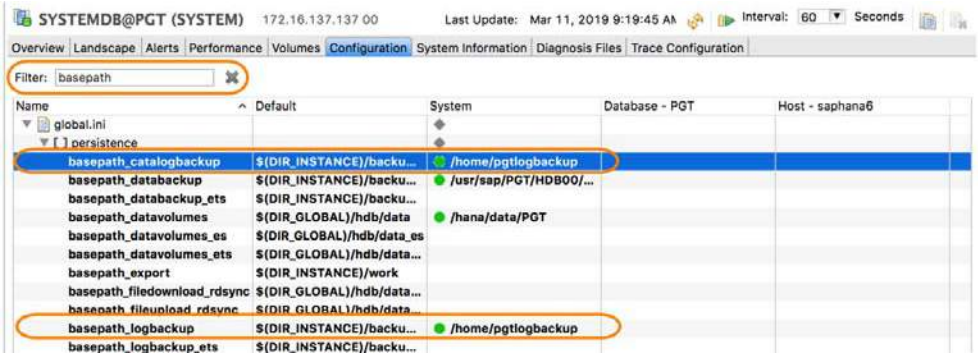
Setting up the Log Backup in Actifio AGM on page 33

Setting up the Log Mode and Log Backup in HANA Studio

1. In SAP HANA HDB studio, make sure log backup is set correctly under DATABASE (SYSTEMDB FOR HANA 2.0) - Backup - Configuration page
   - Destination Type is File.
   - Destination is set to a local file system mount path.
   - Backup Interval is set to required RPO.
   - Automatic Log Backup is enabled.

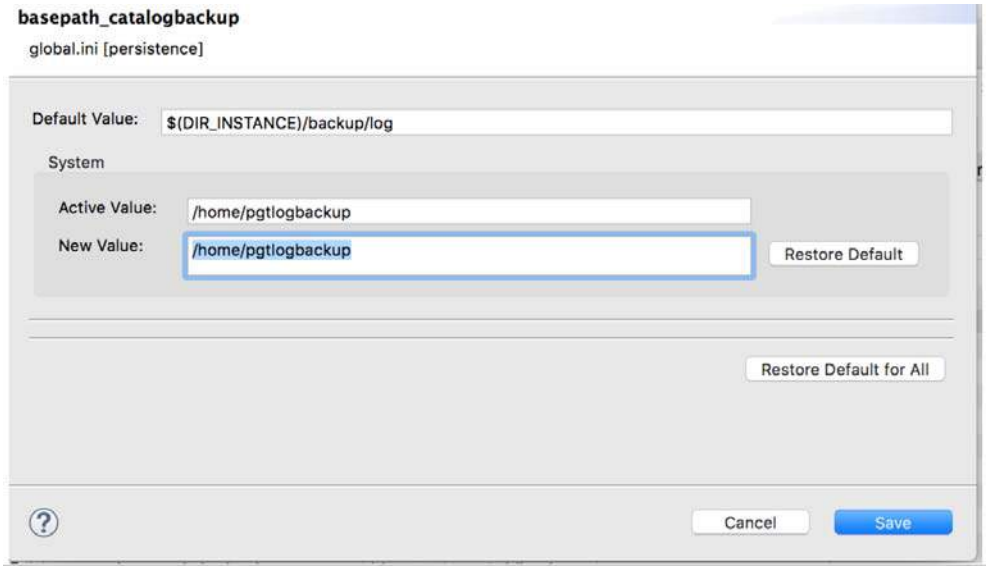


2. Check under Database configuration: DATABASE (SYSTEMDB FOR HANA 2.0) - Configuration page. In the filter, type basepath.



3. Verify basepath_logbackup is set correctly:
   - Set the basepath_catalogbackup to same as basepath_logbackup.

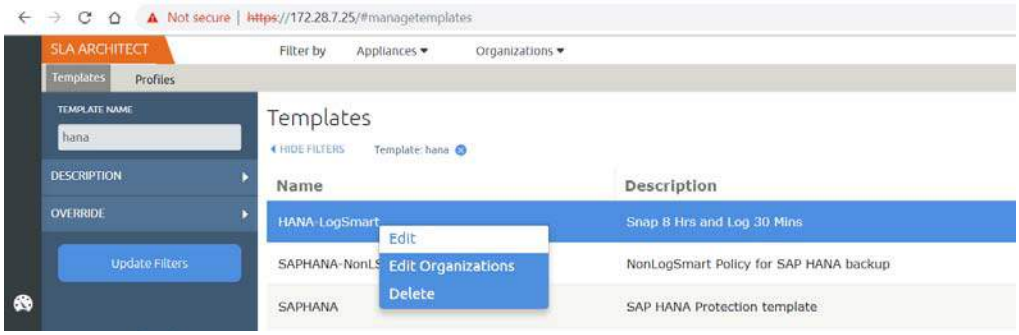
- Open the basepath_catalogbackup edit page.
- Set the New Value to same as basepath_logbackup and click Save. This will ensure the backup of catalog with log backup for point in time recovery.



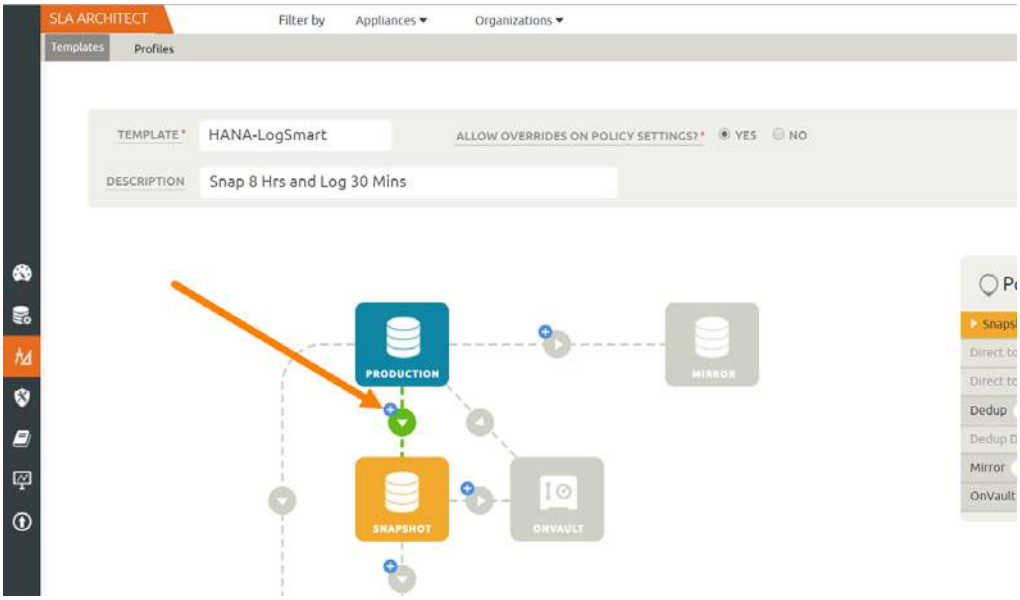
Setting up the Log Backup in Actifio AGM

To enable and set up the HANA database log backup:

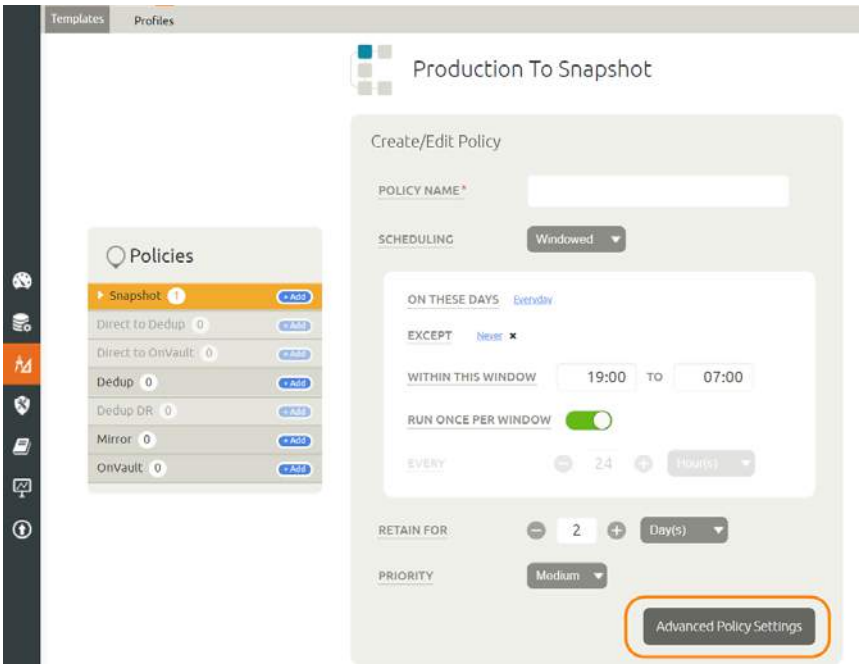
1. From the SLA Architect page, edit the template created for HANA database protection:



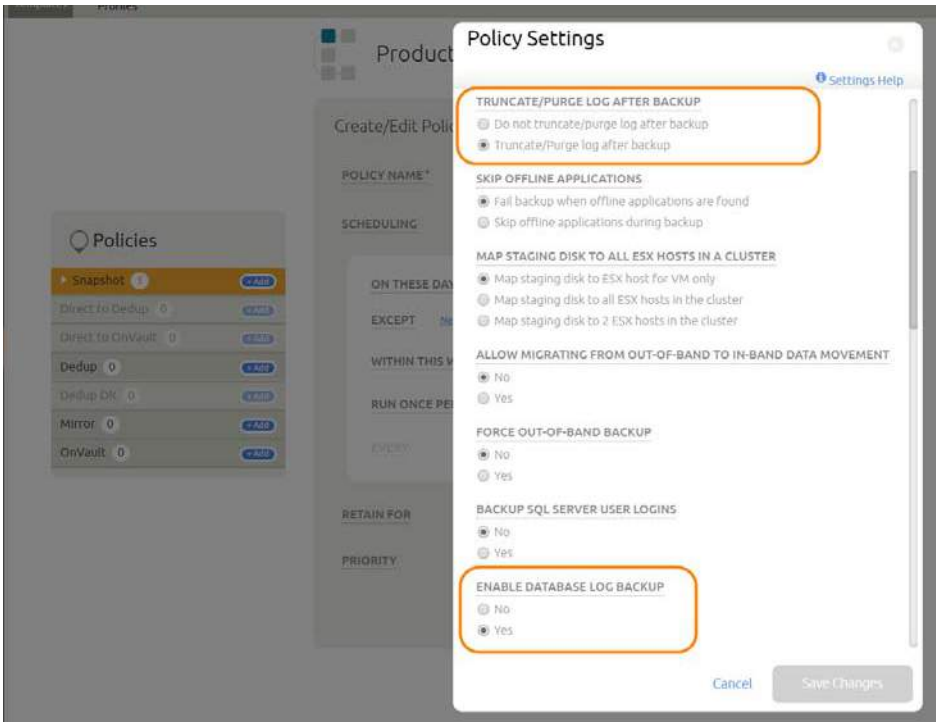
2. Click the Production to Snapshot "**+**".



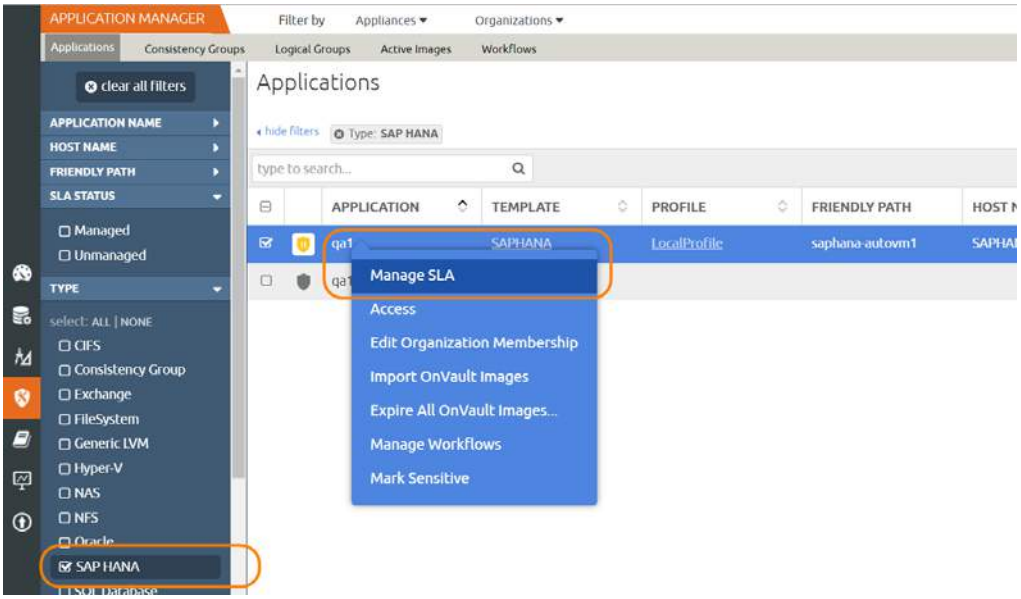
3. Select Advanced Policy Settings.



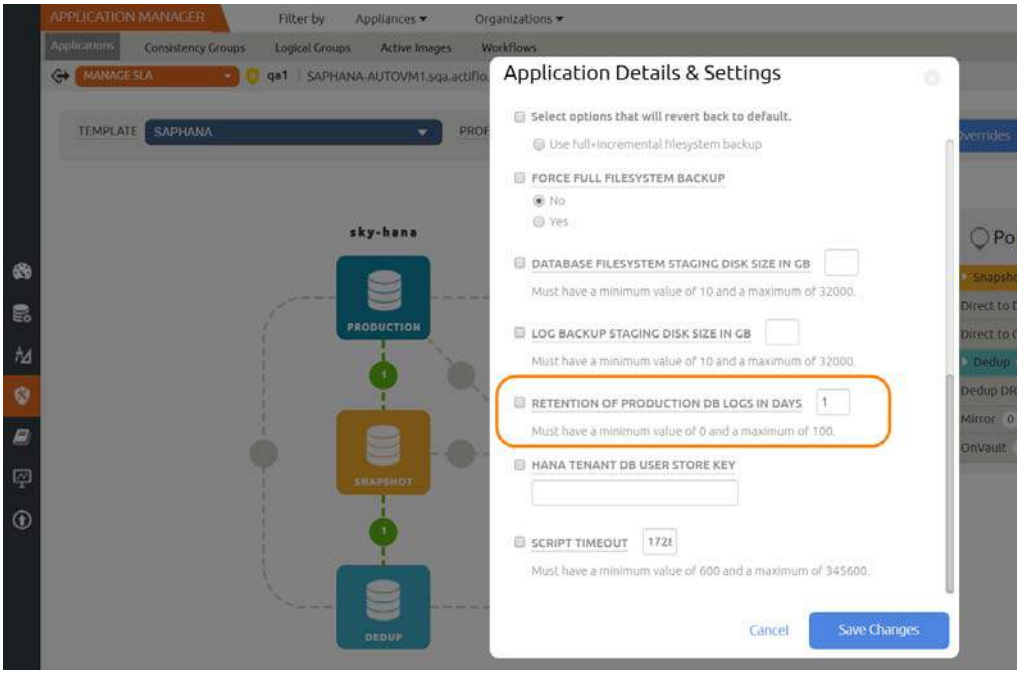
4. Set the log policy options (you will have to scroll to see them all):
   - Truncate/Purge Log After Backup: Select this.
   - Enable Database Log Backup: Select this.
   - RPO (Minutes): Enter the desired frequency of log backup
   - Log Backup Retention Period (in Days): the SLA to retain the backup of log for point in time recovery.
   - Replicate Logs (Uses StreamSnap Technology): Select this to enable StreamSnap replication of log backup to a DR site.



5. From Application Manager, select the HANA database. You can use the SAP HANA checkbox to filter the list. Select Manage SLA.



6. At the top of the screen, select Details & Settings.



7. Set the Retention of Production DB Logs in Days. This value is used to purge the HANA log backup from basepath_logbackup destination. Based on this setting the last data backup id will be selected (CURRENT_TIMESTAMP - the # days set) and the log will be purged older then the data backup id. Default value is 0 days. With the default value, all logs prior to last data backup are purged.

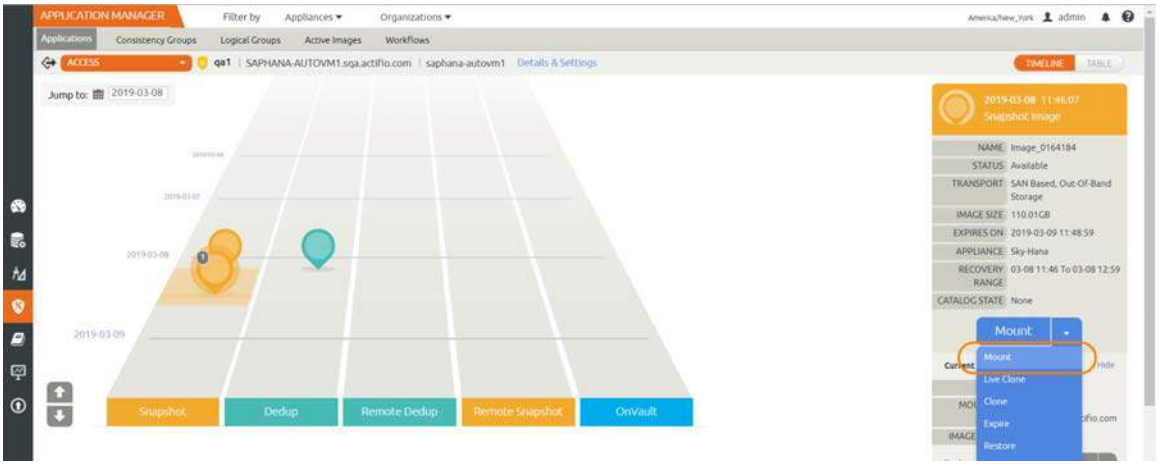
8 Restoring and Recovering an SAP HANA Database

This section includes:

Mount and Refresh from Block-Based LVM Snapshot with CBT to a Target SAP HANA Database as a Virtual Application

To mount the database image as a virtual application (an application aware mount) to a new target:

1. From Application Manager > Protected Application > Access, from the latest snapshot, choose Mount.



2. On the Mount page, from Target, choose the desired target HANA server from the dropdown.
3. Under Application Options:
   - Select Create New Virtual Application.
   - Choose a point in time on the slider bar for a database protected with log roll-forward to recover to.
   - Target Database SID > Provide the target HANA database name.
   - SAP DB User Store-Key > Provide the hdbuserstore key for the target database (HANA 2.0: SYSTEMDB).
   - Mount Location> Specify a Mount Point to mount to new target.
   - Manage New Application> To reprotect, click and enable Manage New Application.
   - Template > Choose a template to protect the database.
   - Profile> Choose a profile.
4. Click Submit.

Restoring and Recovering a SAP HANA Database

Depending on how you protected the database, you need the procedure for:

Recovering from Block-Based LVM Snapshot with CBT on page 38

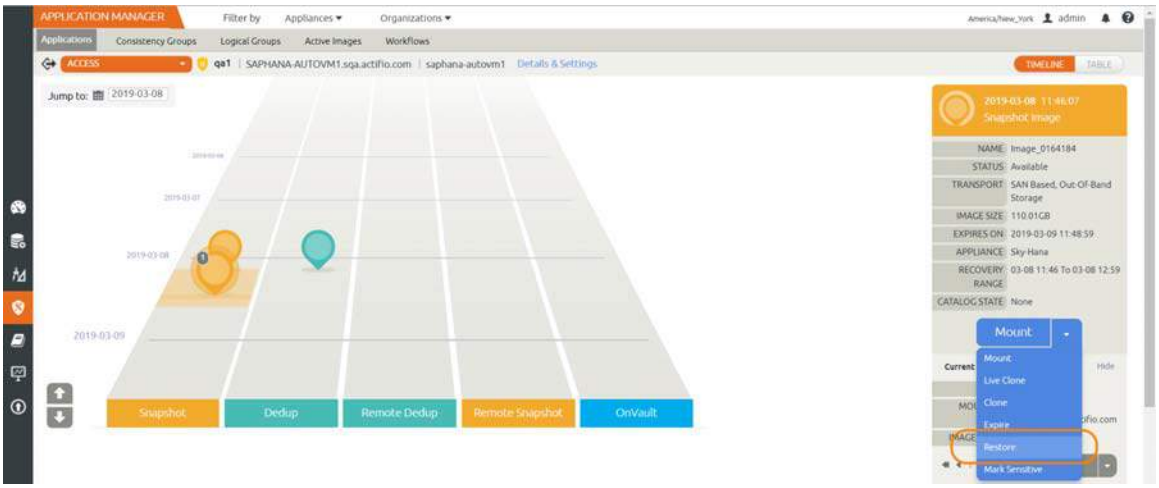
Recovering from a File-Based Backup with NFS on page 39

Recovering from Block-Based LVM Snapshot with CBT

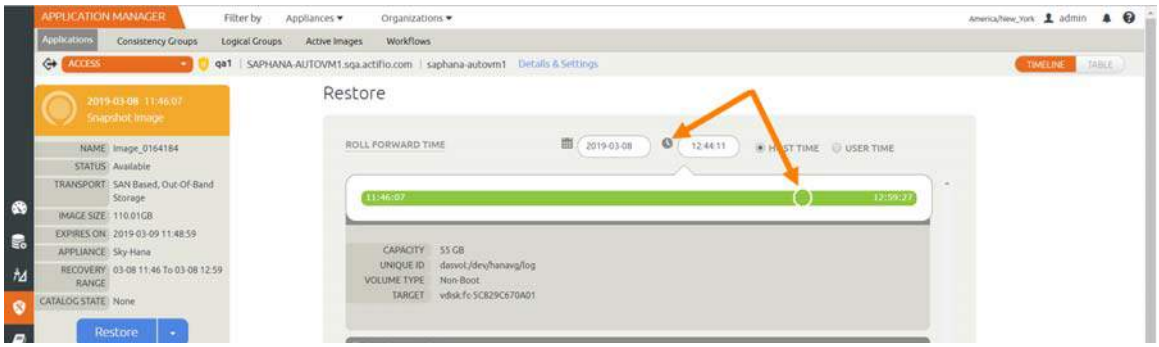
Use this procedure to restore and recover the source HANA database. This procedure uses physical recovery of the source data area.

To recover back to the source:

1. From the Application Manager > Protected Application > Access, from the latest snapshot to recover, choose Restore.



2. On the Restore page choose point in time on the slider bar for database protected with log to recover to desired point in time.



3. Click Submit.

Recovering from a File-Based Backup with NFS

You have two options:

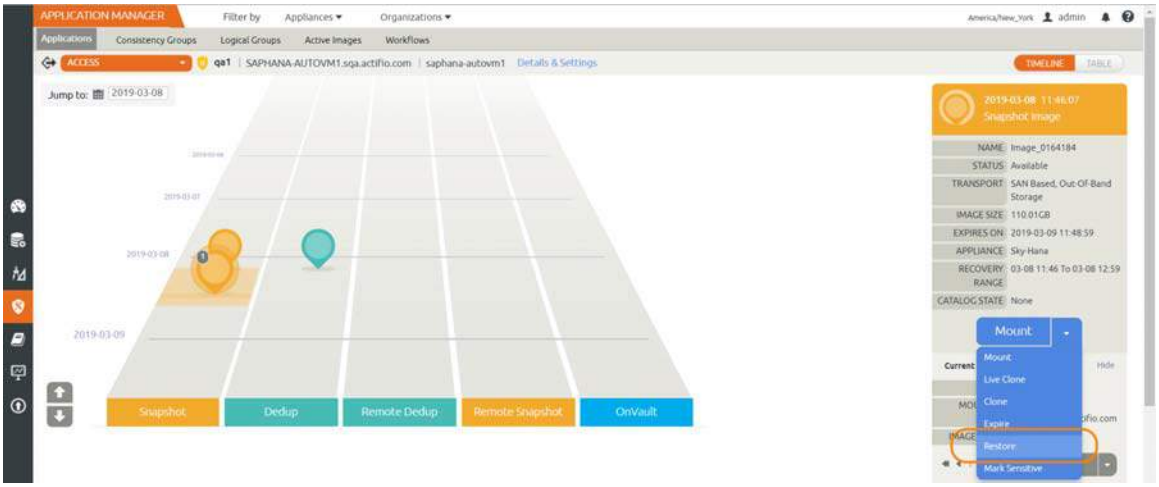
Recovering Back to the Source: Use this procedure to restore and recover the source HANA database. This procedure overwrites the source data.

Recovering to a New Target: Use this procedure to restore and recover to a new target server.

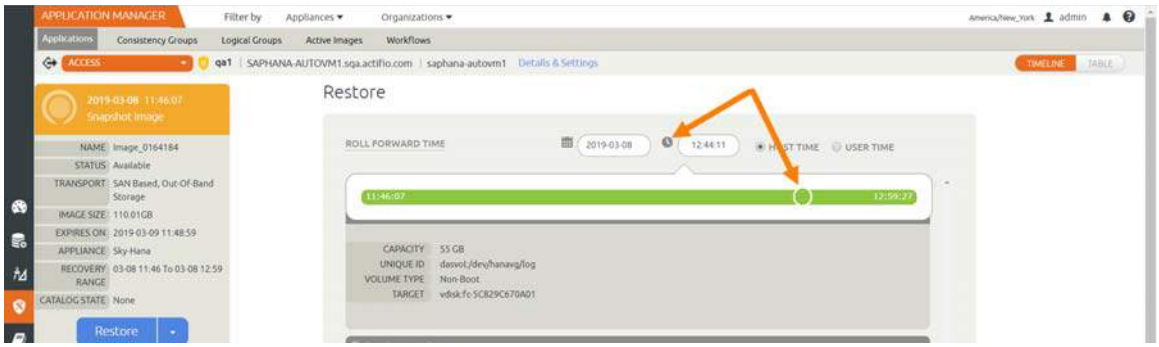
When you are finished, you must bring up the database, as detailed in Bringing up the HANA Database on page 41.

Recovering Back to the Source

1. From Application Manager > Protected Application > Access.
2. Select the latest snapshot to recover, and choose Restore.



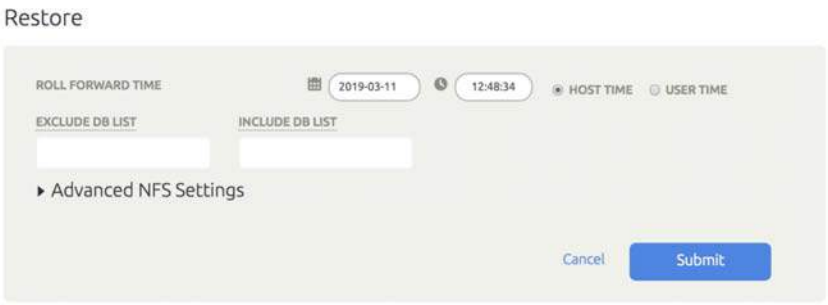
3. For a database protected with logs, on the Restore page, choose a date and then a point in time on the slider.



Notes

- HANA 1.0: EXCLUDE and INCLUDE db list do not apply
- HANA 2.0
  - Only one out of EXCLUDE and INCLUDE is applicable at a time.
  - Complete HANA recovery leave EXCLUDE AND INCLUDE empty
  - INCLUDE LIST: For recovering one or more database out of n database: provide comma separated list of database under INCLUDE

- o EXCLUDE LIST: For excluding one or more database during recovery out of n database: provide comma separated list of database under EXCLUDE



4. Click Submit. This will start the source database physical recovery using HANA recover commands.

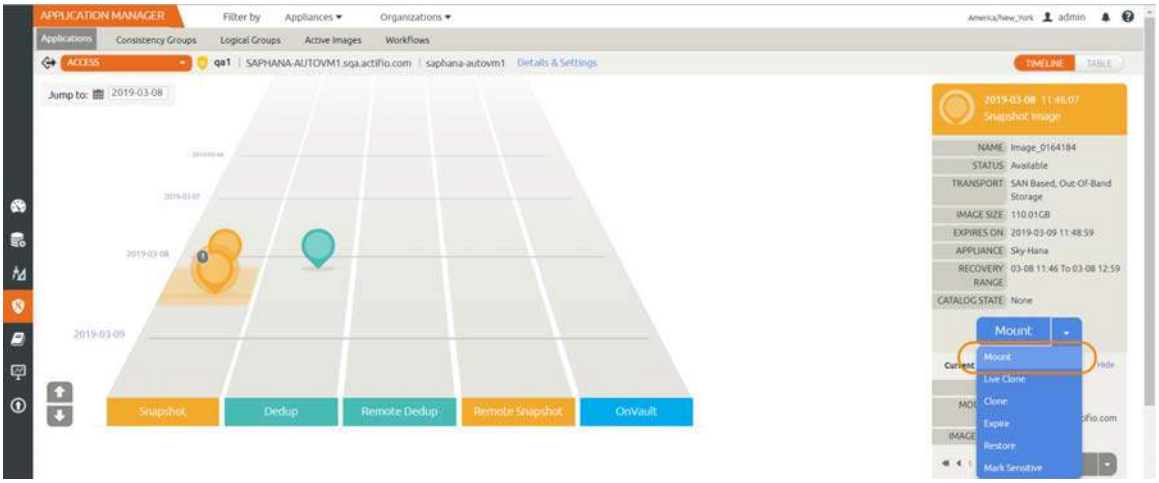
Recovering to a New Target

Before You Begin:

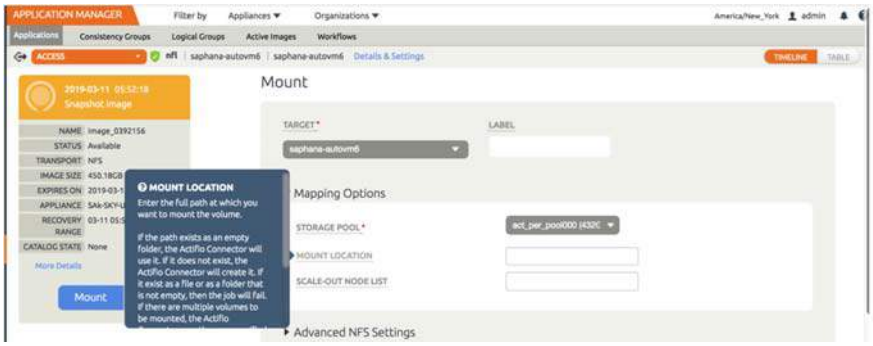
- Make sure target HANA server is set up as same as source HANA server (OS version, CPU and memory, HANA version)
- Make sure HANA database on target server is configured same as source i.e. global.ini, nameserver.ini

To recover:

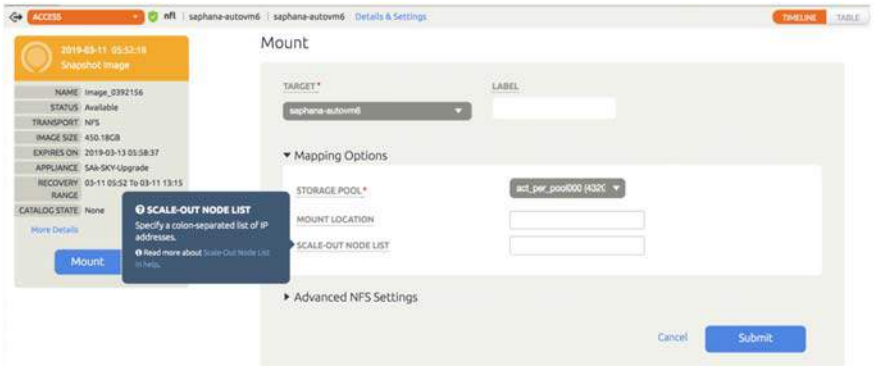
1. From Application Manager > Protected Application > Access, select the latest snapshot to recover, and choose Mount.



2. On the Mount page, specify a mount location to mount to new target.



3. Enter scale-out information:
    - For non-scale out HANA: leave SCALE-OUT NODE LIST empty
    - For scale out HANA environment: Provide colon-separated list of target HANA servers



4. Click Submit. This will mount the backup image to target server. In case of scale out, the image will be mounted to all nodes as NFS shared volume.

Bringing up the HANA Database

To bring up the HANA database from the mounted image, modify and configure this script:

1. Configure /act/custom_apps/saphana/dump/restoreDumpToNewTarget.conf parameter

```
DBSID=<source database sid>
DBPORT="HDB<instance #>" ex:for instane# 00 this will be "HDB00"
HANABACKUPPATH=<mount path from mount operation>
DBUSER=<userstore key or HANA 2.0: systemdb userstore key>
HANAVERSION="<HANA version: 1.0 or 2.0>"
# optional if rollforward is required
LOGMOUNTPATH="<mounted log backup mount point>"
RECOVERYTIME="2019-03-04 03:11:36"
# do not change below
EXCLUDE_DB_LIST="null"
INCLUDE_DB_LIST="null"
```

   For example:

```
DBSID=ipl
DBPORT="HDB01"
HANABACKUPPATH=/iplmnt
DBUSER=ACTBACKUP
HANAVERSION="2.0"
# optional if rollforward is required
LOGMOUNTPATH="/iplmnt_archivelog"
RECOVERYTIME="2019-03-04 03:11:36"
# do not change below
EXCLUDE_DB_LIST="null"
INCLUDE_DB_LIST="null"
```

2. `cd /act/custom_apps/saphana/dump/`
3. Run ACT_HANADB_newtargetdumprestore.sh:

```
./ACT_HANADB_newtargetdumprestore.sh
```

   or

```
/act/custom_apps/saphana/dump/ACT_HANADB_newtargetdumprestore.sh
```