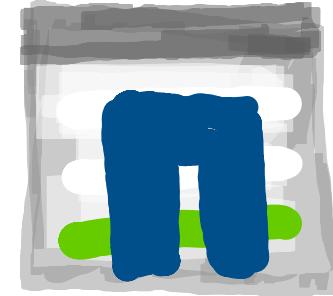
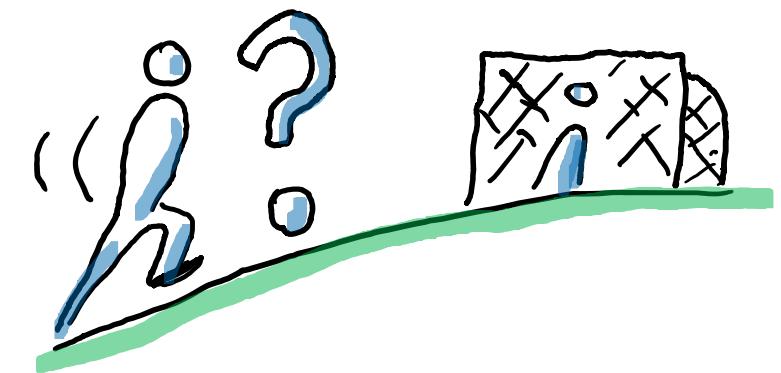


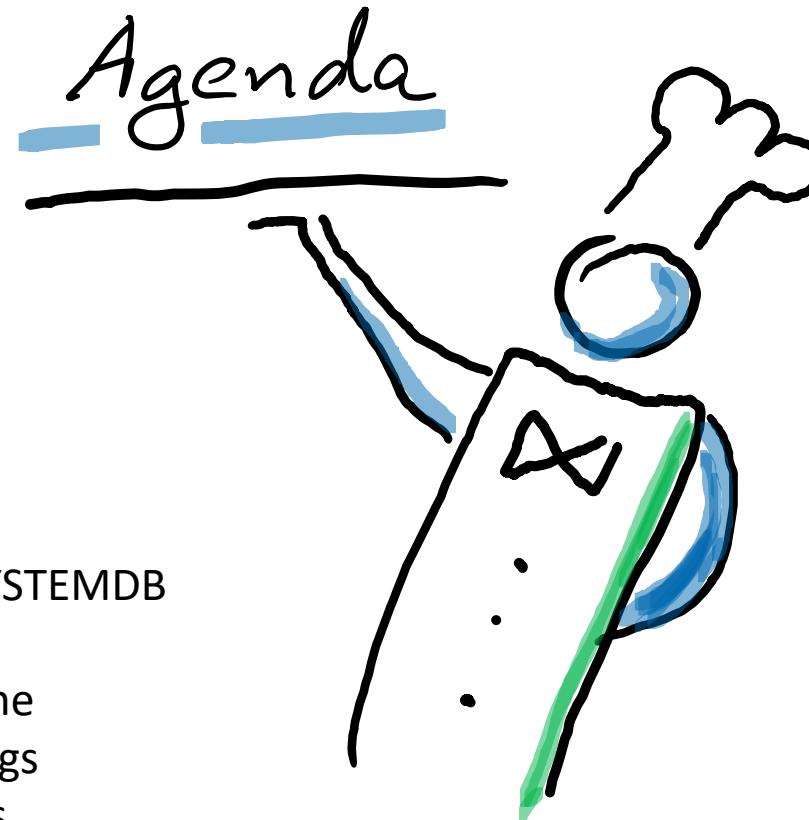


on



Part III Recovery & Cloning





- Volume Design
- Backup Parameter
- SnapShot Directory
- Recovery Process SYSTEMDB
- Recovery TenantDB
- Recovery – Until Time
- Recovery – Reset Logs
- Cloning – Reset Logs

Backup - Options

Default NFS Backup

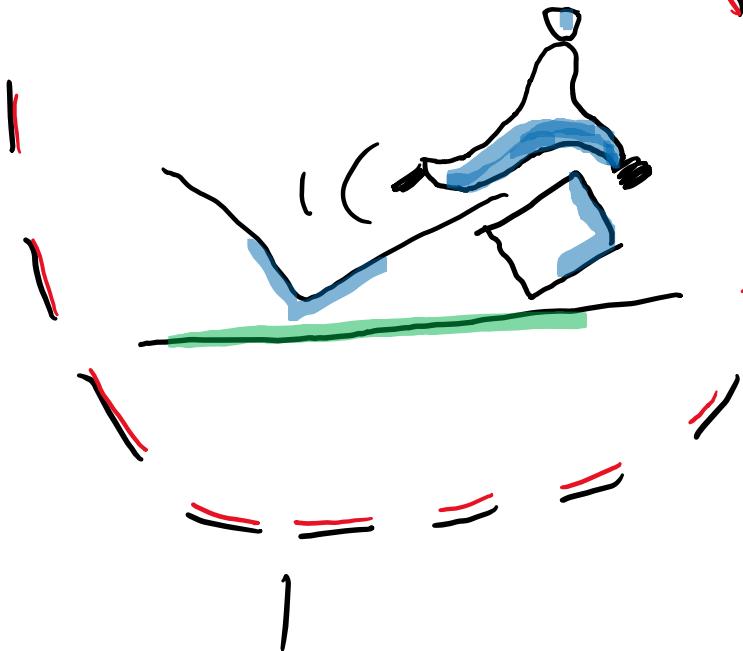


GitHub NetApp Script

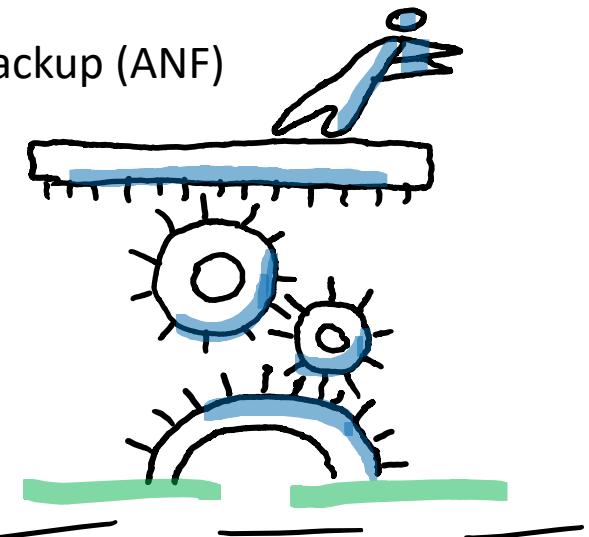


<https://github.com/netapp/ntaphana>

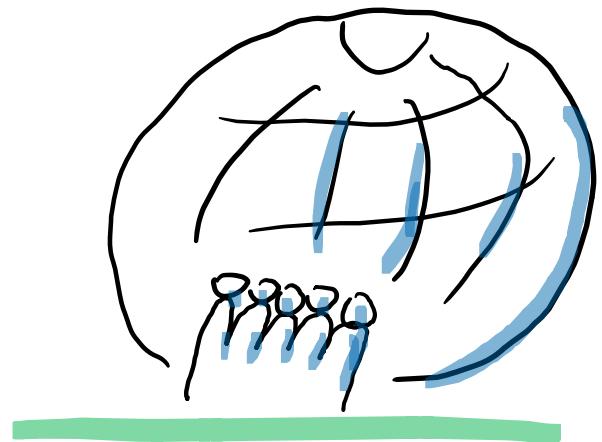
azacsnap (private preview)



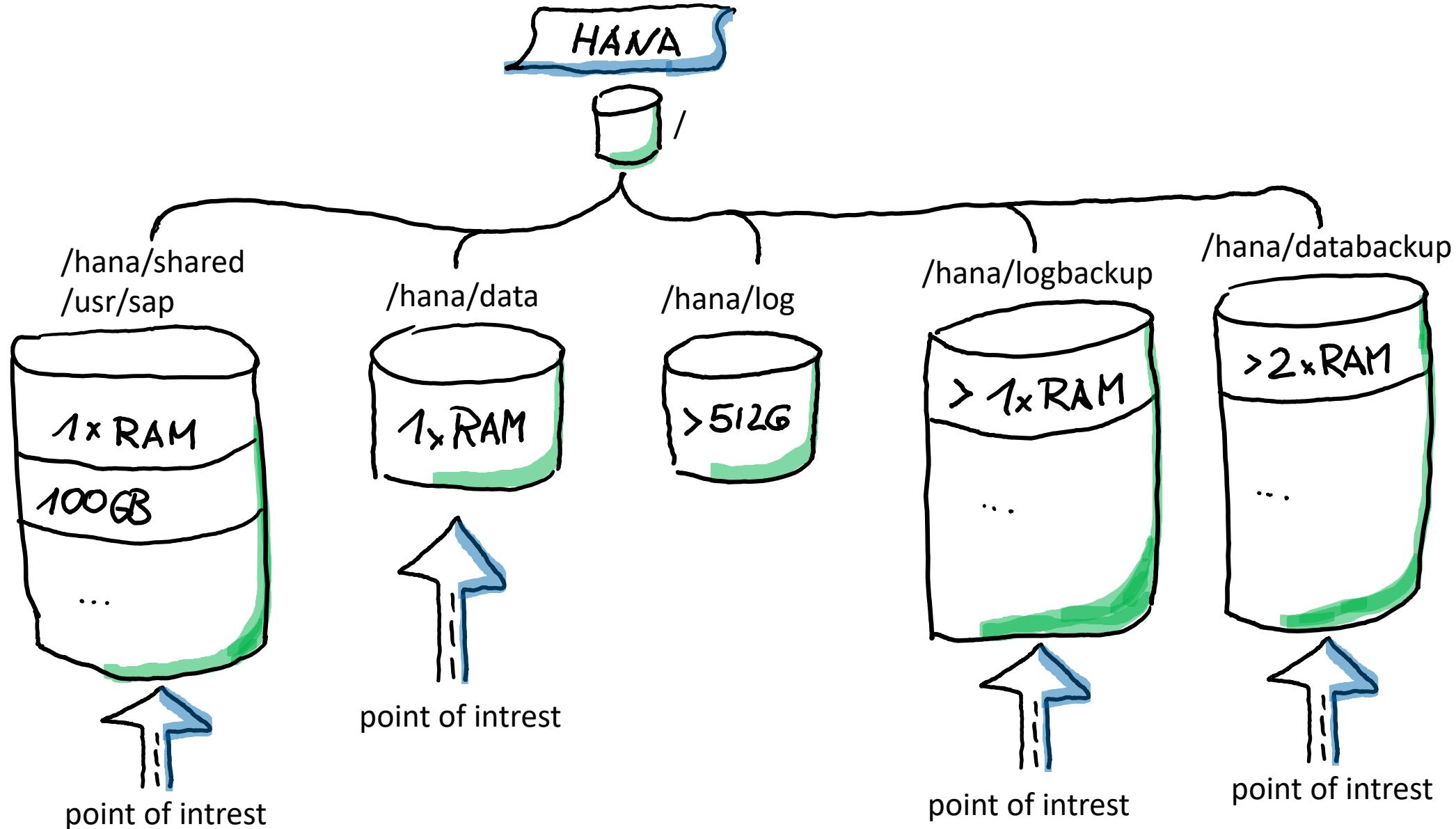
az backup (ANF)



Commvault IntelliSnap >=11.21



Volume Design Single Node

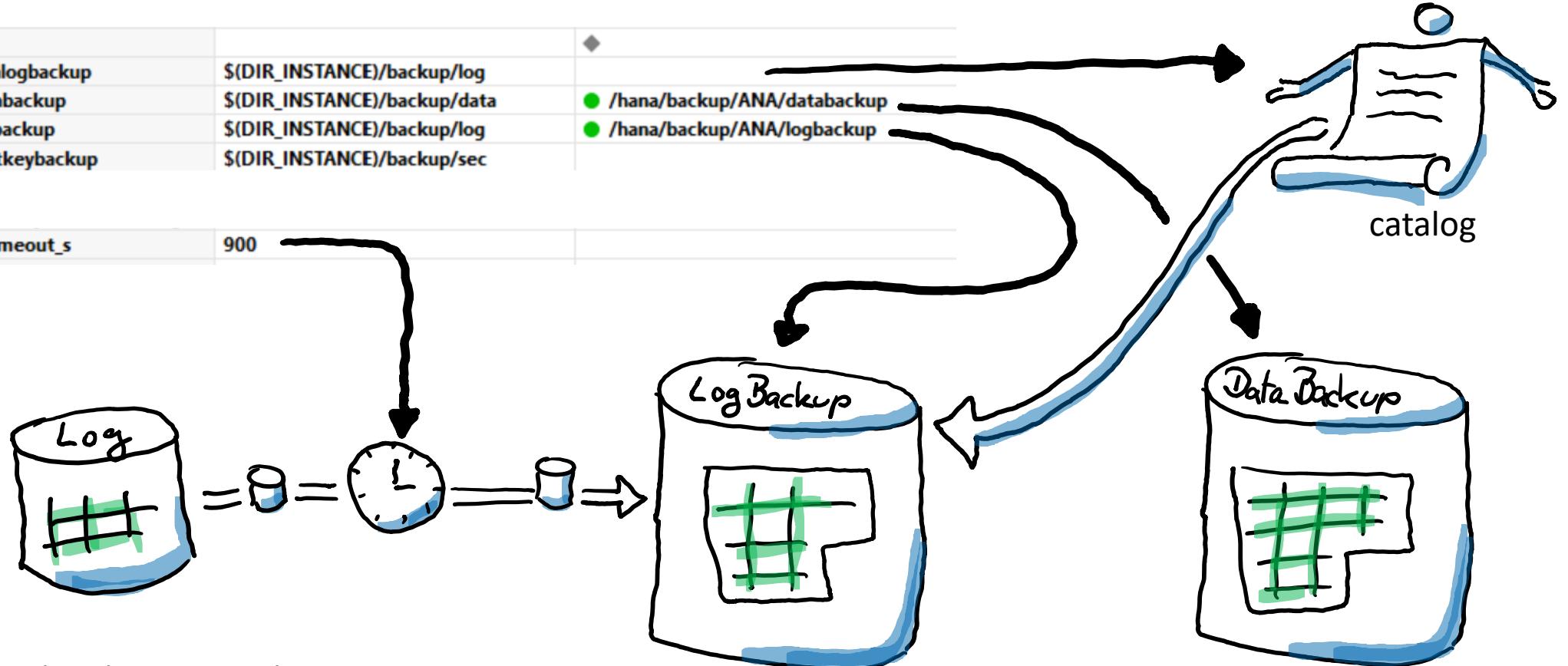


Backup Parameter

`$(DIR_INSTANCE) = /hana/shared/<SID>/HDB<ID>/backup/`

persistance	
basepath_catalogbackup	<code>\$(DIR_INSTANCE)/backup/log</code>
basepath_databackup	<code>\$(DIR_INSTANCE)/backup/data</code>
basepath_logbackup	<code>\$(DIR_INSTANCE)/backup/log</code>
basepath_rootkeybackup	<code>\$(DIR_INSTANCE)/backup/sec</code>

log_backup_timeout_s	900
----------------------	-----

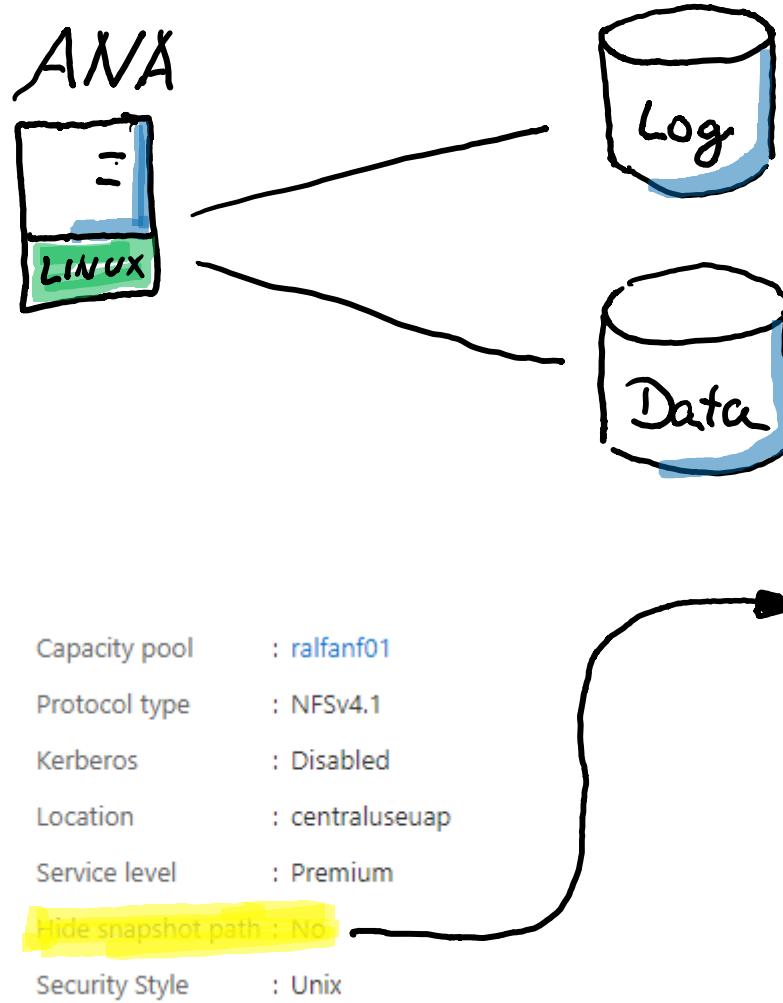


/hana/log/SID/mnt0001/
→ hdb0001 → SYSTEMDB
→ hdb0002 → XS Engine
→ hdb0003 → TenantDB

/hana/backup/SID/logbackup
→ SYSTEMDB
→ DB_SID

/hana/backup/SID/databackup
→ SYSTEMDB
→ DB_SID

SnapShot Directory



The SnapShot folder is located in the same volume where also the data files persist. It is a **read only** hidden directory.
Backup the data within a snapshot to protect the customer data!!!
 A single SnapShot is always a **full view** of the data – not a **delta!!!**

```
ralfafsvm01:/hana/data/ANA/mnt00001 # ls -la
total 16
drwxr-x--- 5 anaadm sapsys 4096 Oct  5 09:06 .
drwxr-x--- 3 anaadm sapsys 22 Sep 24 08:48 ..
drwxr-x--- 2 anaadm sapsys 4096 Oct  7 13:06 hdb00001
drwxr-xr-- 2 anaadm sapsys 4096 Oct  7 13:06 hdb00002.00003
drwxr-xr-- 2 anaadm sapsys 4096 Sep 24 11:13 hdb00003.00003
-rw-r--r-- 1 anaadm sapsys 21 Oct  7 13:28 nameserver.lck
```

```
ralfafsvm01:/hana/data/ANA/mnt00001 # cd .snapshot
ralfafsvm01:/hana/data/ANA/mnt00001/.snapshot # ls -l
total 20
drwxr-x--- 5 anaadm sapsys 4096 Oct  5 09:06 hana_hourly_2020-10-07T082Z
drwxr-x--- 5 anaadm sapsys 4096 Oct  5 09:06 hana_hourly_2020-10-07T167Z
drwxr-x--- 5 anaadm sapsys 4096 Oct  5 09:06 hana_hourly_2020-10-07T128Z
drwxr-x--- 5 anaadm sapsys 4096 Oct  5 09:06 hana_hourly_2020-10-07T049Z
drwxr-x--- 5 anaadm sapsys 4096 Oct  5 09:06 hana_hourly_2020-10-07T175Z
```

When you Revert older Snapshots

When you revert a volume with an older Snapshot all newer taken snapshots will be deleted!!!
The recovery order should always start with the newest snapshot!!!



Demo00001 (ralfanftest01/ralfanf01/Demo00001) | Snapshots

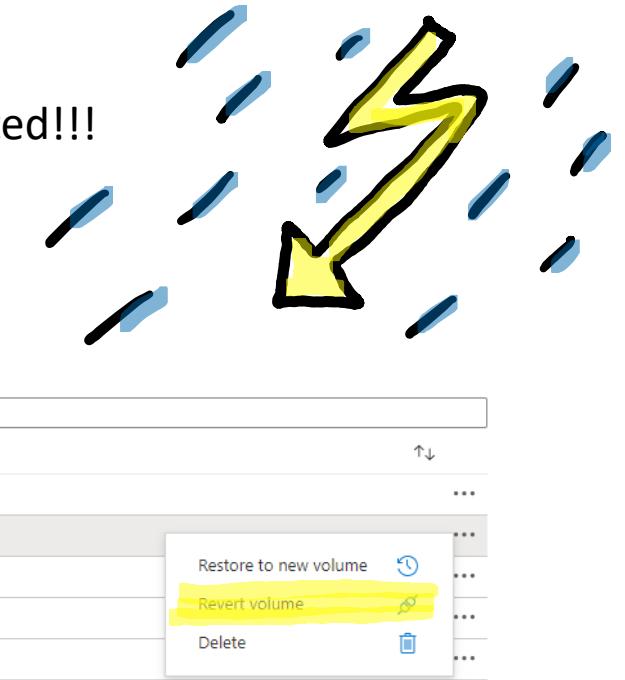
Search (Ctrl+ /) Add snapshot Refresh

Overview Activity log Access control (IAM) Tags

Settings Properties Locks

Search snapshots

Name
snapshot0001
snapshot0002
snapshot0003
snapshot0004
snapshot0005



Revert volume to snapshot

Revert volume Demo00001 to snapshot snapshot0002

This action is irreversible and it will delete all the volumes snapshots that are newer than snapshot0002. Please type 'Demo00001' to confirm.

Demo00001 (ralfanftest01/ralfanf01/Demo00001) | Snapshots

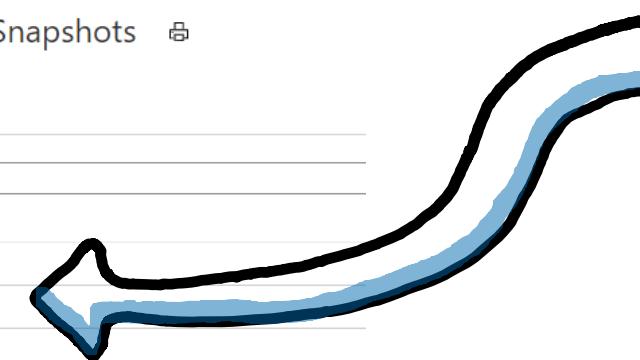
Search (Ctrl+ /) Add snapshot Refresh

Overview Activity log Access control (IAM) Tags

Settings

Search snapshots

Name
snapshot0001
snapshot0002



Are you sure you want to revert 'Demo00001' to state of 'snapshot0002'?

Demo00001

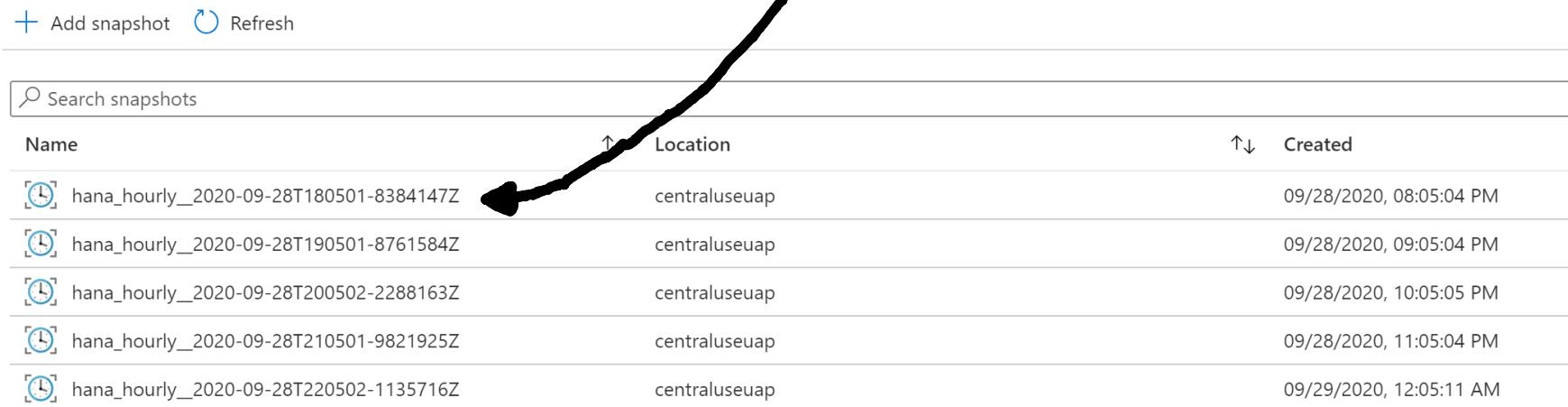
Azure CLI for ANF – List SnapShots

```
az login
```

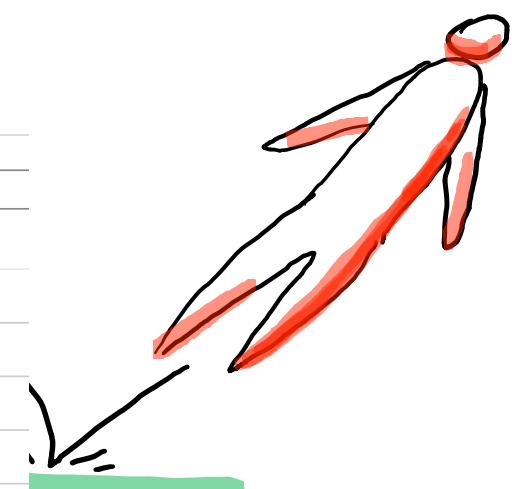
```
az netappfiles snapshot list -g ralfAFSrg --account-name ralfanftest01 --pool-name ralfanf01 --volume-name raldanfdata01
```

Command group 'netappfiles' is in preview. It may be changed/removed in a future release.

```
[  
 {  
   "created": "2020-09-28T18:05:04+00:00",  
   "id": "/subscriptions/SUB-  
ID/resourceGroups/ralfAFSrg/providers/Microsoft.NetApp/netAppAccounts/ralfanftest01/capacityPools/ralfanf0  
1/volumes/ralfanfdata01/snapshots/hana_hourly_2020-09-28T180501-8384147Z",  
   "location": "centraluseuap",  
   "name": "ralfanftest01/ralfanf01/ralfanfdata01/hana_hourly_2020-09-28T180501-8384147Z",  
   "provisioningState": "Succeeded",
```



Name	Location	Created
hana_hourly_2020-09-28T180501-8384147Z	centraluseuap	09/28/2020, 08:05:04 PM
hana_hourly_2020-09-28T190501-8761584Z	centraluseuap	09/28/2020, 09:05:04 PM
hana_hourly_2020-09-28T200502-2288163Z	centraluseuap	09/28/2020, 10:05:05 PM
hana_hourly_2020-09-28T210501-9821925Z	centraluseuap	09/28/2020, 11:05:04 PM
hana_hourly_2020-09-28T220502-1135716Z	centraluseuap	09/29/2020, 12:05:11 AM



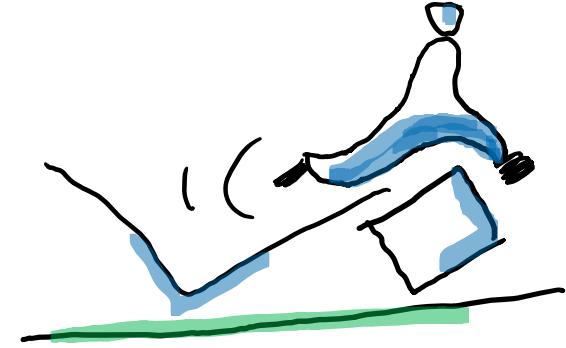


Configure azacsnap to create a Application aware SnapShot

Log-in to the Azure Portal and start the CLI

Create a service principal using Azure CLI per the following example

```
user@Azure> az account show
user@Azure> az account set -s <subscription name or id>
user@Azure> az ad sp create-for-rbac --sdk-auth
{
    "clientId": "00aa000a-aaaa-0000-00a0-00aa000aaa0a",
    "clientSecret": "00aa000a-aaaa-0000-00a0-00aa000aaa0a",
    "subscriptionId": "00aa000a-aaaa-0000-00a0-00aa000aaa0a",
    "tenantId": "00aa000a-aaaa-0000-00a0-00aa000aaa0a",
    "activeDirectoryEndpointUrl": "https://login.microsoftonline.com",
    "resourceManagerEndpointUrl": "https://management.azure.com/",
    "activeDirectoryGraphResourceId": "https://graph.windows.net/",
    "sqlManagementEndpointUrl": "https://management.core.windows.net:8443/",
    "galleryEndpointUrl": "https://gallery.azure.com/",
    "managementEndpointUrl": "https://management.core.windows.net"
}
```



save the output to [/tmp/azureauth.json](#)

Configure azacsnap

Install and setup the azacsnap tool

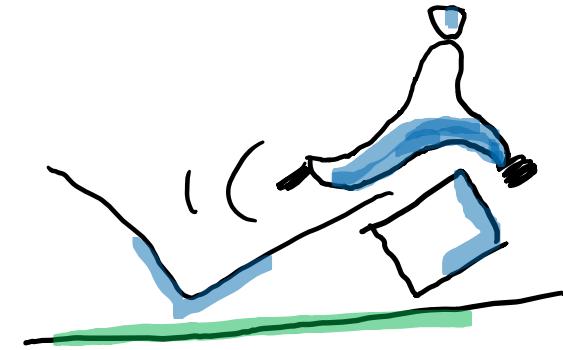
```
su - (this is a root task)
chmod 755 azacsnap_installer_v5.0_Preview_Build_20200916.21051.run
./azacsnap_installer_v5.0_Preview_Build_20200916.21051.run -I

su - azacsnap
mv /tmp/azureauth.json ./bin/
hdbuserstore Set AZACSNAP ralfafsvm01:30013 system <PASSWORD>

cd bin/
azacsnap -c configure --configuration new
azacsnap -c test --test hana
azacsnap -c test --test storage

azacsnap -c backup --volume data --prefix hana_hourly --retention 5 --trim

crontab -e
5 * * * * ( . ~/.profile ; cd /home/azacsnap/bin ; ./azacsnap -c backup --volume=data
--prefix=hana_hourly --retention=5 --trim --configfile=azacsnap.json)
```

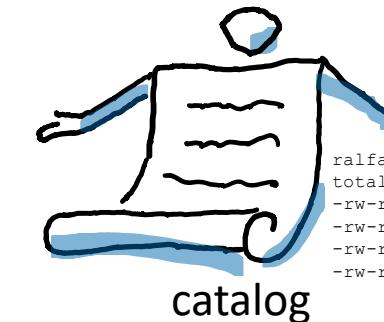
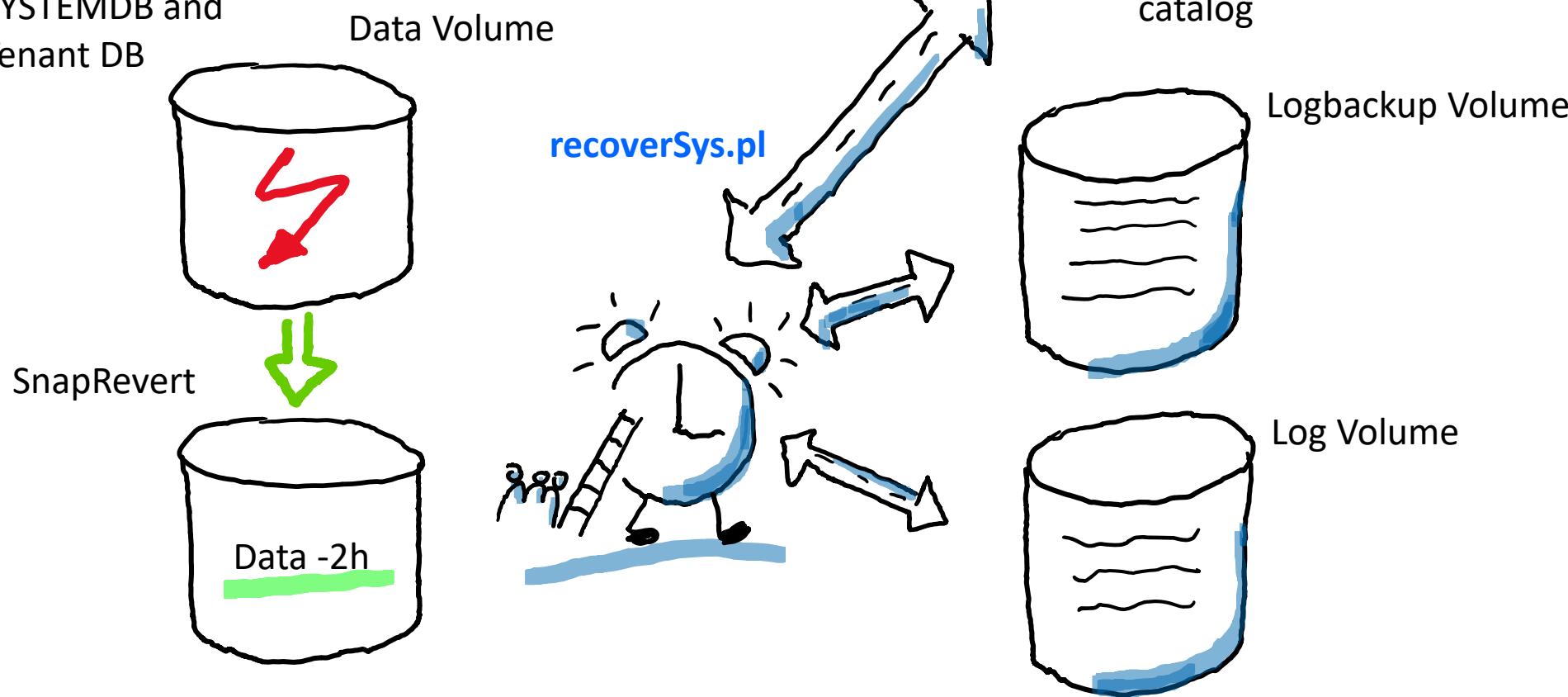


Recovery Process SYSTEMDB

Volume or Logical issue:

Full recovery

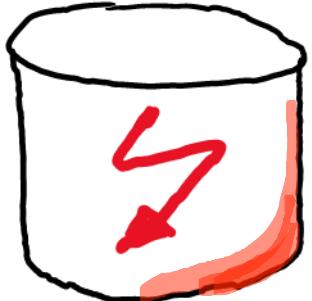
SYSTEMDB and
Tenant DB



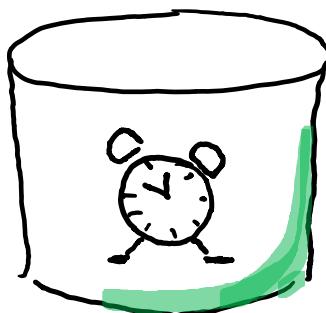
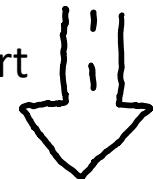
```
ralfafsvm01:~ # ls -l /usr/sap/ANA/HDB00/backup/log/SYSTEMDB
total 832
-rw-r----- 1 anaadm sapsys 24576 Oct  5 08:06 log_backup_0_0_0_0.16015608
-rw-r----- 1 anaadm sapsys 24576 Oct  5 08:06 log_backup_0_0_0_0.16011961
-rw-r----- 1 anaadm sapsys 24576 Oct  5 08:06 log_backup_0_0_0_0.16051086
-rw-r----- 1 anaadm sapsys 24576 Oct  5 08:08 log_backup_0_0_0_0.16012858
```

CLI - Recovery SystemDB

Logical Error DB needs recovery



Snap Revert



```
azacsnap@ralfafsvm01:~/bin> azacsnap -c restore --restore revertvolume --hanasid ANA
=====
ANF volumes not support for revertvolume, will not revert volume.
```

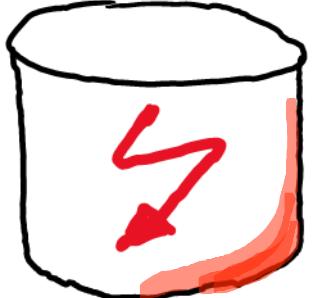
```
anaadm@ralfafsvm01:/usr/sap/ANA/HDB00> sapcontrol -nr 00 -function StopSystem
anaadm@ralfafsvm01:/usr/sap/ANA/HDB00> exit
```

```
ralfafsvm01:/hana/data/ANA/mnt00001 # ls -l
total 12
drwxr-x--- 2 anaadm sapsys 4096 Oct  5 12:06 hdb00001
drwxr-xr-- 2 anaadm sapsys 4096 Oct  5 12:06 hdb00002.00003
drwxr-xr-- 2 anaadm sapsys 4096 Sep 24 11:13 hdb00003.00003
-rw-r--r-- 1 anaadm sapsys    20 Oct  5 13:03 nameserver.lck
```

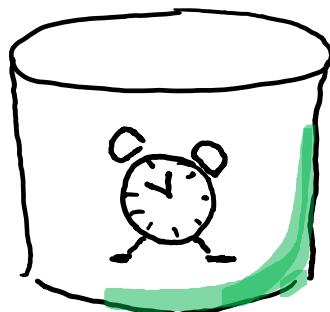
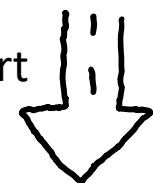
```
ralfafsvm01:/hana/data/ANA/mnt00001 # cd / ; umount /hana/data/ANA/mnt00001
```

CLI - Recovery SystemDB

Logical Error DB needs recovery



Snap Revert



1?

```
az netappfiles volume revert -g ralfAFSrg --account-name ralfanftest01
--pool-name ralfanf01 --volume-name raldanfdata01
--snapshot-id f77126ca-91b5-3240-38b4-da32fec82798
```

or clone to a new volume for recovery

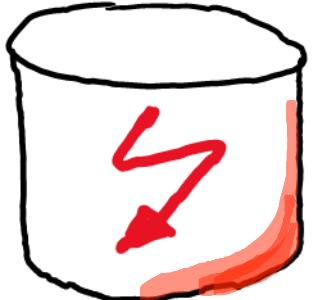
2?

```
az netappfiles volume create -g ralfAFSrg --account-name ralfanftest01 --pool-name ralfanf01
--name ralfanfclone01 --location centraluseuap --usage-threshold 512 --service-level premium
--vnet ralfAFSrw --subnet ralfanfsubnet --file-path "ralfanfclone01" --protocol-types NFSv4.1
--snapshot-id f77126ca-91b5-3240-38b4-da32fec82798
```

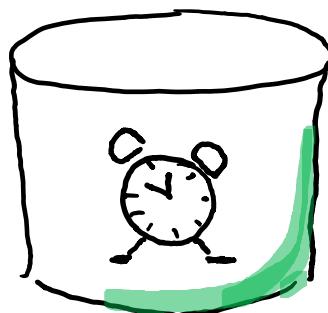
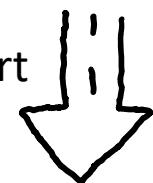
```
az netappfiles snapshot list -g ralfAFSrg --account-name ralfanftest01
--pool-name ralfanf01 --volume-name raldanfdata01
...
{
    "created": "2020-10-05T12:05:04+00:00",
    "id": "/subscriptions/6488549f-cccd1-462f-a46e-154644e5bedd/resourceGroups/ralfAFSrg/
providers/Microsoft.NetApp/netAppAccounts/ralfanftest01/capacityPools/ralfanf01/volumes/
ralfanfdata01/snapshots/hana_hourly_2020-10-05T120501-6073996Z",
    "location": "centraluseuap",
    "name": "ralfanftest01/ralfanf01/raldanfdata01/hana_hourly_2020-10-05T120501-6073996Z",
    "provisioningState": "Succeeded",
    "resourceGroup": "ralfAFSrg",
    "snapshotId": "f77126ca-91b5-3240-38b4-da32fec82798",
    "type": "Microsoft.NetApp/netAppAccounts/capacityPools/volumes/snapshots"
}
]
```

CLI - Recovery SystemDB

Logical Error DB needs recovery



Snap Revert



```
ralfafsvm01:/ # mount -a
ralfafsvm01:/ # cd /hana/data/ANA/mnt00001/hdb00001

ralfafsvm01:/hana/data/ANA/mnt00001/hdb00001# ls -l
-rw-r---- 1 anaadm sapsys 0 Sep 24 11:12 __DO_NOT_TOUCH_FILES_IN_THIS_DIRECTORY__
-rw-r---- 1 anaadm sapsys 3925868544 Oct 5 11:05 datavolume_0000.dat
-rw-r---- 1 anaadm sapsys 36 Oct 4 20:53 landscape.id
-rw-r---- 1 anaadm sapsys 159744 Oct 5 11:05 snapshot_databasebackup_0_1

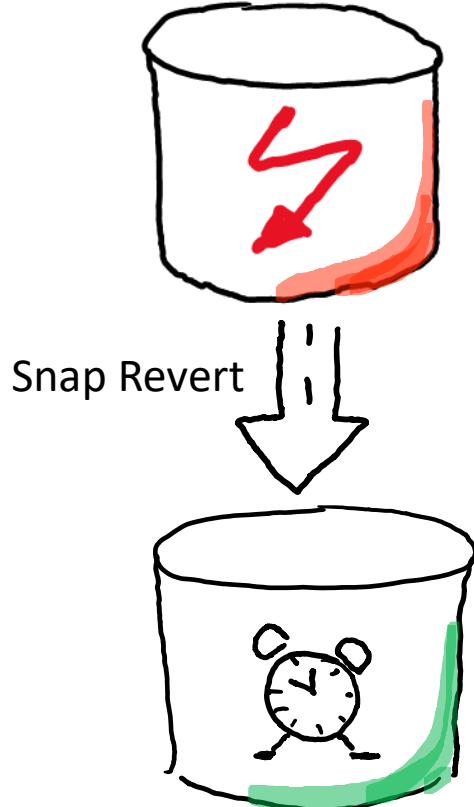
ralfafsvm01:/hana/data/ANA/mnt00001 # su - anaadm

anaadm@ralfafsvm01:/usr/sap/ANA/HDB00> cd /hana/shared/ANA/exe/linuxx86_64/hdb/python_support

anaadm@ralfafsvm01:.../python_support> python recoverSys.py --command="RECOVER DATABASE
UNTIL TIMESTAMP '2021-10-05 06:00:00' USING SNAPSHOT"
[140301016327360, 0.017] >> starting recoverSys (at Mon Oct 5 14:03:24 2020)
...
creating file recoverInstance.sql
restart database
restart master nameserver: 2020-10-05 14:03:31
start system: ralfafsvm01
sapcontrol parameter: ['-function', 'Start']
sapcontrol returned successfully:
2020-10-05T14:04:03+00:00 P002523 174f996c INFO RECOVERY RECOVER DATA finished successfully
, reached timestamp 2020-10-05T13:02:00+00:00, reached log position 45083520
recoverSys finished successfully: 2020-10-05 14:04:04
[140301016327360, 39.572] << ending recoverSys, rc = 0 (RC_TEST_OK), after 39.555 secs
anaadm@ralfafsvm01:/hana/shared/ANA/exe/linuxx86_64/hdb/python_support>
```

CLI - Recovery TenantDB

Logical Error DB needs recovery



```
anaadm@ralfafsvm01:/hana/shared/ANA/exe/linuxx86_64/hdb/python_support> hdbuserstore list
DATA FILE      : /usr/sap/ANA/home/.hdb/ralfafsvm01/SSFS_HDB.DAT
KEY FILE       : /usr/sap/ANA/home/.hdb/ralfafsvm01/SSFS_HDB.KEY
```

```
KEY ANASAPDBCTRL
  ENV : ralfafsvm01:30013
  USER: SAPDBCTRL
```

```
KEY SYSTEM
  ENV : ralfafsvm01:30013
  USER: system
```

```
KEY SYSTEMANA
  ENV : ralfafsvm01:30015
  USER: system
```

```
anaadm@ralfafsvm01:/hana/shared/ANA/exe/linuxx86_64/hdb/python_support> hdbsql -U system
```

Welcome to the SAP HANA Database interactive terminal.

Type: \h for help with commands
\q to quit

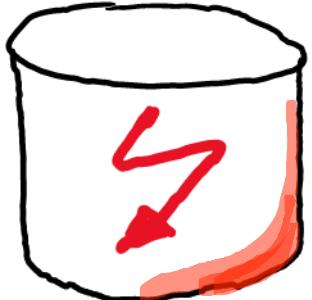
```
hdbsql SYSTEMDB=> recover database for ANA UNTIL TIMESTAMP '2021-10-05 06:00:00' USING SNAPSHOT
0 rows affected (overall time 59.683446 sec; server time 59.680613 sec)
```

```
hdbsql SYSTEMDB=>
```

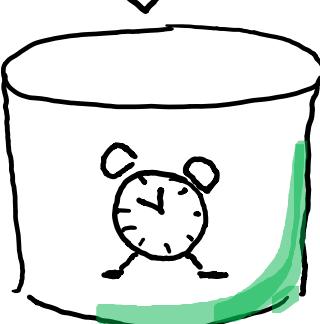


GUI - Recovery TenantDB

Logical Error DB needs recovery



Snap Revert

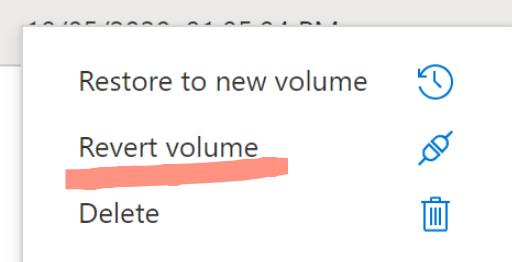


```
anaadm@ralfafsvm01:/usr/sap/ANA/HDB00> sapcontrol -nr 00 -function StopSystem  
anaadm@ralfafsvm01:/usr/sap/ANA/HDB00> exit
```

```
ralfafsvm01:/hana/data/ANA/mnt00001 # ls -l  
total 12  
drwxr-x--- 2 anaadm sapsys 4096 Oct  5 12:06 hdb00001  
drwxr-xr-- 2 anaadm sapsys 4096 Oct  5 12:06 hdb00002.00003  
drwxr-xr-- 2 anaadm sapsys 4096 Sep 24 11:13 hdb00003.00003  
-rw-r--r-- 1 anaadm sapsys    20 Oct  5 13:03 nameserver.lck
```

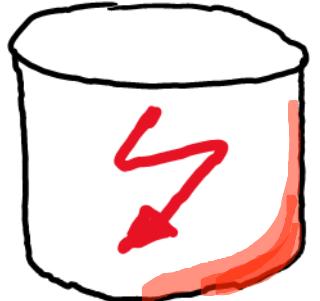
```
ralfafsvm01:/hana/data/ANA/mnt00001 # cd / ; umount /hana/data/ANA/mnt00001
```

Name	Location	Created	Actions
[clock] hana_hourly_2020-10-05T08...	centraluseuap	10/05/2020, 10:05:04 AM	...
[clock] hana_hourly_2020-10-05T09...	centraluseuap	10/05/2020, 11:05:05 AM	...
[clock] hana_hourly_2020-10-05T10...	centraluseuap	10/05/2020, 12:05:04 PM	...
[clock] hana_hourly_2020-10-05T11...	centraluseuap	10/05/2020, 01:05:04 PM	...

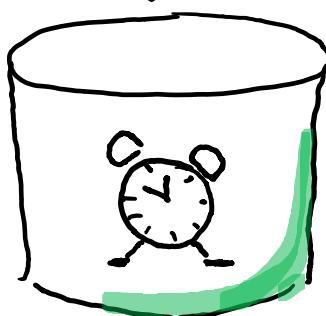
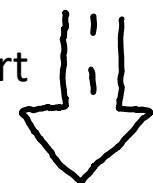


GUI - Recovery TenantDB

Logical Error DB needs recovery



Snap Revert



Revert the volume from the snapshot

Revert volume to snapshot

Revert volume raldanfdata01 to snapshot hana_hourly_2020-10-05T110...



This action is irreversible and it will delete all the volumes snapshots that are newer than hana_hourly_2020-10-05T110501-8164250Z. Please type 'raldanfdata01' to confirm.

Are you sure you want to revert 'raldanfdata01' to state of 'hana_hourly_2020-10-05T110501-8164250Z'?

raldanfdata01

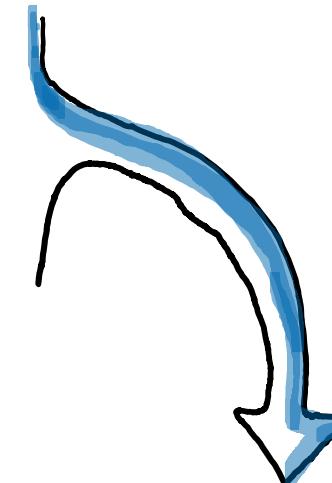
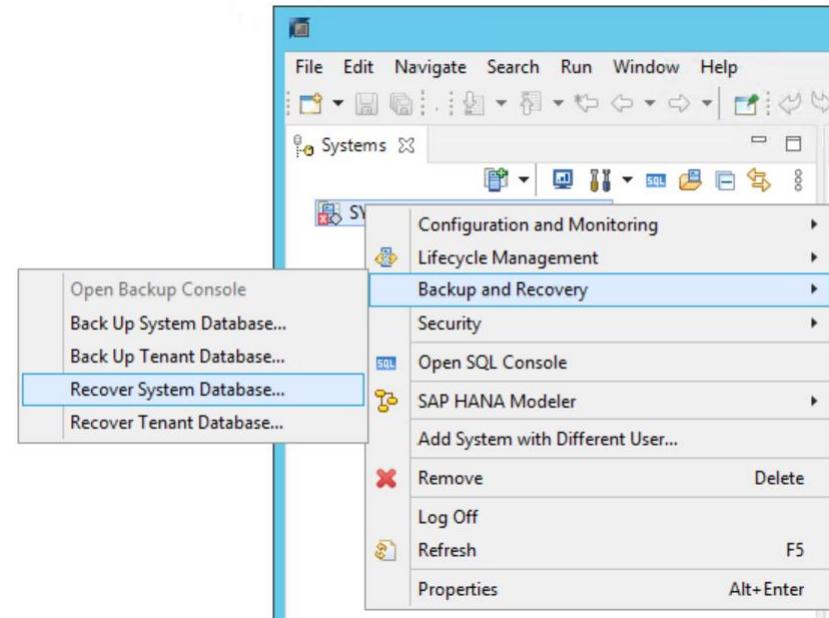
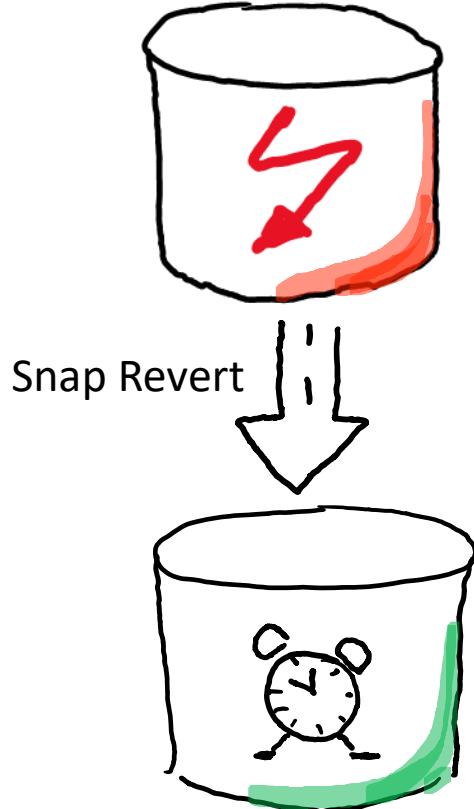


Revert

Cancel

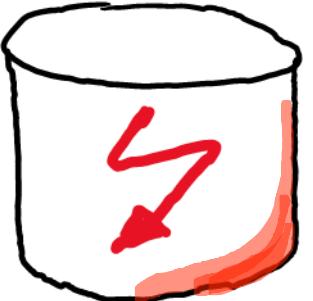
GUI - Recovery TenantDB

Logical Error DB needs recovery

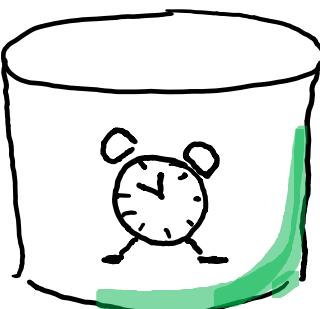


GUI - Recovery TenantDB

Logical Error DB needs recovery



Snap Revert



Start Time	Location	Backup Prefix	A...
2020-10-05 12:05:02	/hana/data/ANA	SNAPSHOT	X
2020-10-05 11:05:02	/hana/data/ANA	SNAPSHOT	●
2020-10-05 10:05:02	/hana/data/ANA	SNAPSHOT	X
2020-10-05 09:05:02	/hana/data/ANA	SNAPSHOT	X
2020-10-05 08:05:02	/hana/data/ANA	SNAPSHOT	X

```
ralfafsvm01:~ # ls -l /hana/data/ANA/mnt00001/hdb00001
-rw-r----- 1 anaadm sapsys 159744 Oct  5 11:05 snapshot databackup_0_1
```

Even if no log backups were created, a location is still needed to read data that will be used for recovery.

If the log backups were written to the file system and subsequently moved, you need to specify their current location. If you do not specify an alternative location for the log backups, the system uses the location where the log backups were first saved. The directory specified will be searched recursively.

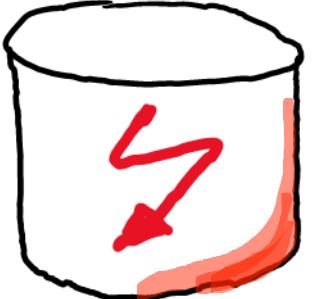
Locations:

/hana/backup/ANA/logbackup/SYSTEMDB

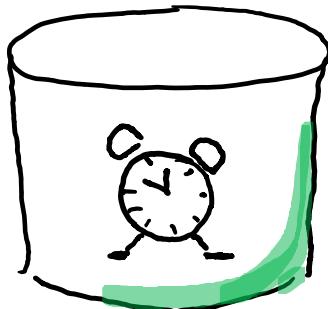
Add Remove All Remove

GUI - Recovery TenantDB

Logical Error DB needs recovery



Snap Revert



Recovery of SYSTEMDB@ANA

Other Settings

Check Availability of Delta and Log Backups
You can have the system check whether all required delta and log backups are available at the beginning of the recovery process. If delta or log backups are missing, they will be listed and the recovery process will stop before any data is changed. If you choose not to perform this check now, it will still be performed but later. This may result in a significant loss of time if the complete recovery must be repeated.

File System i

Third-Party Backup Tool (Backint)

Initialize Log Area
If you do not want to recover log segments residing in the log area, select this option. After the recovery, the log entries will be deleted from the log area.

Initialize Log Area i

Use Delta Backups
Select this option if you want to perform a recovery using delta backups. If you choose to perform a recovery without delta backups, only log backups will be used.

Use Delta Backups (Recommended)

Install New License Key
If you recover the database from a different system, the old license key will no longer be valid
You can:

- Select a new license key to install now
- Install a new license key manually after the database has been recovered

 Install New License Key

Review Recovery Settings
Review the recovery settings and choose 'Finish' to start the recovery. You can modify the recovery settings by choosing 'Back'.

Database Information

Database:	SYSTEMDB@ANA
Host:	10.4.0.4
Version:	2.00.052.00.1599235305

Recovery Definition

Recovery Type: Snapshot (Point-in-Time Recovery (Until Now))

Caution
Recovering the system database from a storage snapshot invalidates all the tenant databases. After you recover the system database, you need to recover all the tenant databases.

Configuration File Handling

Caution
To recover customer-specific configuration changes, you may need to make the changes manually in the target system.
More Information: SAP HANA Administration Guide

Recovery Execution Summary

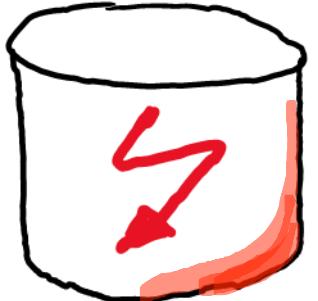
Database SYSTEMDB@ANA recovered
1 volumes were recovered

Caution
Recovering the system database from a storage snapshot invalidates all the tenant databases. After you recover the system database, you need to recover all the tenant databases.

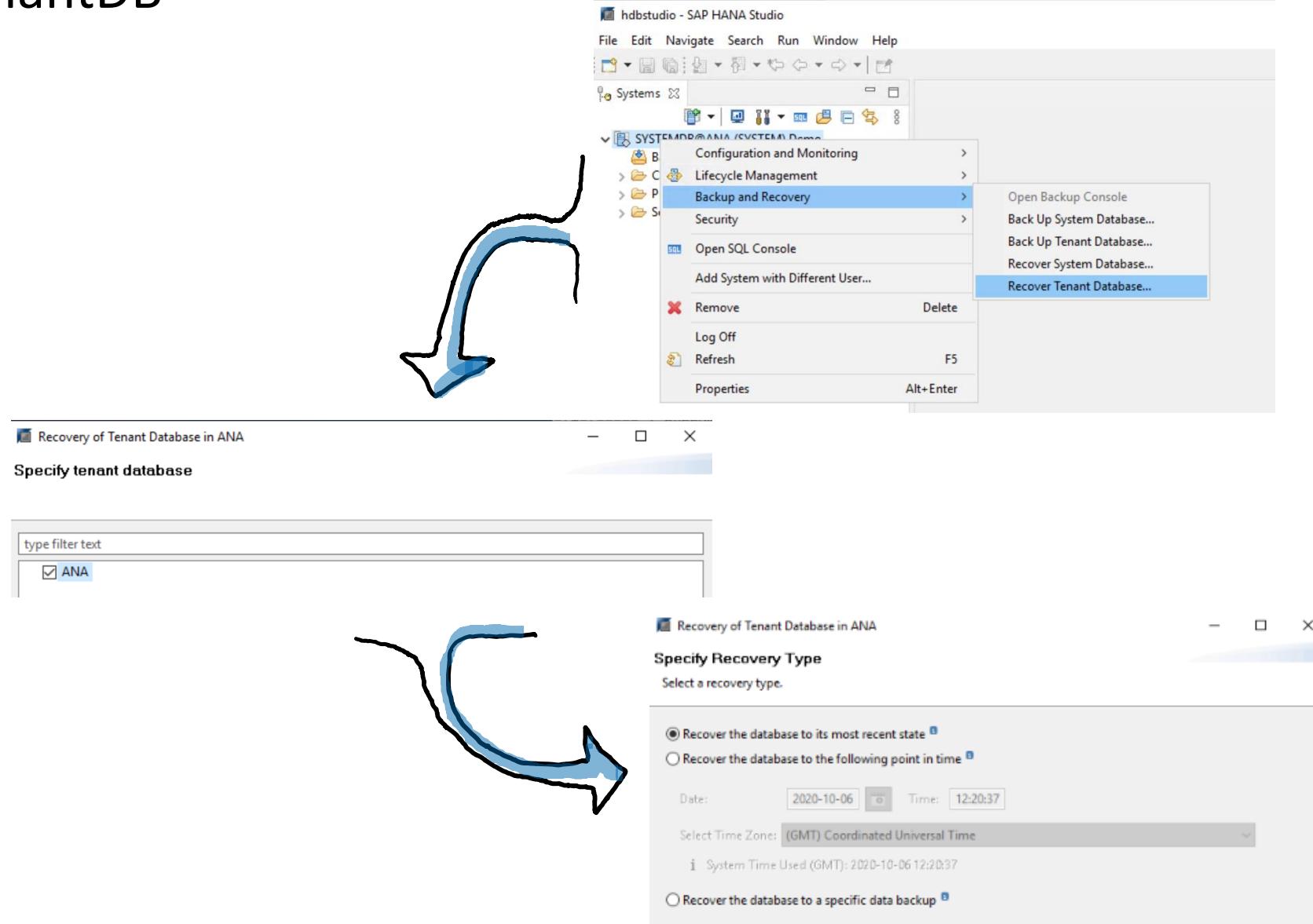
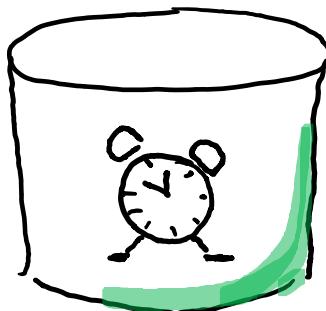
Recovered to Time: Oct 5, 2020 2:20:11 PM GMT
Recovered to Log Position: 45161152

GUI - Recovery TenantDB

Logical Error DB needs recovery

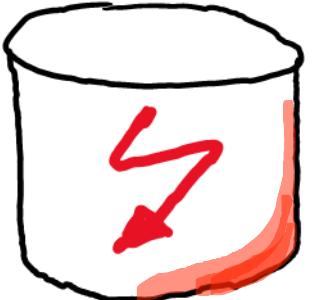


Snap Revert

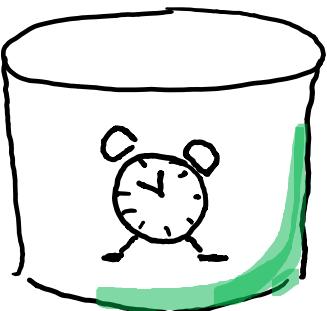


GUI - Recovery TenantDB

Logical Error DB needs recovery



Snap Revert



Select a Backup
Select a backup to recover the SAP HANA database

Selected Point in Time
Database will be recovered to its most recent state.

Backups
The overview shows backups that were recorded in the backup catalog as successful. The backup at the top is estimated to have the shortest recovery time.

Start Time	Location	Backup Prefix	A...
2020-10-05 12:05:02	/hana/data/ANA	SNAPSHOT	✗
2020-10-05 11:05:02	/hana/data/ANA	SNAPSHOT	✓
2020-10-05 10:05:02	/hana/data/ANA	SNAPSHOT	✗
2020-10-05 09:05:02	/hana/data/ANA	SNAPSHOT	✗
2020-10-05 08:05:02	/hana/data/ANA	SNAPSHOT	✗
2020-09-28 14:09:17	/hana/data/ANA	SNAPSHOT	✗

Recovery of Tenant Database in ANA

Locate Backup Catalog
Specify location of the backup catalog.

Recover using the backup catalog
 Search for the backup catalog in the file system only
Backup Catalog Location: /usr/sap/ANA/HDB00/backup/log/DB_ANA

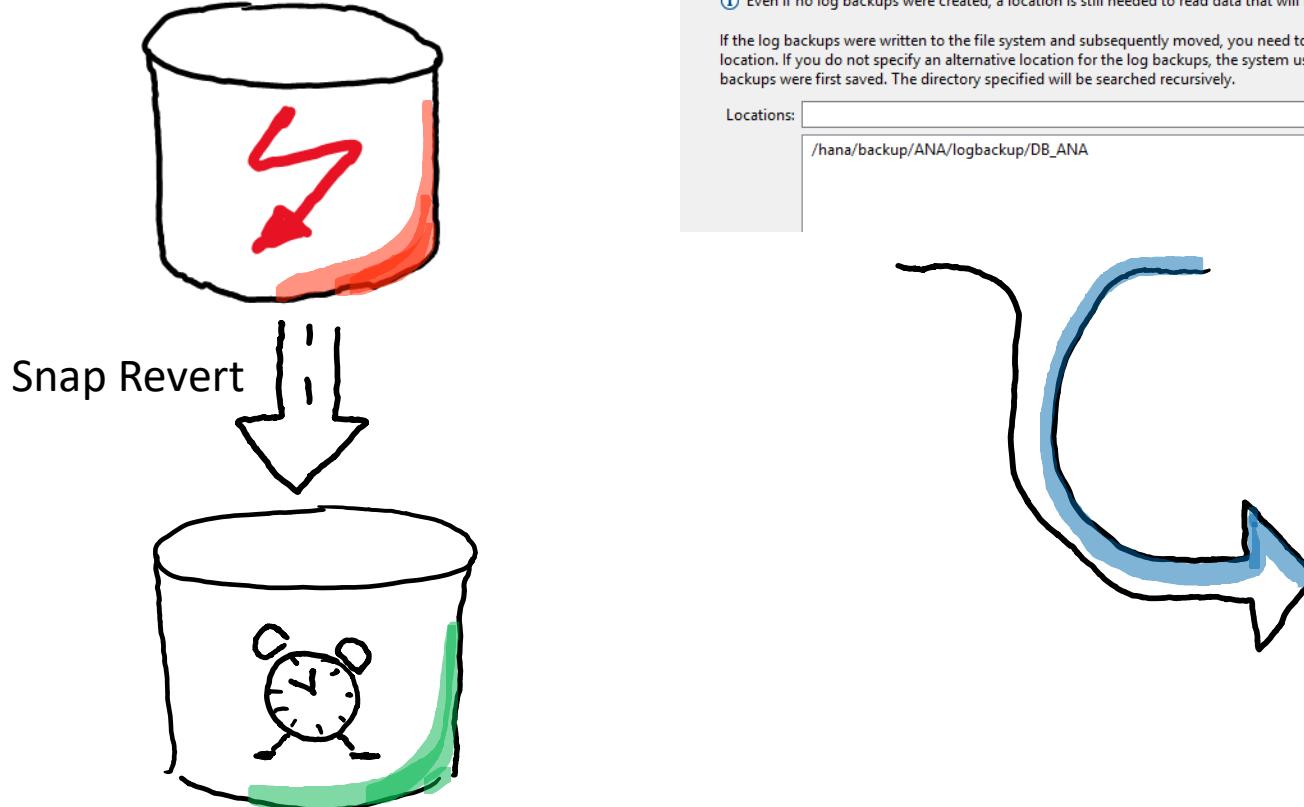
Recover without the backup catalog

Backint System Copy
 Backint System Copy
Source System: []

```
ralfafsvm01:~ # ls -l /hana/data/ANA/mnt00001/hdb00002.00003/
-rw-r----- 1 anaadm sapsys 155648 Oct  5 11:05 snapshot_databasebackup_0_1
```

GUI - Recovery TenantDB

Logical Error DB needs recovery



Locate Log Backups
Specify location(s) of log backup files to be used to recover the database.

Even if no log backups were created, a location is still needed to read data that will be used for recovery.
If the log backups were written to the file system and subsequently moved, you need to specify their current location. If you do not specify an alternative location for the log backups, the system uses the location where the log backups were first saved. The directory specified will be searched recursively.

Locations: Add Remove All Remove

Other Settings

Check Availability of Delta and Log Backups
You can have the system check whether all required delta and log backups are available at the beginning of the recovery process. If delta or log backups are missing, they will be listed and the recovery process will stop before any data is changed. If you choose not to perform this check now, it will still be performed but later. This may result in a significant loss of time if the complete recovery must be repeated.

Check the availability of delta and log backups:
 File System ?
 Third-Party Backup Tool (Backint)

Initialize Log Area
If you do not want to recover log segments residing in the log area, select this option. After the recovery, the log entries will be deleted from the log area.
 Initialize Log Area ?

Use Delta Backups
Select this option if you want to perform a recovery using delta backups. If you choose to perform a recovery without delta backups, only log backups will be used.
 Use Delta Backups (Recommended)

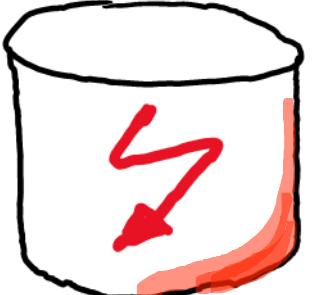
Install New License Key
If you recover the database from a different system, the old license key will no longer be valid.
You can:

- Select a new license key to install now
- Install a new license key manually after the database has been recovered

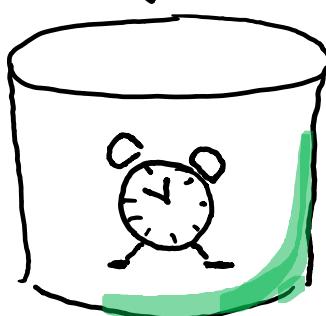
 Install New License Key

GUI - Recovery TenantDB

Logical Error DB needs recovery



Snap Revert



Review Recovery Settings

Review the recovery settings and choose 'Finish' to start the recovery. You can modify the recovery settings by choosing 'Back'.

Database Information

Database: ANA@ANA
Host: 10.4.0.4
Version: 2.00.052.00.1599235305

Recovery Definition

Recovery Type: Snapshot (Point-in-Time Recovery (Until Now))

Configuration File Handling

Caution

To recover customer-specific configuration changes, you may need to make the changes manually in the target system.
More Information: SAP HANA Administration Guide

Log Recovery (Phase 2 of 3)

Recovery is running - 0 of 2 services finished successfully

Host: ralfafsvm01



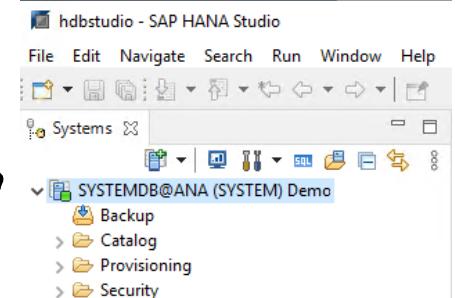
Recovery Execution Summary

Database ANA@ANA recovered

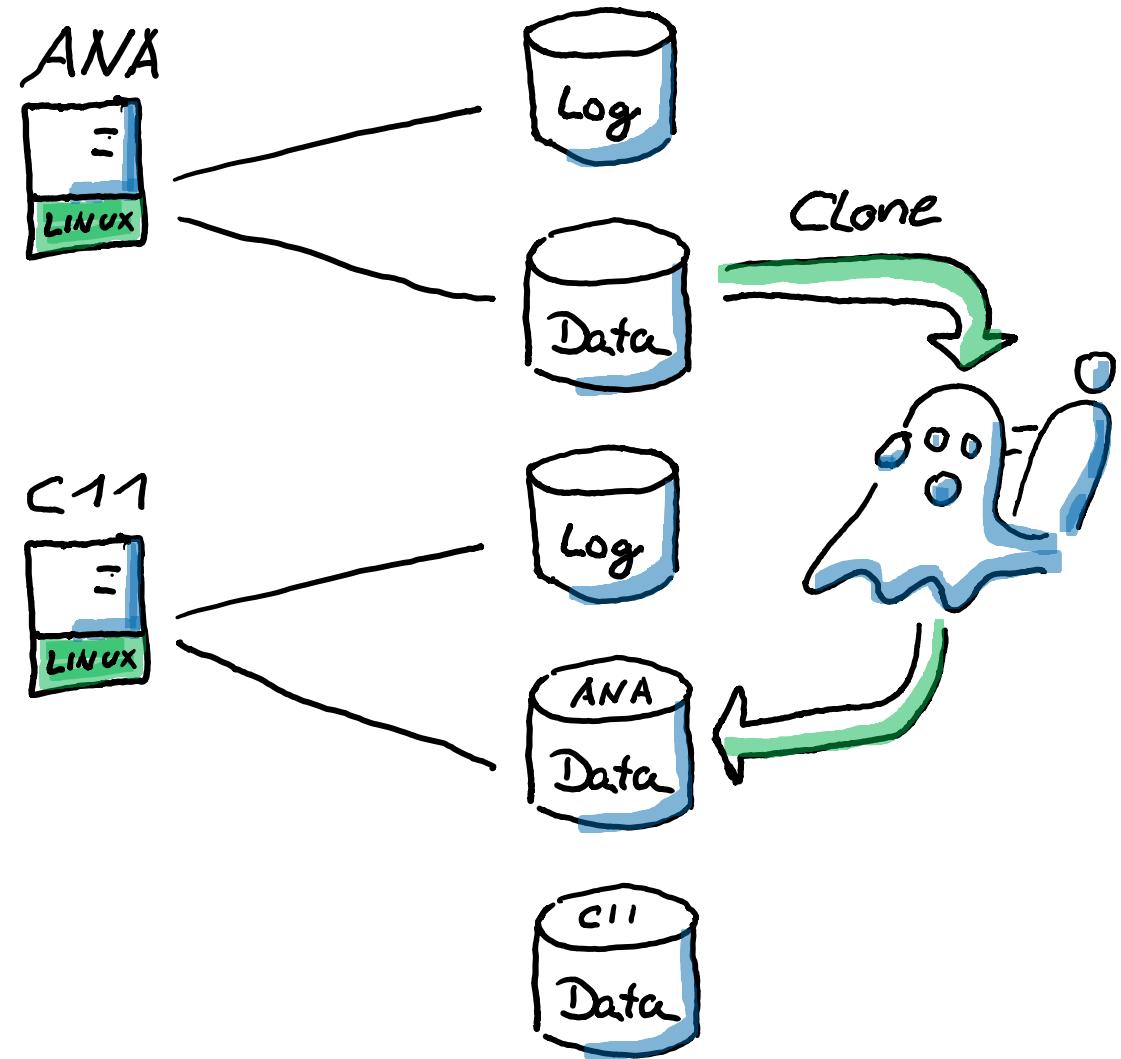
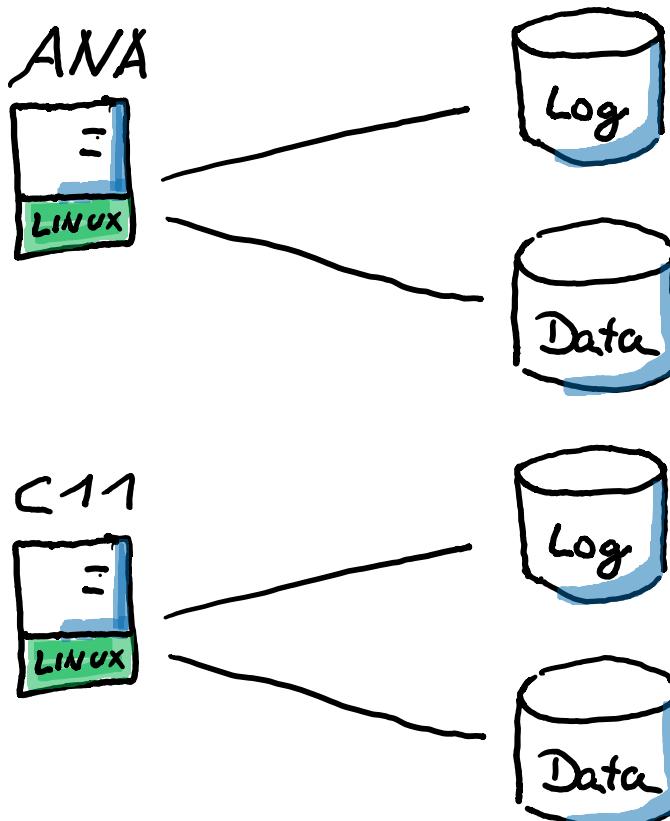
2 volumes were recovered

Recovered to Time: Oct 5, 2020 2:20:11 PM GMT

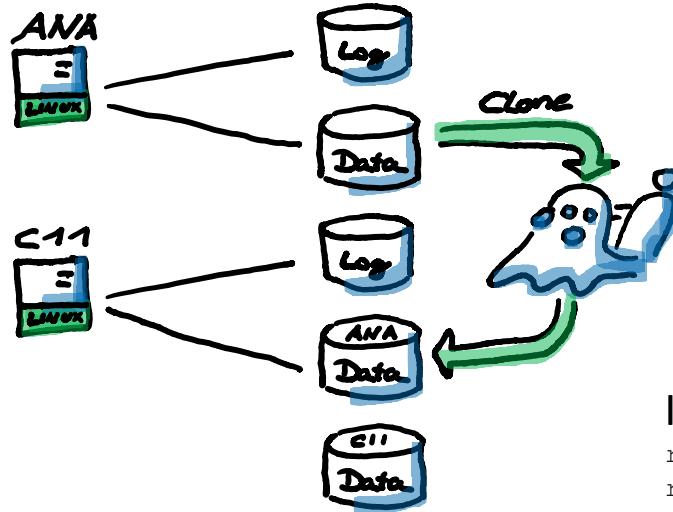
Recovered to Log Position: 94339904



System Cloning / Snap 2 Volume



System Cloning / Snap 2 Volume / CLI



```
az netappfiles snapshot list -g ralfAFSrg --account-name ralfanftest01 --pool-name ralfanf01 --volume-name ralfanfdata01
```

```
az netappfiles volume create -g ralfAFSrg --account-name ralfanftest01 --pool-name ralfanf01 --name ralfanfclone01 --location centraluseuap --usage-threshold 512 --service-level premium --vnet ralfAFSrw --subnet ralfanfsubnet --file-path "ralfanfclone01" --protocol-types NFSv4.1 --snapshot-id 362ce440-a082-b14d-d22a-43109d542cc9
```

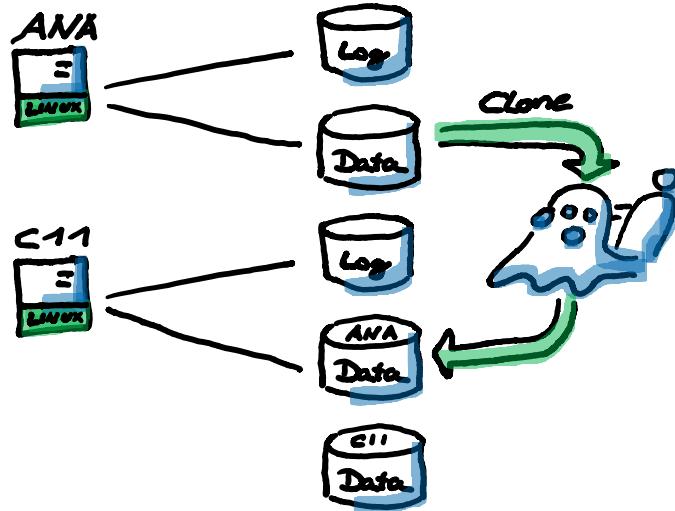
Install HANA on the second node

```
ralfafsvm02:/Software # zypper install insserv  
ralfafsvm02:/Software # cd SAP_HANA_DATABASE/  
ralfafsvm02:/Software/SAP_HANA_DATABASE # ./hdblcm --ignore=check_signature_file
```

Shutdown HANA and mount the Clone of the data volume from ANA

```
ralfafsvm02:/Software # su - c11adm  
c11adm@ralfafsvm02:/usr/sap/C11/HDB00> sapcontrol -nr 00 -function StopSystem , exit  
ralfafsvm02:~ # umount /hana/data/C11/mnt00001  
ralfafsvm02:~ # mount /hana/data/C11/mnt00001      # after changing /etc/fstab for data  
ralfafsvm02:~ # df -h  
Filesystem          Size  Used Avail Use% Mounted on  
10.4.2.5:/ralfanflog01/C11    1.1T  7.8G 1020G  1% /hana/log/C11/mnt00001  
10.4.2.5:/ralfanfbackup01/C11  514G  3.9G  510G  1% /hana/backup/C11  
10.4.2.5:/ralfanfshared01/C11  1.1T   20G 1016G  2% /hana/shared/C11  
10.4.2.5:/ralfanfclone01     515G  6.6G  509G  2% /hana/data/C11/mnt00001
```

System Cloning / Snap 2 Volume / CLI



After mounting the cloned volume we need to recover HANA SYSTEMDB first

```
ralfafsvm02:/ # chown -R c11adm:sapsys /hana/data/C11
```

```
ralfafsvm02:/Software # su - c11adm
```

```
c11adm@ralfafsvm02:/usr/sap/C11/HDB00> cd exe/python_support
```

```
c11adm@ralfafsvm02:/usr/sap/C11/HDB00/exe/python_support>
```

```
python recoverSys.py --command="RECOVER DATA USING SNAPSHOT CLEAR LOG"
```

```
...
```

```
sapcontrol returned successfully:
```

```
2020-10-08T12:50:48+00:00 P0018658
```

```
1750843342f INFO
```

```
RECOVERY RECOVER DATA finished successfully
```

Then Recover the TenantDB with SID change from ANA to C11

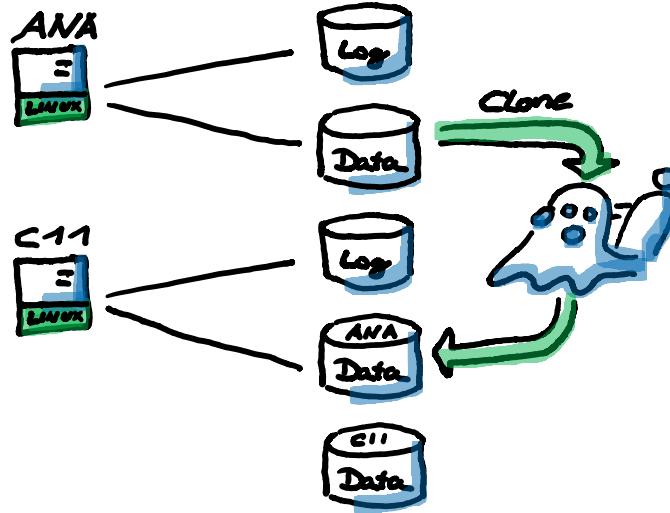
```
c11adm@ralfafsvm02:/usr/sap/C11/HDB00/exe/python_support> hdbsql -u system -p <pwd> -n localhost:30013
```

```
hdbsql SYSTEMDB=> recover data for C11 using snapshot clear log
```

```
0 rows affected (overall time 61.742062 sec; server time 61.739634 sec)
```

```
hdbsql SYSTEMDB=> exit
```

System Cloning / Snap 2 Volume / GUI



Create a new Volume out of an existing Snapshot

Create a volume 

[Basics](#) [Protocol](#) [Tags](#) [Review + create](#)

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

Volume details

Volume name *****

ralfanfclone02

Restoring from snapshot 

hana_hourly_2020-10-12T140501-5159480Z

Available quota (GiB) 

1024

1 Tib

Quota (GiB) ***** 

512

512 GiB

Virtual network 

ralfAFSnw (10.4.0.0/16)

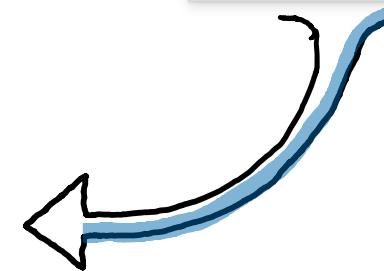
Subnet 

ralfanfsubnet (10.4.2.0/24)

Show advanced section 

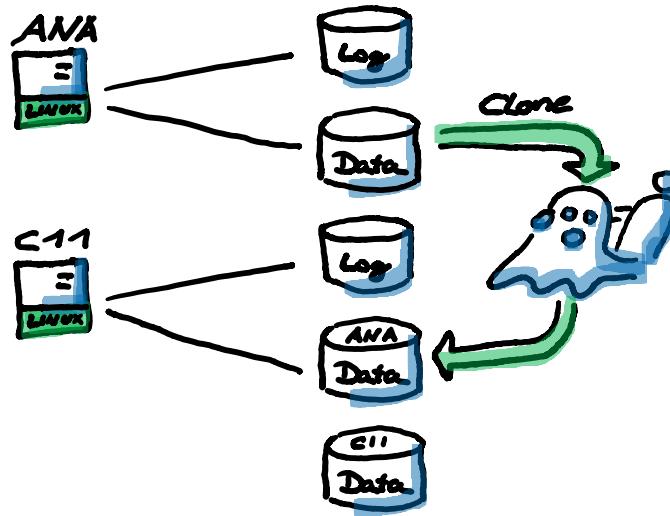
Hide snapshot path 

 hana_hourly_2020-10-07T09...	centraluseuap	10/07/2020, 11:05:05 AM	
 hana_hourly_2020-10-07T10...	centraluseuap	10/07/2020, 12:05:05 PM	
 hana_hourly_2020-10-07T11...	centraluseuap	10/07/2020, 01:05:05 PM	
 hana_hourly_2020-10-07T12...	centraluseuap	10/07/2020, 02:05:05 PM	
 hana_hourly_2020-10-07T13...	centraluseuap	10/07/2020, 03:05:05 PM	





System Cloning / Snap 2 Volume / GUI



Create a volume

Basics Protocol Tags Review + create

Configure access to your volume.

Access

Protocol type NFS SMB Dual-protocol (NFSv3 and SMB)

Configuration

File path *

Versions

Kerberos Enabled Disabled

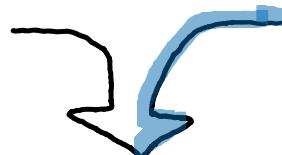
Export policy

Configure the volume's export policy. This can be edited later. [Learn more](#)

↑ Move up ↓ Move down ⌈ Move to top ⌋ Move to bottom ⚡ Delete

Index	Allowed clients	Access	Root Access
1	0.0.0.0/0	Read & Write	On

Create



ralfanfclone02

512 GiB

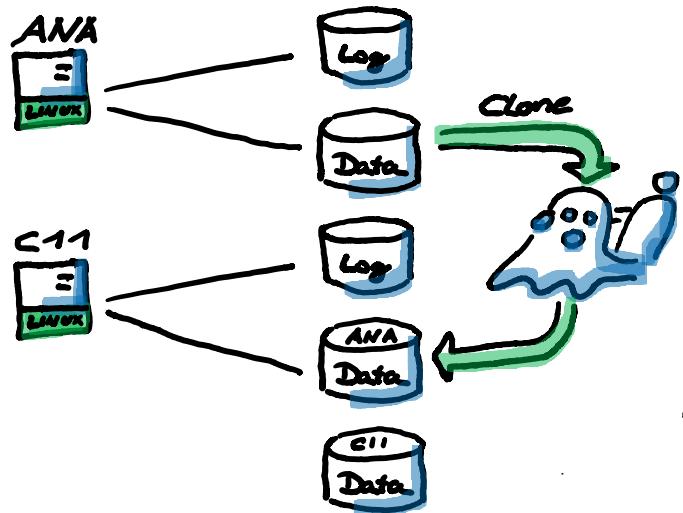
NFSv4.1

10.4.2.5:/ralfanfclone02

Premium

ralfanf01

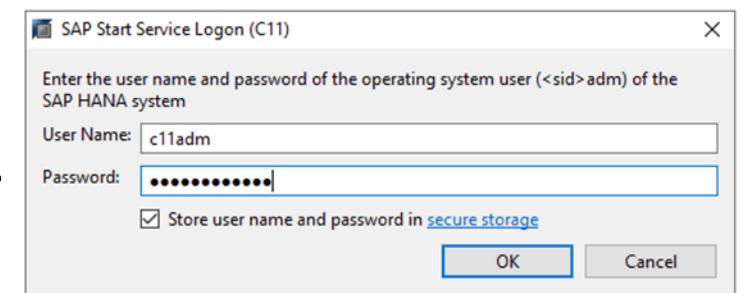
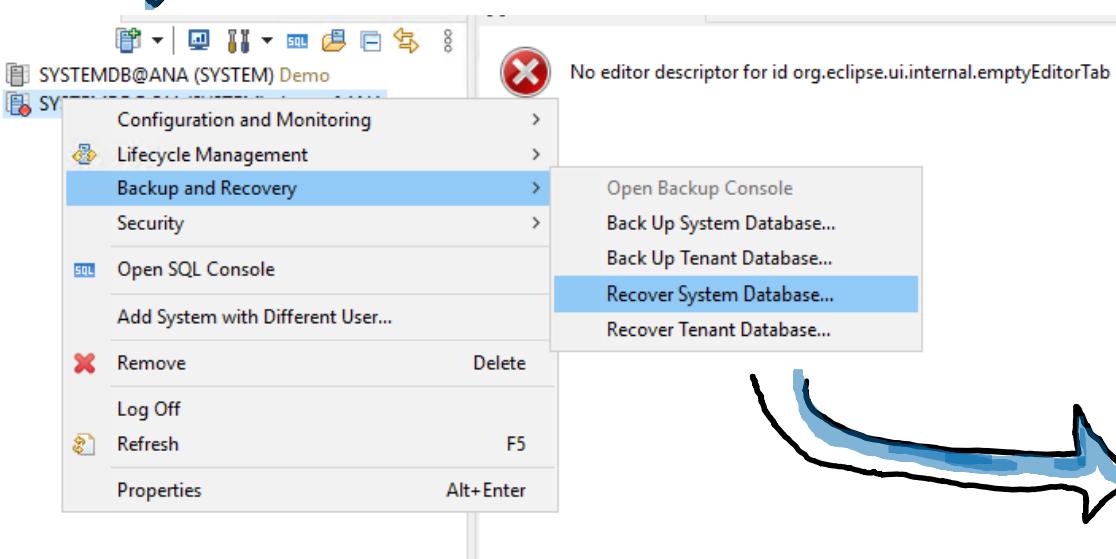
System Cloning / Snap 2 Volume / GUI



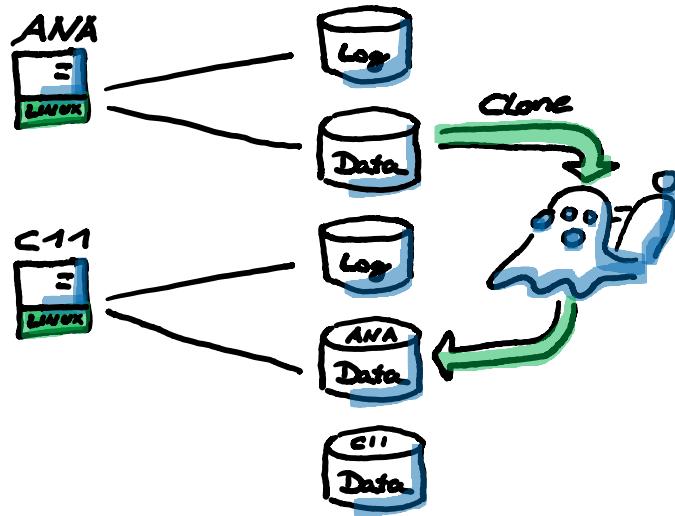
Shutdown HANA and mount the Clone of the data volume from ANA

```
ralfafsvm02:/Software # su - c11adm
c11adm@ralfafsvm02:/usr/sap/C11/HDB00> sapcontrol -nr 00 -function StopSystem , exit
ralfafsvm02:~ # umount /hana/data/C11/mnt00001
ralfafsvm02:~ # mount /hana/data/C11/mnt00001      # after changing /etc/fstab for data
ralfafsvm02:~ # df -h
Filesystem          Size  Used Avail Use% Mounted on
10.4.2.5:/ralfanflog01/C11   1.1T  7.8G 1020G  1% /hana/log/C11/mnt00001
10.4.2.5:/ralfanfbackup01/C11 514G  3.9G 510G  1% /hana/backup/C11
10.4.2.5:/ralfanfshared01/C11 1.1T   20G 1016G  2% /hana/shared/C11
10.4.2.5:/ralfanfclone02    515G  6.6G 509G  2% /hana/data/C11/mnt00001

ralfafsvm02:/ # chown -R c11adm:sapsys /hana/data/C11
```



System Cloning / Snap 2 Volume / GUI



Specify Recovery Type

Select a recovery type.

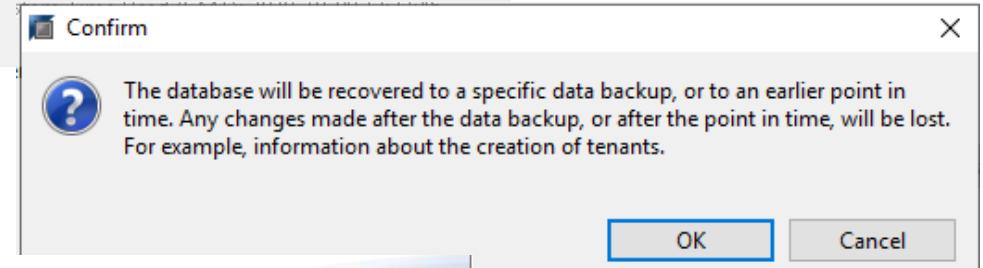
- Recover the database to its most recent state i
- Recover the database to the following point in time i

Date: 2020-10-08 Time: 13:22:46

Select Time Zone: (GMT) Coordinated Universal Time

i System Time Used (GMT): 2020-10-08 13:22:46

- Recover the database to a specific data backup i



Specify Backup Location

Choose whether you want to select a backup from a backup catalog or enter the name and the path of a backup in the next step.

- Recover using the backup catalog

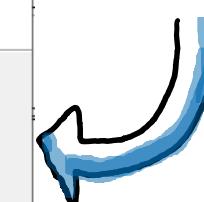
- Search for the backup catalog in the file system only

Backup Catalog Location: /usr/sap/C11/HDB00/backup/log/SYSTEMDB

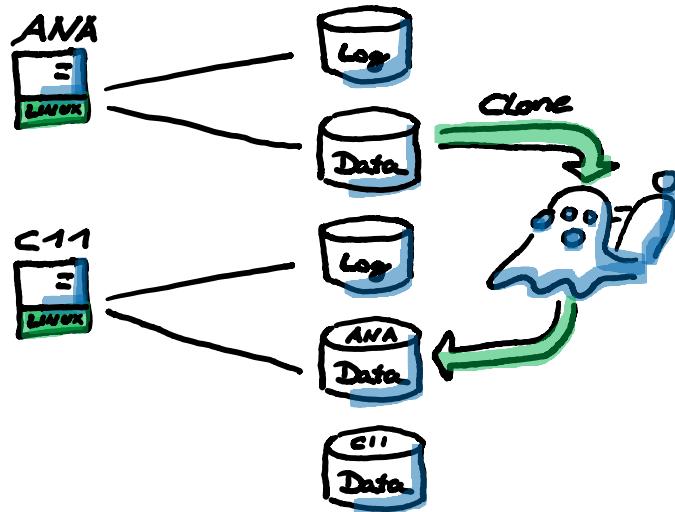
- Recover without the backup catalog

Backint System Copy

Backint System Copy



System Cloning / Snap 2 Volume / GUI



Specify the Backup to Recover
Specify the backup to be recovered.

Destination type: Snapshot

Locate the Data Backup
Specify the destination of the data backup that you want to use to recover the database.

Location: /hana/data/C11
Backup Prefix:

Other Settings

Initialize Log Area
If you do not want to recover log segments residing in the log area, select this option. After the recovery, the log entries will be deleted from the log area.
 Initialize Log Area 

Use Delta Backups
Select this option if you want to perform a recovery using delta backups. If you choose to perform a recovery without delta backups, only log backups will be used.
 Use Delta Backups (Recommended)

Install New License Key
If you recover the database from a different system, the old license key will no longer be valid
You can:

- Select a new license key to install now
- Install a new license key manually after the database has been recovered

 Install New License Key

Review Recovery Settings
Review the recovery settings and choose 'Finish' to start the recovery. You can modify the recovery settings by choosing 'Back'.

Database Information

Database:	SYSTEMDB@C11
Host:	10.4.0.6
Version:	2.00.052.00.1599235305

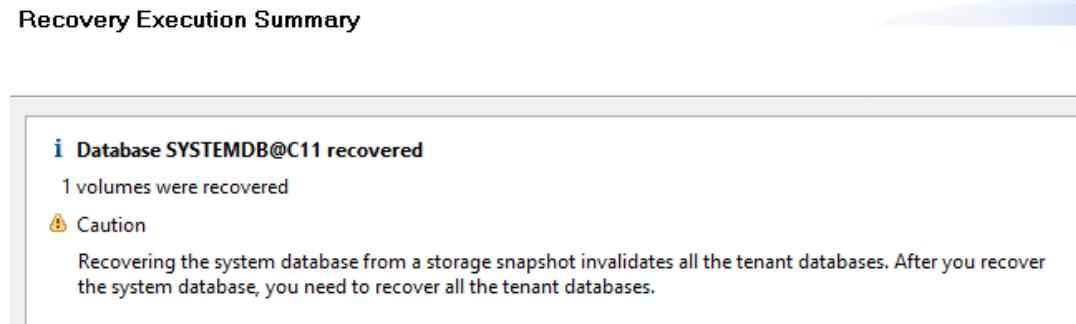
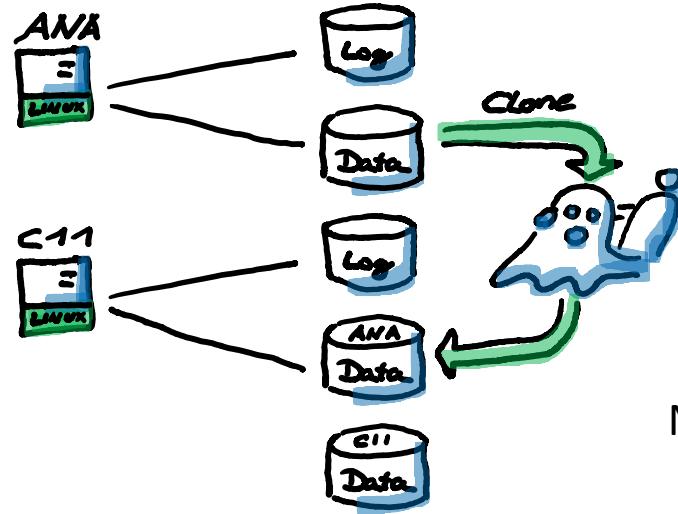
Recovery Definition
Recovery Type: Snapshot (Data Backup Recovery)

Caution
Recovering the system database from a storage snapshot invalidates all the tenant databases. After you recover the system database, you need to recover all the tenant databases.

Configuration File Handling
Caution
To recover customer-specific configuration changes, you may need to make the changes manually in the target system.
More Information: SAP HANA Administration Guide

Finish

System Cloning / Snap 2 Volume / GUI



Now the TenantDB will be recovered

hdbstudio - SAP HANA Studio

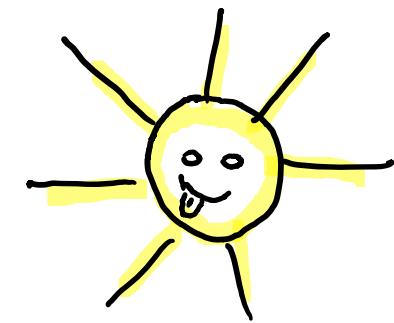
File Edit Navigate Search Run Window Help

Systems SYSTEMDB@ANA (SYSTEM) Demo SYSTEMDB@C11 (SYSTEM) clone of ANA

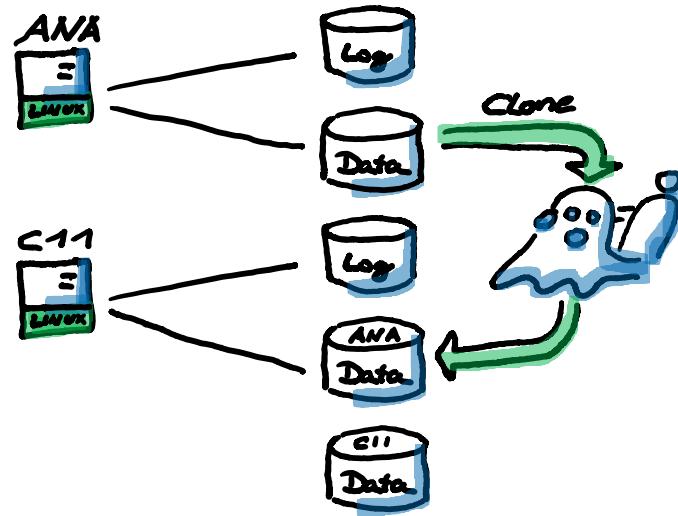
Configuration and Monitoring
Lifecycle Management
Backup and Recovery
Security
Open SQL Console
Add System with Different User...
Remove Delete
Log Off Refresh F5 Properties Alt+Enter

No editor descriptor for id org.eclipse.ui.internal.emptyEditorTab

Open Backup Console
Back Up System Database...
Back Up Tenant Database...
Recover System Database...
Recover Tenant Database...



System Cloning / Snap 2 Volume / GUI



Specify tenant database

type filter text
 C11

Specify Recovery Type
 Select a recovery type.

- Recover the database to its most recent state ?
- Recover the database to the following point in time ?

Date: 2020-10-08 Time: 13:34:28
 Select Time Zone: (GMT) Coordinated Universal Time
i System Time Used (GMT): 2020-10-08 13:34:28

Recover the database to a specific data backup ?

Specify Backup Location
 Choose whether you want to select a backup from a backup catalog or enter path of a backup in the next step.

Recover using the backup catalog

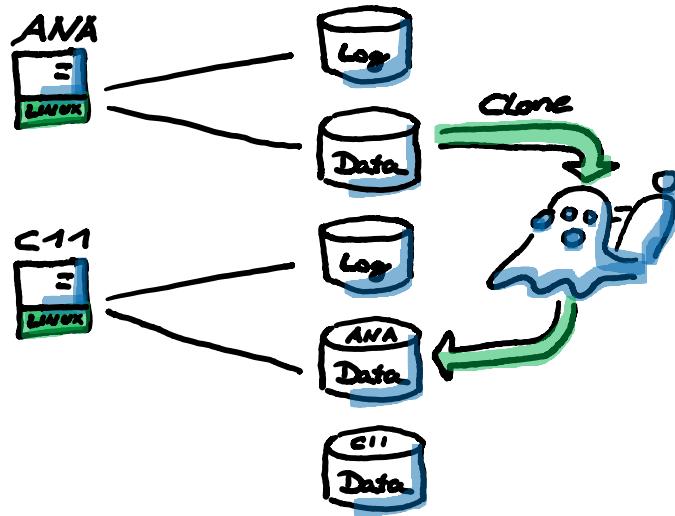
- Search for the backup catalog in the file system only

 Backup Catalog Location: /usr/sap/C11/HDB00/backup/log/DB_C11

Recover without the backup catalog

Backint System Copy
 Backint System Copy
 Source System:

System Cloning / Snap 2 Volume / GUI



Specify the Backup to Recover
Specify the backup to be recovered.

Destination Type: Snapshot

Locate the Data Backup
Specify the destination of the data backup that you want to use to recover the database.

Location: /usr/sap/C11/SYS/global/hdb/backint/DB_C11
Backup Prefix:

Initialize Log Area
If you do not want to recover log segments residing in the log area, select this option. After the recovery, the log entries will be deleted from the log area.
 Initialize Log Area

Review Recovery Settings
Review the recovery settings and choose 'Finish' to start the recovery. You can modify the recovery settings by choosing 'Back'.

Database Information

Database:	C11@C11
Host:	10.4.0.6
Version:	2.00.052.00.1599235305

Recovery Definition
Recovery Type: Snapshot (Data Backup Recovery)

Configuration File Handling

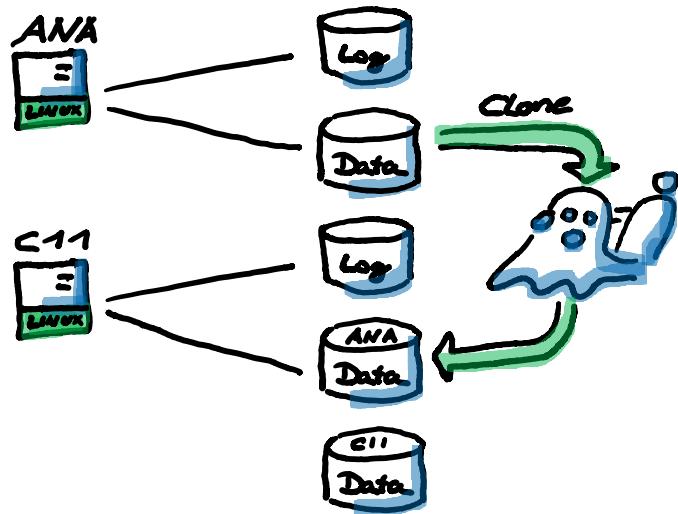
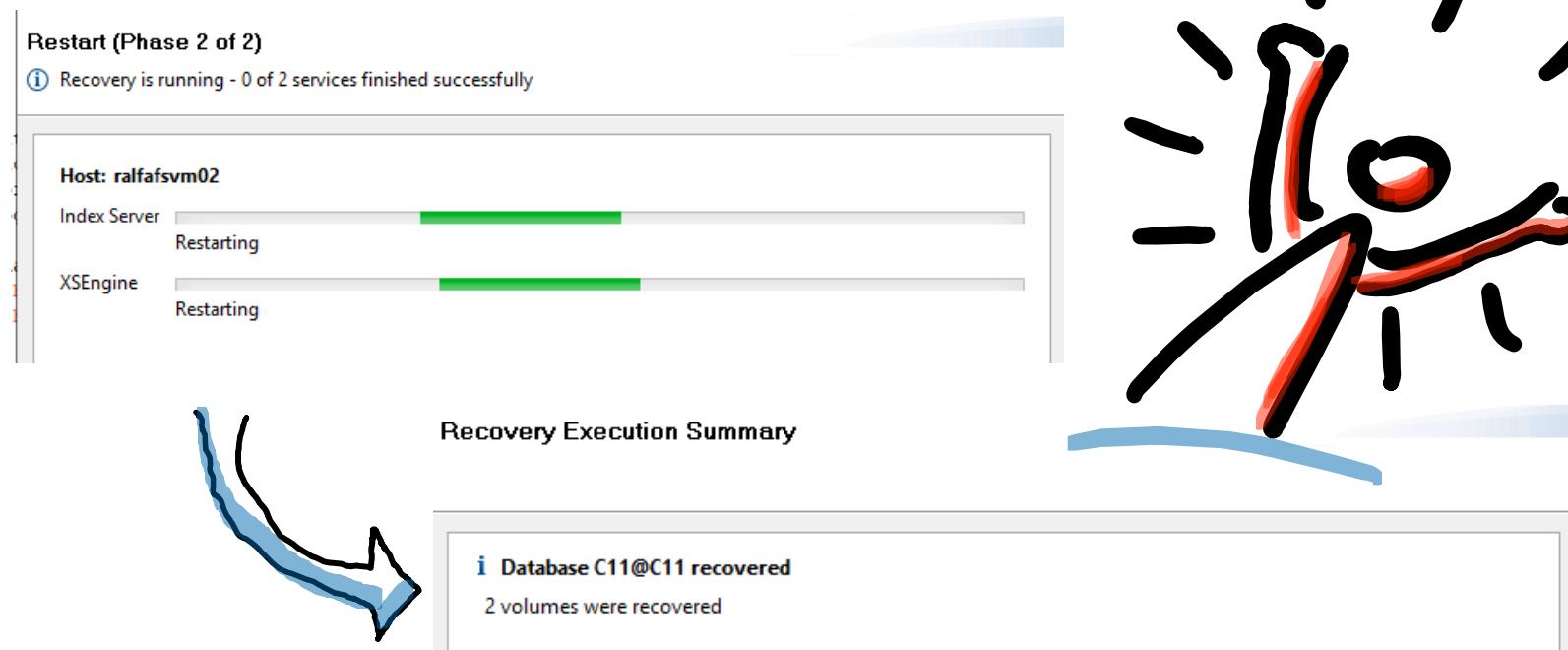
Caution
To recover customer-specific configuration changes, you may need to make the changes manually in the target system.
More Information: SAP HANA Administration Guide

system, the old license key will no longer be valid

database has been recovered

Finish

System Cloning / Snap 2 Volume / GUI

Restart (Phase 2 of 2)

① Recovery is running - 0 of 2 services finished successfully

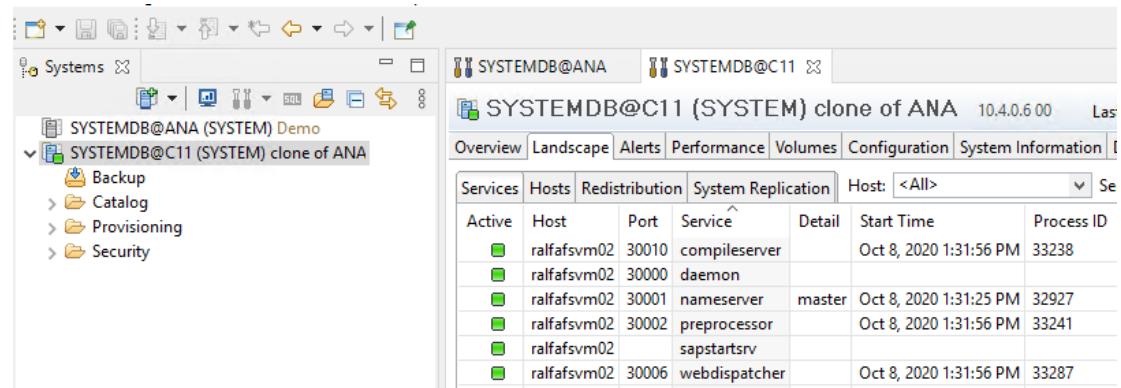
Host: ralfafsvm02

Index Server: Restarting

XSEngine: Restarting

Recovery Execution Summary

i Database C11@C11 recovered
2 volumes were recovered



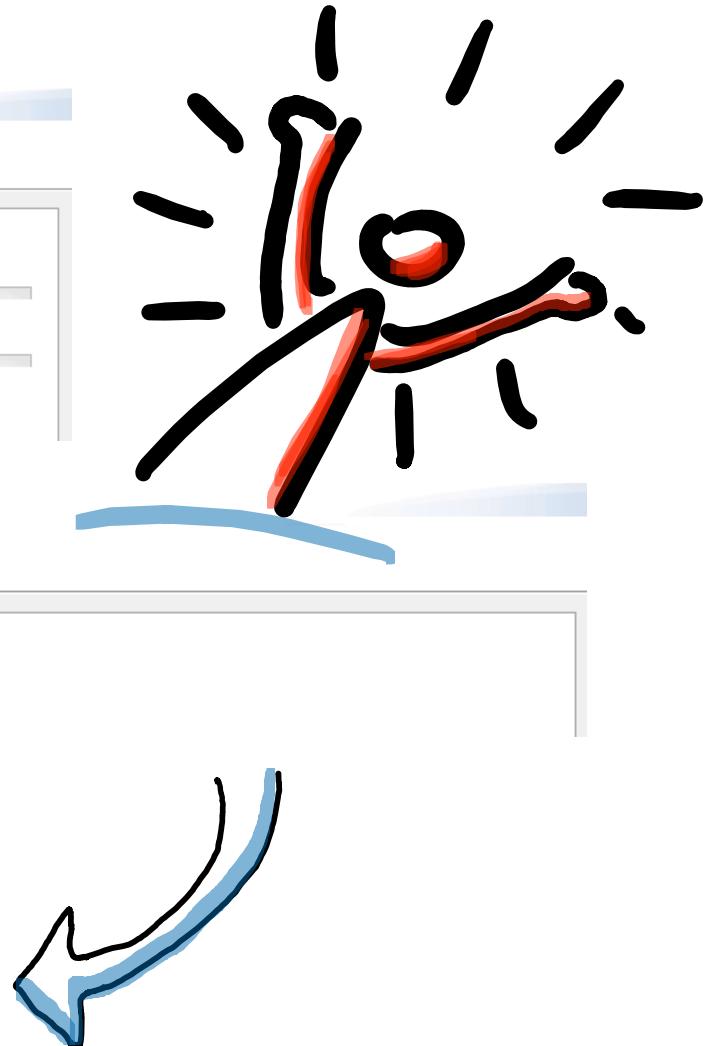
Systems

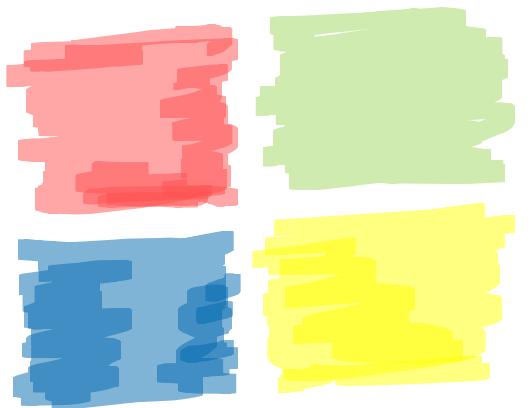
SYSTEMDB@ANA (SYSTEM) Demo

SYSTEMDB@C11 (SYSTEM) clone of ANA

- Backup
- Catalog
- Provisioning
- Security

Services	Hosts	Redistribution	System Replication	Host: <All>	Se	
Active	Host	Port	Service	Detail	Start Time	Process ID
ralfafsvm02	30010		compileserver		Oct 8, 2020 1:31:56 PM	33238
ralfafsvm02	30000		daemon			
ralfafsvm02	30001		nameserver	master	Oct 8, 2020 1:31:25 PM	32927
ralfafsvm02	30002		preprocessor		Oct 8, 2020 1:31:56 PM	33241
ralfafsvm02			sapstartsrv			
ralfafsvm02	30006		webdispatcher		Oct 8, 2020 1:31:56 PM	33287





Thank You

