



# 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 3.4 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 a SAP HANA 2.0 system.

**Disclaimer:** *This guide and the associated screenshots are taken from an SAP HANA v2.0 system recovery as set up in the Microsoft HANA Large Instances test environment. 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. In this example the SID is "T41".
- **HLI:** SAP HANA on Azure Large Instance Unit.

## Recover the database to its most recent state

1. First step is to stop the database

**System**

**Stop System T41**  
Stop all databases of system T41 based on the specified parameters

**Shutdown Type**

☒ **Soft**  
Stops the system. All currently running statements are stopped. After the specified timeout, the system is hard stopped.  
Date: 3/13/2019  
Time: 1:55:46 AM

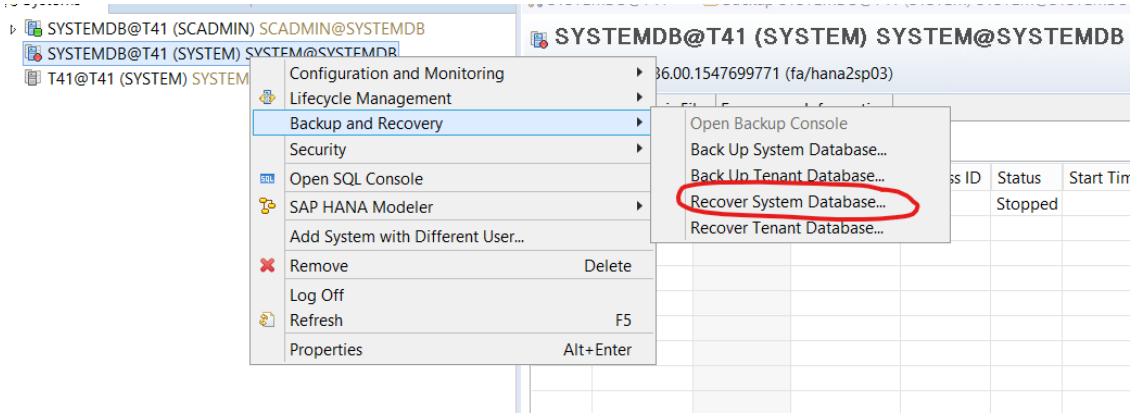
☐ **Hard**  
Stops the system immediately. Open transactions are aborted and rolled back.

? OK Cancel

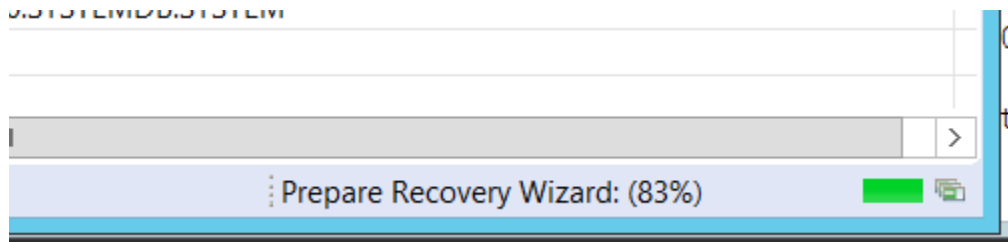
When this is finished, the Processes tab should display as follows:

[illegible]

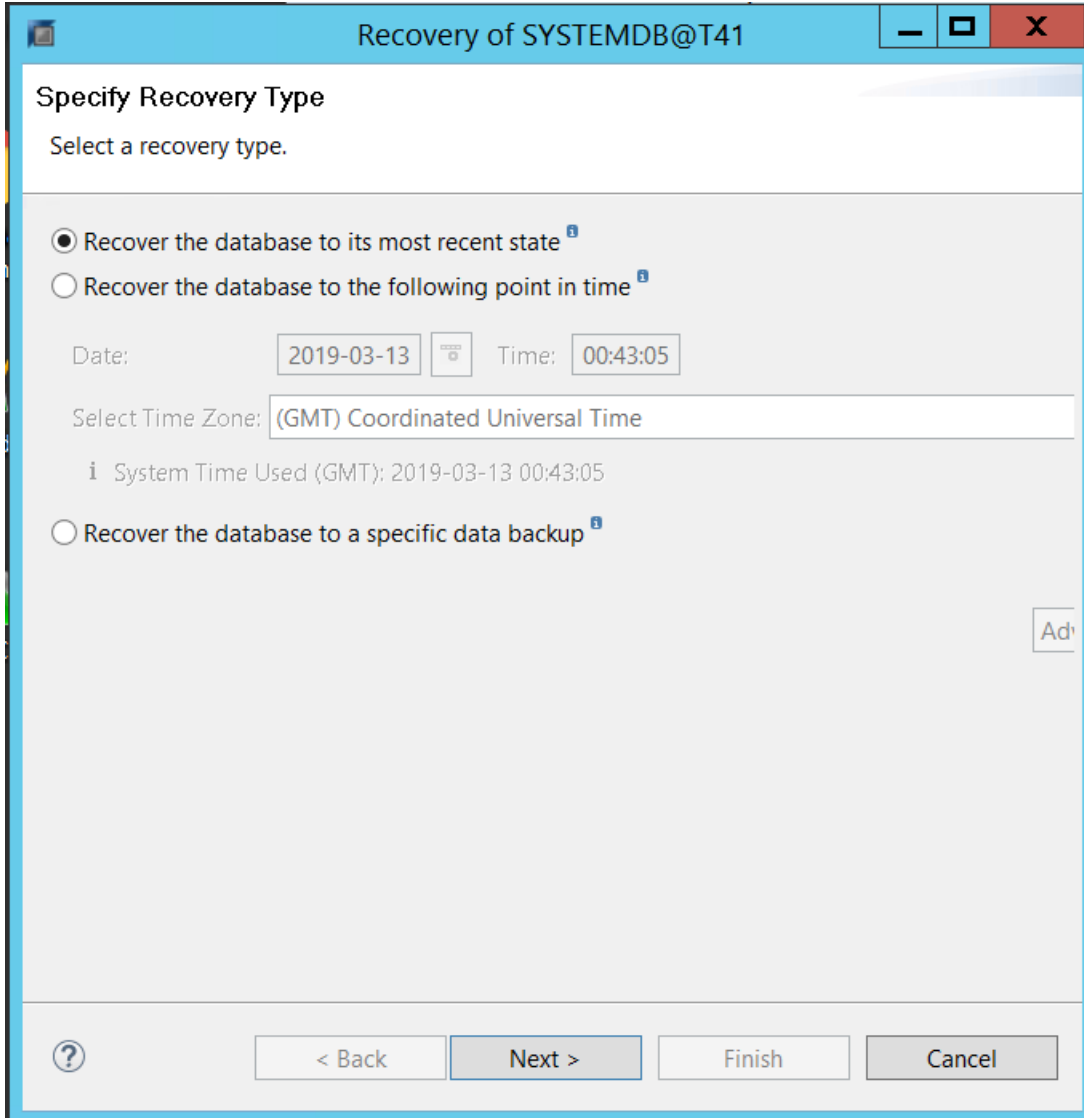
## 2. Start the recovery process from the menu.



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 its most recent state”



**Recovery of SYSTEMDB@T41**

**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: 2019-03-13 Time: 00:43:05

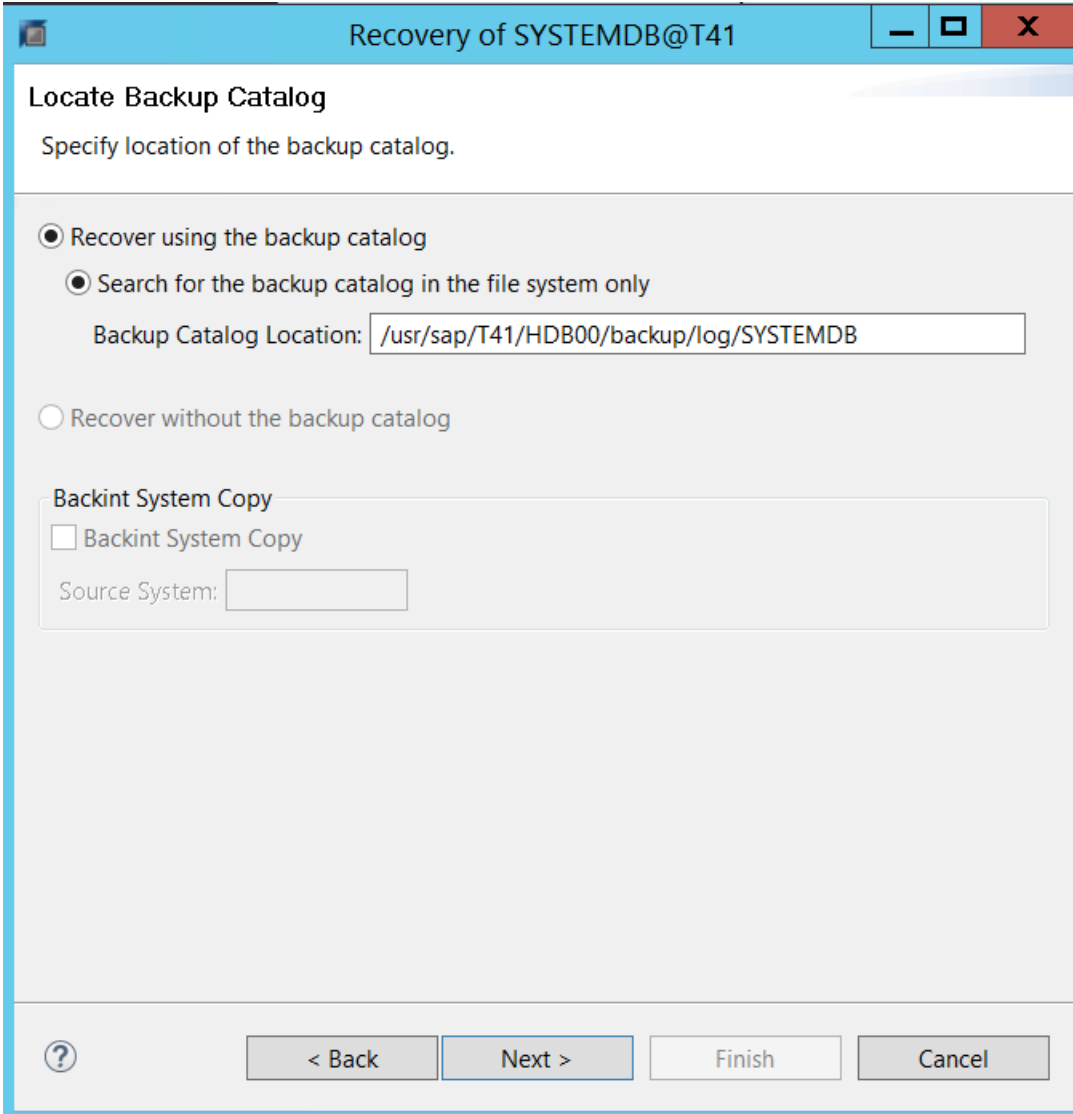
Select Time Zone: (GMT) Coordinated Universal Time

i System Time Used (GMT): 2019-03-13 00:43:05

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

? < Back Next > Finish Cancel

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



**Recovery of SYSTEMDB@T41**

**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:

? < Back Next > Finish Cancel



- 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@T41

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...	A...

Refresh

Show More

**Details of Selected Item**  
 Start Time:                      Destination Type:                      Source System: SYSTEMDB@T4  
 Size:                              Backup ID:                              External Backup ID:  
 Backup Name:  
 Alternative Location:

Check Availability

?

< Back

Next >

Finish

Cancel

6. 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@T41

-
□
X

### 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...	A...
2019-03-13 00:30...	/hana/data/T41	SNAPSHOT	✖
2019-03-12 22:26...	/hana/data/T41	SNAPSHOT	✖

Refresh Show More

#### Details of Selected Item

Start Time: i 2019-03-13 00:30:10 Destination Type: SNAPSHOT Source System: SYSTI

Size: 1.78 GB Backup ID: 1552437010 External Backup ID: S

Backup Name: ✖ /hana/data/T41

Alternative Location: i

Check Availability

?

< Back
Next >
Finish
Cancel

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

```
# su - t41adm
```

```
> cp -pr /hana/data/T41/mnt00001/.snapshot/daily_db_bkup.2019-03-13_0030.0/* \
/hana/data/T41/mnt00001/.
```

8. 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@T41

\_
□
X

### 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...	A...
2019-03-13 00:30...	/hana/data/T41	SNAPSHOT	✖
2019-03-12 22:26...	/hana/data/T41	SNAPSHOT	✖

Refresh
Show More

#### Details of Selected Item

Start Time: i 2019-03-13 00:30:10 Destination Type: SNAPSHOT Source System: SYSTI

Size: 1.78 GB Backup ID: 1552437010 External Backup ID: S

Backup Name: ✖ /hana/data/T41

Alternative Location: i

Check Availability

?

< Back
Next >
Finish
Cancel

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

Recovery of SYSTEMDB@T41

-
□
X

### 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...	A...
2019-03-13 00:30...	/hana/data/T41	SNAPSHOT	●
2019-03-12 22:26...	/hana/data/T41	SNAPSHOT	✗

Refresh
Show More

**Details of Selected Item**

Start Time: 2019-03-13 00:30:10 Destination Type: SNAPSHOT Source System: SYSTI

Size: 1.78 GB Backup ID: 1552437010 External Backup ID: S

Backup Name: /hana/data/T41

Alternative Location:

Check Availability

?
< Back
Next >
Finish
Cancel

10. Choose the location of the Log Backups.

Recovery of SYSTEMDB@T41

### Locate Log Backups

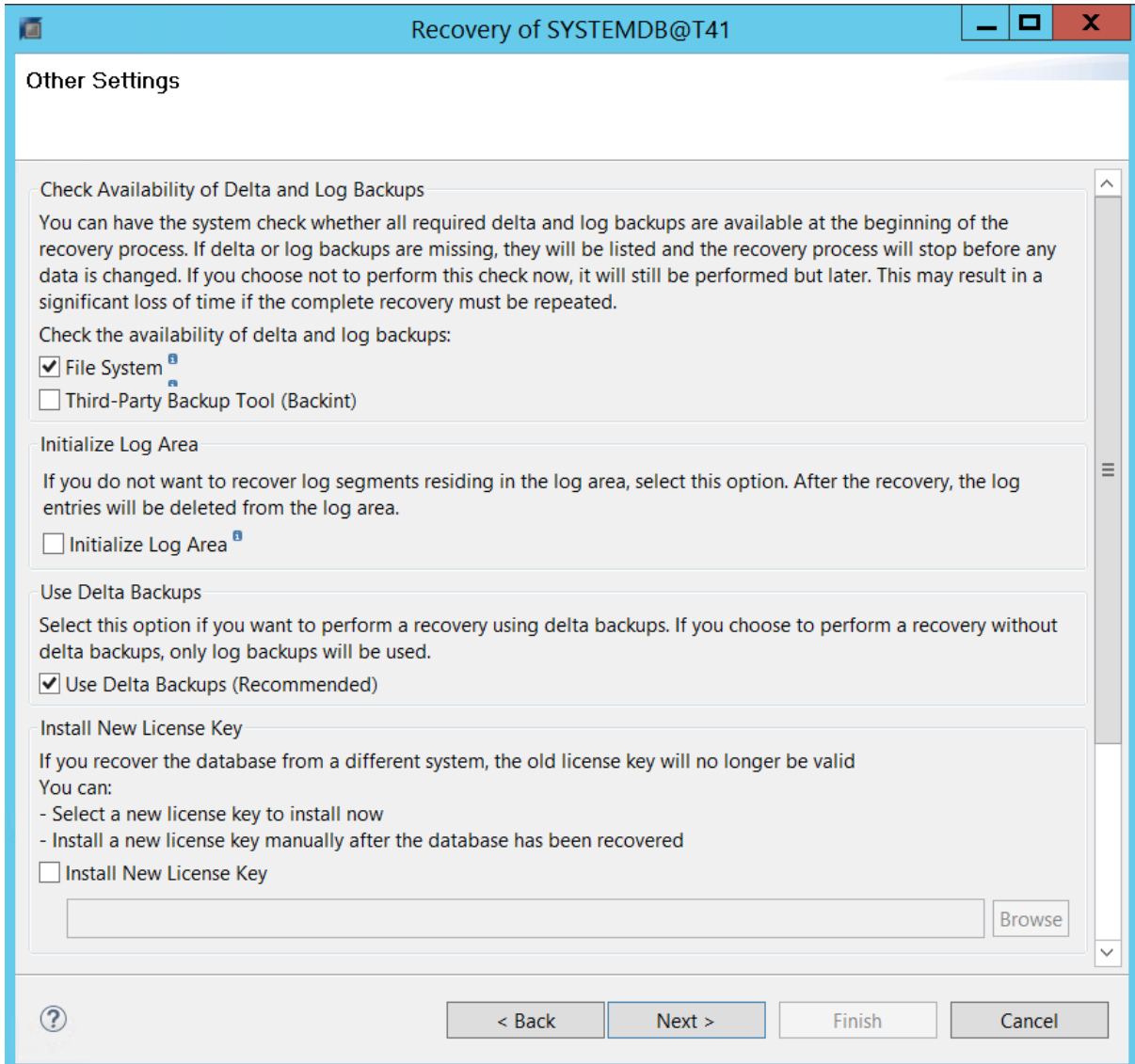
Specify location(s) of log backup files to be used to recover the database.

*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:

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



**Recovery of SYSTEMDB@T41**

### 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) <sup>?</sup>

**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

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

Recovery of SYSTEMDB@T41

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@T41  
Host: XXXXXXXXXX  
Version: 2.00.036.00.1547699771

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

?

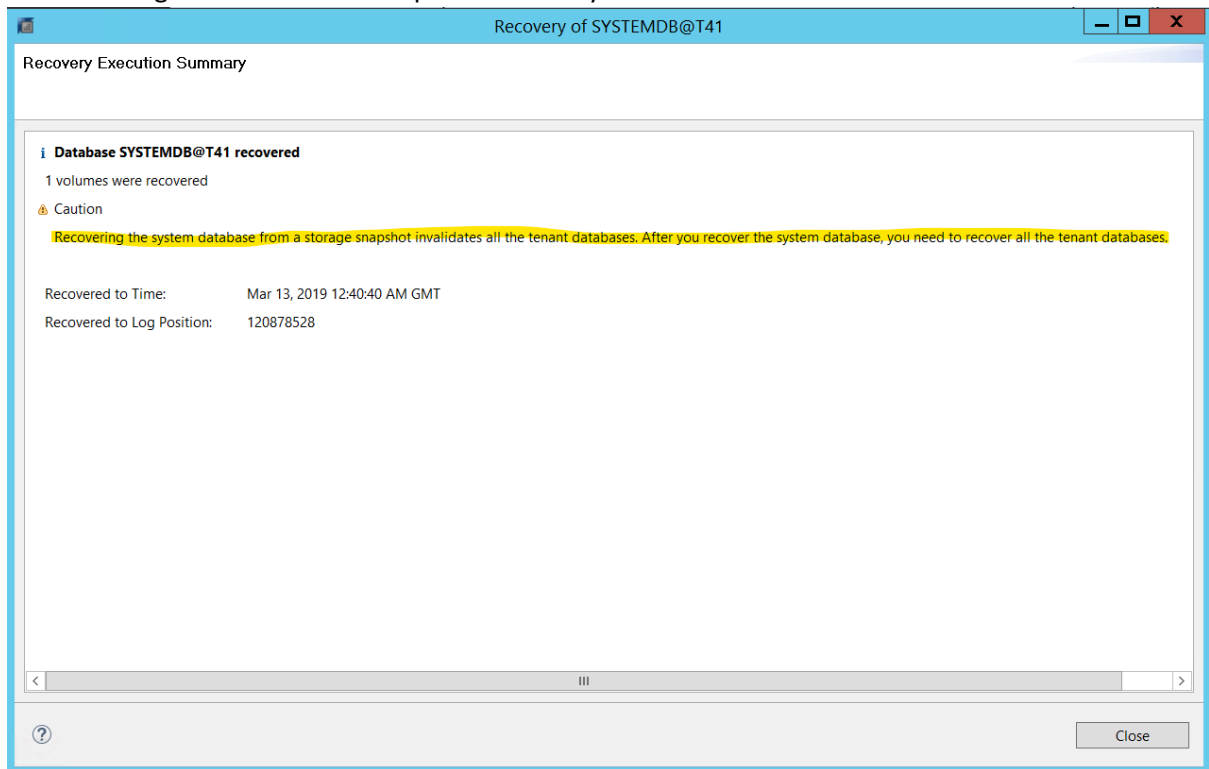
< Back

Next >

Finish

Cancel

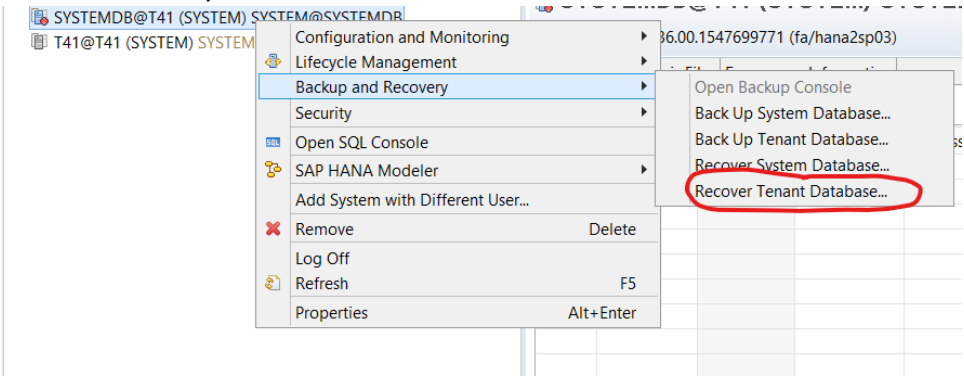
13. When the recovery has finished a Recovery Execution Summary provides details of the recovery. The following screen shows a completed recovery of the SYSTEMDB.



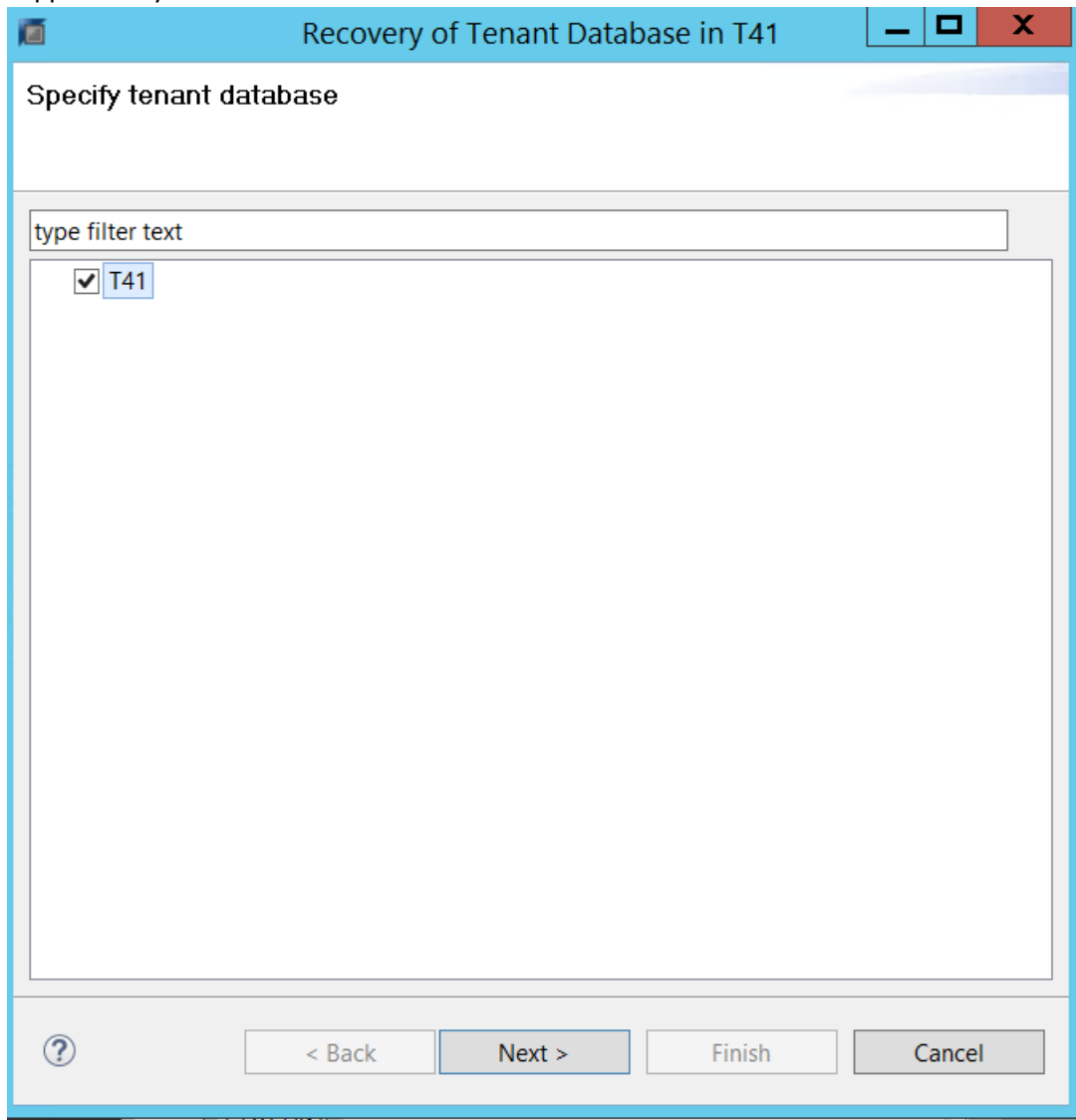
- ! The message stating a recovery from a storage snapshot invalidates all the tenant databases. Tenant databases now need to be recovered.



14. Start the recovery of the Tenant database



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



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

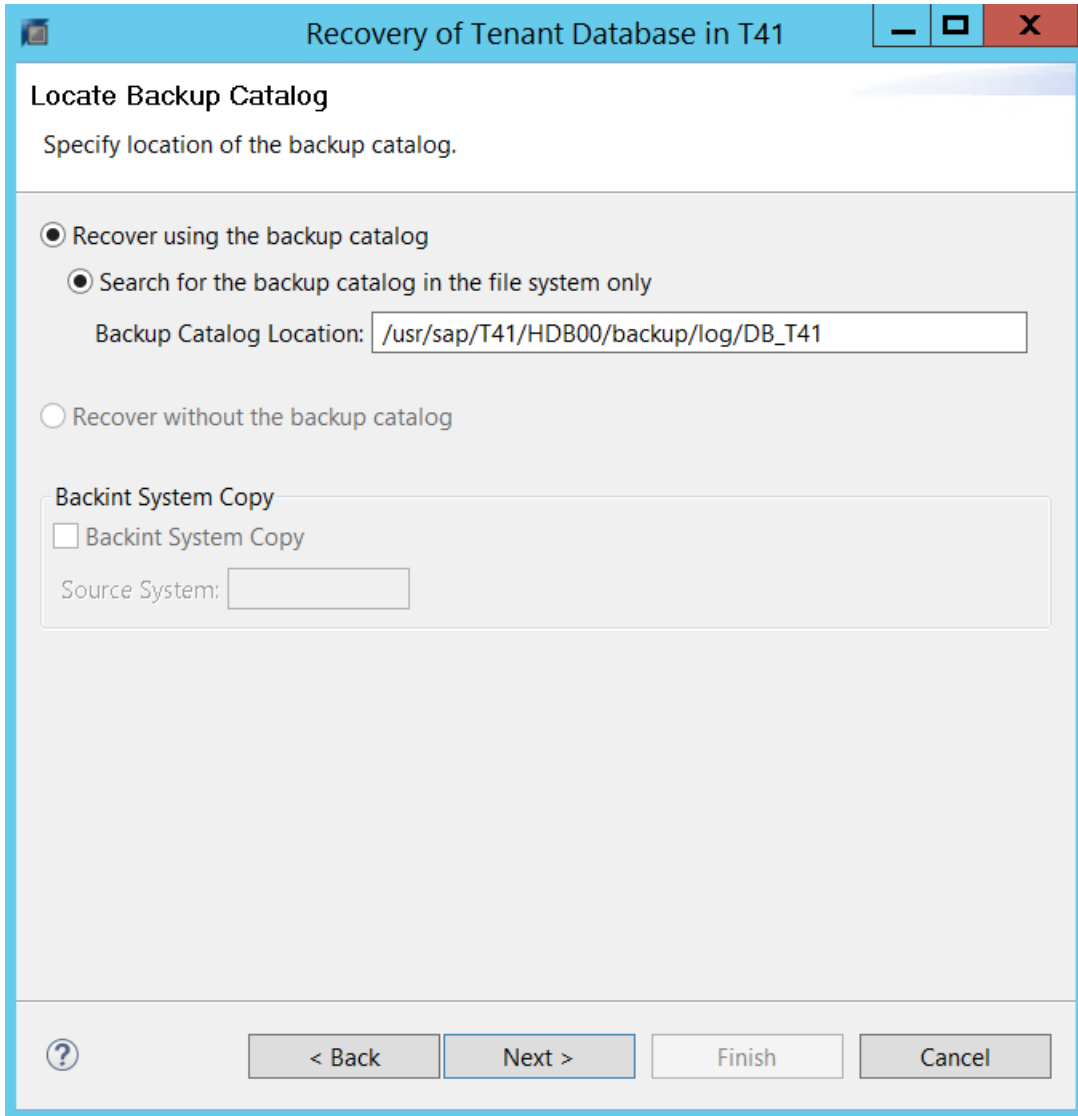
**Recovery of Tenant Database in T41**

**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): 2019-03-13 00:52:33  
☐ Recover the database to a specific data backup <sup>i</sup>  
 Ad...

? < Back Next > Finish Cancel

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



**Recovery of Tenant Database in T41**

**Locate Backup Catalog**  
Specify location of the backup catalog.

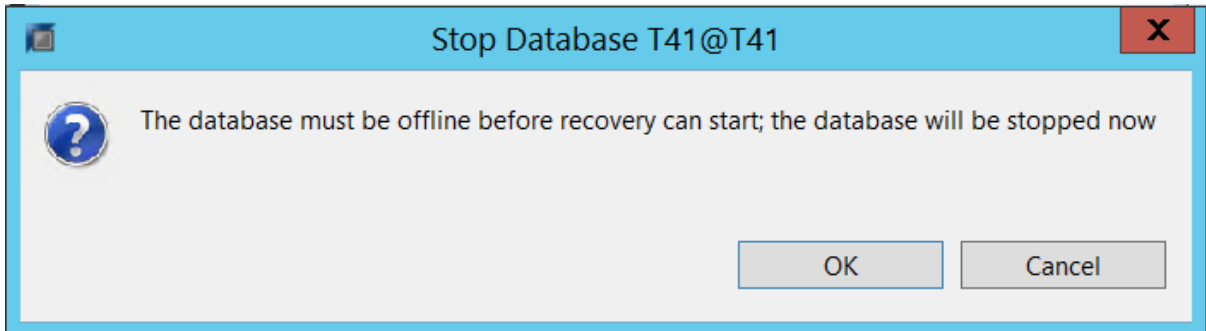
☒ Recover using the backup catalog  
☒ Search for the backup catalog in the file system only  
☐ Recover without the backup catalog

Backup Catalog Location:

**Backint System Copy**  
☐ Backint System Copy  
 Source System:

? < Back Next > Finish Cancel

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



**Stop Database T41@T41**

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

OK Cancel

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

Recovery of Tenant Database in T41

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...	A...

Refresh

Show More

Details of Selected Item

Start Time:

Destination Type:

Source System: T41@T41

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 T41

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...	A...
2019-03-13 00:30...	/hana/data/T41	SNAPSHOT	●
2019-03-12 22:26...	/hana/data/T41	SNAPSHOT	⊗

Refresh Show More

Details of Selected Item

Start Time:

2019-03-13 00:30:10

Destination Type:

SNAPSHOT

Source System:

T41@

Size:

2.20 GB

Backup ID:

1552437010

External Backup ID:

S

Backup Name:

/hana/data/T41

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 T41**

### 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

/usr/sap/T41/HDB00/backup/log/DB\_T41

Remove All

Remove



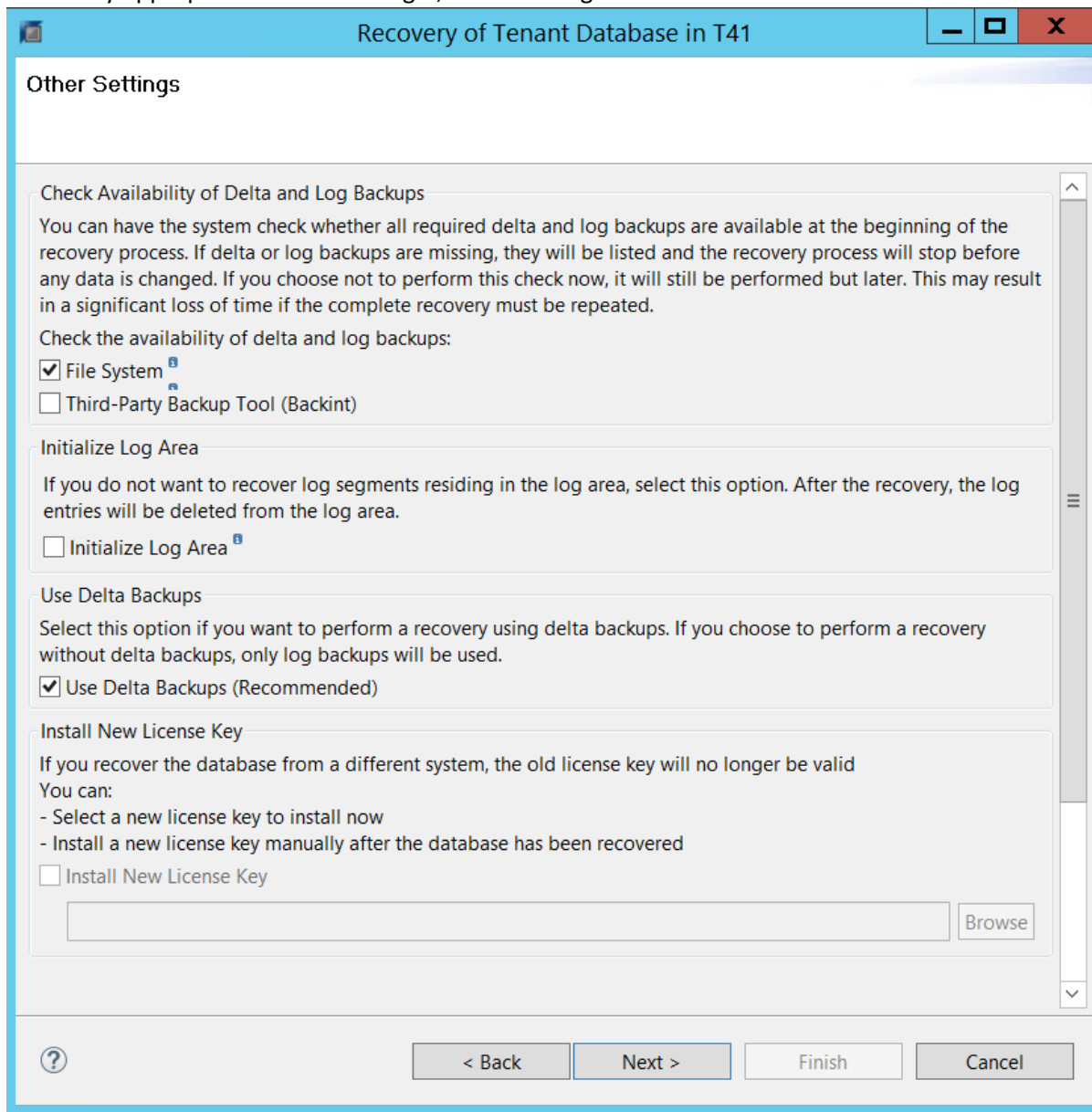
< Back

Next >

Finish

Cancel

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



**Recovery of Tenant Database in T41**

### 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



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 T41

### 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:	T41@T41
Host:	[REDACTED]
Version:	2.00.036.00.1547699771

#### Recovery Definition

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

#### Configuration File Handling

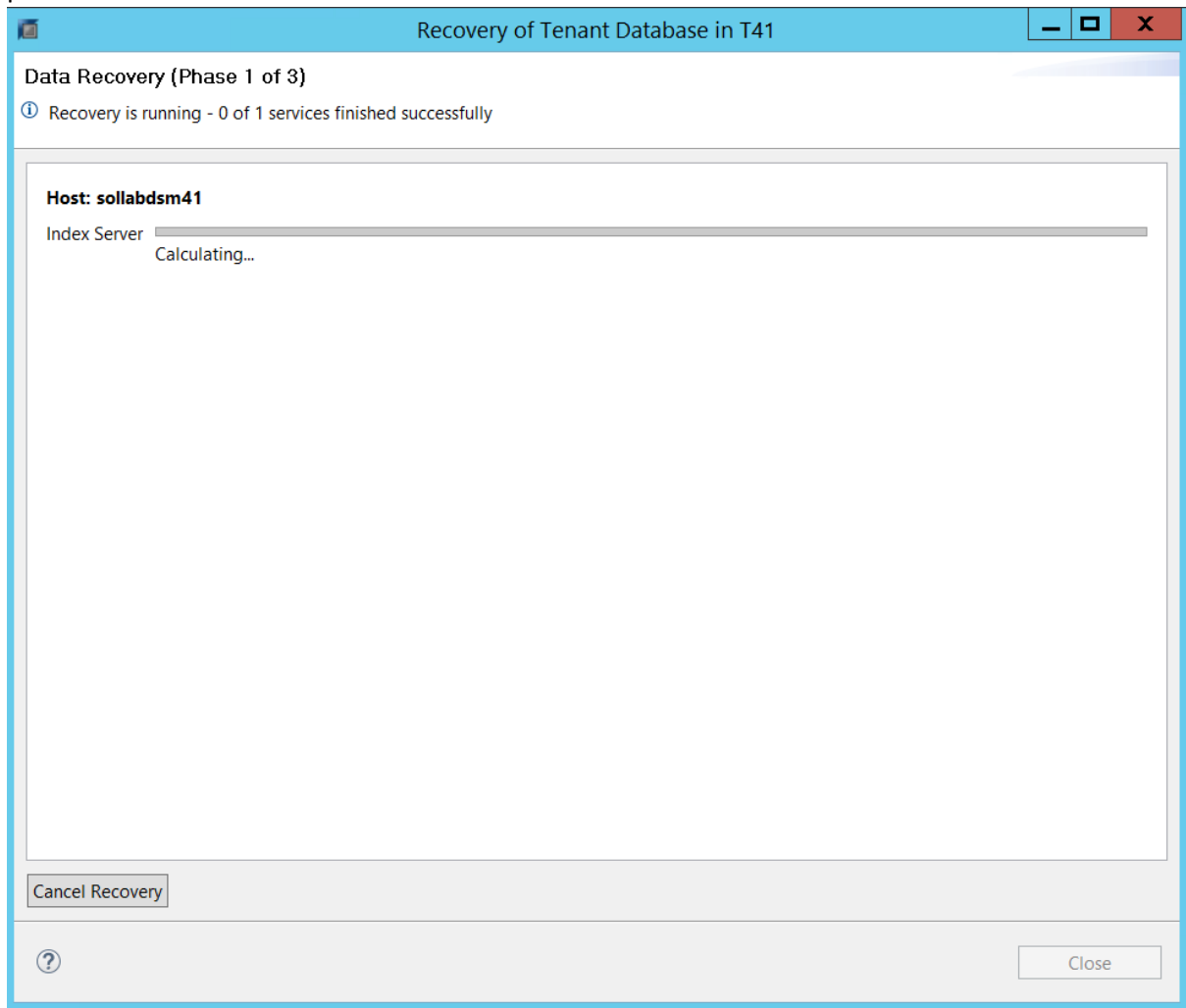
 Caution

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

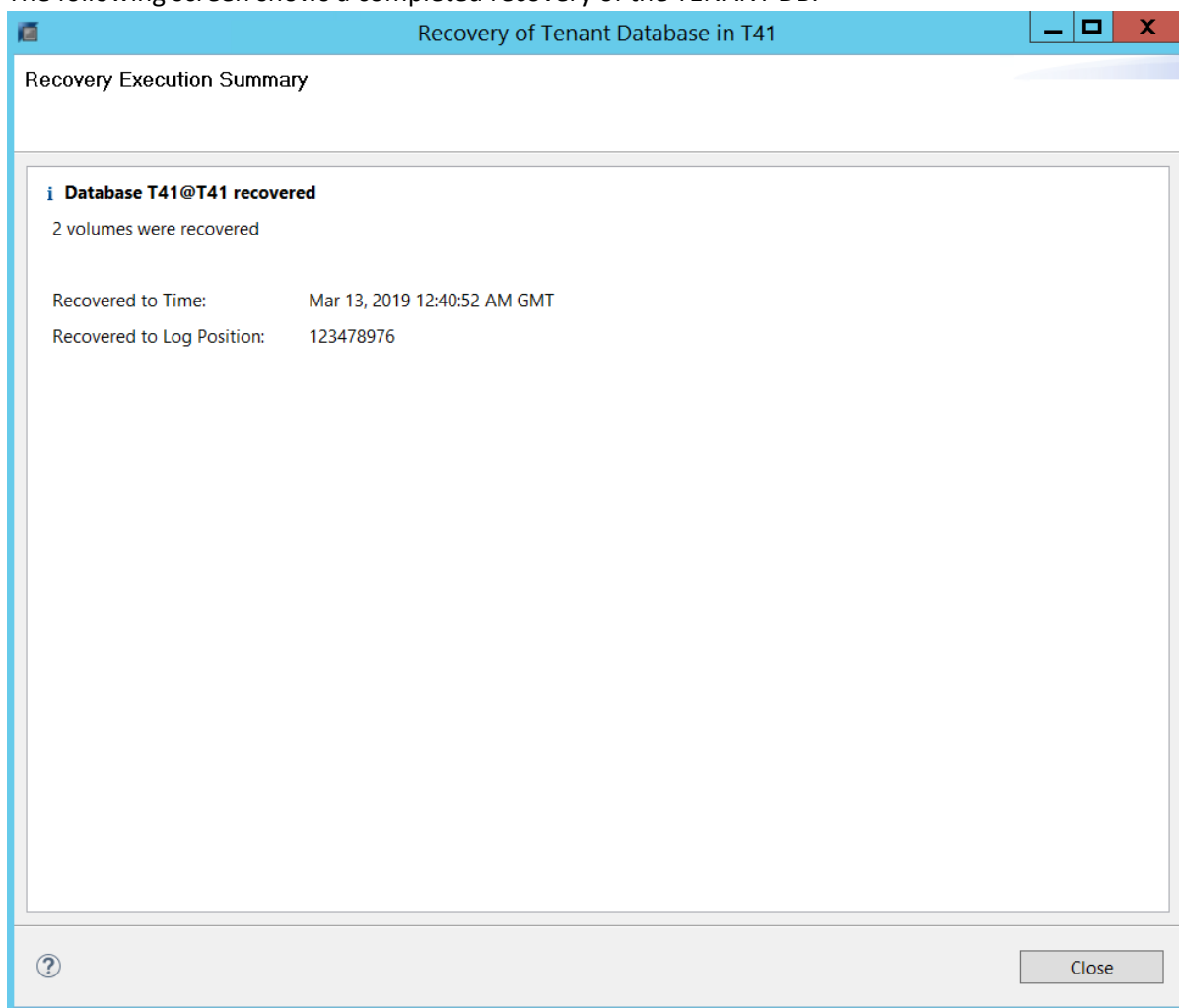
Show SQL Statement

?
< Back
Next >
Finish
Cancel







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.



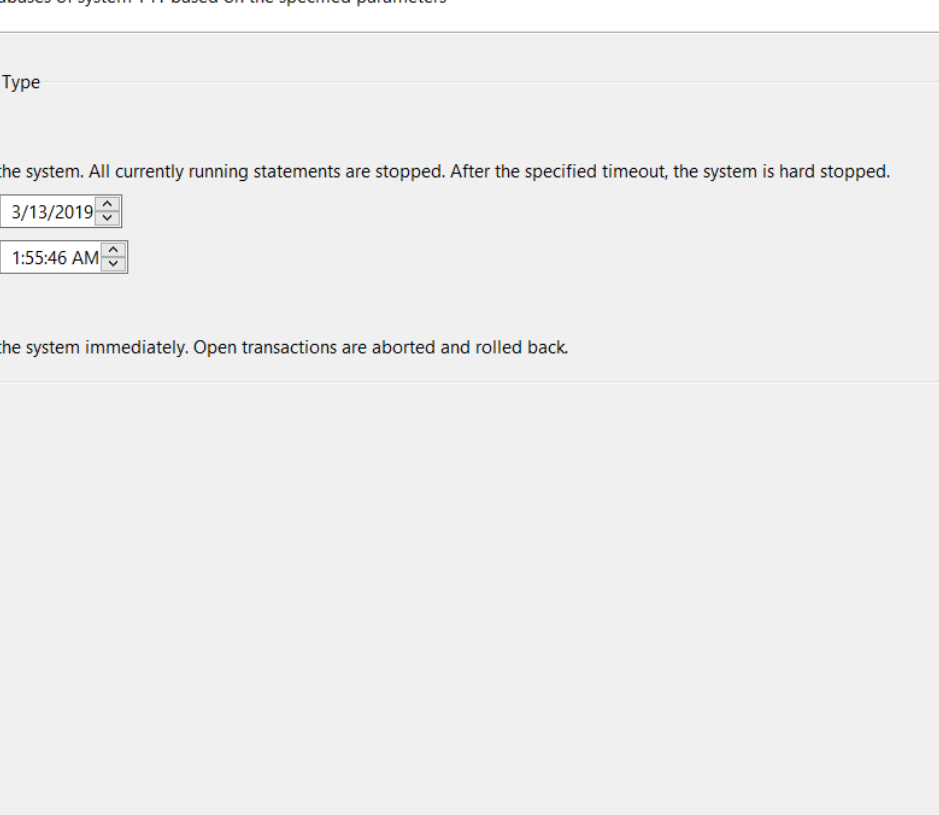
26. The following screenshot shows the database after recovery with all services running.

Overview   Landscape   Alerts   Performance   Volumes   Configuration   System Information   Diagnosis Files   Trace Configuration									
Services	Hosts	Redistribution	System Replication	Host: <All>	Service: <All>				
Active	Host	Port	Service	Detail	Start Time	Process ID	CPU	Memory	Used Memory (MB)
	sollabds41	30010	compileserv		Mar 13, 2019 12:49:28 AM	435137			1,507
	sollabds41	30000	daemon		Mar 4, 2019 9:50:16 PM				0
	sollabds41	30001	nameserv	master	Mar 13, 2019 12:49:03 AM	434689			4,617
	sollabds41	30002	preprocessor		Mar 13, 2019 12:49:28 AM	435139			1,723
	sollabds41		sapstartsv						
	sollabds41	30006	webdispatcher		Mar 13, 2019 12:49:30 AM	435184			1,756

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



**Stop System T41**

Stop all databases of system T41 based on the specified parameters

Shutdown Type

☒ Soft

Stops the system. All currently running statements are stopped. After the specified timeout, the system is hard stopped.

Date: 3/13/2019

Time: 1:55:46 AM

☐ Hard

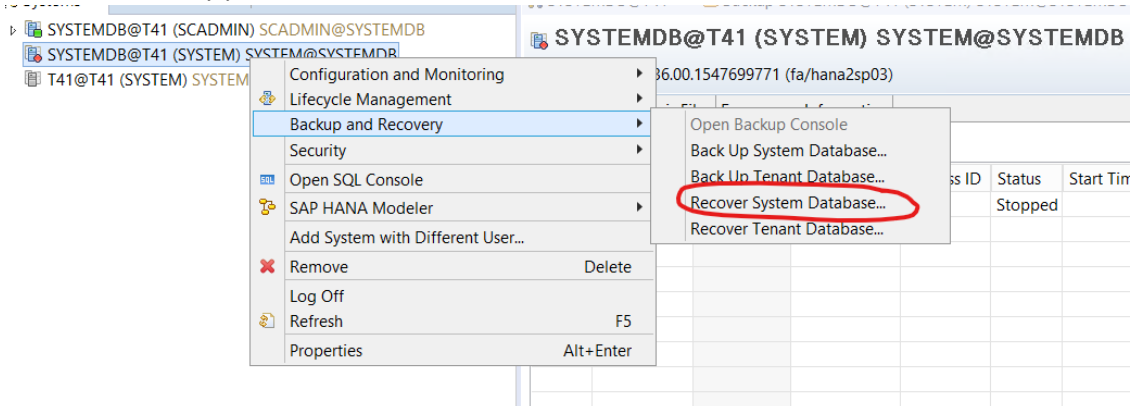
Stops the system immediately. Open transactions are aborted and rolled back.

OK Cancel

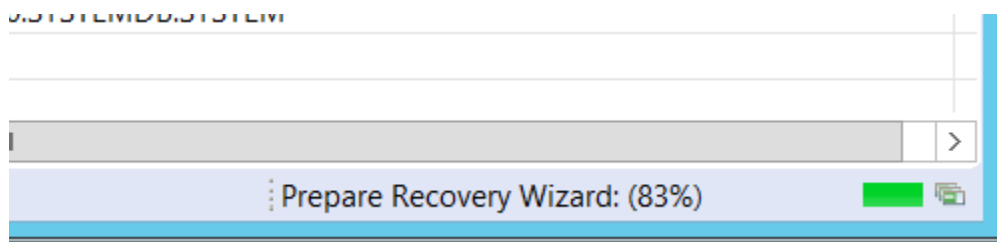
When this is finished, the Processes tab should display as follows:

[illegible]

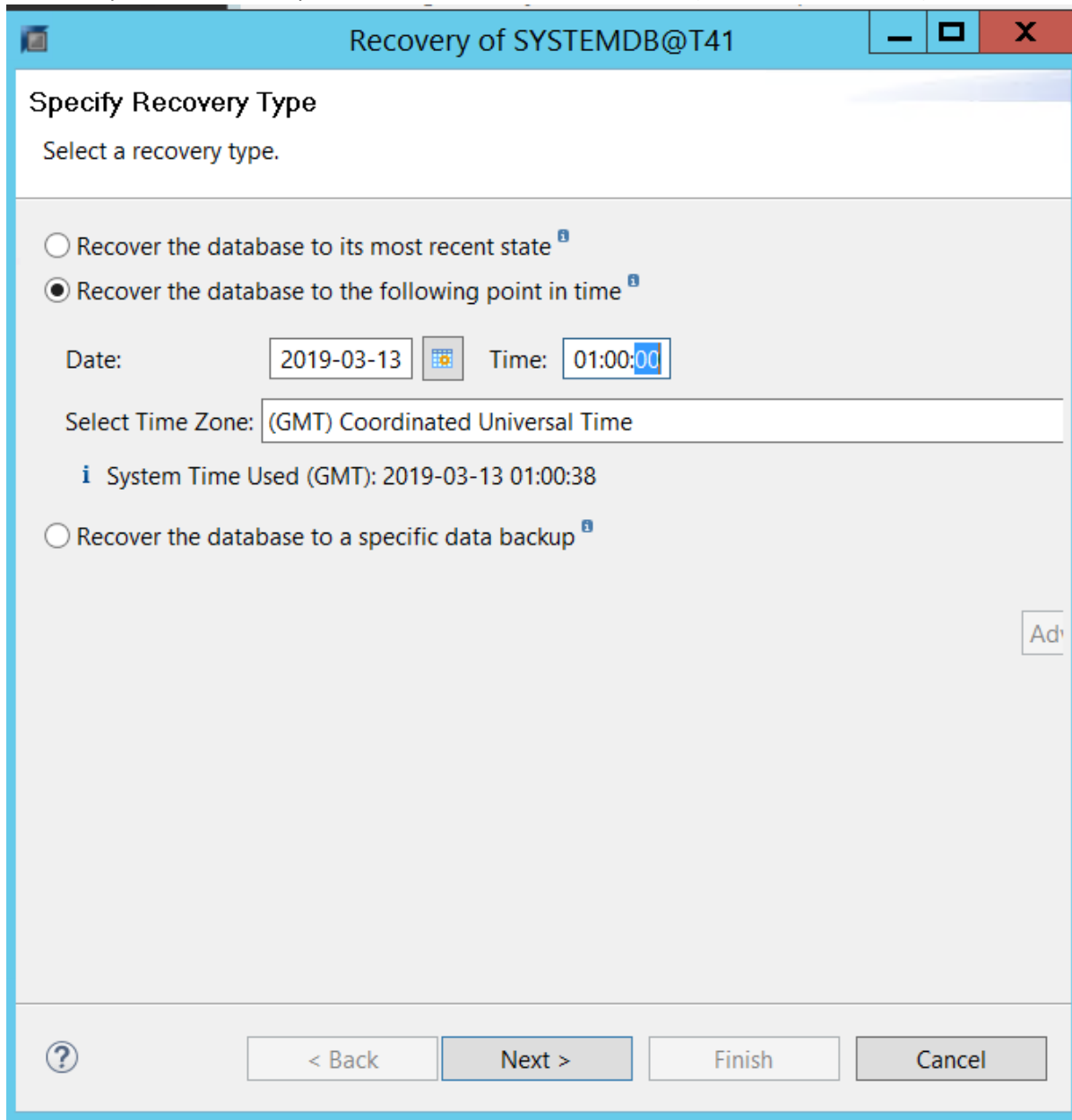
## 2. Start the recovery process from the menu.



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 13-March-2019 01:00:00 (in 24 hour UTC/GMT)




**Recovery of SYSTEMDB@T41**

**Specify Recovery Type**

Select a recovery type.

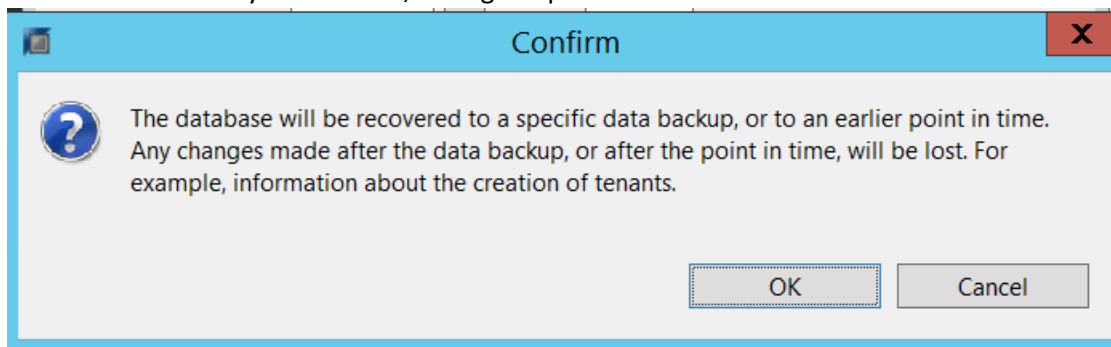
☐ Recover the database to its most recent state <sup>i</sup>  
☒ Recover the database to the following point in time <sup>i</sup>  
 Date:   Time:   
 Select Time Zone:   
 i System Time Used (GMT): 2019-03-13 01:00:38  
☐ Recover the database to a specific data backup <sup>i</sup>

Ad

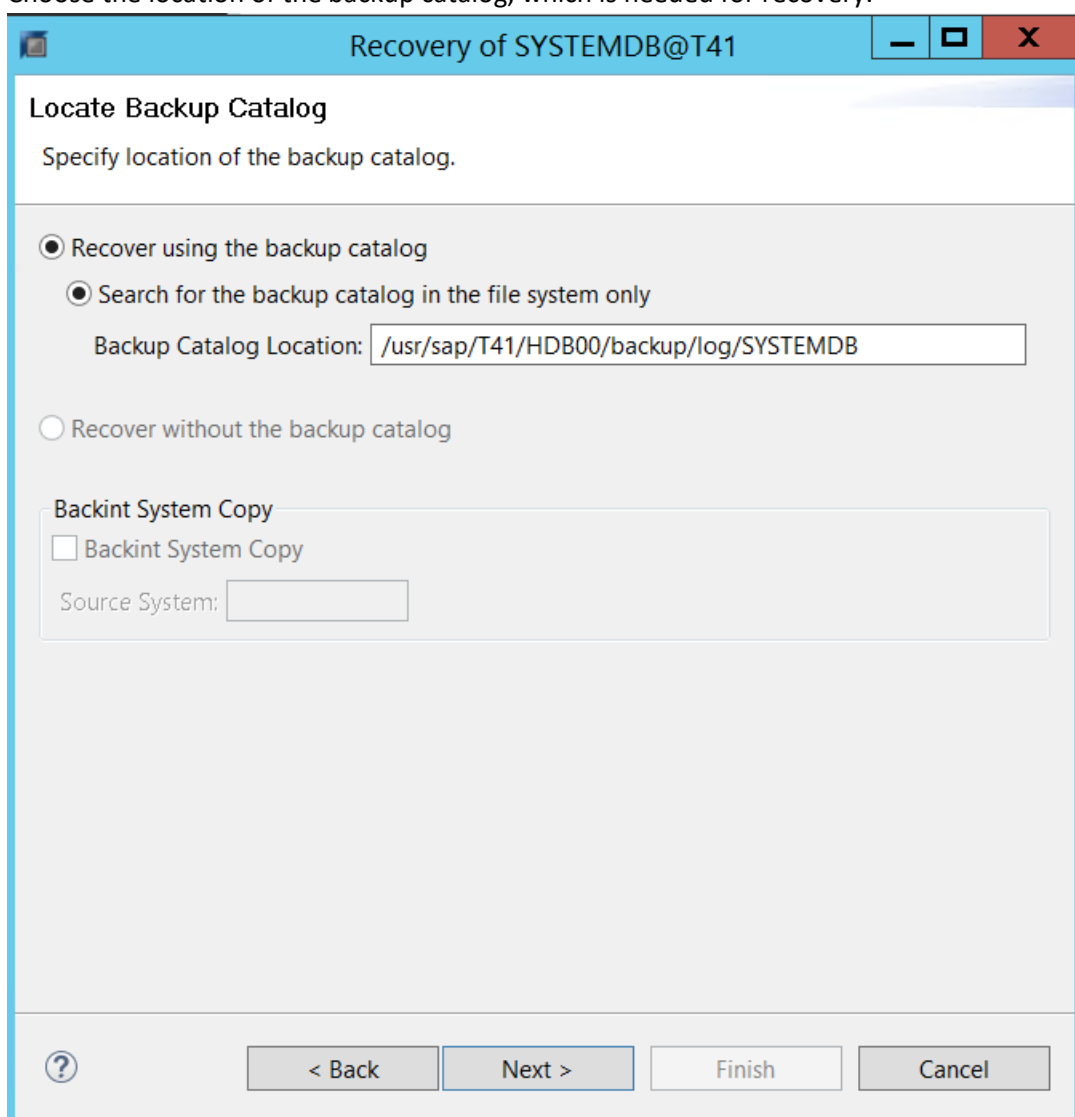


! It is important to note the time used is based on UTC/GMT.

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



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



6. 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@T41

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□
X

**Select a Backup**

i Fetching Backup Catalog...

---

**Selected Point in Time**

Database will be recovered to 2019-03-13 01:00:00. (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...	A...

Refresh Show More

**Details of Selected Item**

Start Time:

Size:

Backup Name:

Alternative Location:

Destination Type:

Backup ID:

Source System: SYSTEMDB@T4

External Backup ID:

Check Availability

?

< Back
Next >
Finish
Cancel



7. 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@T41

-
□
✕

### Select a Backup

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

#### Selected Point in Time

Database will be recovered to 2019-03-13 01:00:00. (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...	A...
2019-03-13 00:30...	/hana/data/T41	SNAPSHOT	✕
2019-03-12 22:26...	/hana/data/T41	SNAPSHOT	✕

Refresh Show More

#### Details of Selected Item

Start Time: 2019-03-13 00:30:10 Destination Type: SNAPSHOT Source System: SYSTI

Size: 1.78 GB Backup ID: 1552437010 External Backup ID: S

Backup Name: ✕ /hana/data/T41

Alternative Location:

Check Availability

?
< Back
Next >
Finish
Cancel

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

```
# su - t41adm
```

```
> cp -pr /hana/data/T41/mnt00001/.snapshot/daily_db_bkup.2019-03-13_0030.0/* \
/hana/data/T41/mnt00001/.
```

9. 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@T41

-
□
X

### Select a Backup

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

#### Selected Point in Time

Database will be recovered to 2019-03-13 01:00:00. (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...	A...
2019-03-13 00:30...	/hana/data/T41	SNAPSHOT	✖
2019-03-12 22:26...	/hana/data/T41	SNAPSHOT	✖

Refresh
Show More

#### Details of Selected Item

Start Time: i 2019-03-13 00:30:10 Destination Type: SNAPSHOT Source System: SYSTI

Size: 1.78 GB Backup ID: 1552437010 External Backup ID: S

Backup Name: ✖ /hana/data/T41

Alternative Location: i

Check Availability

?

< Back
Next >
Finish
Cancel

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

Recovery of SYSTEMDB@T41

Select a Backup

Select a backup to recover the SAP HANA database

Selected Point in Time

Database will be recovered to 2019-03-13 01:00:00. (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...	A...
2019-03-13 00:30...	/hana/data/T41	SNAPSHOT	●
2019-03-12 22:26...	/hana/data/T41	SNAPSHOT	✖

Refresh

Show More

Details of Selected Item

Start Time:

2019-03-13 00:30:10

Destination Type:

SNAPSHOT

Source System:

SYSTI

Size:

1.78 GB

Backup ID:

1552437010f

External Backup ID:

S

Backup Name:

/hana/data/T41

Alternative Location:

Check Availability

?

< Back

Next >

Finish

Cancel

# 11. Choose the location of the Log Backups.

Recovery of SYSTEMDB@T41

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

/usr/sap/T41/HDB00/backup/log/SYSTEMDB

Remove All

Remove

?

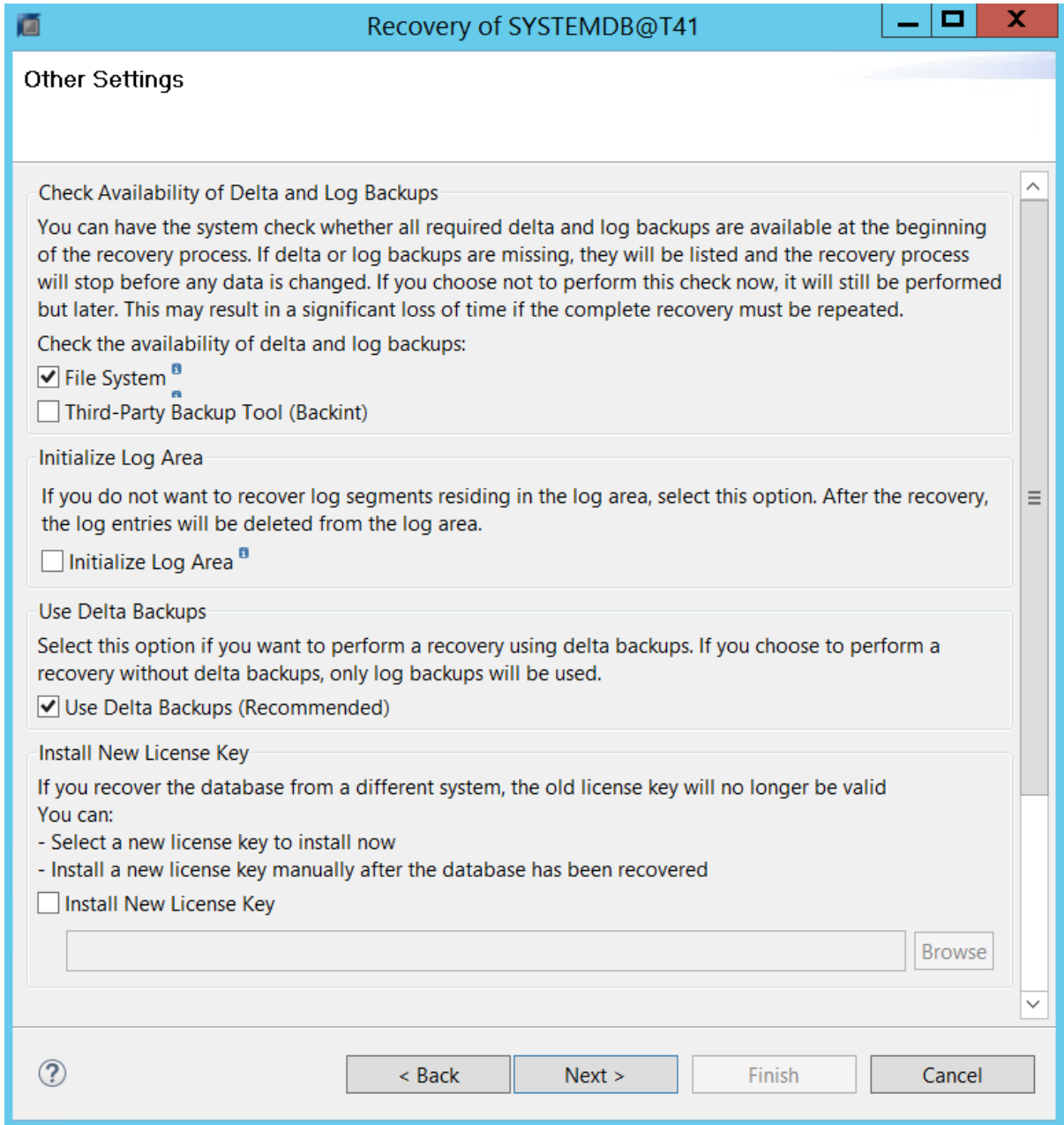
< Back

Next >

Finish

Cancel

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



**Recovery of SYSTEMDB@T41**

### 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**

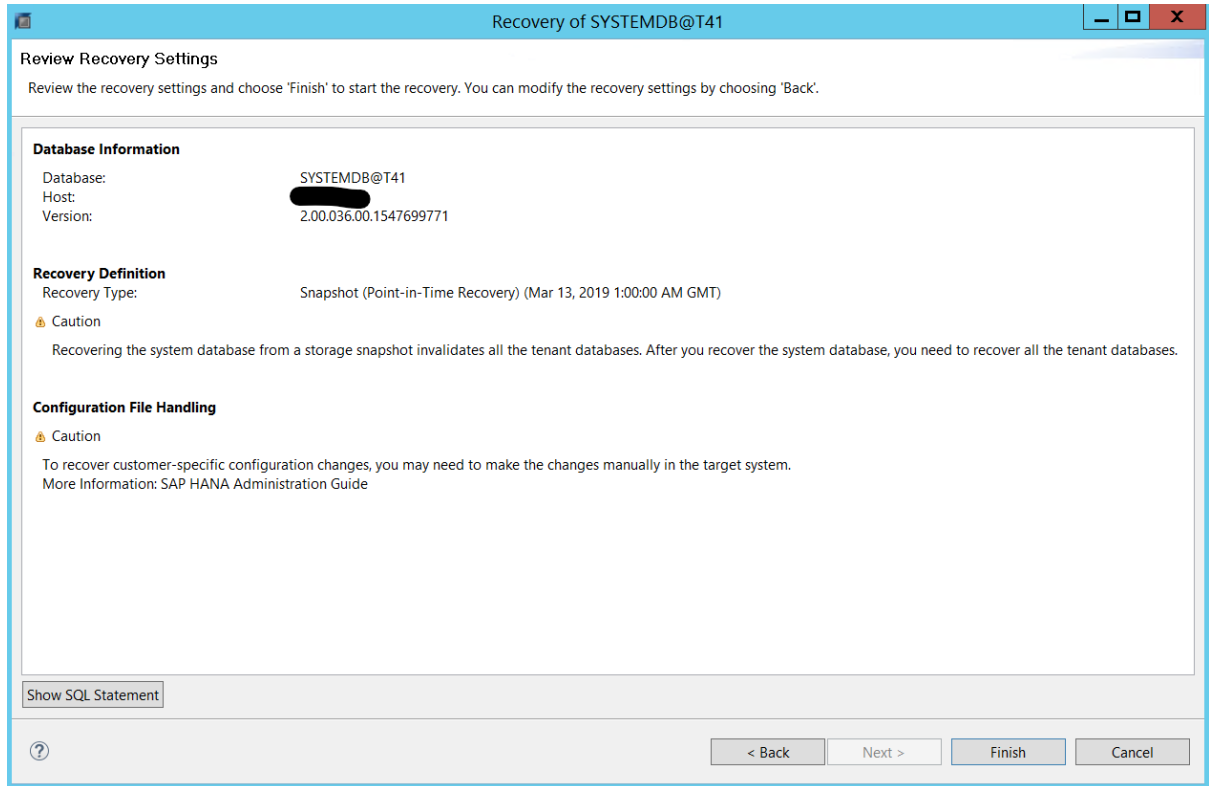
If you recover the database from a different system, the old license key will no longer be valid

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

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



**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@T41  
 Host: [REDACTED]  
 Version: 2.00.036.00.1547699771

**Recovery Definition**

Recovery Type: Snapshot (Point-in-Time Recovery) (Mar 13, 2019 1:00:00 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.

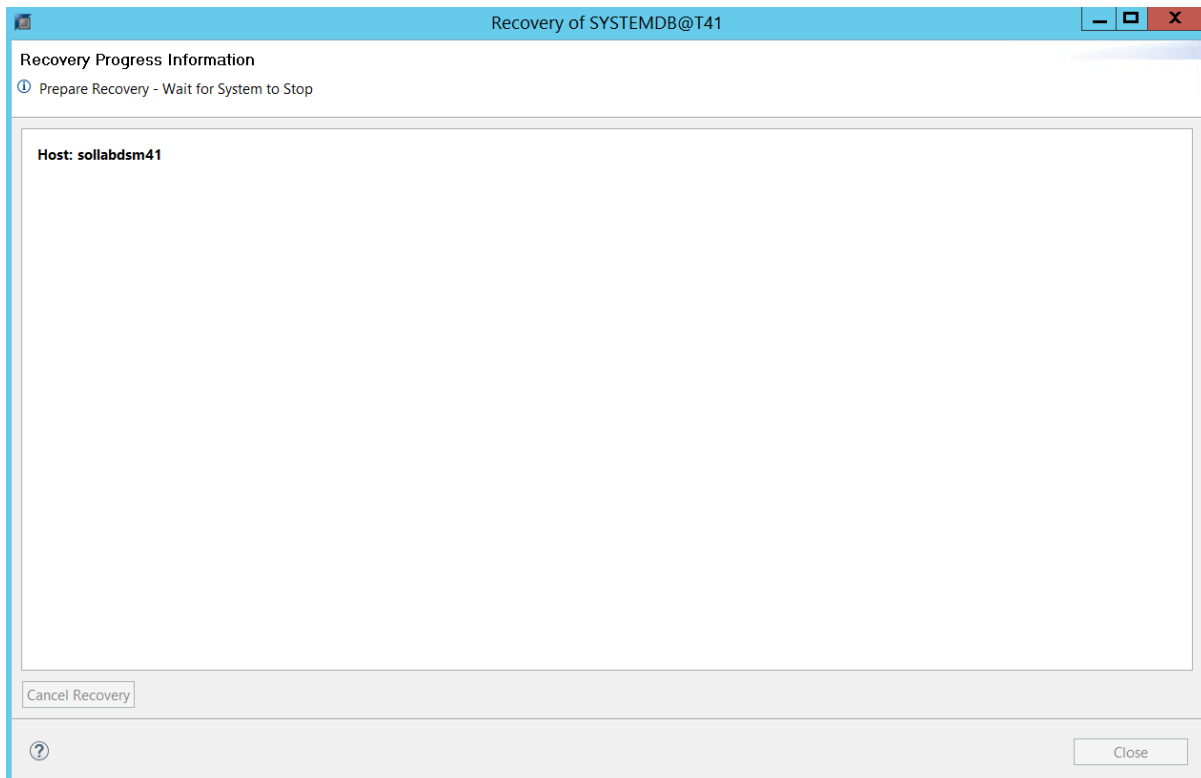
**Configuration File Handling**

**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



**Recovery Progress Information**

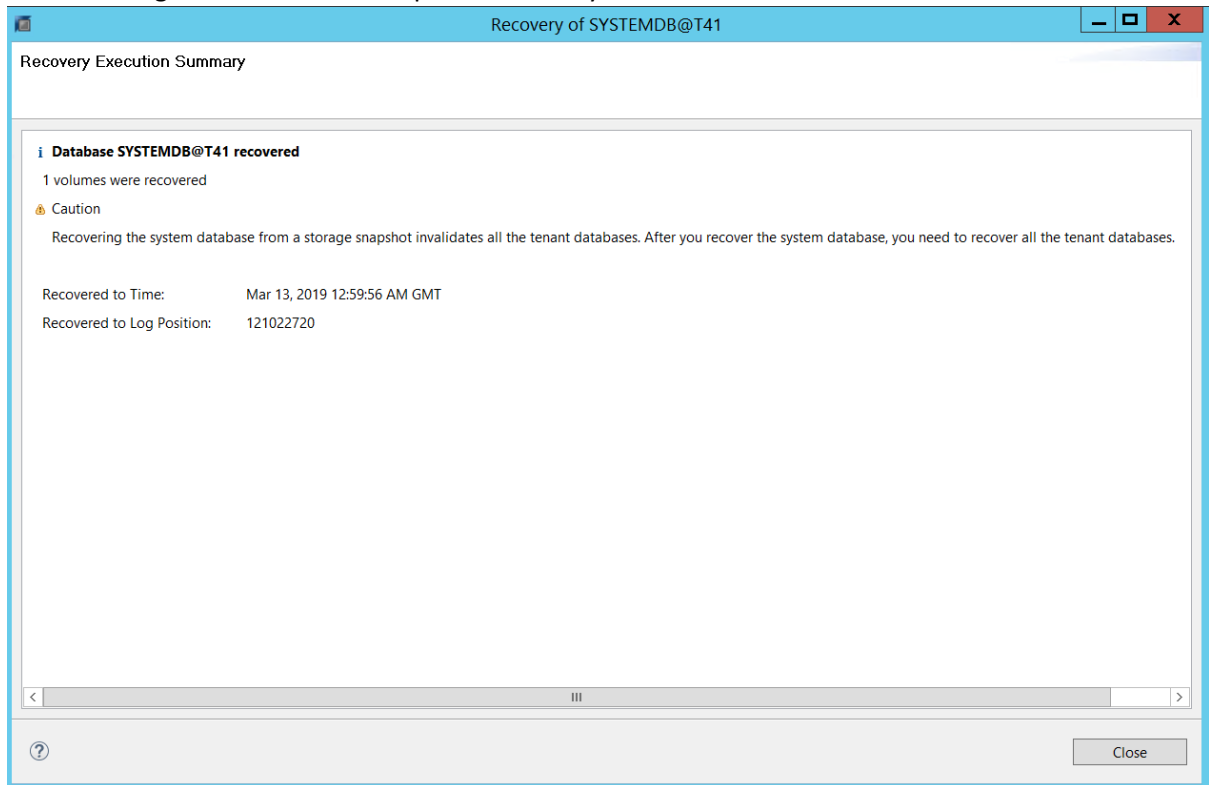
① Prepare Recovery - Wait for System to Stop

Host: sollabdsrm41

Cancel Recovery

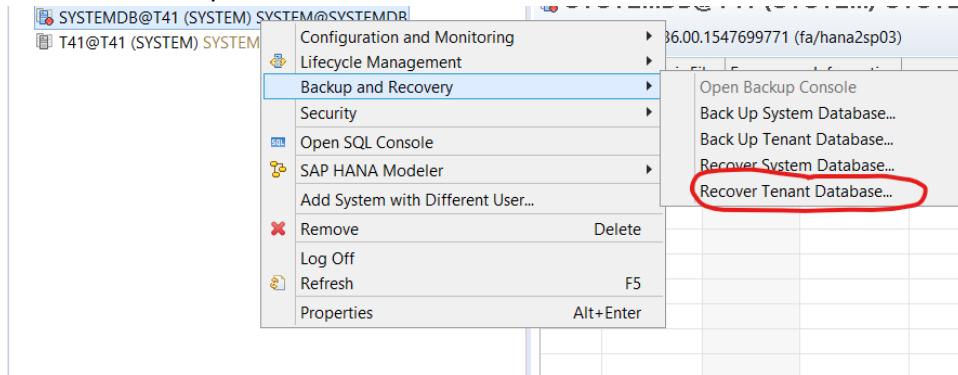
Close

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.



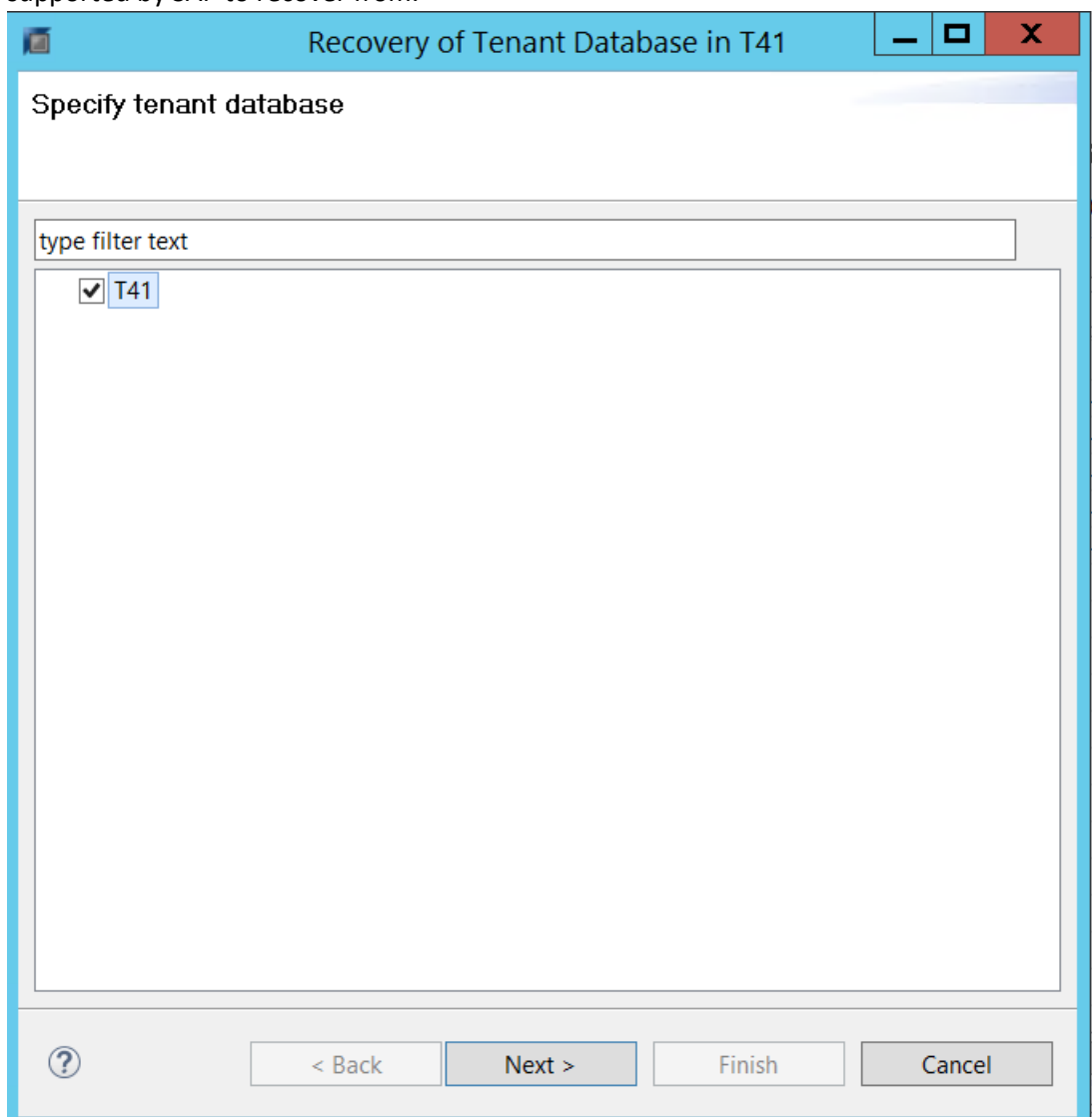
**!** The message stating a recovery from a storage snapshot invalidates all the tenant databases. Tenant databases now need to be recovered.

## 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 T41

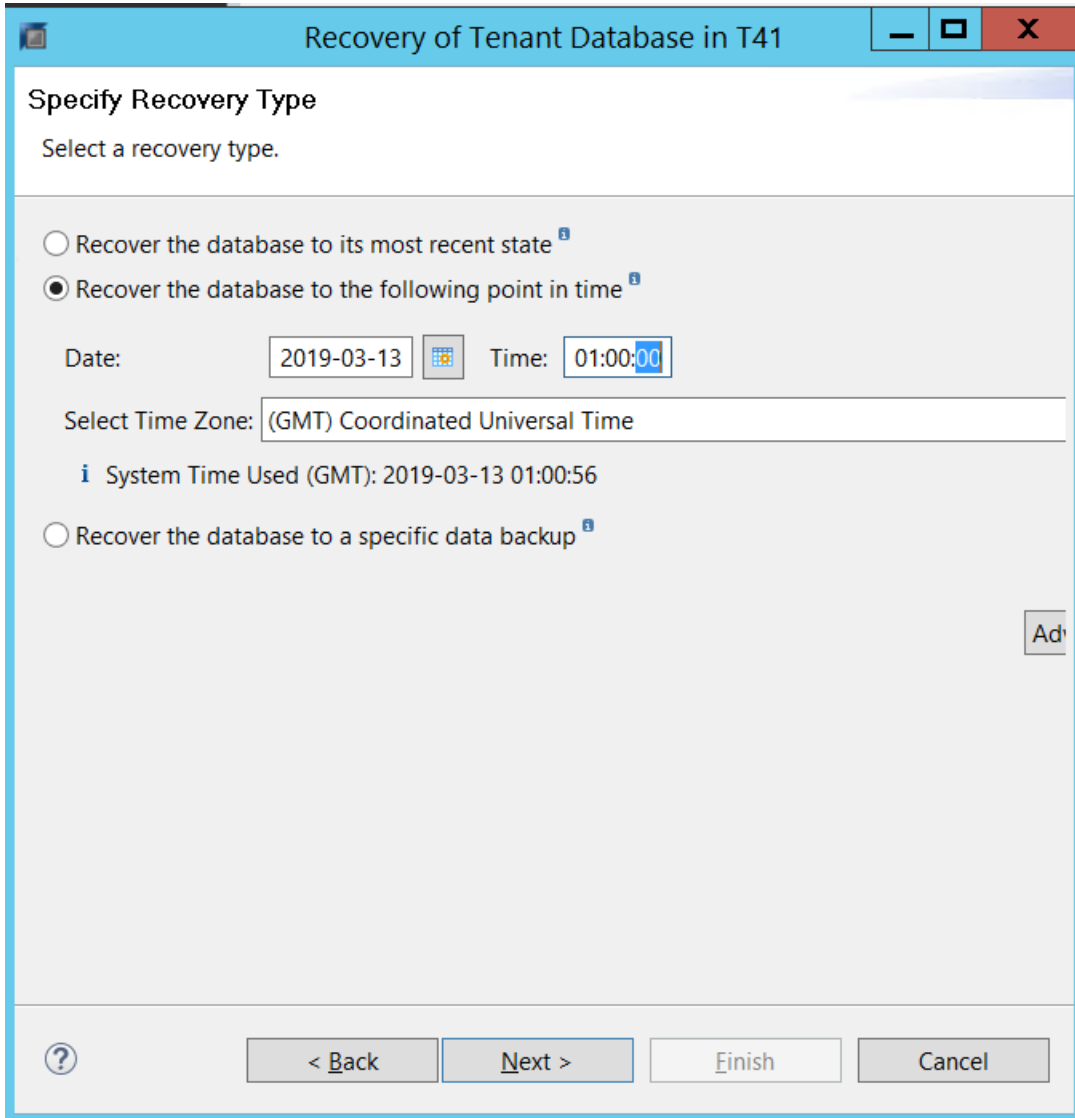
Specify tenant database

type filter text

☒ T41


? < Back Next > Finish Cancel

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




**Recovery of Tenant Database in T41**

**Specify Recovery Type**  
Select a recovery type.

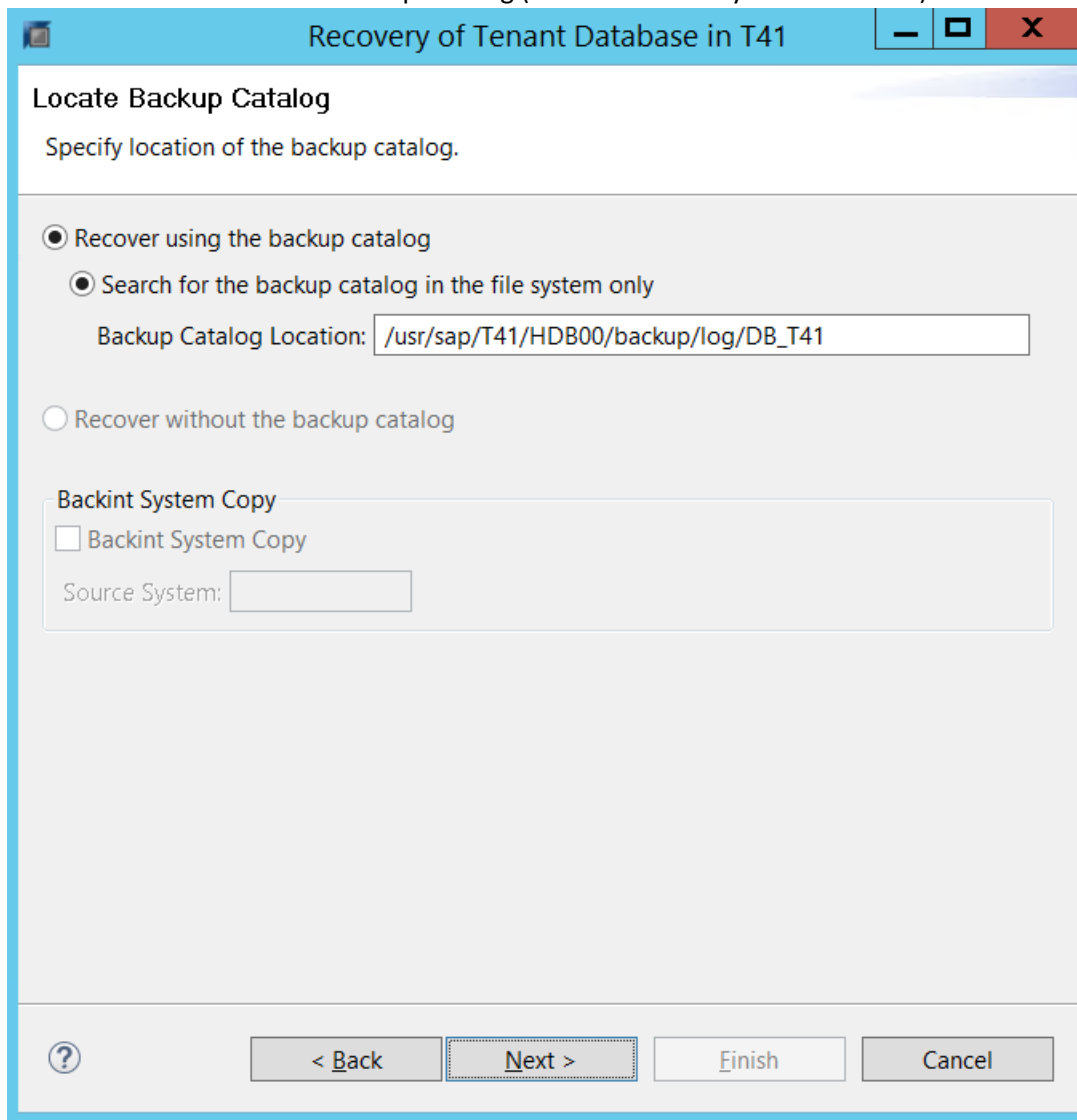
☐ Recover the database to its most recent state <sup>i</sup>  
☒ Recover the database to the following point in time <sup>i</sup>  
 Date:   Time:   
 Select Time Zone:   
 i System Time Used (GMT): 2019-03-13 01:00:56  
☐ Recover the database to a specific data backup <sup>i</sup>

Ad



! 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 T41**

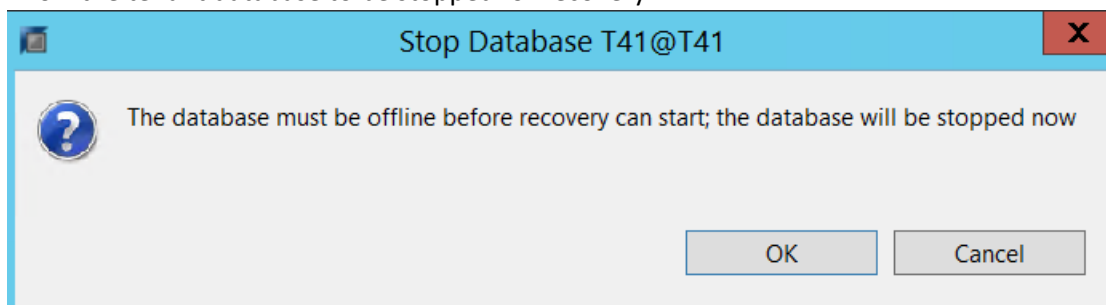
**Locate Backup Catalog**  
Specify location of the backup catalog.

☒ Recover using the backup catalog  
☒ Search for the backup catalog in the file system only  
☐ Recover without the backup catalog


Backup Catalog Location:

**Backint System Copy**  
☐ Backint System Copy  
 Source System:


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






**Stop Database T41@T41**

 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



Recovery of Tenant Database in T41

Select a Backup

 Fetching Backup Catalog...

Selected Point in Time

Database will be recovered to 2019-03-13 01:00:00. (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...	A...

Refresh

Show More

Details of Selected Item

Start Time:

Destination Type:

Source System: T41@T41

Size:


Backup ID:

External Backup ID:

Backup Name:

Alternative Location:

Check Availability



< Back

Next >

Finish

Cancel

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 T41

Select a Backup

Select a backup to recover the SAP HANA database

Selected Point in Time

Database will be recovered to 2019-03-13 01:00:00. (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...	A...
2019-03-13 00:30...	/hana/data/T41	SNAPSHOT	●
2019-03-12 22:26...	/hana/data/T41	SNAPSHOT	✖

Refresh

Show More

Details of Selected Item

Start Time:

2019-03-13 00:30:10

Destination Type:

SNAPSHOT

Source System:

T41@

Size:

2.20 GB

Backup ID:

1552437010

External Backup ID:

S

Backup Name:

/hana/data/T41

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 T41

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

/usr/sap/T41/HDB00/backup/log/DB\_T41

Remove All

Remove

?

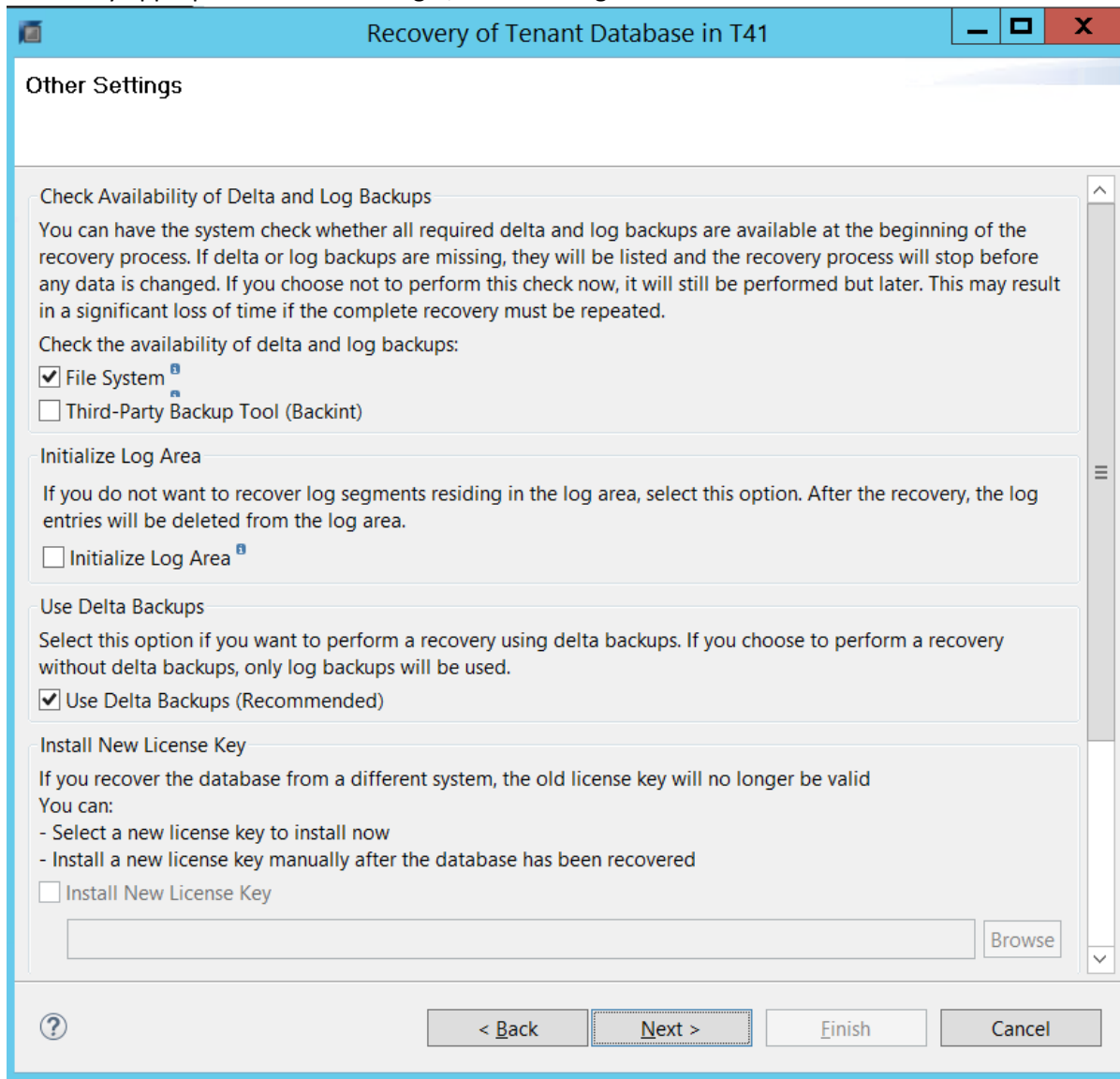
< Back

Next >

Finish

Cancel

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



**Recovery of Tenant Database in T41**

**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 T41

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:

T41@T41

Host:

Version:

2.00.036.00.1547699771

Recovery Definition

Recovery Type:

Snapshot (Point-in-Time Recovery) (Mar 13, 2019 1:00:00 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

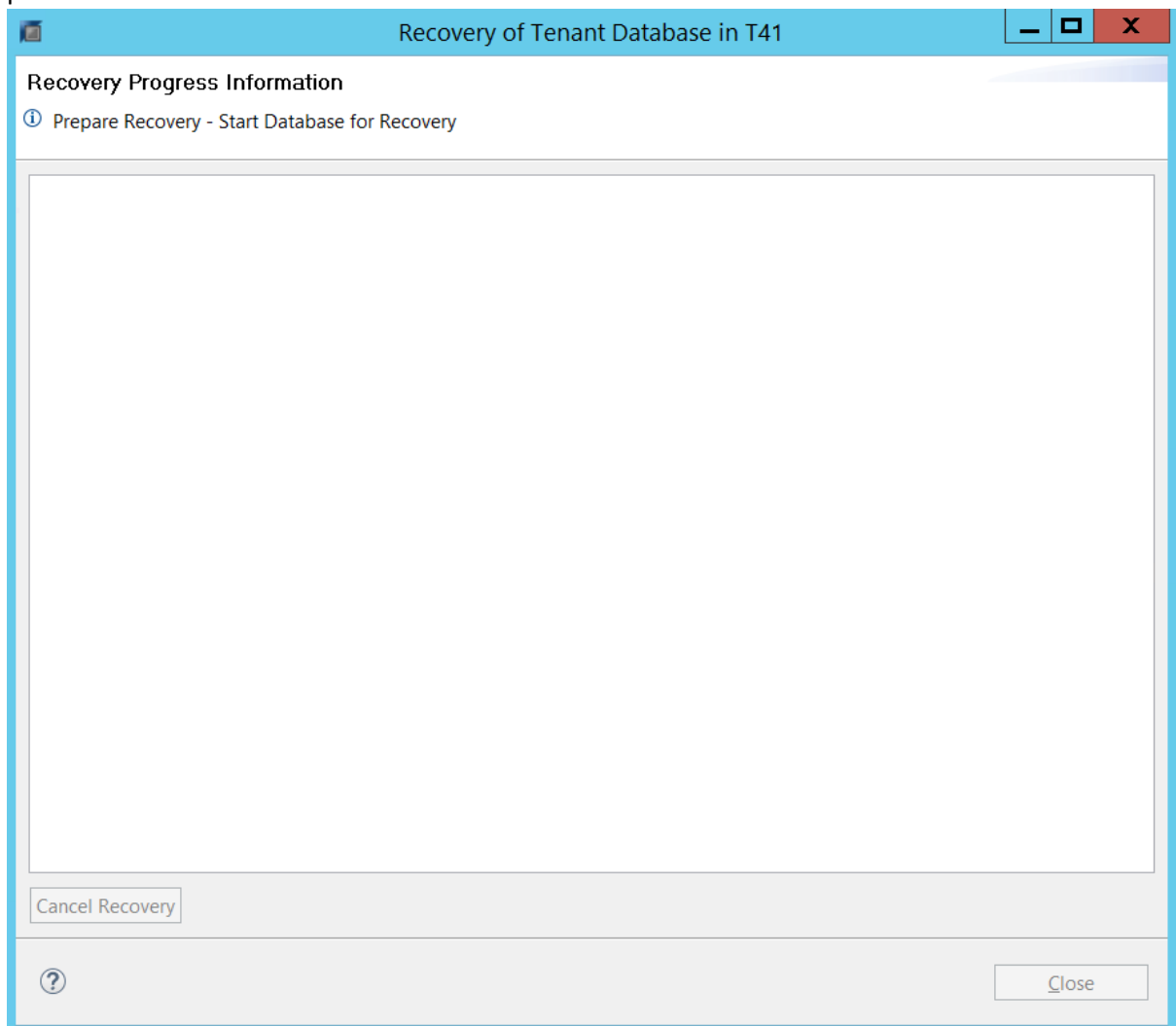
Next >

Finish

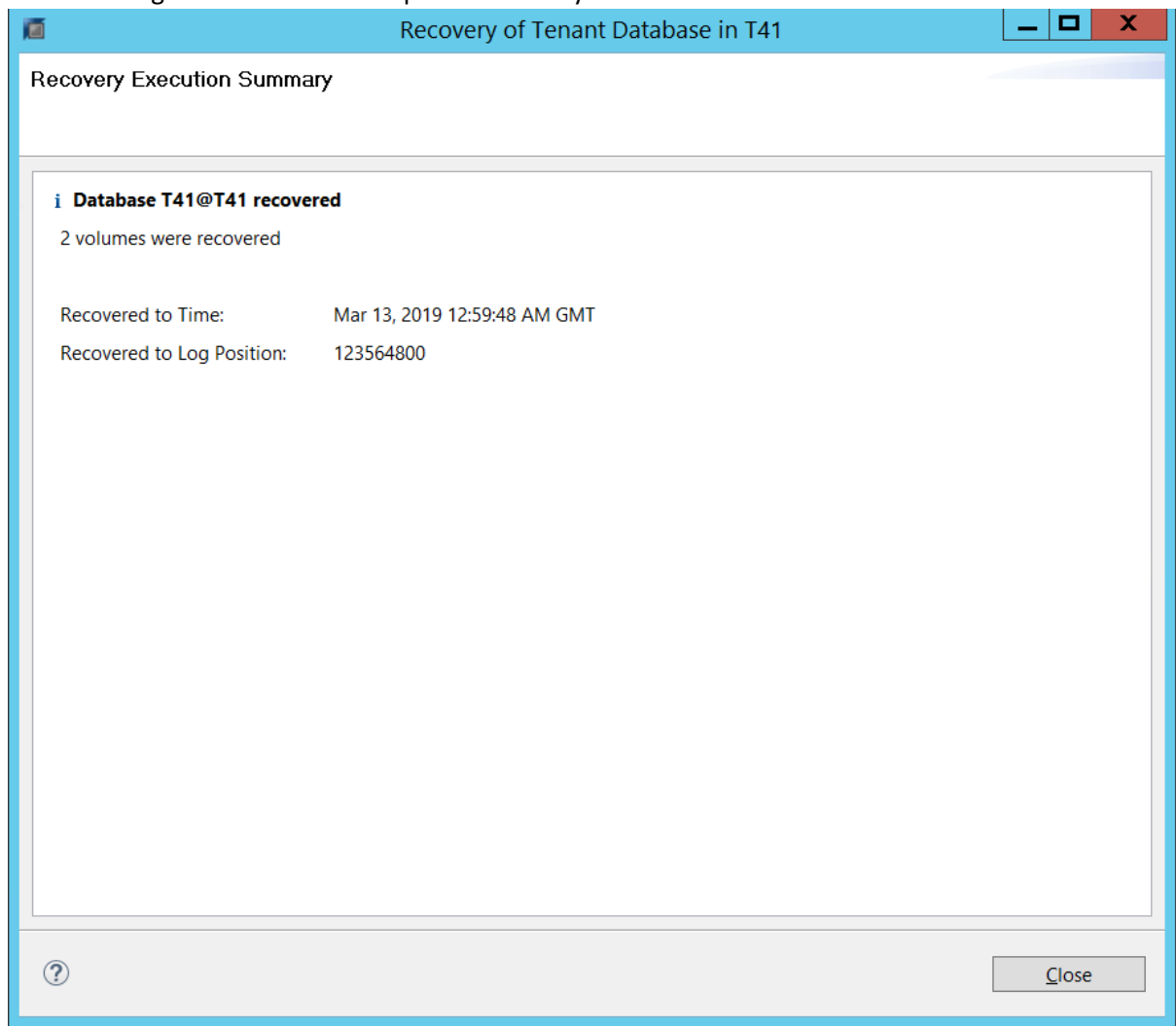
Cancel









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 all services running.

Overview   Landscape   Alerts   Performance   Volumes   Configuration   System Information   Diagnosis Files   Trace Configuration										
Services   Hosts   Redistribution   System Replication			Host: <All>		Service: <All>					
Active	Host	Port	Service	Detail	Start Time	Process ID	CPU	Memory	Used Memory (MB)	Peak Used Memc
	sollabds41	30010	compileserv		Mar 13, 2019 12:49:28 AM	435137			1,507	
	sollabds41	30000	daemon		Mar 4, 2019 9:50:16 PM				0	
	sollabds41	30001	nameserver	master	Mar 13, 2019 12:49:03 AM	434689			4,617	
	sollabds41	30002	preprocessor		Mar 13, 2019 12:49:28 AM	435139			1,723	
	sollabds41		sapstartsv							
	sollabds41	30006	webdispatcher		Mar 13, 2019 12:49:30 AM	435184			1,756	

## 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

**Stop System T41**

Stop all databases of system T41 based on the specified parameters

**Shutdown Type**

☒ **Soft**

Stops the system. All currently running statements are stopped. After the specified timeout, the system is hard stopped.

Date: 3/13/2019

Time: 1:55:46 AM

☐ **Hard**

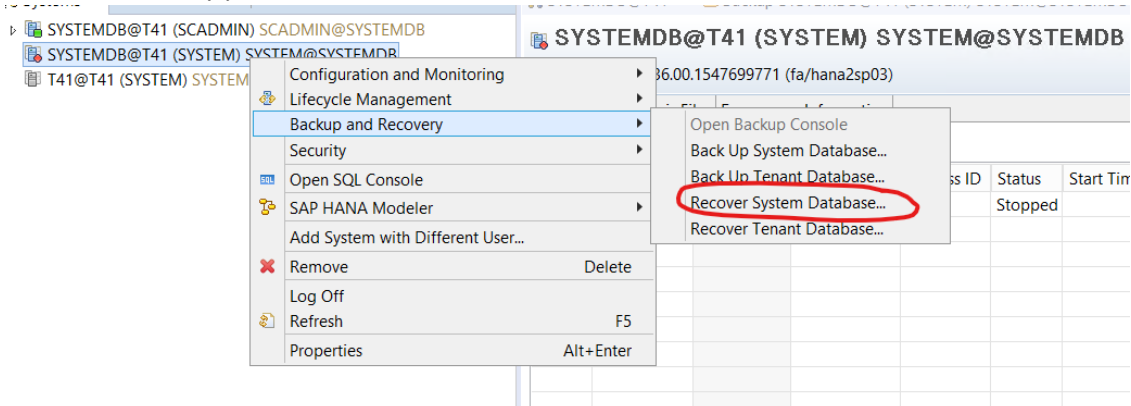
Stops the system immediately. Open transactions are aborted and rolled back.

OK Cancel

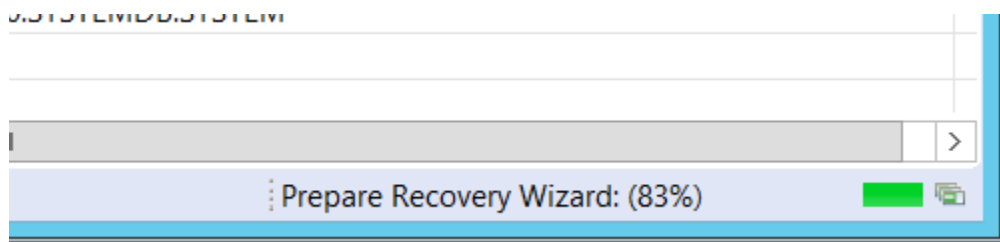
When this is finished, the Processes tab should display as follows:

[illegible]

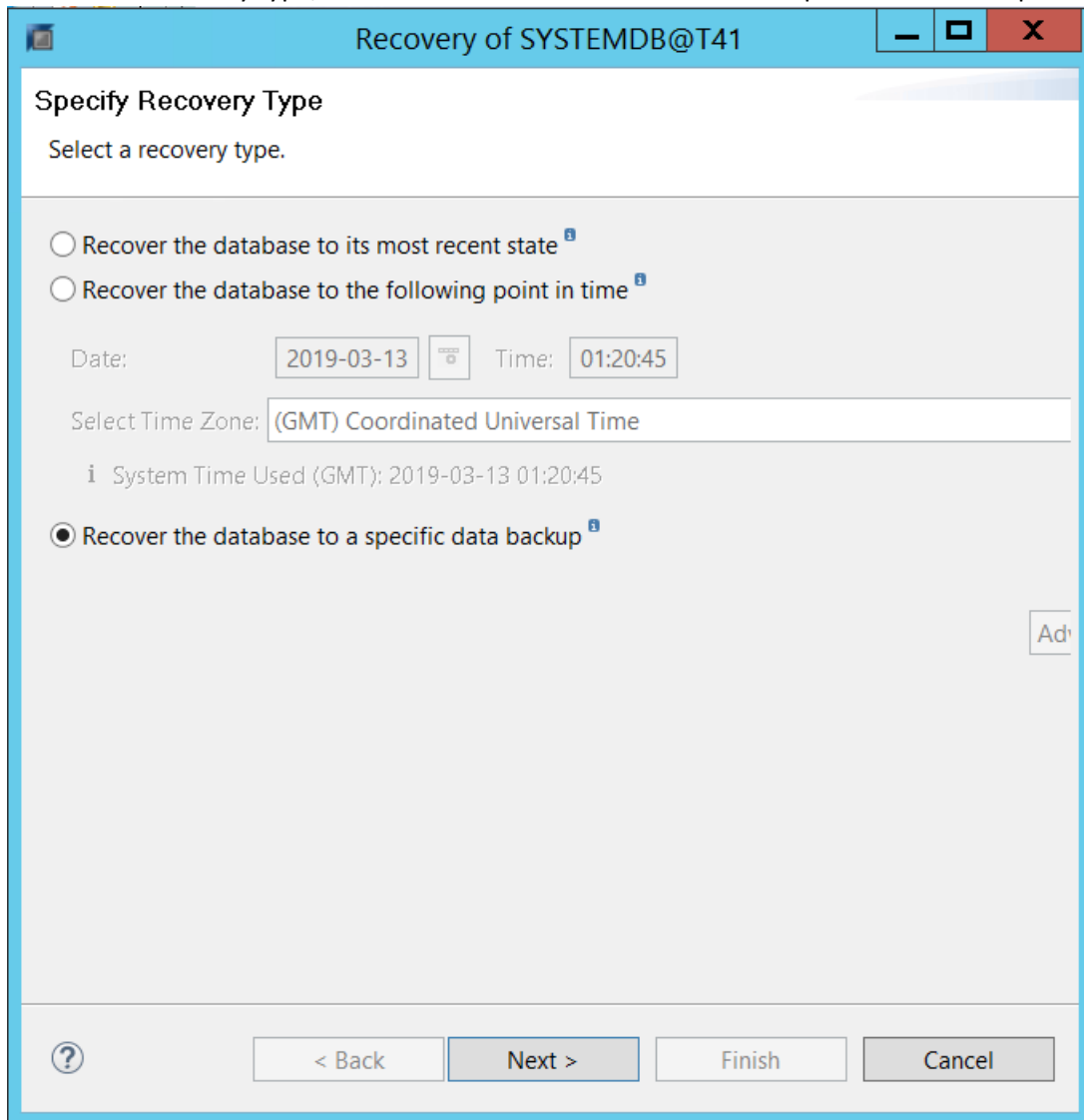
## 2. Start the recovery process from the menu.



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 a specific data backup”.



**Recovery of SYSTEMDB@T41**

**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: 2019-03-13 Time: 01:20:45

Select Time Zone: (GMT) Coordinated Universal Time

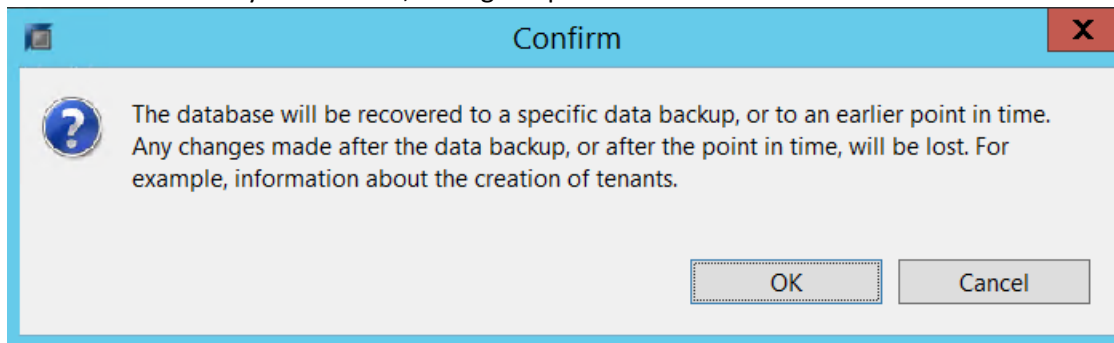
i System Time Used (GMT): 2019-03-13 01:20:45

☒ Recover the database to a specific data backup

Ad

? < 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@T41

-
□
X

### 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

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

Recovery of SYSTEMDB@T41

—
□
X

### Specify the Backup to Recover

Specify the backup to be recovered.

Destination Type: Snapshot ▼

**Locate the Data Backup**

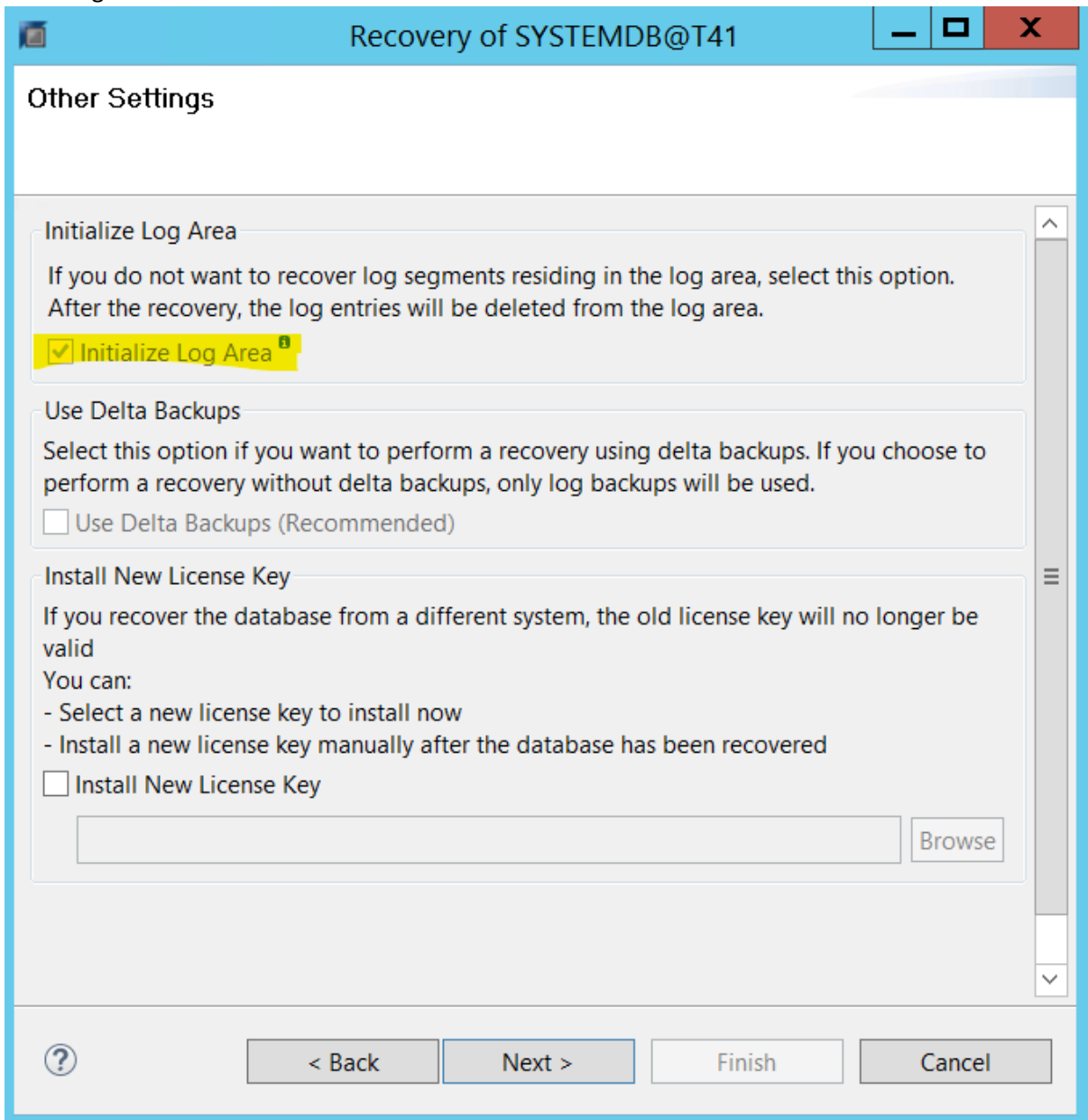
Specify the destination of the data backup that you want to use to recover the database.

Location: /hana/data/T41

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



The screenshot shows a window titled "Recovery of SYSTEMDB@T41" with standard Windows window controls. The main content area is titled "Other Settings". It contains three sections:

- Initialize Log Area:** A text box explaining that if you do not want to recover log segments, you should select this option. Below the text, the checkbox "Initialize Log Area" is checked and highlighted in yellow.
- Use Delta Backups:** A text box explaining that this option is for recovery using delta backups. Below the text, the checkbox "Use Delta Backups (Recommended)" is unchecked.
- Install New License Key:** A text box explaining that if the database is recovered from a different system, the old license key will no longer be valid. Below the text, the checkbox "Install New License Key" is unchecked. There is a text input field and a "Browse" button next to it.

At the bottom of the window, there is a navigation bar with a help icon (?), and four buttons: "< Back", "Next >", "Finish", and "Cancel".

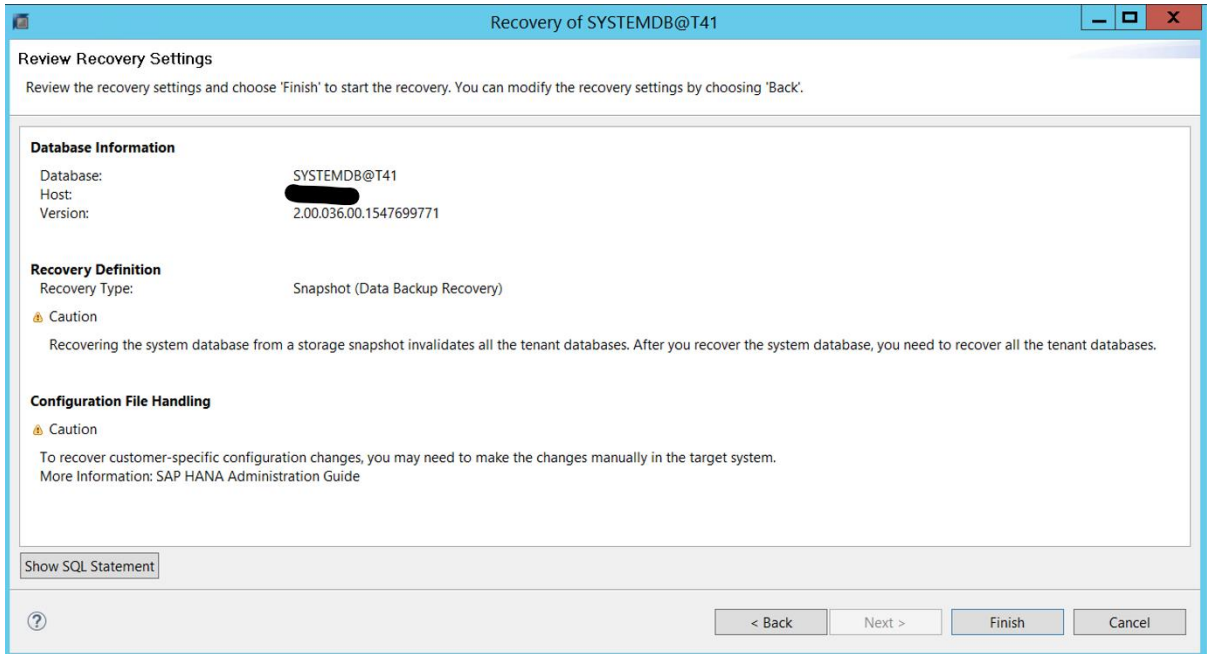
8. Restore the snapshot files to the data area. In this example, the files can be copied from the “hidden” location in the filesystem

```
# su - t41adm
```

```
> cp -pr /hana/data/T41/mnt00001/.snapshot/daily_db_bkup.2019-03-13_0030.0/* \
/hana/data/T41/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@T41**

**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@T41  
 Host: XXXXXXXXXX  
 Version: 2.00.036.00.1547699771

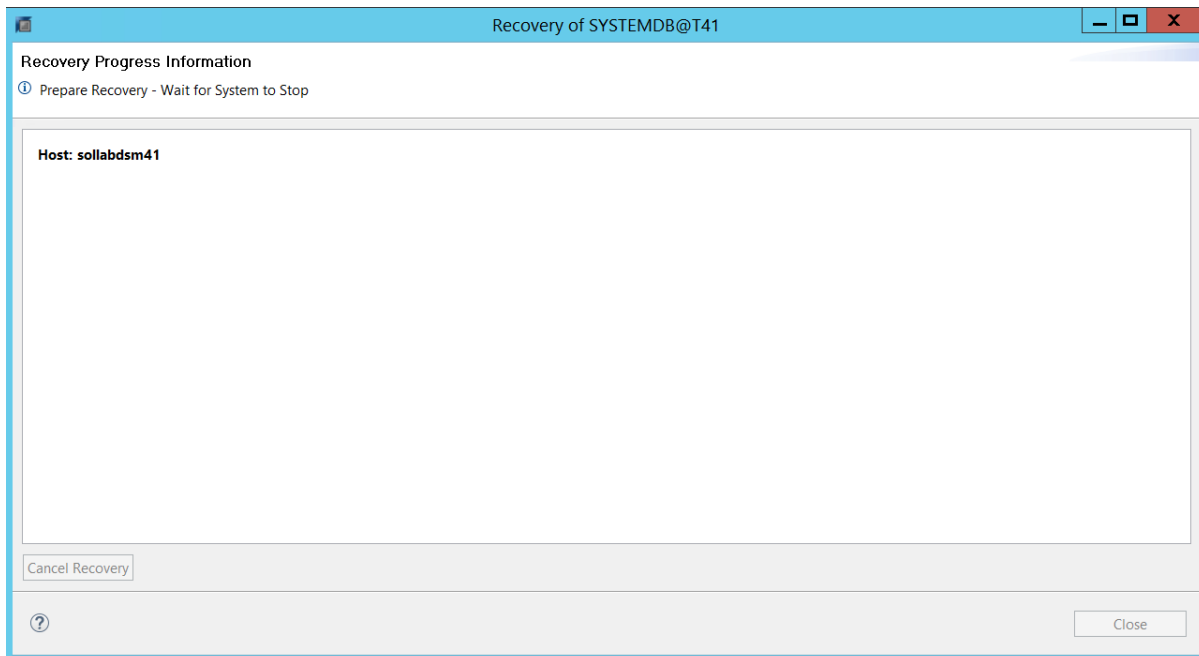
**Recovery Definition**  
 Recovery Type: Snapshot (Data Backup Recovery)

**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



**Recovery of SYSTEMDB@T41**

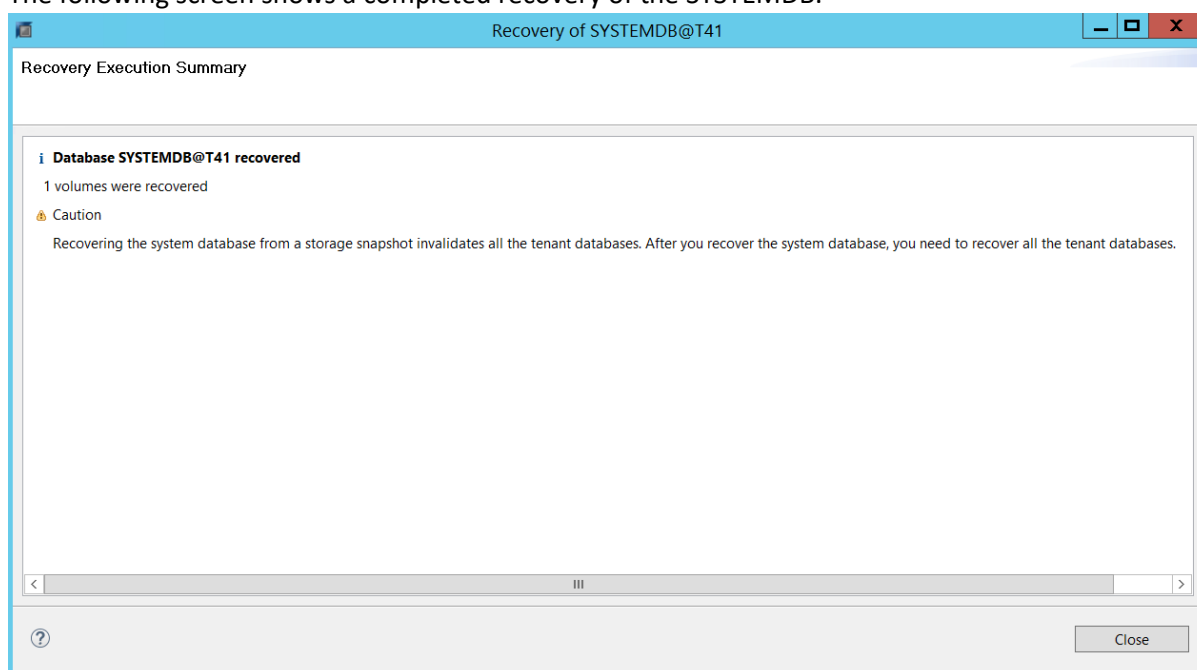
**Recovery Progress Information**  
 Prepare Recovery - Wait for System to Stop

**Host: sollabds41**

Cancel Recovery

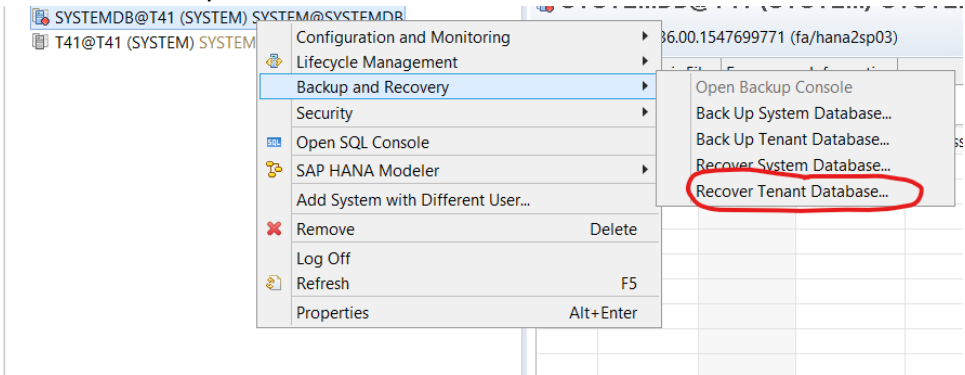
Close

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.

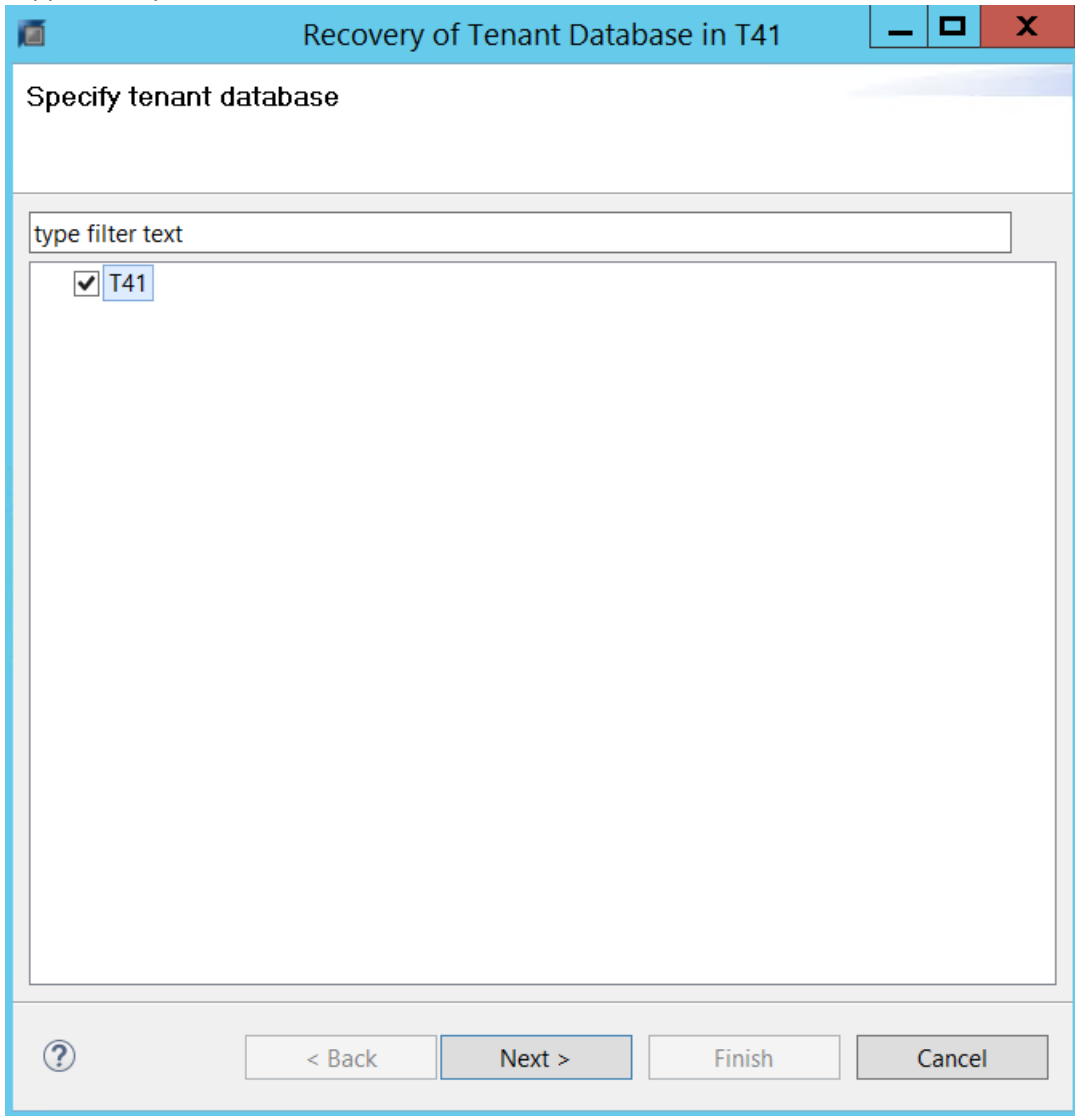


**!** The message stating a recovery from a storage snapshot invalidates all the tenant databases. Tenant databases now need to be recovered.

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 T41

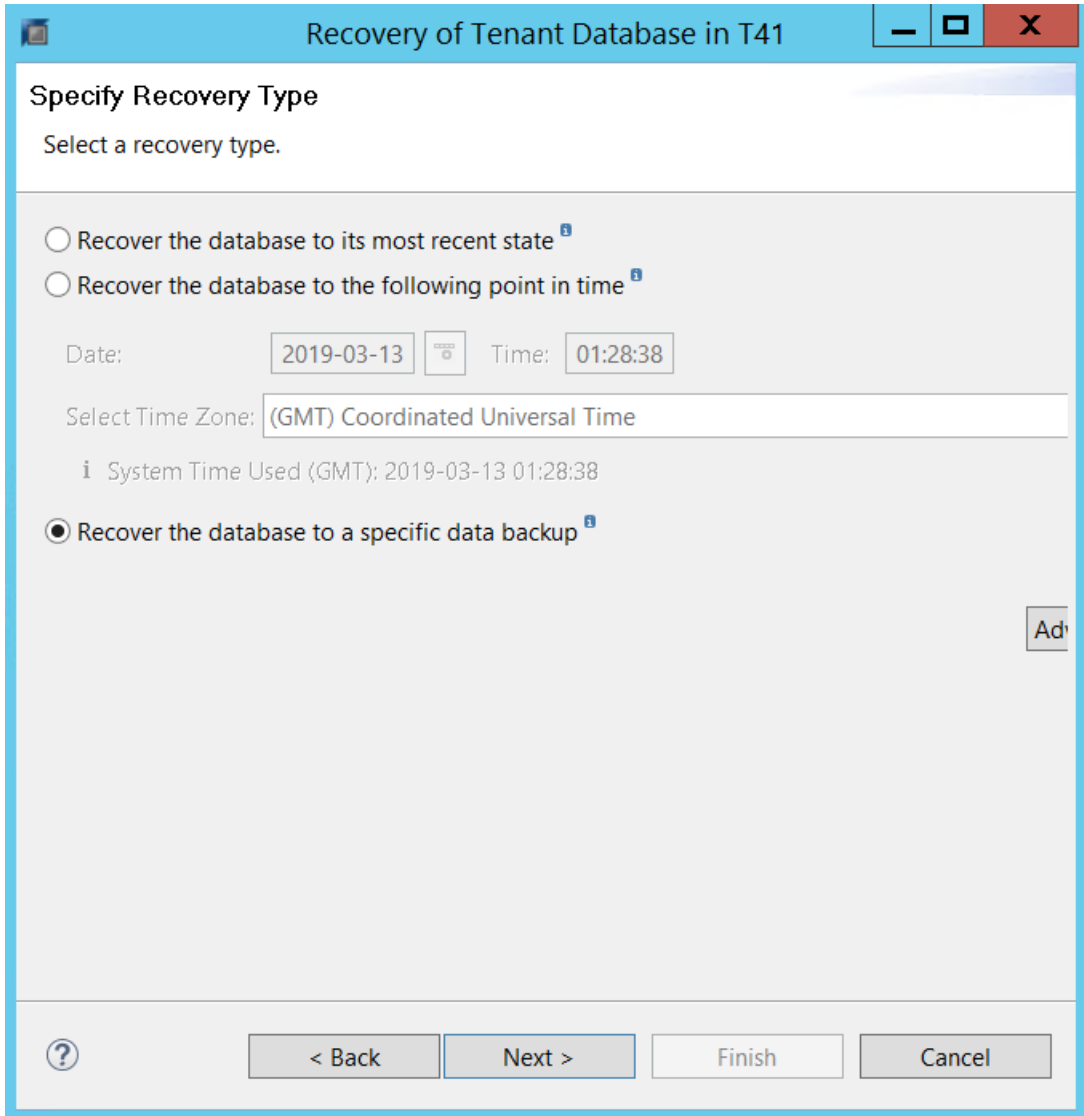
Specify tenant database

type filter text

☒ T41

? < Back Next > Finish Cancel

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



**Recovery of Tenant Database in T41**

**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: 2019-03-13 Time: 01:28:38

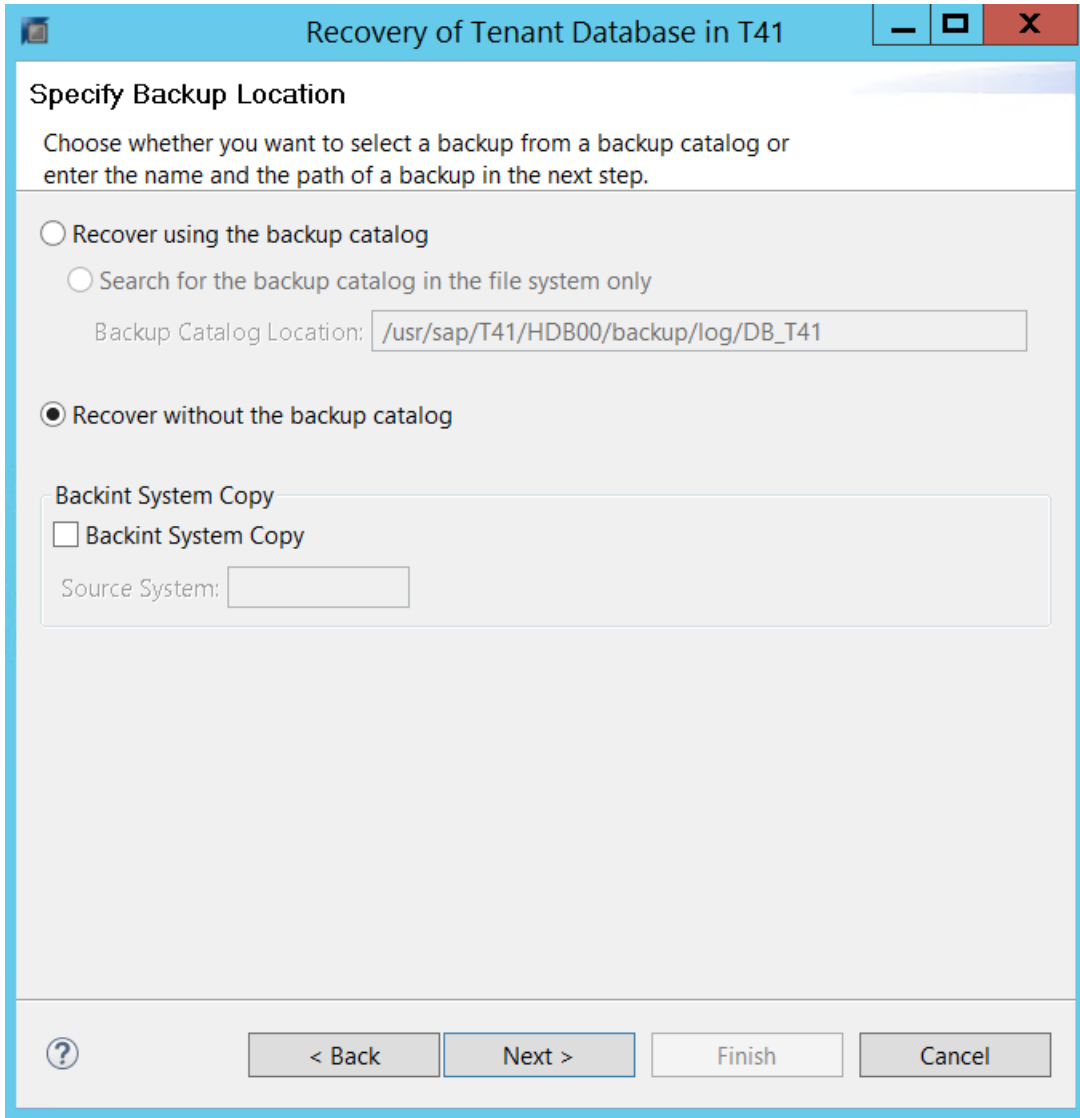
Select Time Zone: (GMT) Coordinated Universal Time

i System Time Used (GMT): 2019-03-13 01:28:38

☒ Recover the database to a specific data backup

? < Back Next > Finish Cancel

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



**Recovery of Tenant Database in T41**

**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:



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

Recovery of Tenant Database in T41

-
□
X

### Specify the Backup to Recover

Specify the backup to be recovered.

Destination Type: Snapshot ▼

Locate the Data Backup

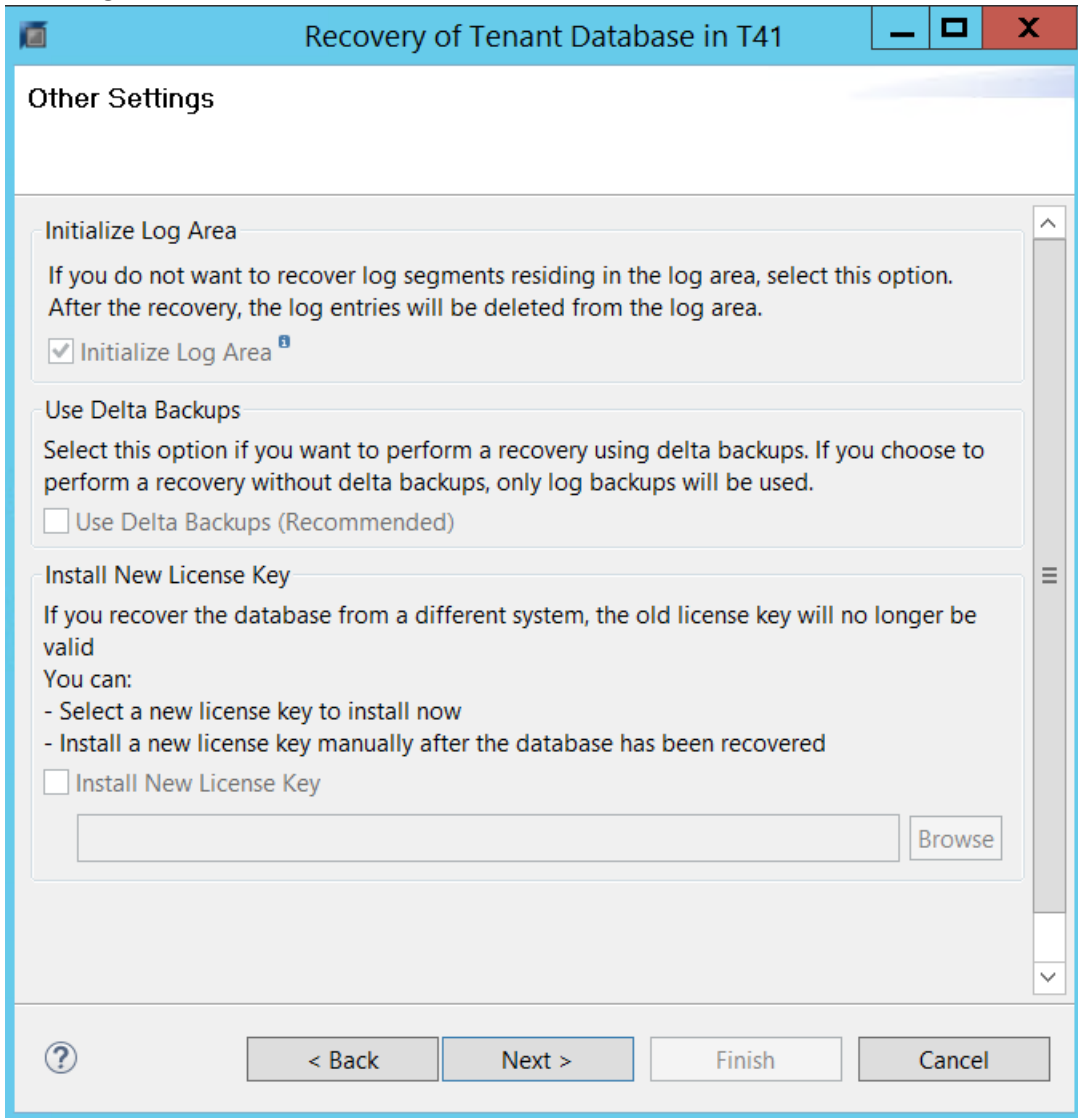
Specify the destination of the data backup that you want to use to recover the database.

Location: /usr/sap/T41/SYS/global/hdb/backint/DB\_T41

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



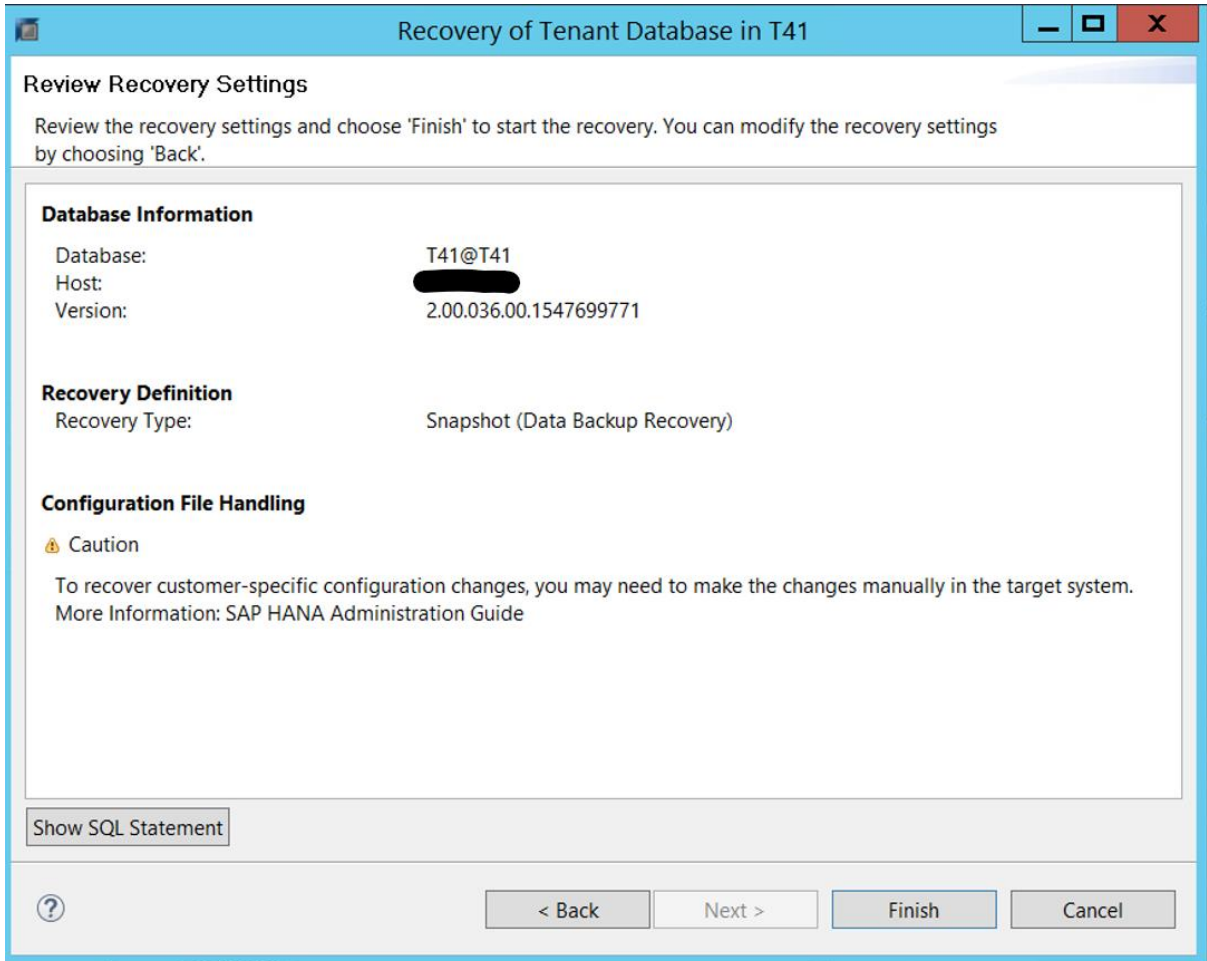
The screenshot shows a window titled "Recovery of Tenant Database in T41" with standard Windows window controls (minimize, maximize, close). The main content area is titled "Other Settings" and contains three sections:

- 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 checked checkbox labeled "Initialize Log Area".
- 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 an unchecked checkbox labeled "Use Delta Backups (Recommended)".
- 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 an unchecked checkbox labeled "Install New License Key".

At the bottom of the window, there is a "Browse" button next to a text input field. The bottom of the window features a navigation bar with a help icon (?), and four buttons: "< Back", "Next >", "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 T41**

**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: T41@T41  
 Host: [REDACTED]  
 Version: 2.00.036.00.1547699771

**Recovery Definition**

Recovery Type: Snapshot (Data Backup Recovery)

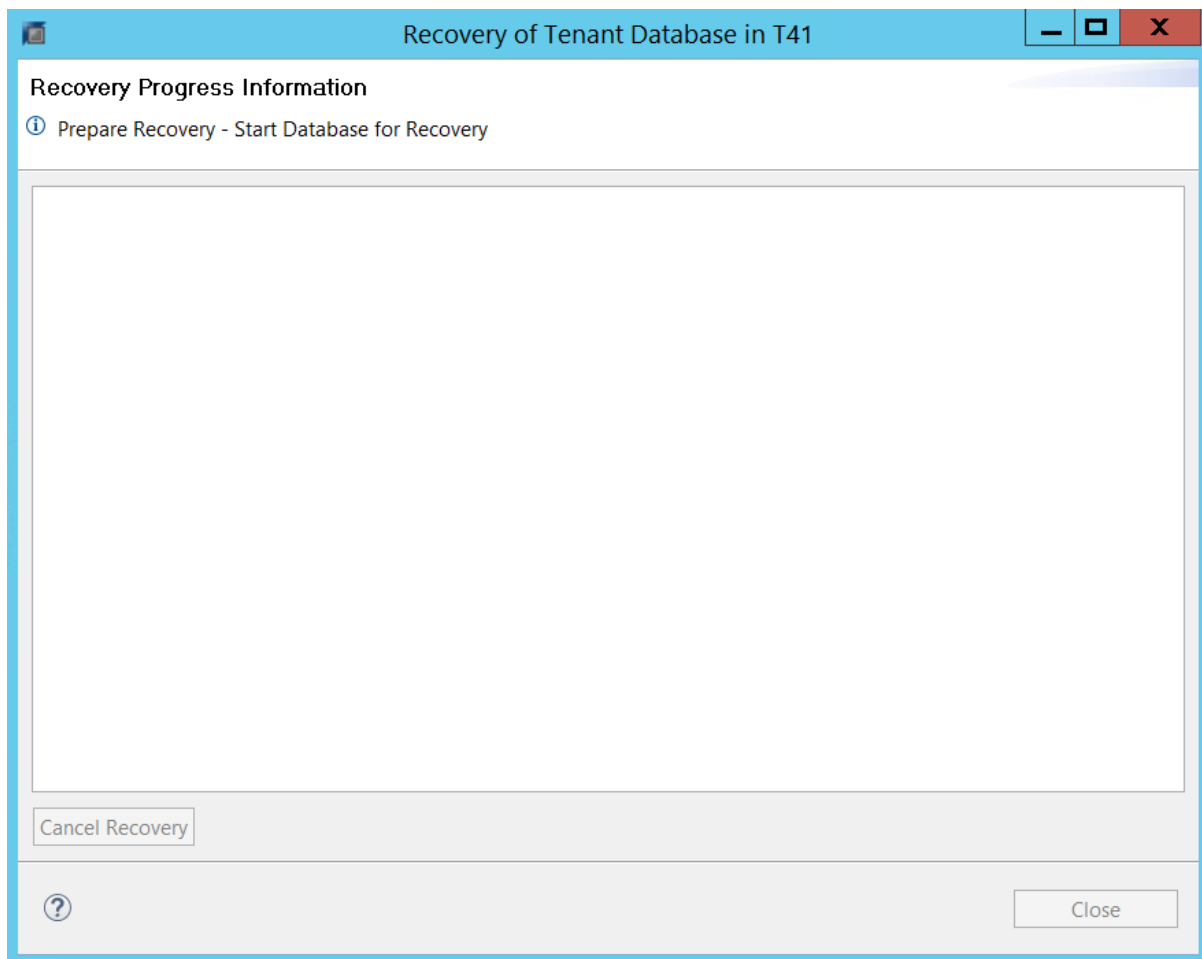
**Configuration File Handling**

⚠ Caution

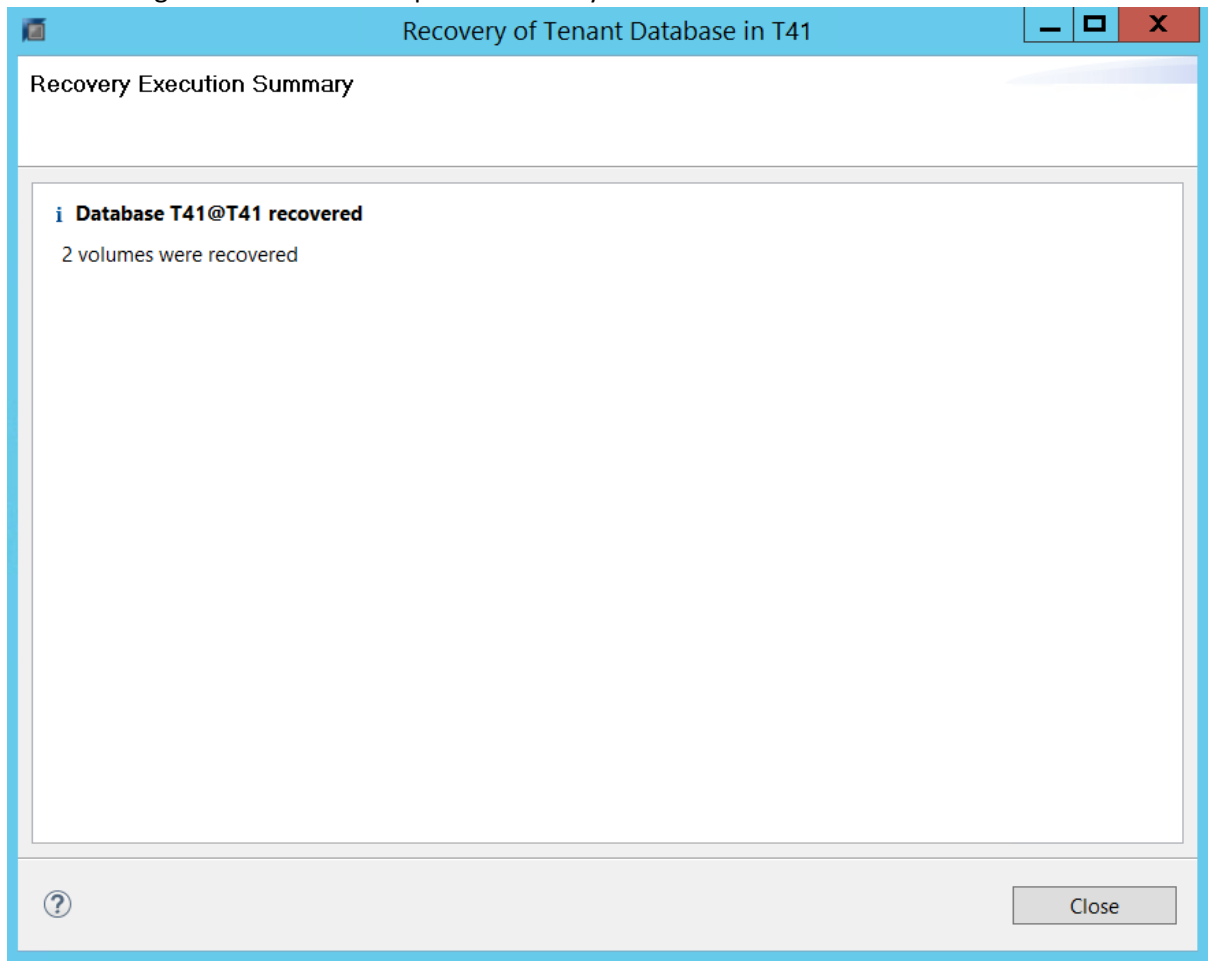
To recover customer-specific configuration changes, you may need to make the changes manually in the target system.  
 More Information: SAP HANA Administration Guide

Show SQL Statement







? < Back Next > Finish Cancel



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 all services running.

Overview   Landscape   Alerts   Performance   Volumes   Configuration   System Information   Diagnosis Files   Trace Configuration										
Services   Hosts   Redistribution   System Replication			Host: <All>		Service: <All>					
Active	Host	Port	Service	Detail	Start Time	Process ID	CPU	Memory	Used Memory (MB)	Peak Used Mem
	sollabds41	30010	compileserv		Mar 13, 2019 12:49:28 AM	435137			1,507	
	sollabds41	30000	daemon		Mar 4, 2019 9:50:16 PM				0	
	sollabds41	30001	nameserv	master	Mar 13, 2019 12:49:03 AM	434689			4,617	
	sollabds41	30002	preprocessor		Mar 13, 2019 12:49:28 AM	435139			1,723	
	sollabds41		sapstartsv							
	sollabds41	30006	webdispatcher		Mar 13, 2019 12:49:30 AM	435184			1,756	