



# MANUAL RECOVERY GUIDE FOR SAP HANA ON AZURE FROM STORAGE SNAPSHOT

## Abstract

How to guide for recovering SAP HANA on Azure Large Instance  
from a snapshot taken with Microsoft's Snapshot Tools.



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## Version

This document is for the SAP HANA on Azure Large Instances using the Microsoft Snapshot Tools **version 4.2 or later**.

## Authors

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## Overview

This document provides guidance on using SAP HANA Studio to recover SAP HANA on Azure Large Instances. This guide has step-by-step screenshots to follow to understand the three primary methods of recovering SAP HANA using HANA Studio from a snapshot taken using the Microsoft provided snapshot tools.

The screenshots in this document are from SAP HANA Studio session accessing **SAP HANA 2.0SPS04**.

**Disclaimer:** *This guide and the associated screenshots are taken from an SAP HANA v2.0 system recovery as set up in the Microsoft test environment for SAP HANA on Azure Large Instance. Anyone following this guide is responsible for ensuring the recovery process works in their own environment as expected.*

## Assumptions

The administrator following this guide has experience with SAP HANA and HANA Studio because not all details are provided as screenshots to follow (e.g. logging in to HANA Studio, etc.).

The administrator is familiar with SAP HANA backup processes, including the Backup Catalog and Storage Snapshots.

The administrator has the appropriate permissions at a Linux shell to copy files as the <sid>adm user into the SAP HANA Data Area.

## Terms and Definitions

Terms used in this documentation:

- **SID:** A System Identifier for SAP HANA installation, typically 3 characters long.
- **HLI:** SAP HANA on Azure Large Instance Unit.

## System status

The system layout used for this documentation has a “primary” SID (C31) and another second tenant (C32).

The second tenant (C32) was created using the SQL commands:

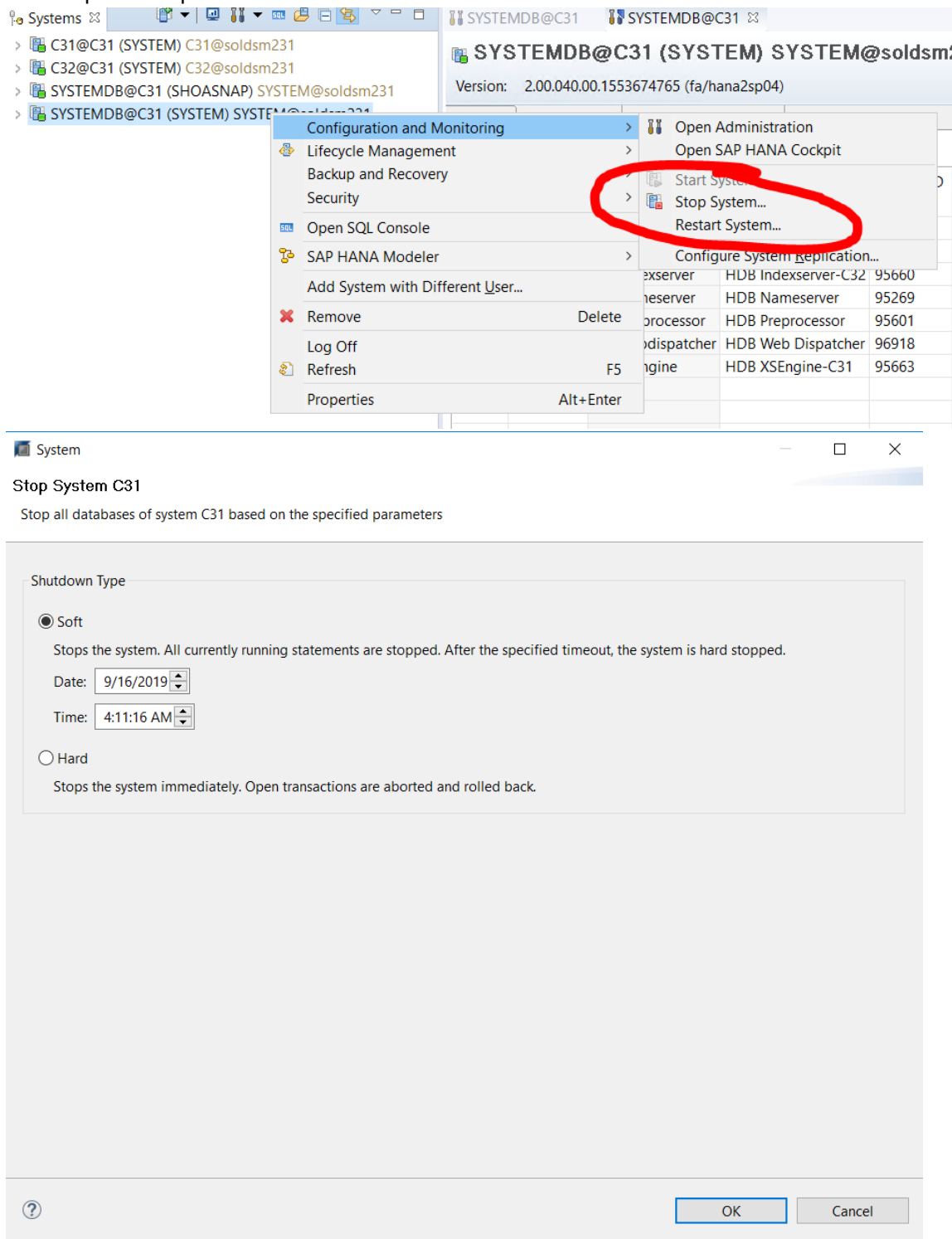
- `CREATE DATABASE C32 SYSTEM USER PASSWORD <SomePassword>`

The primary data area is under “/hana/data/C31/mnt00001”. Further explanation of the SAP HANA persistent data storage area is in the Appendix.

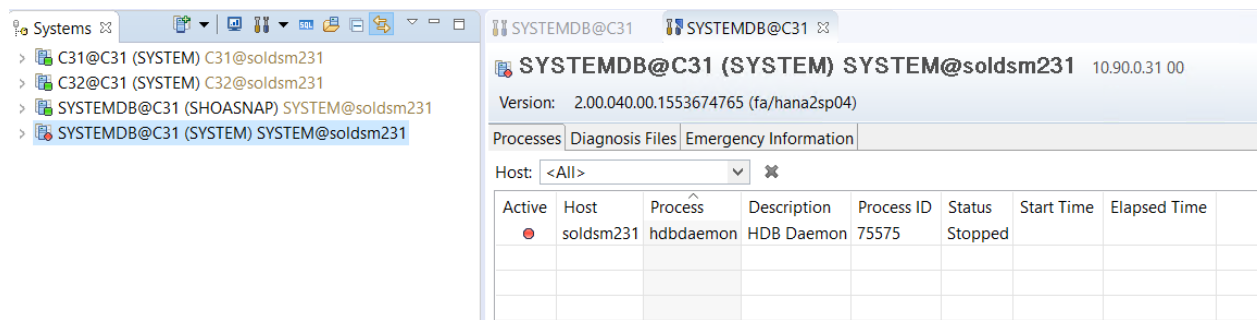
## Recover the database to its most recent state

In this case the goal is to restore the complete system (SYSTEMDB, C31, C32) from a snapshot to the most recent database state, including any log replay.

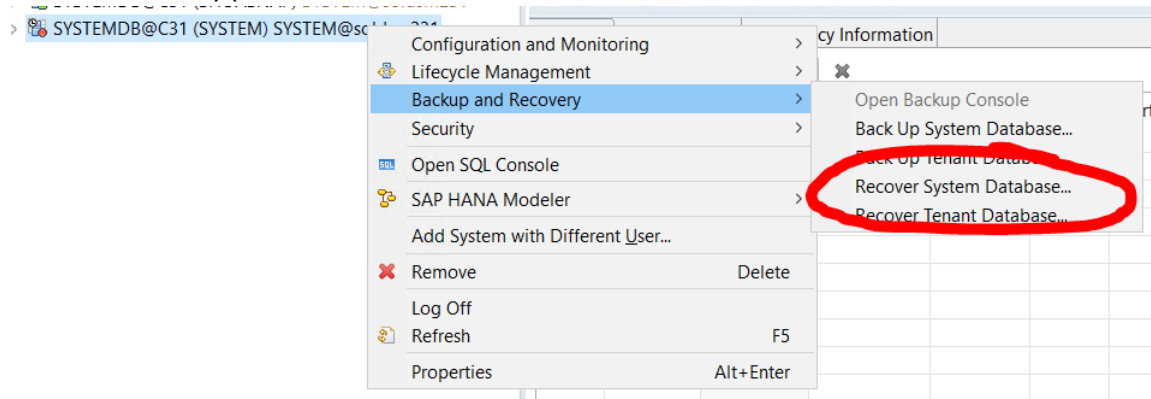
### 1. First step is to stop the database



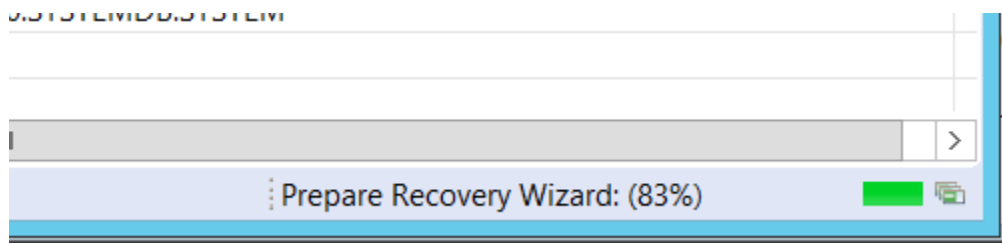
When this is finished, the Processes tab should display as follows:



2. Start the recovery process from the menu.



Note, the recovery wizard can take several seconds to launch (see the following status)



3. Choose the recovery type, in this case “Recover the database to its most recent state”

Recovery of SYSTEMDB@C31

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:2019-09-16Time:04:05:44

Select Time Zone:(GMT) Coordinated Universal Time

System Time Used (GMT): 2019-09-16 04:05:44

☐ Recover the database to a specific data backup

?

< Back

Next >

Finish

Cancel

Ad



4. Choose the location of the backup catalog, which is needed for recovery.

Recovery of SYSTEMDB@C31

### 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:

☐ Recover without the backup catalog


**Backint System Copy**

☐ Backint System Copy


Source System:



- The backup catalog will be fetched to display the appropriate backup to recover from (this can take a minute or two to load)


Recovery of SYSTEMDB@C31

Select a Backup


Fetching Backup Catalog...

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 Pref...	Available	

Refresh

Show More

Details of Selected Item

Start Time:

Destination Type:

Source System: SYSTEMDB@C:

Size:


Backup ID:

External Backup ID:

Backup Name:

Alternative Location:

Check Availability



< Back

Next >

Finish

Cancel

- The first time the backup catalog is refreshed, its likely no suitable snapshot will be found to restore from. This is because the administrator will need to copy/restore the files from the snapshot into the data area.

Recovery of SYSTEMDB@C31

Select a Backup

To recover this snapshot, it must be available in the data area.

**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 Pref...	Available
2019-09-16 02:00...	/hana/data/C31	SNAPSHOT	✗
2019-09-16 01:00...	/hana/data/C31	SNAPSHOT	✗
2019-09-16 00:00...	/hana/data/C31	SNAPSHOT	✗
2019-09-15 23:00...	/hana/data/C31	SNAPSHOT	✗
2019-09-15 22:00...	/hana/data/C31	SNAPSHOT	✗
2019-09-15 21:00...	/hana/data/C31	SNAPSHOT	✗

Refresh
Show More

**Details of Selected Item**

Start Time: 2019-09-16 02:00:03 Destination Type: SNAPSHOT Source System: SYSTE

Size: 0 B Backup ID: 1568599203 External Backup ID: S

Backup Name: /hana/data/C31

Alternative Location:

Check Availability

?

< Back
Next >
Finish
Cancel

- In this example, the files are copied from the “hidden” snapshot location in the filesystem.

```
# su - c31adm
```

```
> cp -pr /hana/data/C31/mnt00001/.snapshot/hana_hourly.2019-09-15_2100.1/* \
/hana/data/C31/mnt00001/.
```

- When the copy is complete, refresh the view of the backup catalog to ensure the snapshot we are restoring from is listed.

Recovery of SYSTEMDB@C31

Select a Backup

To recover this snapshot, it must be available in the data area.

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 Pref...	Available	
2019-09-16 02:00...	/hana/data/C31	SNAPSHOT	<div></div>	
2019-09-16 01:00...	/hana/data/C31	SNAPSHOT	<div></div>	
2019-09-16 00:00...	/hana/data/C31	SNAPSHOT	<div></div>	
2019-09-15 23:00...	/hana/data/C31	SNAPSHOT	<div></div>	
2019-09-15 22:00...	/hana/data/C31	SNAPSHOT	<div></div>	
2019-09-15 21:00...	/hana/data/C31	SNAPSHOT	<div></div>	

Refresh

Show More

Details of Selected Item

Start Time:

2019-09-16 02:00:03

Destination Type:

SNAPSHOT

Source System:

SYSTEMDB@C31

Size:

0 B

Backup ID:

1568599203

External Backup ID:

1568599203

Backup Name:

/hana/data/C31

Alternative Location:

Check Availability

?

< Back

Next >

Finish

Cancel

- Now select the available SNAPSHOT shown in green to recover from.

Recovery of SYSTEMDB@C31

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 Pref...	Available
2019-09-16 02:00...	/hana/data/C31	SNAPSHOT	●
2019-09-16 01:00...	/hana/data/C31	SNAPSHOT	✗
2019-09-16 00:00...	/hana/data/C31	SNAPSHOT	✗
2019-09-15 23:00...	/hana/data/C31	SNAPSHOT	✗
2019-09-15 22:00...	/hana/data/C31	SNAPSHOT	✗
2019-09-15 21:00...	/hana/data/C31	SNAPSHOT	✗

Refresh

Show More

Details of Selected Item

Start Time:

2019-09-16 02:00:03

Destination Type:

SNAPSHOT

Source System:

SYSTE

Size:

0 B

Backup ID:

1568599203

External Backup ID:

S

Backup Name:

/hana/data/C31

Alternative Location:

Check Availability

?


< Back

Next >

Finish


Cancel

## 10. Choose the location of the Log Backups.

 Recovery of SYSTEMDB@C31

### 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



< Back

Next >

Finish

Cancel

11. Check any appropriate “Other Settings”, the following screen is the defaults

Recovery of SYSTEMDB@C31

—
□
×

### 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 <sup>?</sup>

☐ 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 <sup>?</sup>

#### 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

?
< Back
Next >
Finish
Cancel

12. On the summary page, review any final details and press Finish to restore the system database.

Recovery of SYSTEMDB@C31

### 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@C31

Host:

Version:

2.00.040.00.1553674765

#### 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

Show SQL Statement

?

< Back

Next >

Finish

Cancel

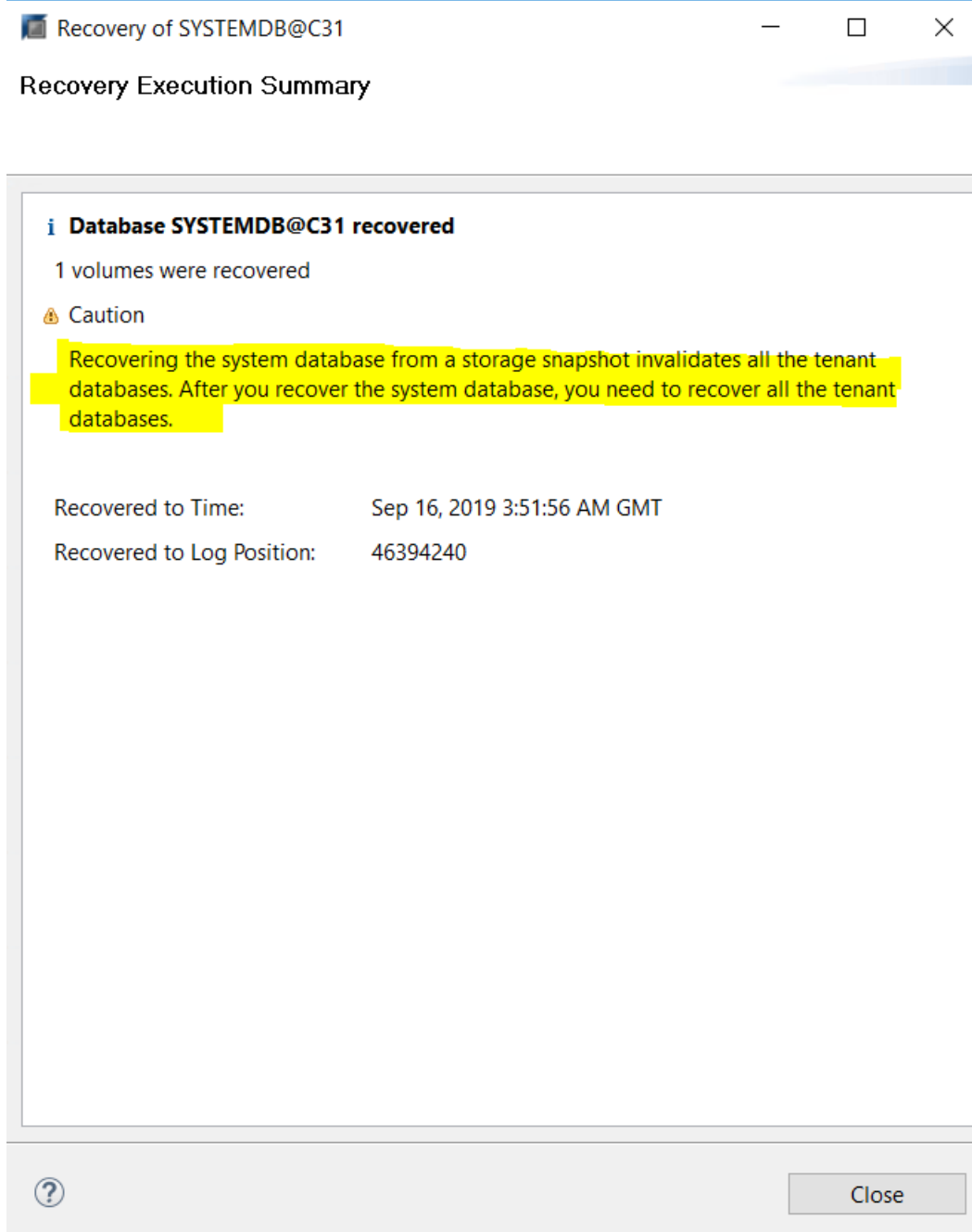
16-Sep-19

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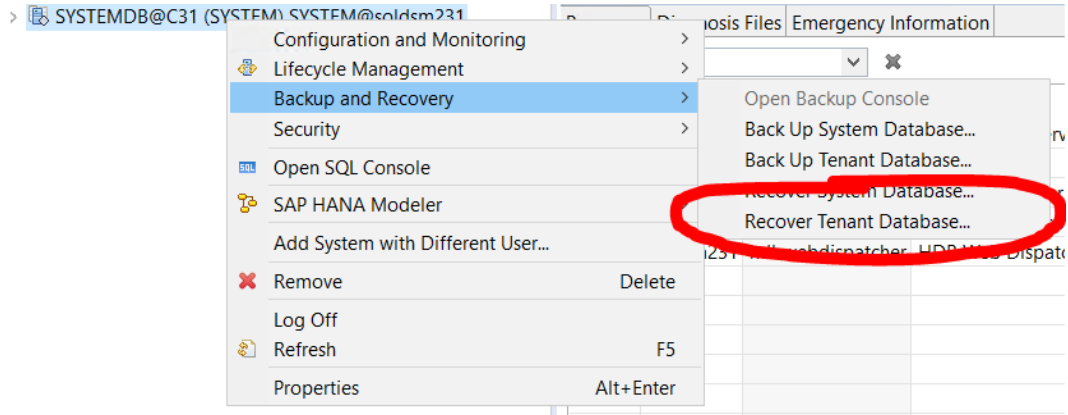


13. When the recovery has finished a Recovery Execution Summary provides details of the recovery. The following screen shows a completed recovery of the SYSTEMDB.



**!** Note the message stating “recovering the system database from a storage snapshot invalidates all the tenant databases”. Tenant databases must now be recovered.

#### 14. Start the recovery of the Tenant database



15. Choose the Tenant to recover from.

Recovery of Tenant Database in C31

Specify tenant database

filter text

☒ C31

☐ C32

?

< Back

Next >

Finish

Cancel

16. Choose to recover the tenant database to its most recent state (same as for the system database).

Recovery of Tenant Database in C31

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: 2019-09-16
Time: 04:21:42

Select Time Zone: (GMT) Coordinated Universal Time

System Time Used (GMT): 2019-09-16 04:21:42

☐ Recover the database to a specific data backup

?
< Back
Next >
Finish
Cancel

17. Provide the location of the Backup Catalog (same as for the system database)

Recovery of Tenant Database in C31

**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:

☐ Recover without the backup catalog

**Backint System Copy**


☐ Backint System Copy

Source System:




18. Allow the tenant database to be stopped for recovery.


Stop Database C31@C31

 The database must be offline before recovery can start; the database will be stopped now

19. Wait for the Backup Catalog to be refreshed and displayed


Recovery of Tenant Database in C31

Select a Backup


Fetching Backup Catalog...

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 Pref...	Available	

Refresh

Show More

Details of Selected Item

Start Time:

Destination Type:

Source System: C31@C31

Size:


Backup ID:

External Backup ID:

Backup Name:

Alternative Location:

Check Availability



< Back

Next >

Finish

Cancel

20. When recovering the tenant database there should already be a valid snapshot to recover from (unlike the system database where we needed to restore the snapshot files into the data area and refresh the view). Select this snapshot and click next.

Recovery of Tenant Database in C31

### 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 Pref...	Available
2019-09-16 02:00...	/hana/data/C31	SNAPSHOT	●
2019-09-16 01:00...	/hana/data/C31	SNAPSHOT	✗
2019-09-16 00:00...	/hana/data/C31	SNAPSHOT	✗
2019-09-15 23:00...	/hana/data/C31	SNAPSHOT	✗
2019-09-15 22:00...	/hana/data/C31	SNAPSHOT	✗
2019-09-15 21:00...	/hana/data/C31	SNAPSHOT	✗

Refresh
Show More

**Details of Selected Item**

Start Time: 2019-09-16 02:00:03 Destination Type: SNAPSHOT Source System: C31@

Size: 0 B Backup ID: 1568599203 External Backup ID: S

Backup Name: /hana/data/C31


Alternative Location:

Check Availability

?


< Back
Next >
Finish
Cancel

## 21. Specify any locations for log backups to include in the recovery process.

 Recovery of Tenant Database in C31

### 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



< Back

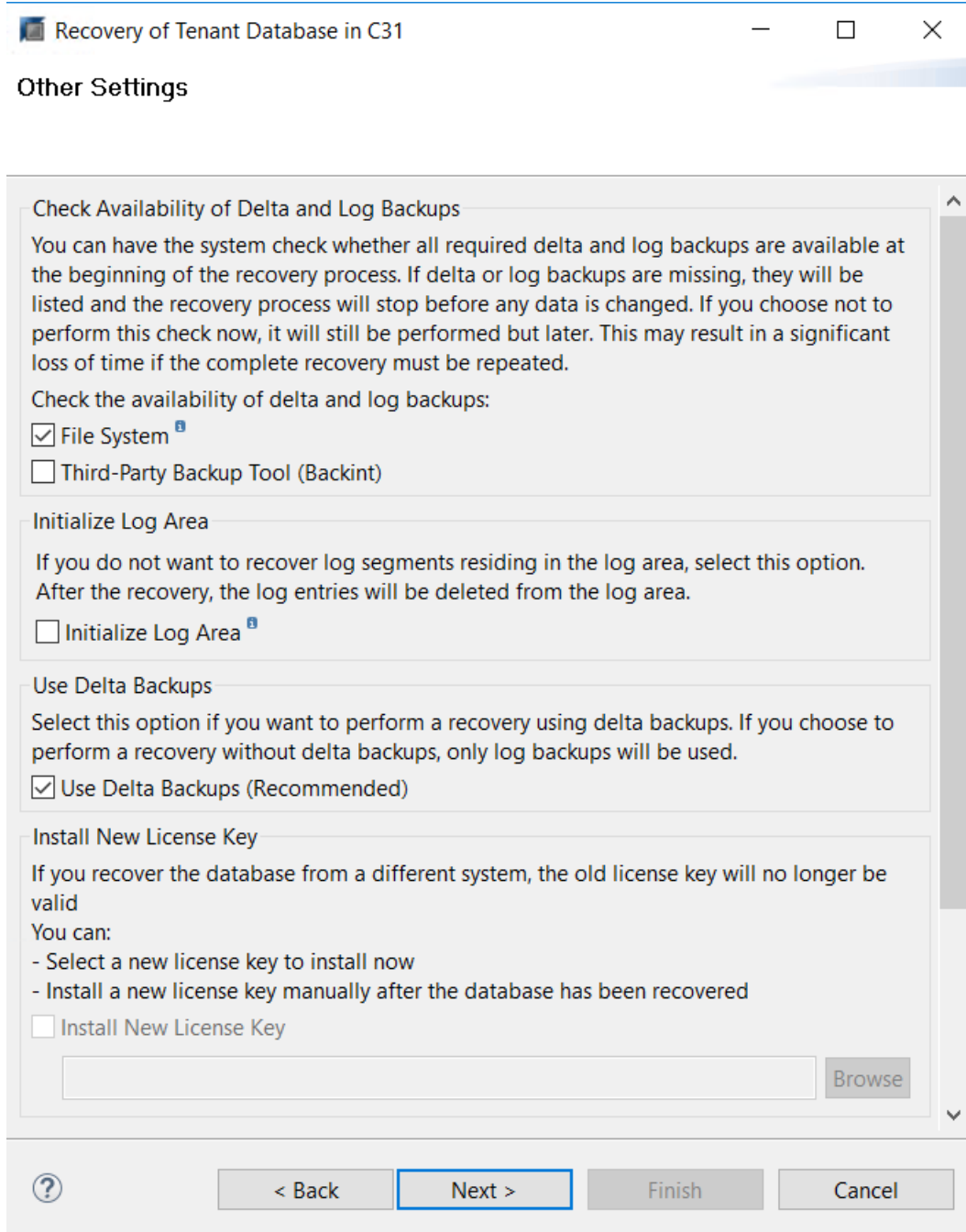
Next >

Finish

Cancel



22. Check any appropriate “Other Settings”, the following screen is the defaults



**Recovery of Tenant Database in C31**

**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 <sup>?</sup>  
☐ 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 <sup>?</sup>

**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

**Navigation:**

23. On the summary page, review any final details and press Finish to restore the tenant database. Select Finish to proceed with the recovery.

Recovery of Tenant Database in C31

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: C31@C31

Host: [REDACTED]

Version: 2.00.040.00.1553674765

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

Show SQL Statement

?

< Back

Next >

Finish

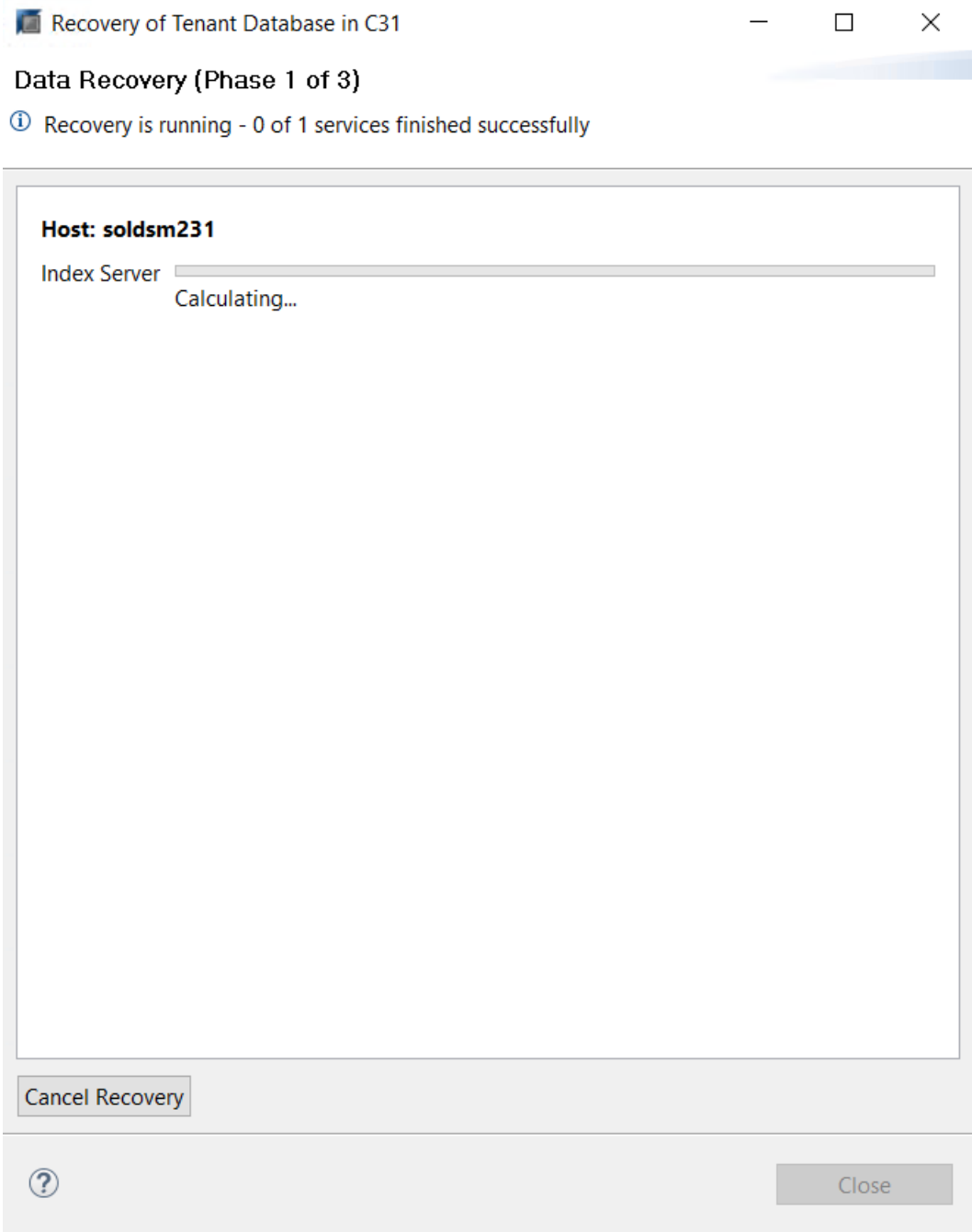
Cancel

16-Sep-19

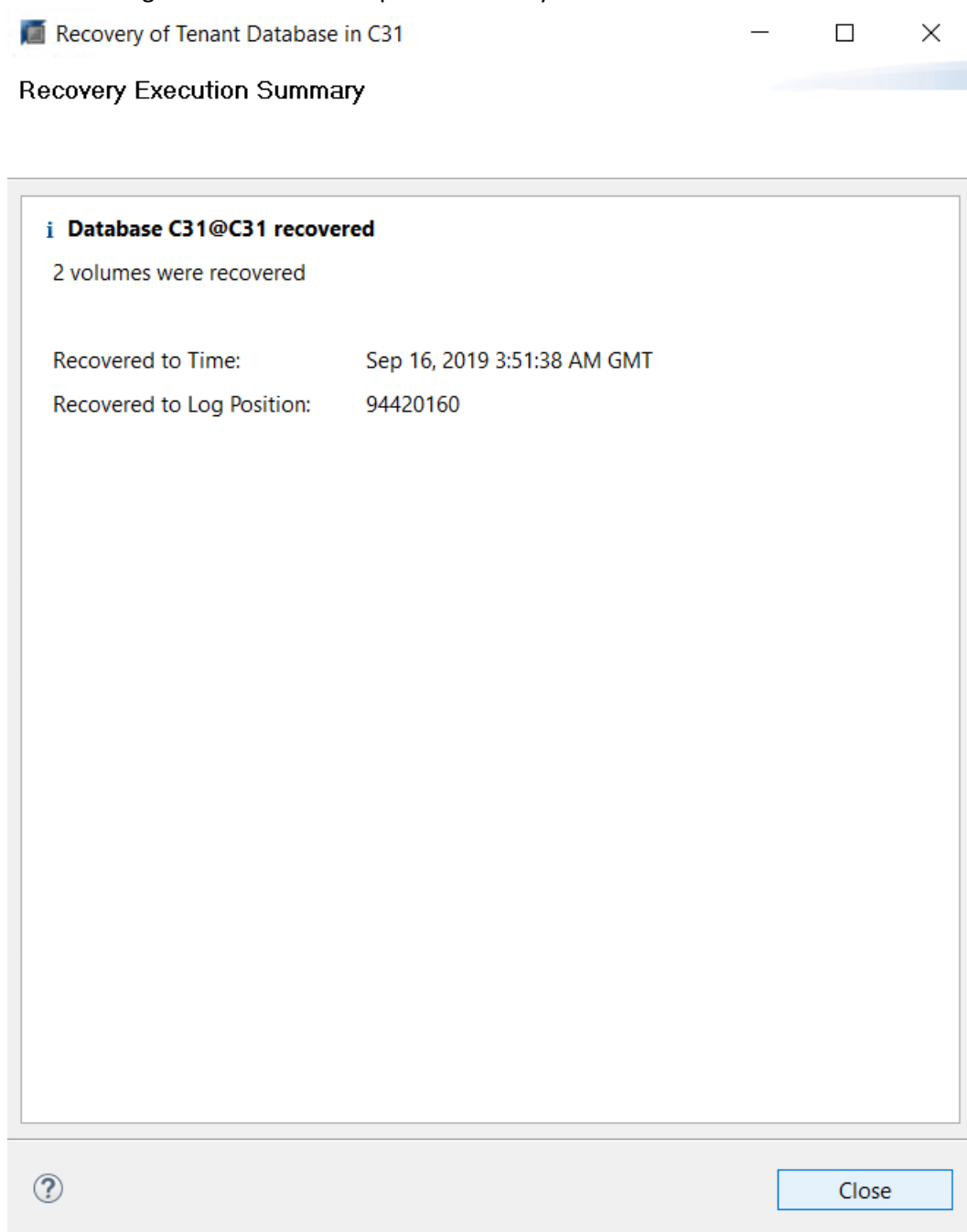
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24. The recovery process can take a few minutes, depending on database size and log files to process.



25. When the recovery has finished a Recovery Execution Summary provides details of the recovery. The following screen shows a completed recovery of the TENANT DB.



26. The following screenshot shows the database after recovery with some services running.

Processes   Diagnosis Files   Emergency Information							
Host: <All> <input type="button" value="X"/>							
Active	Host	Process ^	Description	Process ID	Status	Start Time	Elapsed Time
<input checked="" type="checkbox"/>	soldsm231	hdbcompileserv	HDB Compileserv	29598	Running	Sep 15, 2019 11:09:28 PM	0:19:14
<input checked="" type="checkbox"/>	soldsm231	hdbdaemon	HDB Daemon	28998	Running	Sep 15, 2019 11:08:57 PM	0:19:45
<input checked="" type="checkbox"/>	soldsm231	hdbindexserver	HDB Indexserver-C31	31935	Running	Sep 15, 2019 11:21:34 PM	0:07:08
<input checked="" type="checkbox"/>	soldsm231	hdbnameserver	HDB Nameserver	29017	Running	Sep 15, 2019 11:08:57 PM	0:19:45
<input checked="" type="checkbox"/>	soldsm231	hdbpreprocessor	HDB Preprocessor	29601	Running	Sep 15, 2019 11:09:28 PM	0:19:14
<input checked="" type="checkbox"/>	soldsm231	hdbwebdispatcher	HDB Web Dispatcher	29648	Running	Sep 15, 2019 11:09:29 PM	0:19:13
<input checked="" type="checkbox"/>	soldsm231	hdbxsengine	HDB XSEngine-C31	32071	Running	Sep 15, 2019 11:21:53 PM	0:06:49

Note, there is no process for C32 running, this tenant still needs to be recovered

**Repeat the steps 14-25 to recover any other tenants.**

In our example, after recovering tenant C32, the process list looks like the following:

Processes   Diagnosis Files   Emergency Information							
Host: <All> <input type="button" value="X"/>							
Active	Host	Process ^	Description	Process ID	Status	Start Time	Elapsed Time
<input checked="" type="checkbox"/>	soldsm231	hdbcompileserv	HDB Compileserv	29598	Running	Sep 15, 2019 11:09:28 PM	0:28:34
<input checked="" type="checkbox"/>	soldsm231	hdbdaemon	HDB Daemon	28998	Running	Sep 15, 2019 11:08:57 PM	0:29:05
<input checked="" type="checkbox"/>	soldsm231	hdbindexserver	HDB Indexserver-C31	31935	Running	Sep 15, 2019 11:21:34 PM	0:16:28
<input checked="" type="checkbox"/>	soldsm231	hdbindexserver	HDB Indexserver-C32	36538	Running	Sep 15, 2019 11:37:51 PM	0:00:11
<input checked="" type="checkbox"/>	soldsm231	hdbnameserver	HDB Nameserver	29017	Running	Sep 15, 2019 11:08:57 PM	0:29:05
<input checked="" type="checkbox"/>	soldsm231	hdbpreprocessor	HDB Preprocessor	29601	Running	Sep 15, 2019 11:09:28 PM	0:28:34
<input checked="" type="checkbox"/>	soldsm231	hdbwebdispatcher	HDB Web Dispatcher	29648	Running	Sep 15, 2019 11:09:29 PM	0:28:33
<input checked="" type="checkbox"/>	soldsm231	hdbxsengine	HDB XSEngine-C31	32071	Running	Sep 15, 2019 11:21:53 PM	0:16:09

A process listing can also be retrieved from the command line when logged in as the <sid>adm user.

```
> /usr/sap/hostctrl/exe/sapcontrol -nr 00 -function GetProcessList
```

```
15.09.2019 23:51:43
```

```
GetProcessList
```

```
OK
```

```
name, description, dispstatus, textstatus, starttime, elapsedtime, pid
```

```
hdbdaemon, HDB Daemon, GREEN, Running, 2019 09 15 23:08:57, 0:42:46, 28998
```

```
hdbcompileserv, HDB Compileserv, GREEN, Running, 2019 09 15 23:09:28, 0:42:15, 29598
```

```
hdbindexserver, HDB Indexserver-C31, GREEN, Running, 2019 09 15 23:21:34, 0:30:09, 31935
```

```
hdbindexserver, HDB Indexserver-C32, GREEN, Running, 2019 09 15 23:37:51, 0:13:52, 36538
```

```
hdbnameserver, HDB Nameserver, GREEN, Running, 2019 09 15 23:08:57, 0:42:46, 29017
```

```
hdbpreprocessor, HDB Preprocessor, GREEN, Running, 2019 09 15 23:09:28, 0:42:15, 29601
```

```
hdbwebdispatcher, HDB Web Dispatcher, GREEN, Running, 2019 09 15 23:09:29, 0:42:14,
```

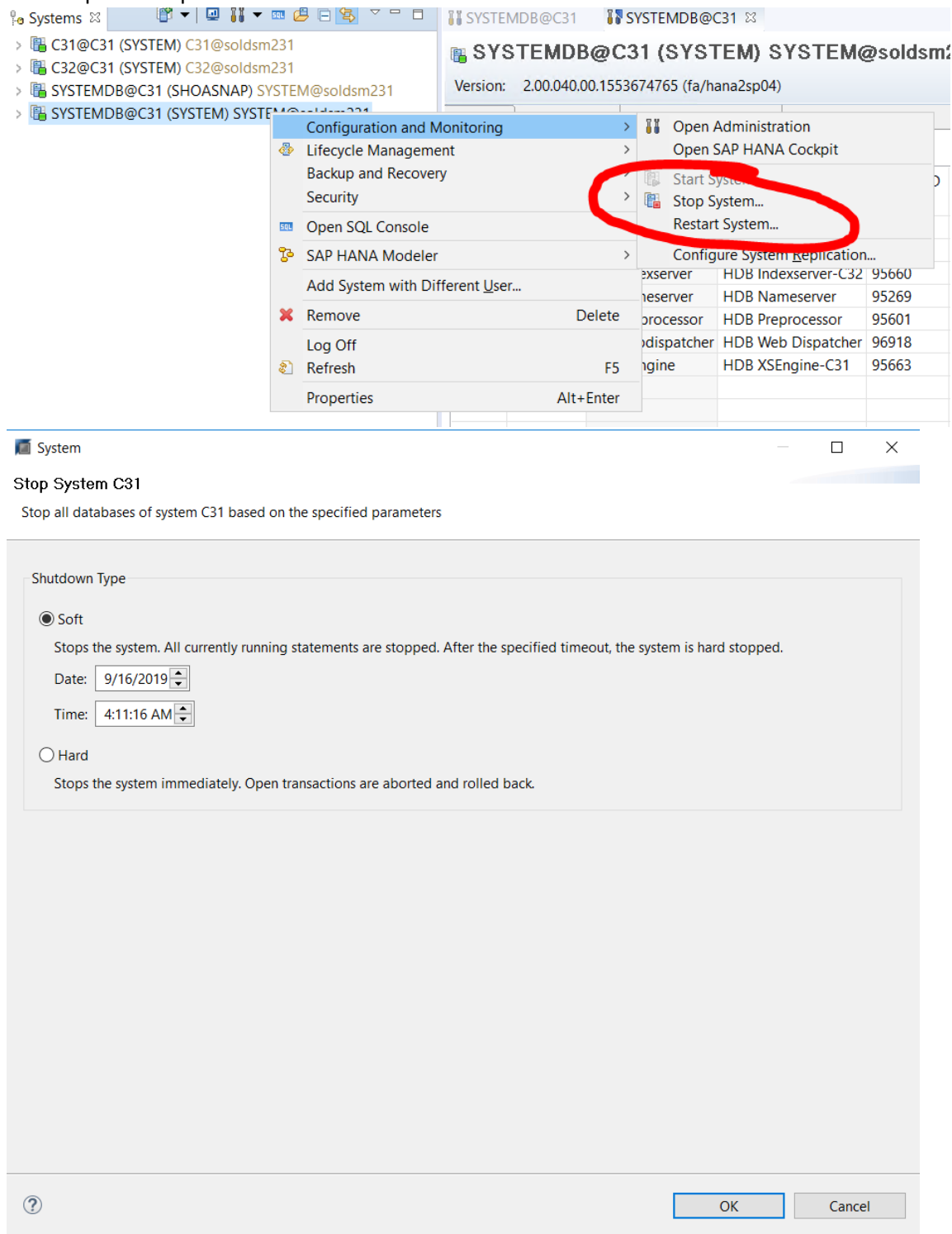
```
29648
```

```
hdbxsengine, HDB XSEngine-C31, GREEN, Running, 2019 09 15 23:21:53, 0:29:50, 32071
```

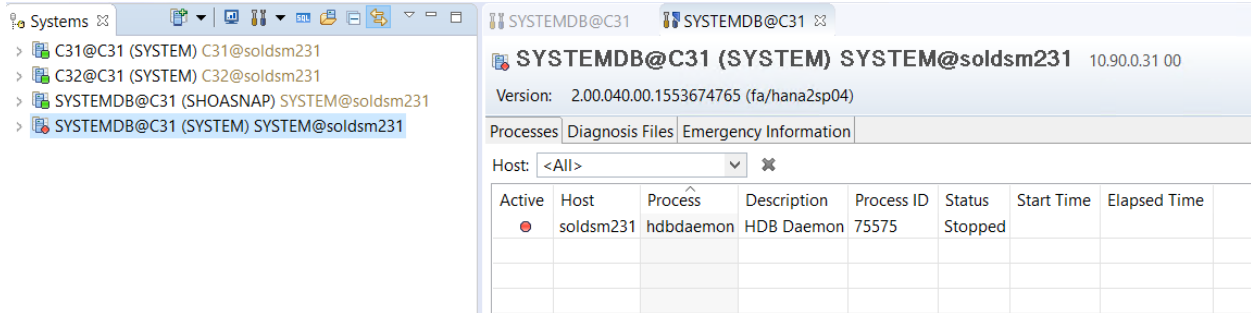
## Recover the database to the following point in time

This process allows recovery of the database to a specific point in time, perhaps just prior to an invalid transaction.

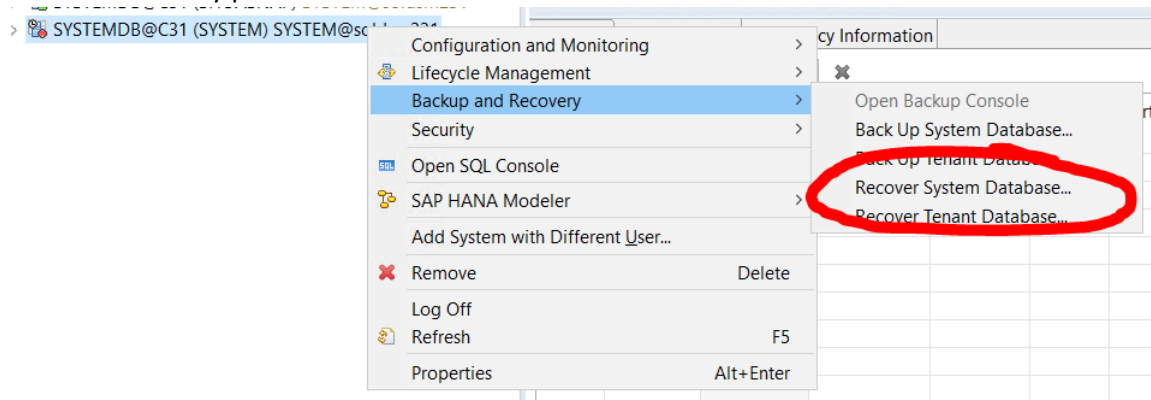
### 1. First step is to stop the database



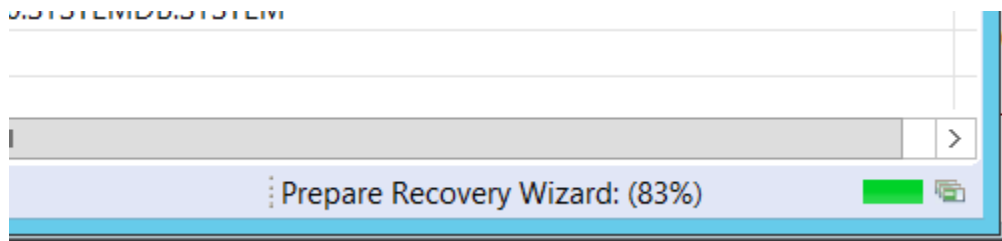
When this is finished, the Processes tab should display as follows:



2. Start the recovery process from the menu.



Note, the recovery wizard can take several seconds to launch (see the following status)



- Choose the recovery type, in this case “Recover the database to the following point in time”, in this example the time stamp chosen is 16-September-2019 05:00:00 (in 24 hour UTC/GMT)

Recovery of SYSTEMDB@C31

### Specify Recovery Type

Select a recovery type.

☐ Recover the database to its most recent state <sup>i</sup>  
☒ Recover the database to the following point in time <sup>i</sup>

Date:   Time:

Select Time Zone:

*i* System Time Used (GMT): 2019-09-16 05:00:18

☐ Recover the database to a specific data backup <sup>i</sup>

Advanced >>

! Note the time used is based on UTC/GMT.

- Confirm the recovery to continue, noting the potential for lost data.

Confirm

The database will be recovered to a specific data backup, or to an earlier point in time. Any changes made after the data backup, or after the point in time, will be lost. For example, information about the creation of tenants.



5. Choose the location of the backup catalog, which is needed for recovery.

Recovery of SYSTEMDB@C31

### 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:

☐ Recover without the backup catalog


**Backint System Copy**

☐ Backint System Copy


Source System:



- The backup catalog will be fetched to display the appropriate backup to recover from (this can take a minute or two to load)

 Recovery of SYSTEMDB@C31
 — □ ×

### Select a Backup

 Fetching Backup Catalog...

#### Selected Point in Time

Database will be recovered to 2019-09-16 05:00:00. (Coordinated Universal Time)

#### 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 Pref...	Available	

Refresh
Show More

#### Details of Selected Item

Start Time:

Destination Type:


Source System: SYSTEMDB@C:

Size:


Backup ID:

External Backup ID:


Backup Name:

Alternative Location: 


Check Availability


< Back
Next >
Finish
Cancel

- The first time the backup catalog is refreshed, its likely no suitable snapshot will be found to restore from. This is because the administrator will need to copy/restore the files from the snapshot into the data area.

 Recovery of SYSTEMDB@C31

Select a Backup
 







 To recover this snapshot, it must be available in the data area.

**Selected Point in Time**

Database will be recovered to 2019-09-16 05:00:00. (Coordinated Universal Time)


**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 Pref...	Available
2019-09-16 01:00...	/hana/data/C31	SNAPSHOT	
2019-09-16 00:00...	/hana/data/C31	SNAPSHOT	
2019-09-15 23:00...	/hana/data/C31	SNAPSHOT	
2019-09-15 22:00...	/hana/data/C31	SNAPSHOT	
2019-09-15 21:00...	/hana/data/C31	SNAPSHOT	
2019-09-15 20:00...	/hana/data/C31	SNAPSHOT	

Refresh
 Show More

**Details of Selected Item**

Start Time: 2019-09-16 03:00:03 Destination Type: SNAPSHOT Source System: SYSTEMDB@C:  
 Size: 0 B Backup ID: 1568602803 External Backup ID: Storage snaps  
 Backup Name:  /hana/data/C31  
 Alternative Location:

Check Availability



< Back

Next >

Finish

Cancel

- In this example, the files can be copied from the “hidden” snapshot location in the filesystem

```
# su - c31adm
```

```
> cp -pr /hana/data/C31/mnt00001/.snapshot/hana_hourly.2019-09-15_2100.2/* \
/hana/data/C31/mnt00001/.
```

- When the copy is complete, refresh the view of the backup catalog to ensure the snapshot we are restoring from is listed.

Recovery of SYSTEMDB@C31

### Select a Backup

✖ To recover this snapshot, it must be available in the data area.

#### 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 Pref...	Available
2019-09-16 02:00...	/hana/data/C31	SNAPSHOT	✖
2019-09-16 01:00...	/hana/data/C31	SNAPSHOT	✖
2019-09-16 00:00...	/hana/data/C31	SNAPSHOT	✖
2019-09-15 23:00...	/hana/data/C31	SNAPSHOT	✖
2019-09-15 22:00...	/hana/data/C31	SNAPSHOT	✖
2019-09-15 21:00...	/hana/data/C31	SNAPSHOT	✖

Refresh
Show More

#### Details of Selected Item

Start Time: 2019-09-16 02:00:03 Destination Type: SNAPSHOT Source System: SYSTE  
Size: 0 B Backup ID: 1568599203 External Backup ID: S  
Backup Name: ✖ /hana/data/C31  
Alternative Location:

?

10. Now select the available SNAPSHOT shown in green to recover from.

Recovery of SYSTEMDB@C31

## Select a Backup

Select a backup to recover the SAP HANA database

### Selected Point in Time

Database will be recovered to 2019-09-16 05:00:00. (Coordinated Universal Time)

### 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 Pref...	Available	
2019-09-16 02:00...	/hana/data/C31	SNAPSHOT	●	
2019-09-16 01:00...	/hana/data/C31	SNAPSHOT	✗	
2019-09-16 00:00...	/hana/data/C31	SNAPSHOT	✗	
2019-09-15 23:00...	/hana/data/C31	SNAPSHOT	✗	
2019-09-15 22:00...	/hana/data/C31	SNAPSHOT	✗	
2019-09-15 21:00...	/hana/data/C31	SNAPSHOT	✗	

Refresh

Show More

### Details of Selected Item

Start Time: 2019-09-16 02:00:03 Destination Type: SNAPSHOT Source System: SYSTEMDB@C:  
 Size: 0 B Backup ID: 1568599203 External Backup ID: Storage snaps  
 Backup Name: /hana/data/C31  
 Alternative Location:

Check Availability




< Back

Next >

Finish


Cancel

# 11. Choose the location of the Log Backups.

 Recovery of SYSTEMDB@C31

## 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

/hana/logbackups/C31/SYSTEMDB




< Back

Next >

Finish

Cancel

12. Check any appropriate “Other Settings”, the following screen is the defaults

 Recovery of SYSTEMDB@C31

—
□
×

### 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 <sup>?</sup>

☐ 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 <sup>?</sup>

#### 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

?
< Back
Next >
Finish
Cancel

- On the summary page, review any final details and press Finish to restore the system database.

Recovery of SYSTEMDB@C31

### 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@C31

Host: [REDACTED]

Version: 2.00.040.00.1553674765

**Recovery Definition**

Recovery Type: Snapshot (Point-in-Time Recovery) (Sep 16, 2019 5:00:00 AM GMT)

**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.

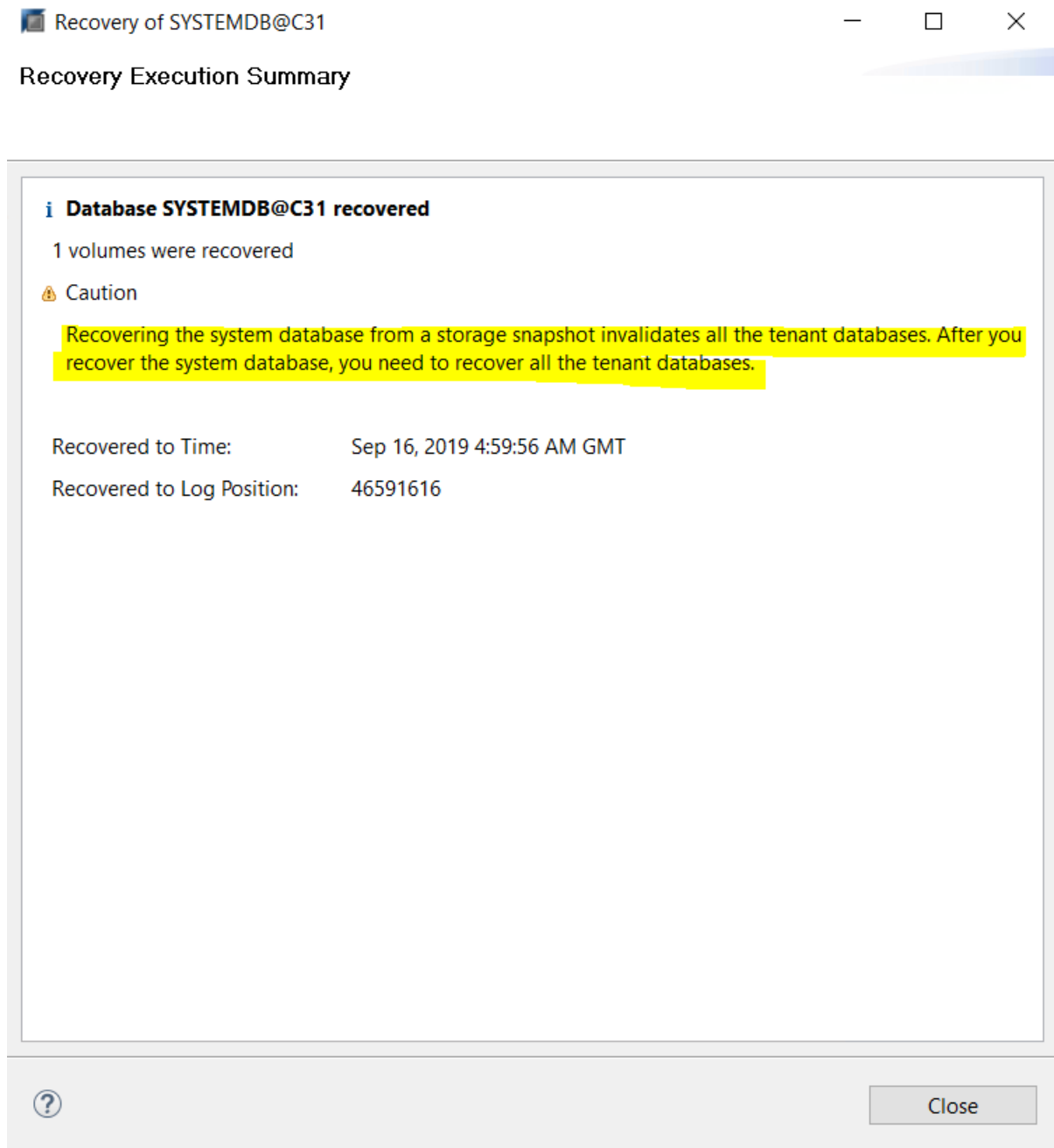
More Information: SAP HANA Administration Guide

Show SQL Statement

?
< Back
Next >
Finish
Cancel

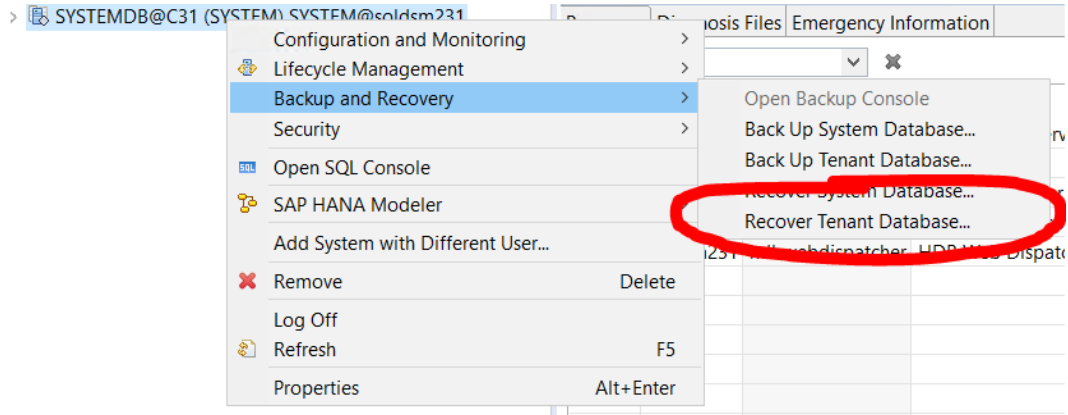


14. When the recovery has finished a Recovery Execution Summary provides details of the recovery. The following screen shows a completed recovery of the SYSTEMDB.



**!** Note the message stating “recovering the system database from a storage snapshot invalidates all the tenant databases”. Tenant databases must now be recovered.

## 15. Start the recovery of the Tenant database



16. Choose the Tenant to recover from. At the time of writing, only a single tenant database is supported by SAP to recover from.

Recovery of Tenant Database in C31

Specify tenant database

filter text

☒ C31

☐ C32

?

< Back

Next >

Finish

Cancel

- Choose to recover the tenant database to the following point in time (same as for the system database).

Recovery of SYSTEMDB@C31

### 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: 2019-09-16
Time: 05:00:00

Select Time Zone: (GMT) Coordinated Universal Time

System Time Used (GMT): 2019-09-16 05:00:18

☐ Recover the database to a specific data backup

Advanced >>

?

< Back

Next >

Finish

Cancel

**!** Note the time used is based on UTC/GMT.

18. Provide the location of the Backup Catalog (same as for the system database)

Recovery of Tenant Database in C31

**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:

☐ Recover without the backup catalog

**Backint System Copy**


☐ Backint System Copy

Source System:

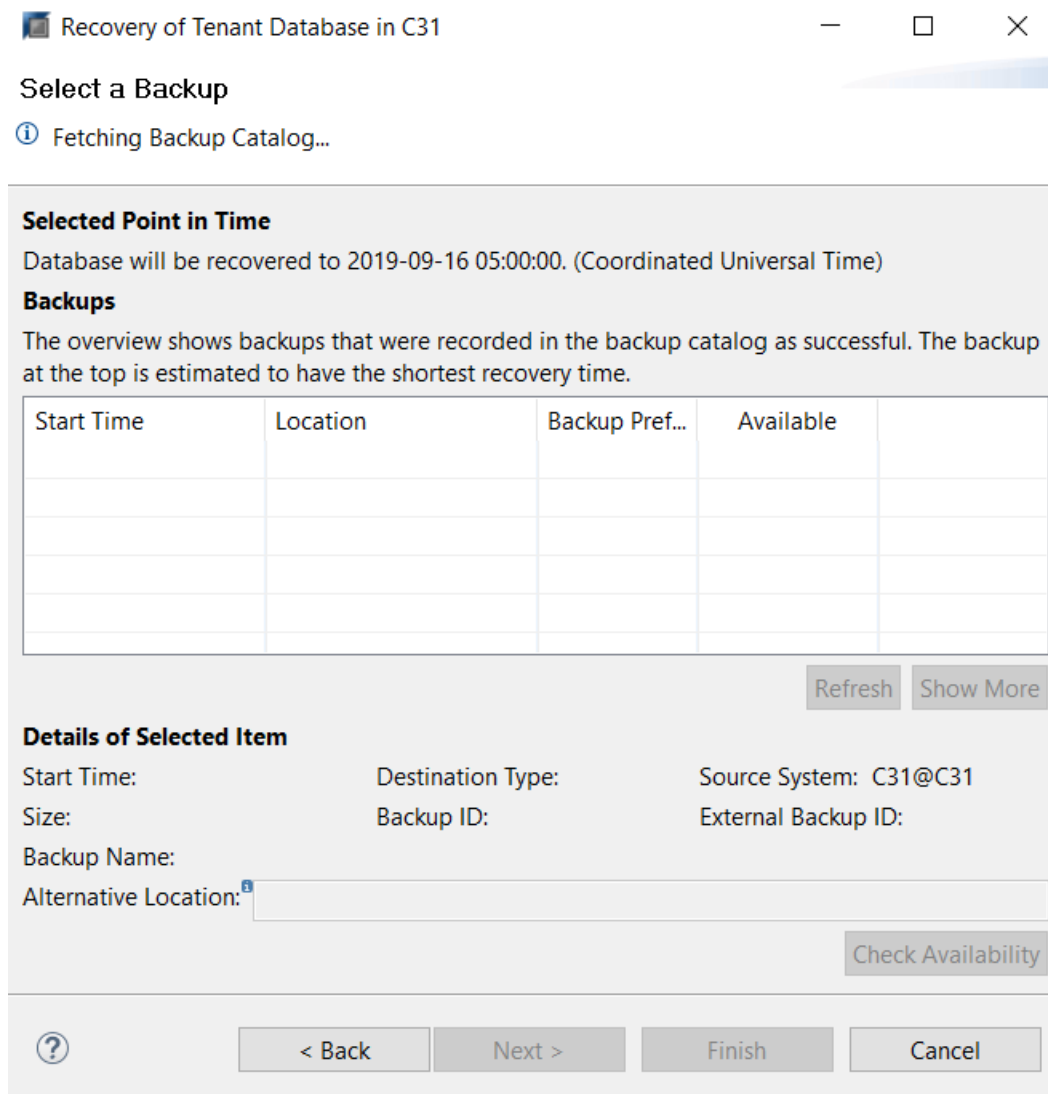


19. Allow the tenant database to be stopped for recovery.


Stop Database C31@C31

 The database must be offline before recovery can start; the database will be stopped now

20. Wait for the Backup Catalog to be refreshed and displayed



21. When recovering the tenant database there should already be a valid snapshot to recover from (unlike the system database where we needed to restore the snapshot files into the data area and refresh the view). Select this snapshot and click next.

 Recovery of Tenant Database in C31

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

**Selected Point in Time**  
 Database will be recovered to 2019-09-16 05:00:00. (Coordinated Universal Time)

**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 Pref...	Available
2019-09-16 02:00...	/hana/data/C31	SNAPSHOT	<span style="color: green;">●</span>
2019-09-16 01:00...	/hana/data/C31	SNAPSHOT	<span style="color: red;">✗</span>
2019-09-16 00:00...	/hana/data/C31	SNAPSHOT	<span style="color: red;">✗</span>
2019-09-15 23:00...	/hana/data/C31	SNAPSHOT	<span style="color: red;">✗</span>
2019-09-15 22:00...	/hana/data/C31	SNAPSHOT	<span style="color: red;">✗</span>
2019-09-15 21:00...	/hana/data/C31	SNAPSHOT	<span style="color: red;">✗</span>


Refresh Show More

**Details of Selected Item**  
 Start Time: 2019-09-16 02:00:03 Destination Type: SNAPSHOT Source System: C31@  
 Size: 0 B Backup ID: 1568599203 External Backup ID: S  
 Backup Name: /hana/data/C31  
 Alternative Location:

Check Availability


? < Back Next > Finish Cancel

22. Specify any locations for log backups to include in the recovery process.

 Recovery of Tenant Database in C31

### 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

/hana/logbackups/C31/DB\_C31

Remove All

Remove



< Back

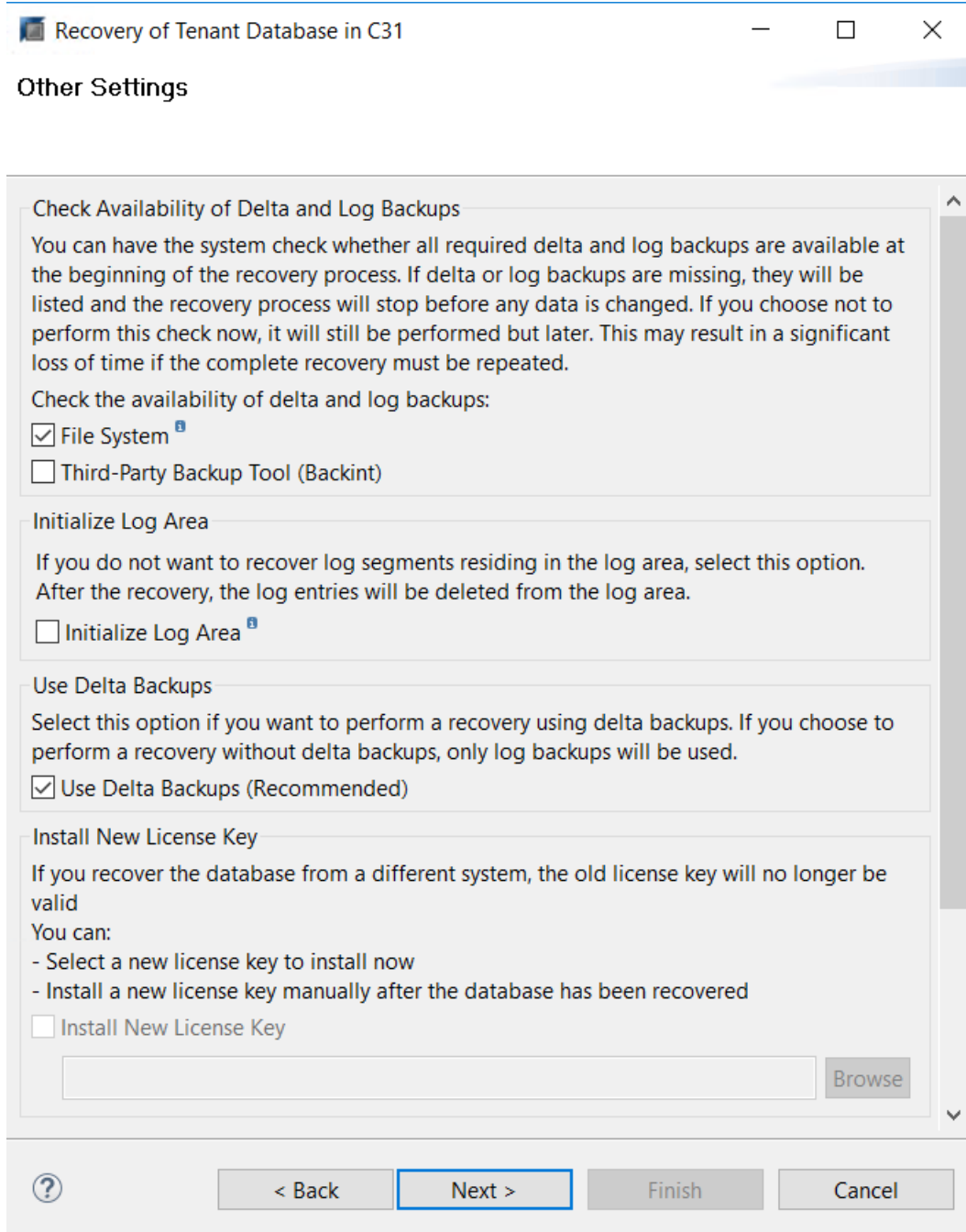
Next >

Finish

Cancel



23. Check any appropriate “Other Settings”, the following screen is the defaults.



**Recovery of Tenant Database in C31**

**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 <sup>?</sup>  
☐ 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 <sup>?</sup>

**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

24. On the summary page, review any final details and press Finish to restore the tenant database. Select Finish to proceed with the recovery.

Recovery of Tenant Database in C31

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:

C31@C31

Host:

Version:

2.00.040.00.1553674765

Recovery Definition

Recovery Type:

Snapshot (Point-in-Time Recovery) (Sep 16, 2019 5:00:00 AM GMT)

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

Show SQL Statement

?

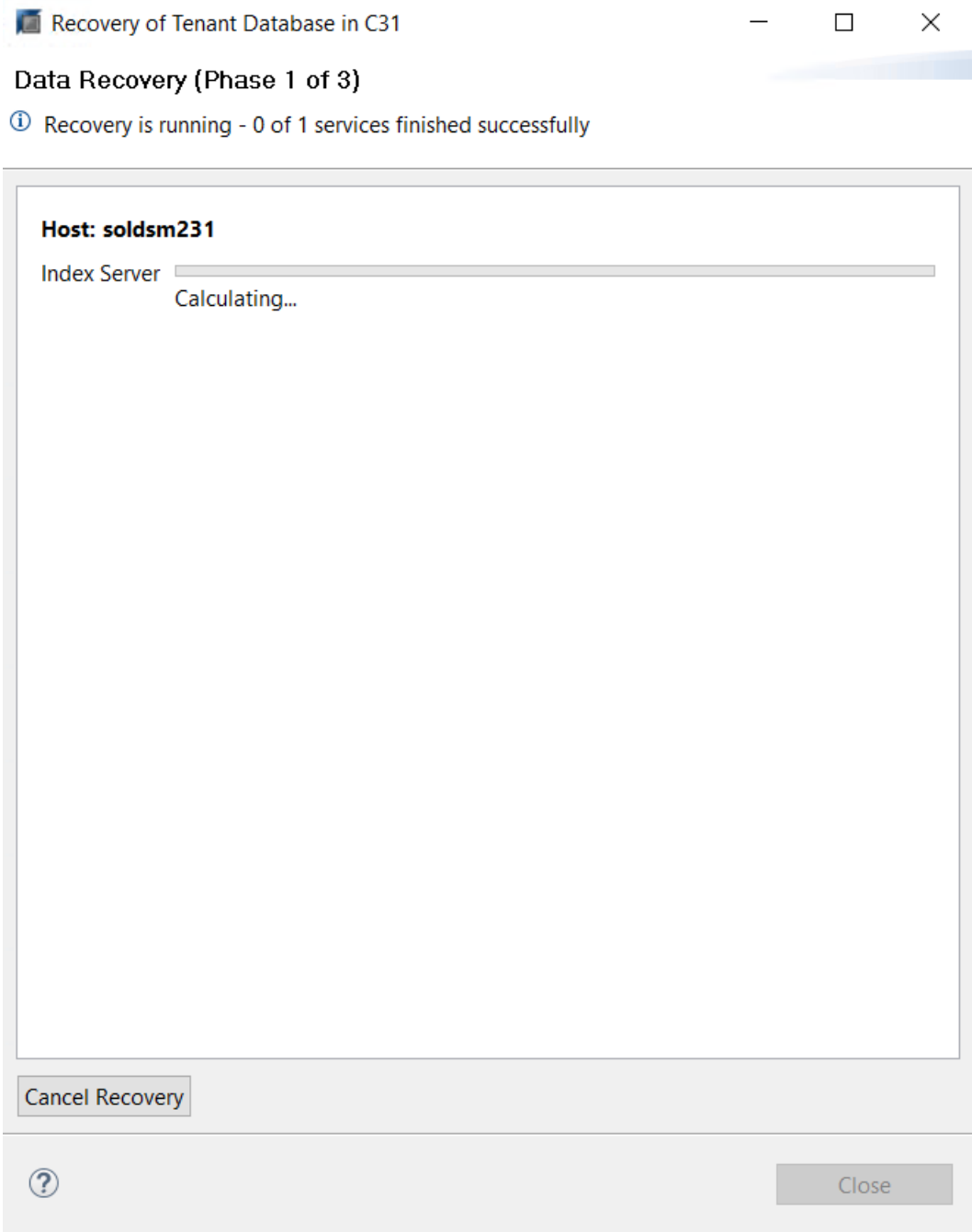
< Back

Next >

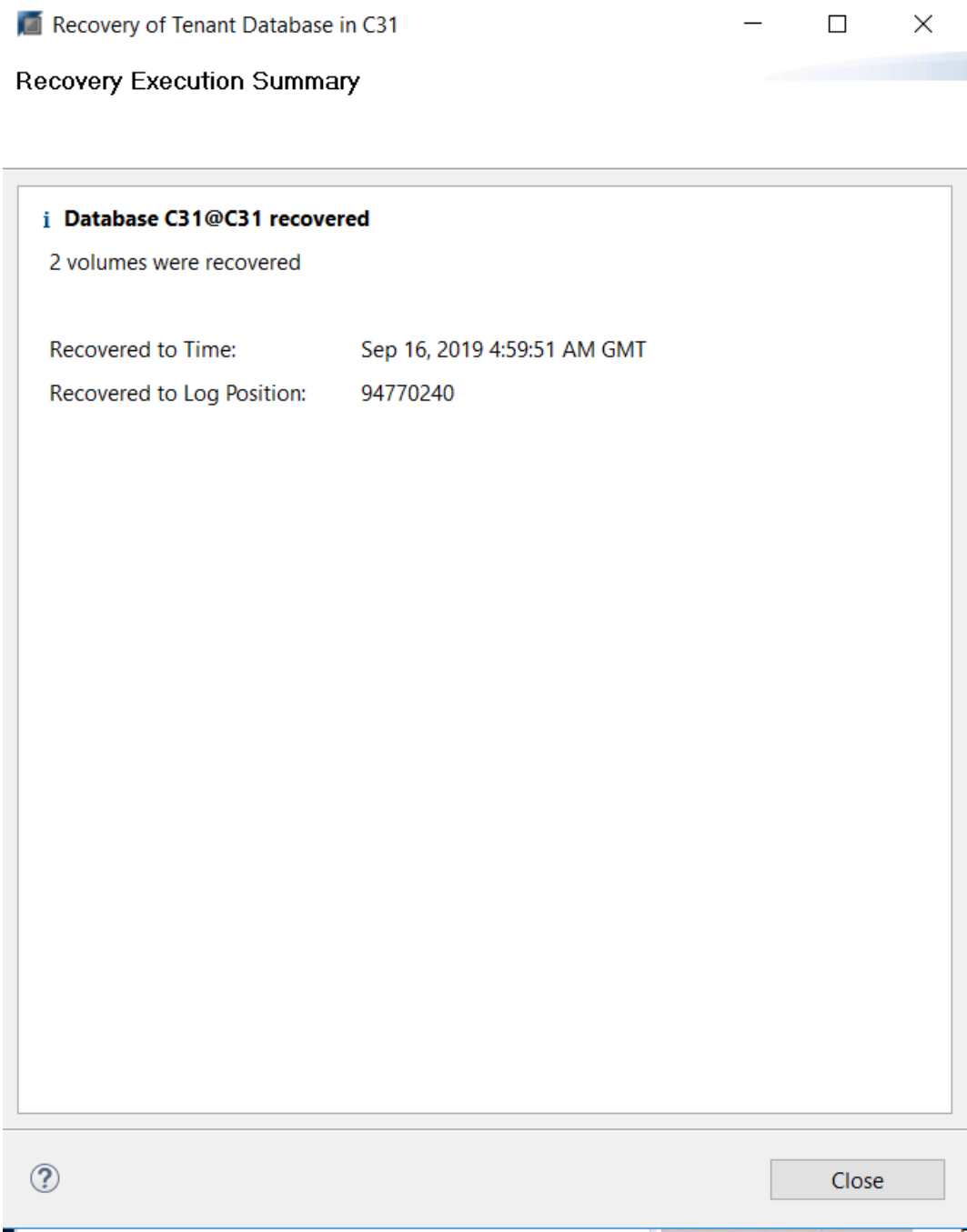
Finish

Cancel








25. The recovery process can take a few minutes, depending on database size and log files to process.



26. When the recovery has finished a Recovery Execution Summary provides details of the recovery. The following screen shows a completed recovery of the TENANT DB.











27. The following screenshot shows the database after recovery with some services running.

Processes   Diagnosis Files   Emergency Information							
Host: <All> X							
Active	Host	Process ^	Description	Process ID	Status	Start Time	Elapsed Time
	soldsm231	hdbcompilesrver	HDB Compilesrver	29598	Running	Sep 15, 2019 11:09:28 PM	0:19:14
	soldsm231	hdbdaemon	HDB Daemon	28998	Running	Sep 15, 2019 11:08:57 PM	0:19:45
	soldsm231	hdbindexserver	HDB Indexserver-C31	31935	Running	Sep 15, 2019 11:21:34 PM	0:07:08
	soldsm231	hdbnameserver	HDB Nameserver	29017	Running	Sep 15, 2019 11:08:57 PM	0:19:45
	soldsm231	hdbpreprocessor	HDB Preprocessor	29601	Running	Sep 15, 2019 11:09:28 PM	0:19:14
	soldsm231	hdbwebdispatcher	HDB Web Dispatcher	29648	Running	Sep 15, 2019 11:09:29 PM	0:19:13
	soldsm231	hdbxsengine	HDB XSEngine-C31	32071	Running	Sep 15, 2019 11:21:53 PM	0:06:49

Note, there is no process for C32 running, this tenant still needs to be recovered

**Repeat the steps 14-25 to recover any other tenants.**

In our example, after recovering tenant C32, the process list looks like the following:

Processes   Diagnosis Files   Emergency Information							
Host: <All> X							
Active	Host	Process ^	Description	Process ID	Status	Start Time	Elapsed Time
	soldsm231	hdbcompilesrver	HDB Compilesrver	29598	Running	Sep 15, 2019 11:09:28 PM	0:28:34
	soldsm231	hdbdaemon	HDB Daemon	28998	Running	Sep 15, 2019 11:08:57 PM	0:29:05
	soldsm231	hdbindexserver	HDB Indexserver-C31	31935	Running	Sep 15, 2019 11:21:34 PM	0:16:28
	soldsm231	hdbindexserver	HDB Indexserver-C32	36538	Running	Sep 15, 2019 11:37:51 PM	0:00:11
	soldsm231	hdbnameserver	HDB Nameserver	29017	Running	Sep 15, 2019 11:08:57 PM	0:29:05
	soldsm231	hdbpreprocessor	HDB Preprocessor	29601	Running	Sep 15, 2019 11:09:28 PM	0:28:34
	soldsm231	hdbwebdispatcher	HDB Web Dispatcher	29648	Running	Sep 15, 2019 11:09:29 PM	0:28:33
	soldsm231	hdbxsengine	HDB XSEngine-C31	32071	Running	Sep 15, 2019 11:21:53 PM	0:16:09

A process listing can also be retrieved form the command line when logged in as the <sid>adm user.

```
> /usr/sap/hostctrl/exe/sapcontrol -nr 00 -function GetProcessList
```

```
15.09.2019 23:51:43
```

```
GetProcessList
```

```
OK
```

```
name, description, dispstatus, textstatus, starttime, elapsedtime, pid
```

```
hdbdaemon, HDB Daemon, GREEN, Running, 2019 09 15 23:08:57, 0:42:46, 28998
```

```
hdbcompilesrver, HDB Compilesrver, GREEN, Running, 2019 09 15 23:09:28, 0:42:15, 29598
```

```
hdbindexserver, HDB Indexserver-C31, GREEN, Running, 2019 09 15 23:21:34, 0:30:09, 31935
```

```
hdbindexserver, HDB Indexserver-C32, GREEN, Running, 2019 09 15 23:37:51, 0:13:52, 36538
```

```
hdbnameserver, HDB Nameserver, GREEN, Running, 2019 09 15 23:08:57, 0:42:46, 29017
```

```
hdbpreprocessor, HDB Preprocessor, GREEN, Running, 2019 09 15 23:09:28, 0:42:15, 29601
```

```
hdbwebdispatcher, HDB Web Dispatcher, GREEN, Running, 2019 09 15 23:09:29, 0:42:14,
```

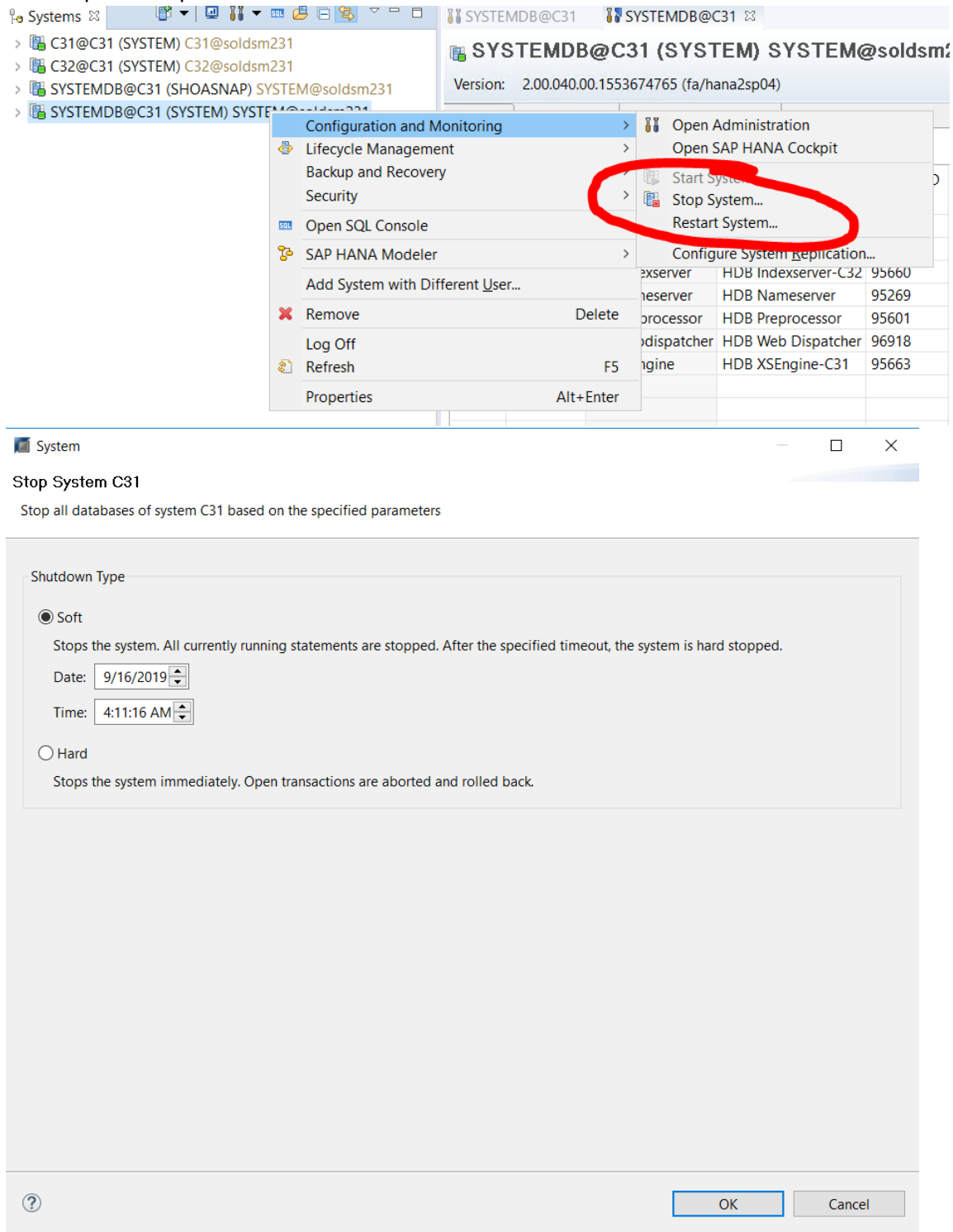
```
29648
```

```
hdbxsengine, HDB XSEngine-C31, GREEN, Running, 2019 09 15 23:21:53, 0:29:50, 32071
```

# Recover the database to a specific data (snapshot) backup

This process recovers the database to a specific snapshot only (i.e. no log replay).

1. First step is to stop the database



When this is finished, the Processes tab should display as follows:

Systems

- C31@C31 (SYSTEM) C31@soldsm231
- C32@C31 (SYSTEM) C32@soldsm231
- SYSTEMDB@C31 (SHOASNAP) SYSTEM@soldsm231
- SYSTEMDB@C31 (SYSTEM) SYSTEM@soldsm231

SYSTEMDB@C31 (SYSTEM) SYSTEM@soldsm231 10.90.0.31 00

Version: 2.00.040.00.1553674765 (fa/hana2sp04)

Processes | Diagnosis Files | Emergency Information

Host: <All>

Active	Host	Process	Description	Process ID	Status	Start Time	Elapsed Time
	soldsm231	hdbdaemon	HDB Daemon	75575	Stopped		

2. Start the recovery process from the menu.

SYSTEMDB@C31 (SYSTEM) SYSTEM@soldsm231

Configuration and Monitoring

Lifecycle Management

Backup and Recovery

Security

Open SQL Console

SAP HANA Modeler

Add System with Different User...

Remove

Log Off

Refresh

Properties

Open Backup Console

Back Up System Database...

Back Up Tenant Database...

Recover System Database...

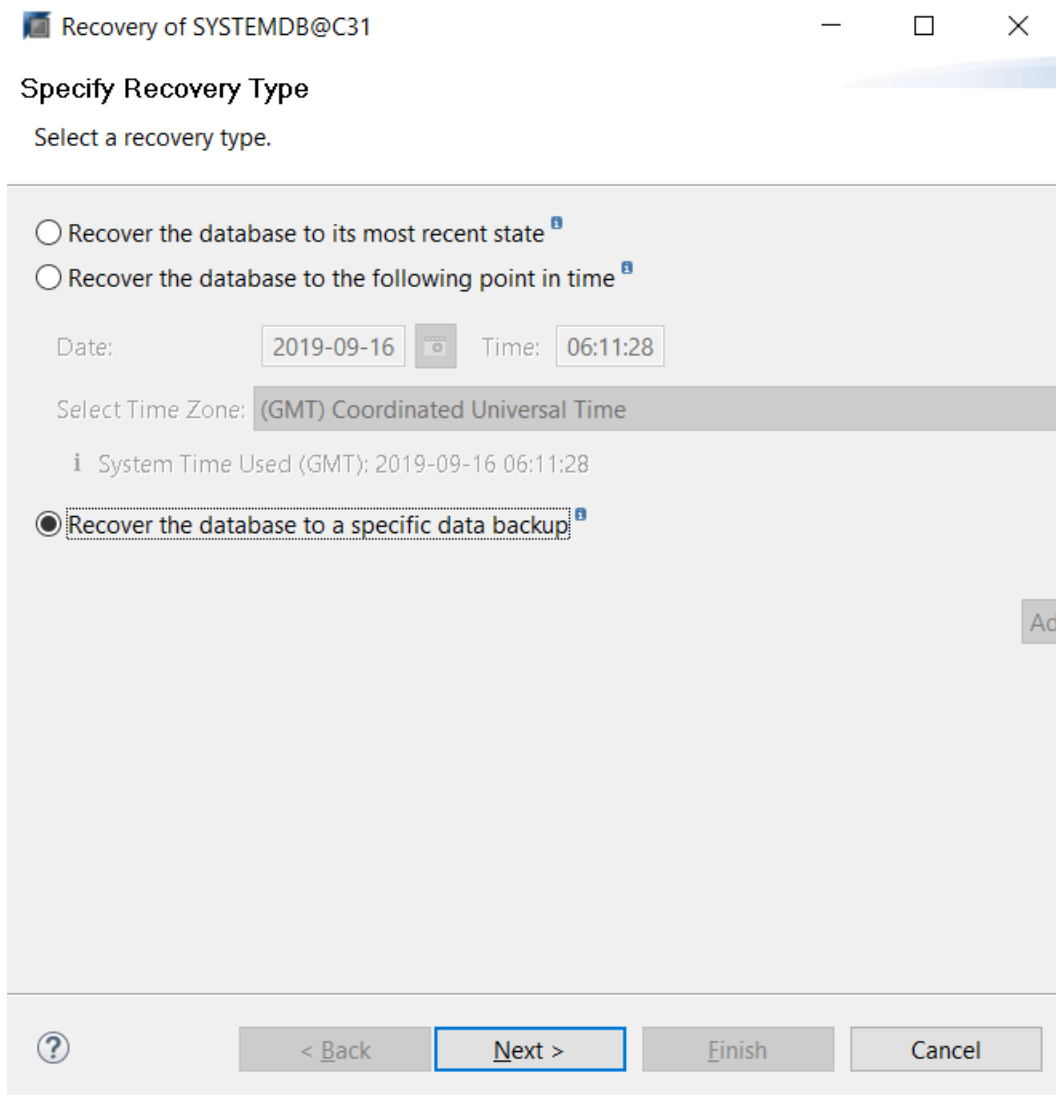
Recover Tenant Database...

Note, the recovery wizard can take several seconds to launch (see the following status)

SYSTEMDB@C31 (SYSTEM) SYSTEM@soldsm231

Prepare Recovery Wizard: (83%)

- Choose the recovery type, in this case “Recover the database to a specific data backup”.



Recovery of SYSTEMDB@C31

### 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: 2019-09-16 Time: 06:11:28

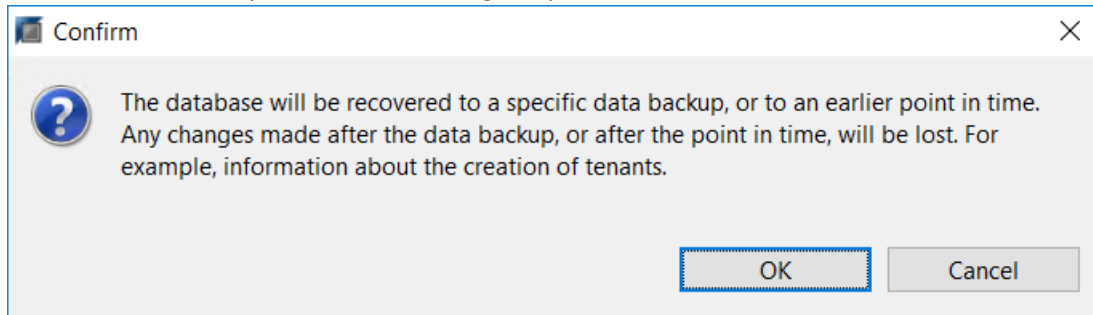
Select Time Zone: (GMT) Coordinated Universal Time

i System Time Used (GMT): 2019-09-16 06:11:28

☒ Recover the database to a specific data backup

? < Back Next > Finish Cancel

- Confirm the recovery to continue, noting the potential for lost data.



Confirm

? The database will be recovered to a specific data backup, or to an earlier point in time. Any changes made after the data backup, or after the point in time, will be lost. For example, information about the creation of tenants.

OK Cancel



5. As there will be no log replay, continue to “Recover without the backup catalog”.

Recovery of SYSTEMDB@C31

### 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:

☒ Recover without the backup catalog

Backint System Copy

☐ Backint System Copy

Source System:



6. Specify the Backup to Recover, Destination Type = Snapshot.

Recovery of SYSTEMDB@C31

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/C31

Backup Prefix:

?

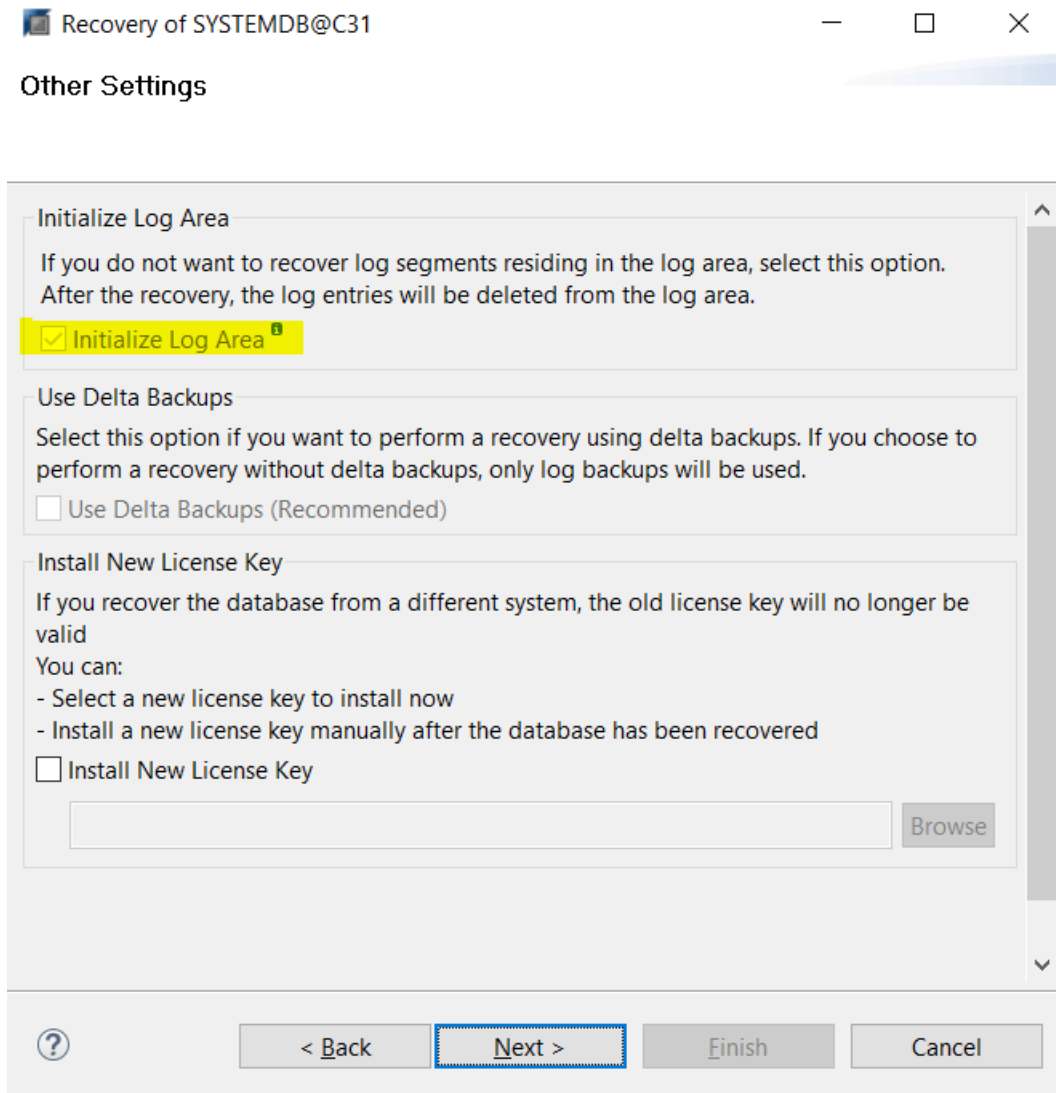
< Back

Next >

Finish

Cancel

7. Note this restore method will Initialize Log Area. Check any appropriate “Other Settings”, the following screen is the defaults



8. Restore the snapshot files to the data area. In this example, the files can be copied from the “hidden” snapshot location in the filesystem

```
# su - c31adm
```

```
> cp -pr /hana/data/C31/mnt00001/.snapshot/hana_hourly.2019-09-15_2100.2/* \
/hana/data/C31/mnt00001/.
```

9. On the summary page, review any final details. **Make sure you have copied/restored the snapshot files to the data area**, if the copy has completed then press Finish to restore the system database.

Recovery of SYSTEMDB@C31

### 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@C31
Host:	10.90.0.31
Version:	2.00.040.00.1553674765

#### 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

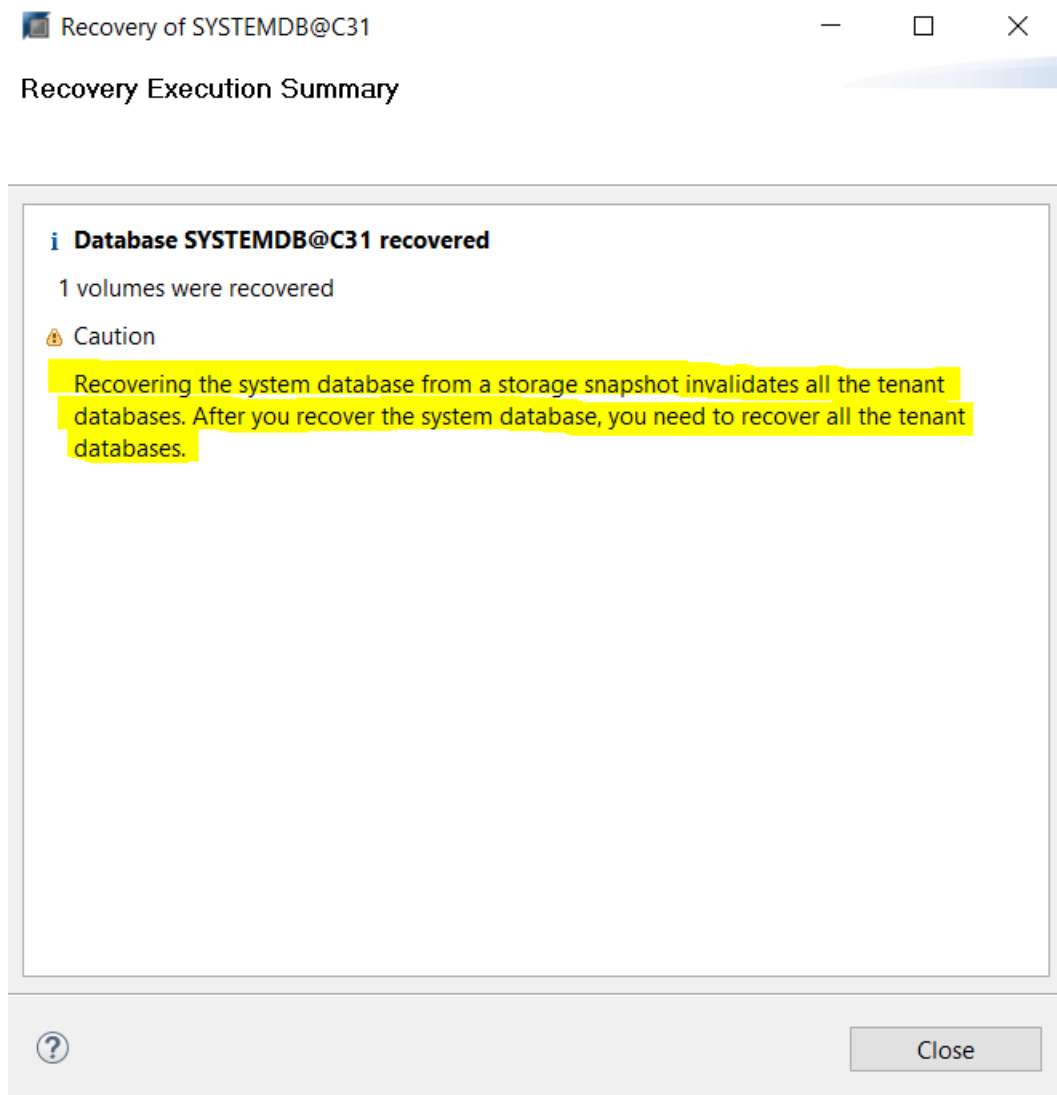
**Caution**

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

Show SQL Statement

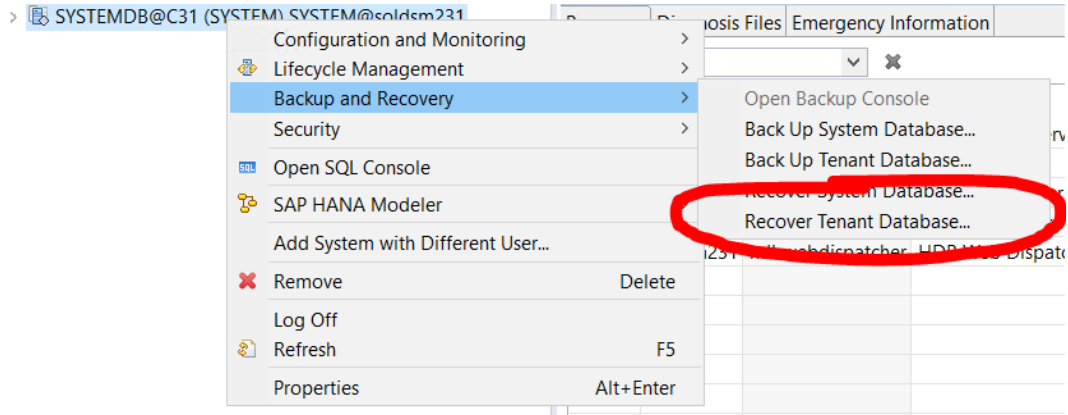
? < Back Next > Finish Cancel

10. When the recovery has finished a Recovery Execution Summary provides details of the recovery. The following screen shows a completed recovery of the SYSTEMDB.



**!** Note the message stating “recovering the system database from a storage snapshot invalidates all the tenant databases”. Tenant databases must now be recovered.

## 11. Start the recovery of the Tenant database



12. Choose the Tenant to recover from. At the time of writing, only a single tenant database is supported by SAP to recover from.

Recovery of Tenant Database in C31

Specify tenant database

filter text

☒ C31

☐ C32

?

< Back

Next >

Finish

Cancel

13. Choose to recover the tenant database to a specific data backup.

Recovery of Tenant Database in C31

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: 2019-09-16 Time: 06:37:43

Select Time Zone: (GMT) Coordinated Universal Time

System Time Used (GMT): 2019-09-16 06:37:43

☒ Recover the database to a specific data backup

Ad

?

< Back

Next >

Finish

Cancel



14. As there will be no log replay, continue to “Recover without the backup catalog”.

Recovery of Tenant Database in C31

— □ ×

## 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:

☒ Recover without the backup catalog

Backint System Copy

☐ Backint System Copy

Source System:

?

< Back

Next >

Finish

Cancel

15. Specify the Backup to Recover, Destination Type = Snapshot.

Recovery of Tenant Database in C31

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/C31/SYS/global/hdb/backint/DB\_C31

Backup Prefix:

?

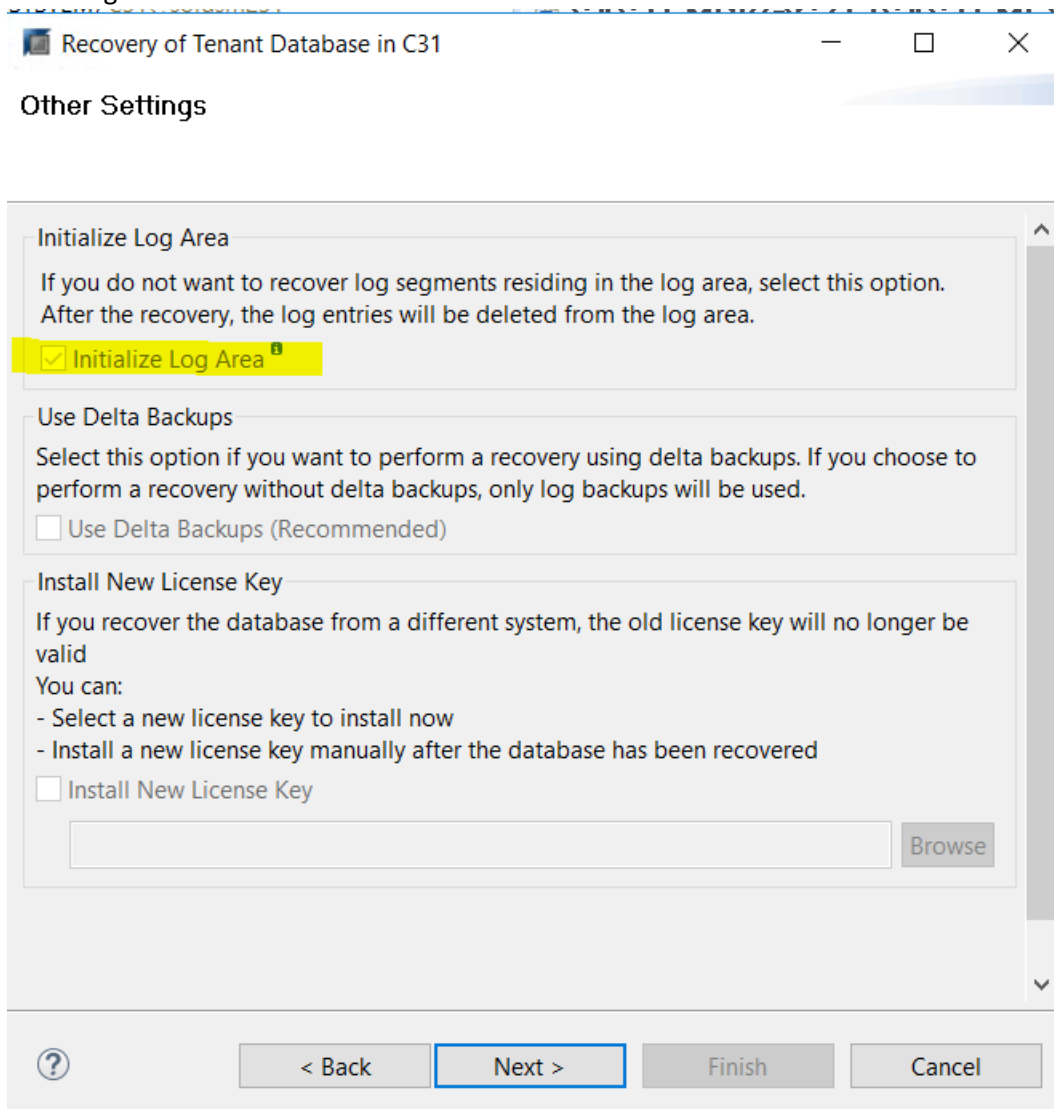
< Back

Next >

Finish

Cancel

16. Note this restore method will Initialize Log Area. Check any appropriate “Other Settings”, the following screen is the defaults



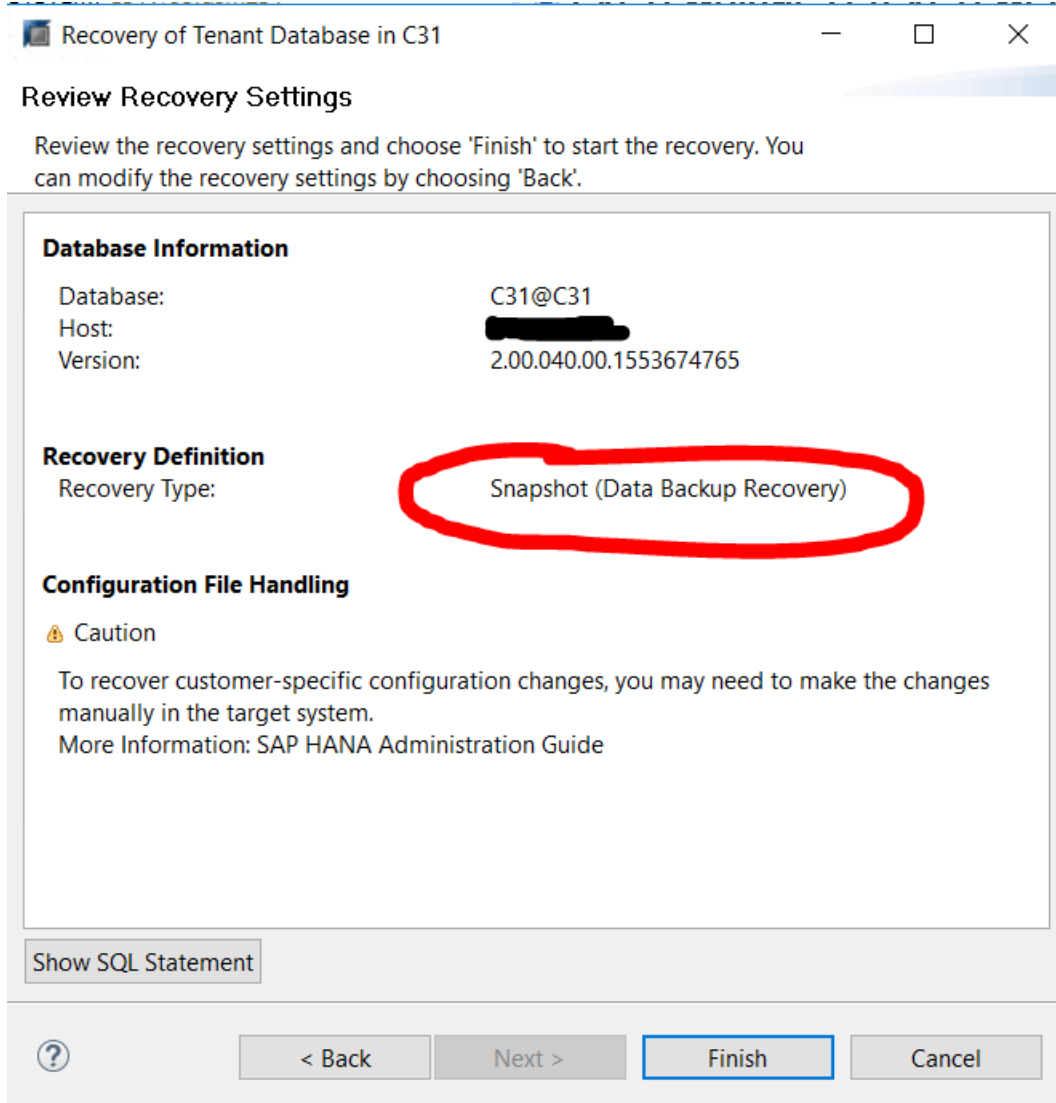
The screenshot shows a window titled "Recovery of Tenant Database in C31" with standard Windows window controls (minimize, maximize, close). Below the title bar is a section labeled "Other Settings".

Inside the "Other Settings" section, there are three main options:

- Initialize Log Area**: A text box explaining that if you do not want to recover log segments residing in the log area, you should select this option. After recovery, log entries will be deleted from the log area. Below this text is a checkbox labeled "Initialize Log Area" which is checked and highlighted with a yellow background.
- Use Delta Backups**: A text box explaining that this option is for performing a recovery using delta backups. If you choose to perform a recovery without delta backups, only log backups will be used. Below this text is a checkbox labeled "Use Delta Backups (Recommended)" which is unchecked.
- Install New License Key**: A text box explaining that if you recover the database from a different system, the old license key will no longer be valid. It lists two options: "Select a new license key to install now" and "Install a new license key manually after the database has been recovered". Below this text is a checkbox labeled "Install New License Key" which is unchecked. To the right of the checkbox is a text input field and a "Browse" button.

At the bottom of the window, there is a navigation bar with a help icon (question mark) on the left and four buttons: "< Back", "Next >" (which is highlighted with a blue border), "Finish", and "Cancel".

17. There is no need to restore the snapshot files to the data area as this was done when recovering the system database.
18. On the summary page, review any final details and press Finish to restore the system database.



**Recovery of Tenant Database in C31**

**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:	C31@C31
Host:	[REDACTED]
Version:	2.00.040.00.1553674765

**Recovery Definition**

Recovery Type:	Snapshot (Data Backup Recovery)
----------------	---------------------------------

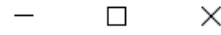
**Configuration File Handling**

 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

Show SQL Statement

Recovery of Tenant Database in C31



Data Recovery (Phase 1 of 3)

Recovery is running - 0 of 1 services finished successfully

**Host: soldsm231**

Index Server

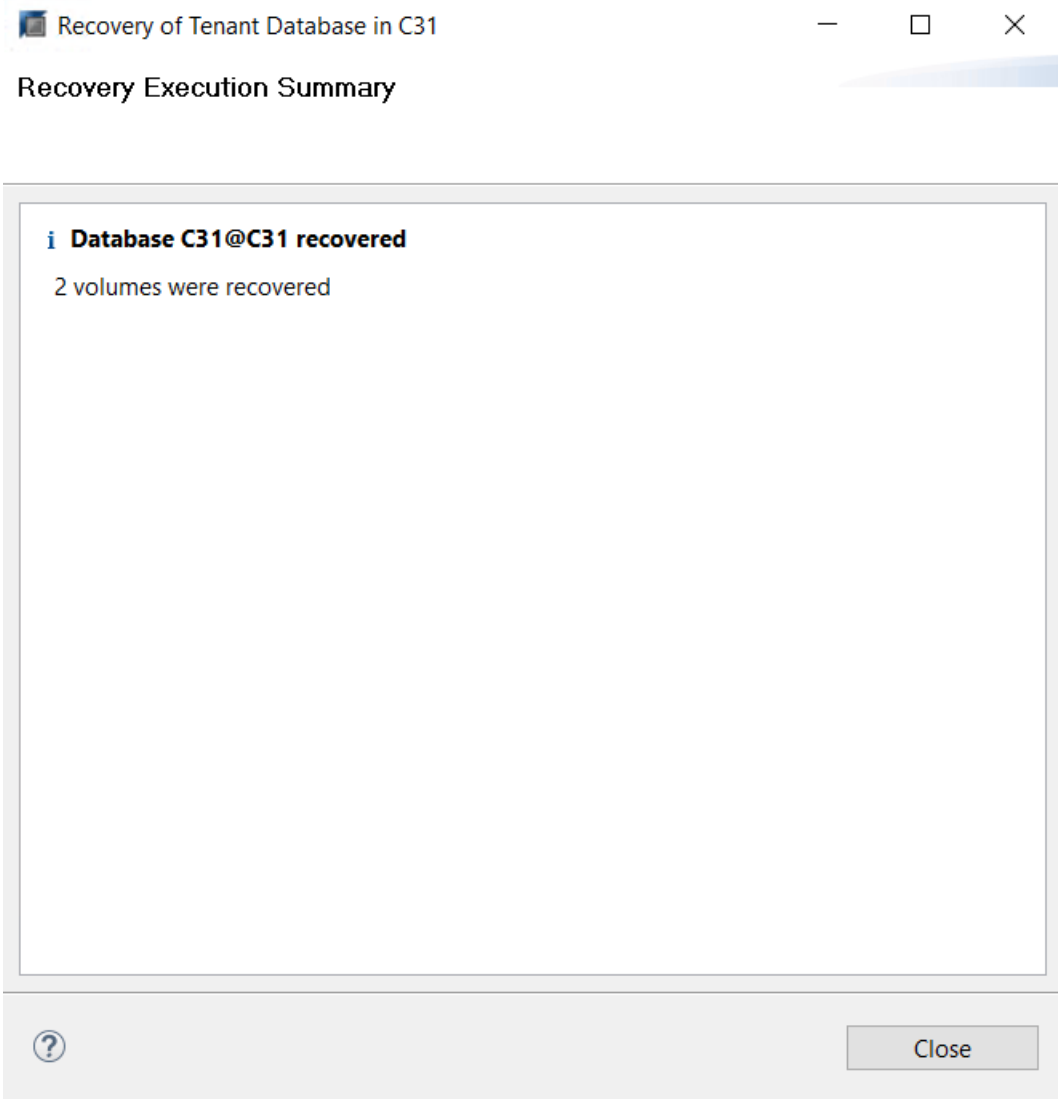
Calculating...

Cancel Recovery








?

Close

19. When the recovery has finished a Recovery Execution Summary provides details of the recovery. The following screen shows a completed recovery of the tenant database.











20. The following screenshot shows the database after recovery with some services running.

Processes   Diagnosis Files   Emergency Information							
Host: <All> X							
Active	Host	Process ^	Description	Process ID	Status	Start Time	Elapsed Time
	soldsm231	hdbcompilesrver	HDB Compilesrver	29598	Running	Sep 15, 2019 11:09:28 PM	0:19:14
	soldsm231	hdbdaemon	HDB Daemon	28998	Running	Sep 15, 2019 11:08:57 PM	0:19:45
	soldsm231	hdbindexserver	HDB Indexserver-C31	31935	Running	Sep 15, 2019 11:21:34 PM	0:07:08
	soldsm231	hdbnameserver	HDB Nameserver	29017	Running	Sep 15, 2019 11:08:57 PM	0:19:45
	soldsm231	hdbpreprocessor	HDB Preprocessor	29601	Running	Sep 15, 2019 11:09:28 PM	0:19:14
	soldsm231	hdbwebdispatcher	HDB Web Dispatcher	29648	Running	Sep 15, 2019 11:09:29 PM	0:19:13
	soldsm231	hdbxsengine	HDB XSEngine-C31	32071	Running	Sep 15, 2019 11:21:53 PM	0:06:49

Note, there is no process for C32 running, this tenant still needs to be recovered

**Repeat the steps 11-20 to recover any other tenants.**

In our example, after recovering tenant C32, the process list looks like the following:

Processes   Diagnosis Files   Emergency Information							
Host: <All> X							
Active	Host	Process ^	Description	Process ID	Status	Start Time	Elapsed Time
	soldsm231	hdbcompilesrver	HDB Compilesrver	29598	Running	Sep 15, 2019 11:09:28 PM	0:28:34
	soldsm231	hdbdaemon	HDB Daemon	28998	Running	Sep 15, 2019 11:08:57 PM	0:29:05
	soldsm231	hdbindexserver	HDB Indexserver-C31	31935	Running	Sep 15, 2019 11:21:34 PM	0:16:28
	soldsm231	hdbindexserver	HDB Indexserver-C32	36538	Running	Sep 15, 2019 11:37:51 PM	0:00:11
	soldsm231	hdbnameserver	HDB Nameserver	29017	Running	Sep 15, 2019 11:08:57 PM	0:29:05
	soldsm231	hdbpreprocessor	HDB Preprocessor	29601	Running	Sep 15, 2019 11:09:28 PM	0:28:34
	soldsm231	hdbwebdispatcher	HDB Web Dispatcher	29648	Running	Sep 15, 2019 11:09:29 PM	0:28:33
	soldsm231	hdbxsengine	HDB XSEngine-C31	32071	Running	Sep 15, 2019 11:21:53 PM	0:16:09

A process listing can also be retrieved form the command line when logged in as the <sid>adm user.

```
> /usr/sap/hostctrl/exe/sapcontrol -nr 00 -function GetProcessList
```

```
15.09.2019 23:51:43
```

```
GetProcessList
```

```
OK
```

```
name, description, dispstatus, textstatus, starttime, elapsedtime, pid
```

```
hdbdaemon, HDB Daemon, GREEN, Running, 2019 09 15 23:08:57, 0:42:46, 28998
```

```
hdbcompilesrver, HDB Compilesrver, GREEN, Running, 2019 09 15 23:09:28, 0:42:15, 29598
```

```
hdbindexserver, HDB Indexserver-C31, GREEN, Running, 2019 09 15 23:21:34, 0:30:09, 31935
```

```
hdbindexserver, HDB Indexserver-C32, GREEN, Running, 2019 09 15 23:37:51, 0:13:52, 36538
```

```
hdbnameserver, HDB Nameserver, GREEN, Running, 2019 09 15 23:08:57, 0:42:46, 29017
```

```
hdbpreprocessor, HDB Preprocessor, GREEN, Running, 2019 09 15 23:09:28, 0:42:15, 29601
```

```
hdbwebdispatcher, HDB Web Dispatcher, GREEN, Running, 2019 09 15 23:09:29, 0:42:14, 29648
```

```
hdbxsengine, HDB XSEngine-C31, GREEN, Running, 2019 09 15 23:21:53, 0:29:50, 32071
```

## Appendix – SAP HANA Data Volume locations

A detailed explanation of persistent data storage can be found in the “SAP HANA Administration Guide for SAP HANA Platform” - “[Persistent Data Storage in the SAP HANA Database](#)” section.

The following diagram is taken from the “[Data and Log Volumes](#)” sub-section. This shows the Directory Hierarchy for Persistent Data Storage (System with Multitenant Database Containers) for SAP HANA. Note the separation of System DB and Tenant DB files into logically grouped sub-directories. The volume names of tenant databases have a suffix to represent the database. For example, the indexserver volume for the first tenant database is hdb00002.00002, for the second database hdb00002.00003, and so on. For example, Tenant DB 1 data storage is grouped into both “hdb00002.00003” and “hdb00003.00003” sub-directories for the indexserver and xsengine respectively.

