

IBM Technical Brief

SAP® HANA® DB Migration from x86 to POWER® via Backup/Recover

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1. Disclaimers

This paper demonstrates a way to minimize downtime and migrate a HANA® database from HANA 1.0 SPS12 to HANA 2.0 SPS02 using HANA backup/restore. It is not a best practices guide. This process has been tested on our lab systems in the configuration described.

2. Trademarks

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3. Version Changes

Version 1.0: September 6, 2017 – initial version Version 1.1: December 4, 2017 – add scenario for backup from Single-DB source

4. Acknowledgements

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5. Feedback

Please send comments or suggestions for changes to gordonmr@us.ibm.com.



6. Introduction

This paper demonstrates a process to migrate a scale-out HANA V1.0 DB on Intel to a single node HANA 2.0 DB on IBM POWER LE (Little Endian) using HANA backup and recover. When backup/recover can be used, migration from x86 to POWER LE can be faster and simpler than classical migration or SUM DMO.

HANA 2.0 on POWER runs on the Little-Endian SLES12 Operating System. HANA on Intel is also LE. As described in SAP note 1642148 items 44 & 45, a DB backup from x86 HANA 1.0 SPS10 (or later) can be restored to HANA on POWER 2.0.

In addition, per SAP "HANA Recovery" online doc at <u>https://help.sap.com/doc/6b94445c94ae495c83a19646e7c3fd56/2.0.00/en-</u>US/c3c66b63bb571014b3e5ad8618cda1ad.html the source HANA system may be Single-DB or Multi-Tenant.

The source and target DBs must have similar topology - both must also have the same number of indexservers. This does not mean that both source and target must be scale-out systems. In this example, we will consolidate a three node HANA cluster onto a single LPAR with three indexservers. This fulfills the requirement that the topology be the same for source and target.

7. DB Migration Steps

In this example, we will migrate a Netweaver 7.5 DB server from x86 to POWER. The application server is kernel 7.49 on SUSE SLES11 SP4 x86. The source DB server is a three-node scale-out system on HANA 1.0 SPS 12 on SUSE SLES11 SP4 x86.

The target DB will be a single LPAR POWER system on SLES12 SP2 running HANA 2.0 SPS02. The application server will remain on x86 SLES11 SP4.

- Application server atssg140
- Source DB servers atssg141, atssg142, atssg143
- Target (POWER) DB server atssg86

In this paper, we will:

- Verify that the SAP system is supported on HANA 2.0 section 7.1
- Backup Scenario 1 Source is Single Database System section 7.2
- Backup Scenario 2 Source is Multi-Tenant section 7.3
- Install target DB and prepare for restore section 7.4.
- Recover HN1 tenant onto target DB section 7.5
- Update SAP application server and restart SAP instance section 7.6
- (Optional) Reduce number of index servers section 7.7



7.1. Verify that the SAP system is supported on HANA 2.0

Review the SAP PAM (<u>https://support.sap.com/en/release-upgrade-maintenance/product-availability-matrix.html</u>) to confirm that the SAP version (in our case Netweaver 7.5) is supported on HANA 2.0. The PAM also shows the kernel versions that are compatible with both HANA 1.0 and 2.0

P NETWEAVER 7.5							
							Copy Link
General Information Technical Release Information	ation SAF	Software Download Center System Da	ata				
Overview Languages Database Platforms	Operating	Systems JSE Platforms Web Browser F	latforms Web Servers IDE Platforms				
Filters Product Instance	<	Application Server ABAP (ABAP) 8 See SAP note 1786123 for an interpret	Entries lation of database and operating system support.				Export as
Application Server ABAP		Database Version	Operating System	Scope	Status	Valid from	Additional Information
Danak Fillan	~	SAP HANA DATABASE 1.00 Supported until see: Details	LINUX REDHAT EL7/X86_64 64BIT Supported Until 06/30/2024: Details	SAP KERNEL 7.49 64-BIT UNICODE Supported Until 03/31/2019	٠	10/23/2015	Display (4)
• Scope	~	SAP HANA DATABASE 1.00 Supported until see: Details	LINUX SUSE SLES12/X86_64 64BIT Supported Until 10/31/2024: Details	SAP KERNEL 7.49 64-BIT UNICODE Supported Until 03/31/2019	۲	10/23/2015	Display (6)
SAP KERNEL 7.45 64-BIT UNICODE (4)		SAP HANA DATABASE 1.00 Supported until see: Details	LINUX REDHAT EL6/X86_64 64BIT Supported Until 11/30/2020: Details	SAP KERNEL 7.49 64-BIT UNICODE Supported Until 03/31/2019	٠	10/23/2015	Display (8)
Database		SAP HANA DATABASE 1.00 Supported until see: Details	LINUX SUSE SLES11/X86_64 64BIT Supported Until 03/31/2019: Details	SAP KERNEL 7.49 64-BIT UNICODE Supported Until 03/31/2019	۲	10/23/2015	Display (6)
DB2 FOR Z/OS (11)		SAP HANA DATABASE 2.0 Supported until see: Details	LINUX REDHAT EL7/X86_64 64BIT Supported Until 06/30/2024: Details	SAP KERNEL 7.49 64-BIT UNICODE Supported Until 03/31/2019	•	02/09/2017	Display (5)
DB2 LUW 64-BIT (8) DB2/400 (0) MAXDB 64-BIT (4)	=	SAP HANA DATABASE 2.0 Supported until see: Details	LINUX SUSE SLES12/X86_64 64BIT Supported Until 10/31/2024: Details	SAP KERNEL 7.49 64-BIT UNICODE Supported Until 03/31/2019	٠	11/30/2016	Display (6)
MS SQL SERVER X86_64 (0) ORACLE 64-BIT (6)		SAP HANA DATABASE 2.0 Supported until see: Details	LINUX REDHAT EL6/X86_64 64BIT Supported Until 11/30/2020: Details	SAP KERNEL 7.49 64-BIT UNICODE Supported Until 03/31/2019		02/09/2017	Display (9)
SAP ASE FOR BUSINESS SUITE (4) SAP HANA DATABASE (8)		SAP HANA DATABASE 2.0 Supported until see: Details	LINUX SUSE SLES11/X86_64 64BIT Supported Until 03/31/2019: Details	SAP KERNEL 7.49 64-BIT UNICODE Supported Until 03/31/2019	۲	02/09/2017	Display (7)
 Operating System 							
AIX 64 (4) HP-UX ON IA64 (2) LINUX FOR ZSERIES (8) LINUX ON POWER BIG ENDIAN (4) LINUX ON POWER LITTLE ENDIAN (2) LINUX ON POWER LITTLE ENDIAN (2) LINUX ON X86 64 (8)							

Figure 1: SAP PAM for Netweaver 7.5

Figure 1 shows the SAP kernel 7.49 on SLES11 SP4 is supported with HANA 1.0 and HANA 2.0 for Netweaver 7.5.

Confirm in SAP note 2218464 that HANA 2.0 on POWER supports Netweaver 7.5. HANA on POWER support has some limitations that are not contained in the PAM.

22	2218464 - Supported products when running SAP HANA on IBM Power Systems Version 46 from 04/03/2017 in English							
De	escription	Software Components	References \sim	Languages				
	SAP NetWe	aver		7.5, if SAP HANA 1.0 or SAP HANA 2.0 is used 7.4, if SAP HANA 2.0 is used during an upgrade of the SAP NetWeaver system as described in <u>SAP Note 24206</u>	99			

Figure 2: SAP note 2218464

Read SAP note 2399995 to review hardware requirements for HANA 2.0 - POWER 8 is required.

2399995 - Hardware requirement for SAP HANA 2.0 Version 11 from 07/18/2017 in English									
Description	Software Components	Support Package Patches	This document is referenced by \sim	Languages					
Hardware Requirements for SAP HANA 2.0 on IBM Power Servers									
Starting with SAP HANA 2.0 computing nodes with at least IBM POWER8 CPU or later are mandatory.									

Figure 3: SAP note 2399995



Review SAP note 2235581 to check Linux requirements for HANA 2.0 on POWER. We will install SLES for SAP Applications 12 SP2.



Figure 4: SAP note 2235581

7.2. Backup Scenario 1 – Source is Single Database System

The source DB (HN1) is a three-node scale-out system, without a standby node. There are three indexservers, one xsengine and one nameserver.

B HN1 (SYSTEM) atssg141.svl.ibm.com 00										
Overview Landscape Alerts Performance Volumes Configuration System Information Diagnosis Files Trace Configuration										
Show: Service THost: <all></all>										
Service/Volume	Service	Total Volume Size (MB)	Data Volume Size (I	MB)	Log Volu	ume Size (MB)				
> atssg141:30001	nameserver	455		326		129				
> atssg141:30003	indexserver	6,679	4	,629		2,049				
> atssg141:30007	xsengine	341		324		17				
> atssg142:30003	indexserver	9,101	7	,052		2,049				
> atssg143:30003	indexserver	6, 1 45	4	,096		2,049				

Figure 5: Source DB topology

Stop the SAP application servers before backup of the HANA DB.



Backup the entire HANA 1.0 system using the userid SYSTEM. This will back up indexservers, nameserver, and xsengine persistence. The restore will use only the indexserver and xs components, when restoring into the HN1 client of the HANA 2.0 system.

-				
en Systems ⊠			🖹 • 🔛 👬 • 🎟 🖉 🖃 🛬 🗆	~
▶ 🗁 BW4HANA				
BW on X86				
V 🗁 BW on X86 Sin	gle Database			
HN1 (SYS	Configuration and Monitoring			
Catalo	Backup and Recovery	•	Open Backup Console	
E Conter	Security	•	Back Up System	Backup
Securit Extension Nc	Open SQL Console		Manage Storage Snapshot Recover System	
▶ 🧀 HAF ▶ 🗁 HANA 1.0 SF ▶ 🗁 HANA 2.0 SF	SAP HANA Modeler New	*		
HANA Cockp Hana Cockp Higration So	Add System with Different User			
SD on HANA	🔀 Remove	∞		
	Log Off 豹 Refresh	F5		
	Properties	81		

Figure 6: Single DB Backup

The Backup prefix 'SINGLE DB SOURCE" is used to name the files.

Backup Type	Complete Data Backup
Destination Type	File
Backup Destinatio	n
The default destin destination, ensu- you specify an ex-	nation is used unless you specify a different destination. If you specify a new re that the directory already exists. For improved data safety, we recommend that ternal backup destination.
Backup Destinatio	/usr/sap/HN1/HDB00/backup/data
Backup Destinatio Backup Prefix	n /usr/sap/HN1/HDB00/backup/data SINGLE_DB_SOURCE

Figure 7: Single DB Backup Settings

Five volumes are backed up – three indexservers, nameserver, and xs. (See Figure 5: Source DB topology)



Figure 8: Single DB Backup Summary



After the backup is complete, note the files (which will be copied to the target system).

```
[atssg141:/hana/shared/HN1/HDB00/backup/data> 1s -1
total 21137596
-rw=r----- 1 hn1adm sapsys 163840 Dec 4 17:18 SINGLE_DB_SOURCE_databackup_0_1
-rw=r----- 1 hn1adm sapsys 83894272 Dec 4 17:18 SINGLE_DB_SOURCE_databackup_1_1
-rw=r----- 1 hn1adm sapsys 83894272 Dec 4 17:18 SINGLE_DB_SOURCE_databackup_2_1
-rw=r----- 1 hn1adm sapsys 4747960320 Dec 4 17:20 SINGLE_DB_SOURCE_databackup_3_1
-rw=r----- 1 hn1adm sapsys 3741327360 Dec 4 17:20 SINGLE_DB_SOURCE_databackup_4_1
-rw=r----- 1 hn1adm sapsys 3741327360 Dec 4 17:21 SINGLE_DB_SOURCE_databackup_5_1
atssg141:/hana/shared/HN1/HDB00/backup/data>
```

Figure 9: Single DB Backup Files

Since the HANA backup does not copy customization of the ini files, review the contents of the ini files to determine which changes need to be applied on the target system.

```
[atssg141:/hana/shared/HN1/HDB00/backup/data> find /hana -name '*ini'
/hana/global.ini
/hana/shared/HN1/global/hdb/custom/config/global.ini
/hana/shared/HN1/global/hdb/custom/config/memberver.ini
/hana/shared/HN1/global/hdb/custom/config/webdispatcher.ini
/hana/shared/HN1/global/hdb/custom/config/statisticsserver.ini
/hana/shared/HN1/global/hdb/custom/config/indexserver.ini
```

Figure 10: Single DB ini files

7.3. Backup Scenario 2 – Source is Multi-Tenant Database

We will backup the HN1 tenant, which will subsequently be recovered onto HANA 2.0.

The HN1 tenant has persistence for indexservers and xs. The nameserver is part of the SystemDB. Note here that the HN1 SYSTEM userid can display only the HN1 tenant resources.

HN1@HN1 (SYSTEM) atssg141.svl.ibm.com 00											
Overview Landscape Alerts Performance Volumes Configuration System Information Diagnosis Files Trace Configuration											
Show: Service THost: <all></all>											
Service/Volume	Service	Total Volume Size (MB)	Data Volume Size	(MB) Log V	olume Size (MB)	Path					
> atssg141:30003	indexserver	7,358		5,309	2,049						
> atssg141:30007	xsengine	341		324	17						
> atssg142:30003	indexserver	10,977		8,928	2,049						
> atssg143:30003	indexserver	6,513		4,464	2,049						

Figure 11: HN1 tenant DB volumes



Using the SYSTEM ID in SYSTEMDB, backup the tenant.

P₀ Systems 🛛			501 00000	01.sql	sQL Console 1	E III		
IIII ▼ IIII ▼ IIII ▼ III I ▷ ▷ ▷ ERP HANA	•••		No co	onnect	ion to databa	se		
🔺 🗁 scale out MDC on in	ntel		💷 SQL					
Image: Book of the second s	TEM))	sel	.ect * ·	from m_databas	es		
SYSTEMDB@HN	1 / C \	CTENA)				1		
b 🗁 scale-out on intel		Configuration	n and Mo	nitoring	•	ι.		
	69	Lifecycle Mar	nagement	t	•	L		
		Backup and F	Recovery		+		Open Backup Console	
		Security	nsole				Back Up System Database	
	SQL	Open SQL Co					Back Up Tenant Database	
	ъ	SAP HANA M					Recover System Database Recover Tenant Database	
		Add System	with Diffe	rent User	ſ		hecover renant batabase	
	×	Remove			Delete			
		Log Off				ι.		
	\$	Refresh			F5			
		Properties			Alt+Enter			
	_							

Figure 12: Backup tenant DB

Backup of Tenant Database in HN1	-							
Specify tenant database								
type filter text								
V HN1								
? < Back Next >	<u>F</u> inish	Cancel						

Figure 13: Backup select tenant

In Figure 14, note the 'Backup Prefix', which will be used for the restore.

Specify Backup Settings									
specify the internation required for the data backap									
Backup Type	Complete Data Backup 🔻								
Destination Type Fi	ile 🔻								
Backup Destination The default destination is used unless you specify a different destination. If you specify a new destination, ensure that the directory already exists. For improved data safety, we recommend that you specify an external backup destination.									
Backup Destination	/usr/sap/HN1/HDB00/backup/data/DB_HN1								
Backup Prefix	20170707_AFTERMDC								
Backup Prefix 20170707_AFTERMDC i Note that customer-specific changes to the SAP HANA database configuration are not saved as part of the data backup. More Information: SAP HANA Administration Guide									
? < <u>B</u> ack	<u>N</u> ext > <u>Finish</u> Cancel								

Figure 14: Backup destination

atssg141:/hana/shared/HN1/hdblcm> cd /usr/sap/HN1/HDB00/backup/data/DB HN1									
atssg141:/usr/sap/HN1/HDB00/backup/data/DB_HN1> ls -ltr									
total 18943148									
-rw-r	1	hn1adm	sapsys	155648	Aug	24	18:33	20170707_AFTERMDC_databackup_0_1	
-rw-r	1	hn1adm	sapsys	838942	Aug	24	18:33	20170707_AFTERMDC_databackup_2_1	
-rw-r	1	hn1adm	sapsys	4328529920	Aug	24	18:35	20170707 AFTERMDC databackup 3 1	
-rw-r	1	hn1adm	sapsys	3741327360	Aug	24	18:35	20170707 AFTERMDC databackup 4 1	
-rw-r	1	hn1adm	sapsys	7012884480	Aug	24	18:36	20170707 AFTERMDC databackup 5 1	

Figure 15: Backup files

Review the configuration parameters for the system and tenant, to determine which need to be re-applied on the target DB.



Figure 16: Multi-tenant source ini files



7.4. Install target DB and prepare for restore

Install the HANA 2.0 SPS2 HN1 database on the POWER system.



Figure 17: hdblcm

The m_databases view on the target LPAR shows we have HN1 tenant and the system DB installed.

SYSTEMDB@HN1 (SYSTEM) atssg86.svl.ibm.com 00										
SQL	📼 SQL 🗎 Result									
sel	.ect * from m_da	tabases								
	DATABASE_NAME	DESCRIPTION	ACTIVE_STATUS	ACTIVE_STATUS_DETAILS	OS_USER	OS_GROUP	RESTART_MODE			
1	SYSTEMDB	SystemDB-HN1-00	YES				DEFAULT			
2	HN1	HN1-00	YES				DEFAULT			

Figure 18: m_databases on target DB

Check configuration of HN1 tenant. Initially, there is persistence for only one indexserver.

B HN1@HN1 (SYSTEM) atssg86.svl.ibm.com 00								
Overview Landscape Alerts Performance Volumes Configuration System Information Diagnosis Files Trace Configuration								
Show: Service Thost: <all></all>								
Service/Volume	Service	Total Volume Size (MB)	Data Volume Size (N	MB) Log Vo	lume Size (MB)	Path		
> atssg86:30003	indexserver	4,045	1,	,996	2,049			
> atssg86:30007	xsengine	337		320	17			

Figure 19: Volumes on target DB after initial install



The initial indexserver is on SQL port 30015. We note this for later, when we remove added indexservers.

HN	HN1@HN1 (SYSTEM) atssg86.svl.ibm.com 00									
💷 SQ	🚥 SQL 🗎 Result									
se	<pre>select * from m_services</pre>									
	HOST	PORT	SERVICE_NAME	PROCESS_ID	DETAIL	ACTIVE_STATUS	SQL_PORT	COORDINATOR_TYPE		
1	atssg86	30,000	daemon	18,226		YES	0	NONE		
2	atssg86	30,001	nameserver	18,242	master	YES	0	MASTER		
3	atssg86	30,002	preprocessor	18,548		YES	0	NONE		
4	atssg86	30,006	webdispatcher	19,770		YES	0	NONE		
5	atssg86	30,010	compileserver	18,546		YES	0	NONE		
6	atssg86	30,003	indexserver	18,591	master	YES	30,015	MASTER		
7	atssg86	30,007	xsengine	18,593		YES	0	NONE		

Next, we need to create two more indexservers on the target DB server, so that the topology will match the source – one XS volume, and three indexserver volumes.

```
SYSTEMDB@HN1 (SYSTEM) atssg86.svl.ibm.com 00

SQL

alter database HN1 add 'indexserver' ;

alter database HN1 add 'indexserver' ;
```

Figure 20: add indexservers

Now, there are three indexservers on HN1 on the POWER system.

HN1@HN1 (SYSTEM) atssg86.svl.ibm.com 00											
💷 SQL	🚥 SQL 🗎 Result										
sel	<pre>select * from m_services</pre>										
	HOST	PORT	SERVICE_NAME	PROCESS_ID	DETAIL	ACTIVE_STATUS	SQL_PORT	COORDINATOR_TYPE			
1	atssg86	30,000	daemon	18,226		YES	0	NONE			
2	atssg86	30,001	nameserver	18,242	master	YES	0	MASTER			
3	atssg86	30,002	preprocessor	18,548		YES	0	NONE			
4	atssg86	30,006	webdispatcher	19,770		YES	0	NONE			
5	atssg86	30,010	compileserver	18,546		YES	0	NONE			
6	atssg86	30,003	indexserver	18,591	master	YES	30,015	MASTER			
7	atssg86	30,007	xsengine	18,593	3	YES	0	NONE			
8	atssg86	30,040	indexserver	33,961		YES	30,041	SLAVE			
9	atssg86	30,043	indexserver	34,418		YES	30,044	SLAVE			

Figure 21: m_services after adding indexservers



And likewise, there are now volumes on the target DB for three indexservers, and one XS server. The target HN1 tenant topology now matches the source HN1.

B HN1@HN1 (SYSTEM) atssg86.svl.ibm.com 00								
Overview Landscape Alerts Performance Volumes Configuration System Information Diagnosis Files Trace Configuration								
Show: Service THost: <all></all>								
Service	Total Volume Size (MB)	Data Volume Size (MB)	Log Volume Size (MB)	Path				
indexserver	4,385	2,336	2,049					
xsengine	337	320	17					
indexserver	2,561	512	2,049					
indexserver	2,369	320	2,049					
	FEM) atssg s Performance T Ho Service indexserver xsengine indexserver indexserver	atssg86.svl.ibm.com 00 s Performance Volumes Configuration Image: Host: <all> Service Total Volume Size (MB) indexserver 4,385 xsengine 337 indexserver 2,561 indexserver 2,369</all>	r Atssg86.svl.ibm.com 00 s Performance Volumes Configuration System Information Diagr Image: Host: <	Image: Service Total Volume Size (MB) Data Volume Size (MB) Log Volume Size (MB) Service Total Volume Size (MB) Data Volume Size (MB) Log Volume Size (MB) indexserver 4,385 2,336 2,049 xsengine 337 320 17 indexserver 2,561 512 2,049 indexserver 2,369 320 2,049				

Figure 22: Target DB volumes after add indexservers

The target DB is now ready to restore the backup made x86. The restore will move the DB from x86 to POWER, and consolidate three x86 nodes to one LPAR.

7.5. Recover HN1 tenant onto target DB

The recover process is the same, whether the source system is Single DB or Multi-Tenant.

First, backup the HN1 tenant on the target DB. It will be replaced by the recovery operation.

Second, copy the HN1 backup files from the source DB to the target.

atssg86:/tmp # su - hnladm				
hnladm@atssg86:/usr/sap/HN1/HDB00> cd /usr/sap/HN1/HDB00/backup/data/DB HN1				
hnladm@atssg86:/usr/sap/HN1/HDB00/backup/data/DB_HN1> scp atssg141:/usr/sap/HN1/HDB00/backup/data/DB_HN1/2017* .				
The authenticity of host 'atssg141 (9.30.175.141)' can't be established.				
ECDSA key fingerprint is SHA256:uQlRAJ89NWxfnIR8m91XcXAcetH7wyjIuozbPaZBIxI.				
Are you sure you want to continue connecting (yes/no)? yes				
Warning: Permanently added 'atssg141,9.30.175.141' (ECDSA) to the list of known hosts.				
Password:				
20170707_AFTERMDC_databackup_0_1	100%	152KB	152.0KB/s	00:00
20170707_AFTERMDC_databackup_2_1	100%	80MB	40.0MB/s	00:02
20170707_AFTERMDC_databackup_3_1	100읭	4128MB	86.0MB/s	00:48
20170707_AFTERMDC_databackup_4_1	100원	3568MB	81.1MB/s	00:44
20170707_AFTERMDC_databackup_5_1	100원	6688MB	83.6MB/s	01:20

Figure 23: Copy files to target DB



Now, using the SYSTEM userid in the SYSTEMDB, recover the tenant DB.

Po Systems 🛛			💷 000001.sql	*SQL Console	1	SYSTEMDB@HN1	SYSTEM	
I → I → II → ERP HANA	SQL (₿ 🖻 🕏 🔻		DB@HN1 (SYS	БТЕ	M) atssg141.svl.ibm.o	om 00	
b 🗁 scale out MDC on	intel		Version: 1.00.	122.06.1485334242	(fa/	/hana1sp12)		
🛛 🗁 scale-out on intel			Processes Diagr	osis Files Emerge	ocy I	Information		
🔺 🗁 target on HoP			Plage	Iosis Thes Emerger	icy i			
A B SYSTEMDB@HI	N1 (S	SYSTEM)	Host: <all></all>	*	2	¢		
🛎 Backup		Configuration	and Monitoring	•		Description	Process ID	
🖻 🗁 Catalog	وهه	Lifecycle Man	nagement			HDR Daemon	201/	
Content		Backup and R	ecovery	•		Open Backup Console		
Provisioning		Security	nsole odeler			Back Up System Database Back Up Tenant Database		
D Security	SQL	Open SOL Co						
	9 1	CARLIANA				Recover System Database		
	10	SAP HANA M				Recover Tenant Datab	ase	
Add System v Remove		Add System v	vith Different User			HDB XSEngine-HN1	4799	
			Delete		HDB Daemon	3840 I		
				rer	HDB Compileserver	3932 I		
	Defresh					HDB Indexserver-HN1	4019 I	
	<u>ن</u>	Refresh		FD		HDB Nameserver	3856 I	
		Properties		Alt+Enter)r	HDB Preprocessor	3934 I	

Figure 24: Recover DB

Choose the tenant to recover.

Specify tenant database							
			1 Standard				
type filter text							
?	< Back	Next >	Finish	Cancel			

Figure 25: Recover DB tenant

Since we copied the files to the new DB server, we cannot use the catalog for recover. We will specify the location of the files, and which backup set to recover.

Recovery of Tenant Database in HN1	×
Select a recovery type.	
 Recover the database to its most recent state Recover the database to the following point in time 	
Date: 2017-08-24 Time: 13:02:28	=
Select Time Zone: (GMT-07:00) Pacific Daylight Time	
i System Time Used (GMT): 2017-08-24 20:02:28	
Recover the database to a specific data backup	-
Image: Second	

Figure 26: Recover DB type



Select "Specify backup without catalog".

Recovery of Ten	ant Database in HN1	×					
Specify Backup	Location						
Choose whether enter the name a	you want to select a backup from a backup catalog or nd the path of a backup in the next step.						
Select backup	from the backup catalog	-					
Search for t	he catalog in the file system in addition to the default locations						
Specify one in the same most recen	e or more locations for the backup catalog. The backup catalog is stored location as the log backups. If multiple backup catalogs are found, the t backup catalog is used.						
Locations:	Add	Ξ					
	/usr/sap/HN1/HDB00/backup/log/DB_HN1 Remove All						
	Remove						
Search for the catalog in Backint only							
Specify backu	p without catalog	-					
?	< <u>B</u> ack <u>N</u> ext > <u>F</u> inish Cancel						

Figure 27: Recover DB backup location

Specify location where files were copied, and use the same prefix that was used above in Figure 14 when the backup was created.

Recovery of Te	nant Database in HN1							
Specify the Ba	Specify the Backup to Recover							
Specify the back	Specify the backup to be recovered.							
Destination Type: File Locate the Data Backup Specify the destination of the data backup that you want to use to recover the database.								
Location:	/usr/sap/HN1/HDB00/backup/data/DB_HN1							
Backup Prefix:	fix: 20170707_AFTERMDC							
?	< <u>Back Next > Finish Cancel</u>							

Figure 28: Recover DB choose files



Keep the defaults on this screen.

Recovery of Tenant Database in HN1	
Other Settings	
Initialize Log Area If you do not want to recover log segments residing in the log area, select After the recovery, the log entries will be deleted from the log area.	this option.
Use Delta Backups Select this option if you want to perform a recovery using delta backups. If perform a recovery without delta backups, only log backups will be used. Use Delta Backups (Recommended)	f you choose to ≣
Install New License Key If you recover the database from a different system, the old license key will 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	l no longer be
? < <u>Back</u> <u>Next</u> > <u>Einish</u>	Browse Cancel

Figure 29: Recover DB other settings

HANA Studio displays what it is about to do.

Recovery of Tenant Database in HN1		X
Review Recovery Settings		
Review the recovery settings and choose can modify the recovery settings by choo	'Finish' to start the recovery. You sing 'Back'.	
Database Information		
Database:	HN1@HN1	
Host:	atssg86.svl.ibm.com	=
Version:	2.00.020.00.1500920972	
Recovery Definition		
Recovery Type:	Data Backup Recovery	
Data Backup Prefix:	20170707_AFTERMDC	
Data Backup Location:	/usr/sap/HN1/HDB00/backup/data/DB_HN1	-
Show SQL Statement		
? < <u>B</u> ack	<u>N</u> ext > <u>Finish</u> Cancel	

Figure 30: Recover DB settings



Press OK to stop the DB and go on.



Figure 31: Pop-up warning

- 31, 0001 4:00:00 DM CMT, 09:00
C 51, 0001 4:00:00 PM GMT-08:00
3

Figure 32: Recover complete

The HN1 tenant DB has been copied from x86 to POWER.

Shutdown, backup and restart the HANA DB on the target system.



7.6. Update SAP application server and restart SAP instance

Update the HANA client using the HANA 2.0 SPS02 install DVD, so that the application server HANA client matches the DB version.



Figure 33: Update HANA client on application server

The SAP ABAP application server uses the "hdbuserstore" configuration to locate the DB server. This is still pointing to the old scale-out x86 DB server.



Figure 34: Original hdbuserstore LIST configuration

```
We will update hdbuserstore on the application server to point to the new DB server.
USER: SAPABAPI
atssg140:b7zadm 54> hdbuserstore SET DEFAULT atssg86:30015 SAPABAP1 password
```

Start the application server and login to SAP, and we're done. The DB is running on HANA on POWER.

\Xi 🗈 😼 🚖 👼 🗈 🖽 System Configuration 🕨	HN1	SAPABAP1	atssg86	00			
System B7Z	SAP HANA da	SAP HANA database					
SAP HANA database: Database Administration [♥] Current Status ^{Overview} Alerts [●] Performance [●] Configuration [●] Diagnostics [●] Diagnostics [●] Diagnostics [●] Diagnostics [●] Diagnostics [●] Diagnostics [●] Documentation [●] System Information [●] Documentation [●] System Configuration Database Connections DB Connection Monitor Central Calendar Self-Montoring	General Sys Operationa Start Time Start Time Distributed System Us Multitenant Version Buildtime Platform Hardware I	tem Information I State Of First Started Service Of Last Started Service System age database container	COI All services are started 24.08.2017 20:26:14 24.08.2017 20:27:41 No Custom System Yes (SystemID = HN1) 2.00.020.00.1500920972 (fa/hana2sp02) 2017-07-24 20:43:16 SUSE Linux Enterprise Server 12.2 (LINUX_IBM	PPC64LE			

Figure 35: DBACOCKPIT transaction display DB



7.7. (Optional) Reduce number of index servers

Additional changes, such changing table partitioning or changing the number of indexservers, can be implemented now or later. SAP notes 1986612 and 2447887 have information on removing indexservers.

To get the full benefit of changing from a scale-out to scale-up DB server, it can be beneficial to remove extra indexservers after migration so that there is one indexserver, as described in SAP note 2103956. See SAP note 1986612 for the steps to remove an indexserver.

Here, tables and partitions are distributed across all three indexservers.

HN1@HN1 (SAPABAP1) atssg86.svl.ibm.com 00									
🚥 SQL 🕕 Result									
sel	<pre>select count(*), host, port from m_table_locations group by host, port</pre>								
	COUNT(*)	HOST	PORT						
1	9,034	atssg86	30,003						
2	9,032	atssg86	30,043						
3	9,032	atssg86	30,040						

Figure 36: m_table_locations with three indexservers

As described in SAP note 1986612, set the two added indexservers to be inactive, so that tables and partitions will be moved off during reorg. Port 30003 in Figure 36 is the default indexserver.

```
HN1@HN1 (SYSTEM) atssg86.svl.ibm.com 00

SQL Result Result

call SYS.UPDATE_LANDSCAPE_CONFIGURATION('SET REMOVE', 'atssg86:30040');

call SYS.UPDATE_LANDSCAPE_CONFIGURATION('SET REMOVE', 'atssg86:30043');
```

Figure 37: SET REMOVE

Create the reorg job.

```
HN1@HN1 (SYSTEM) atssg86.svl.ibm.com 00

SQL
call REORG_GENERATE(2,'')
```

Figure 38: Create reorg job

Then start it.



HN1@HN1 (SYSTEM) atssg86.svl.ibm.com 00 SQL Result call REORG_EXECUTE(?)

Figure 39: Execute reorg job

Track status of reorg job in HANA Studio, or using the queries in note 1986612.

HN1@HN1 (SYSTEM) atssg86.svl.ibm.com 00		La	st Update	Aug 24, 2017 3:06:13	PM 🗞 🛙	Interval: 60	▼ Se		
Overview Landscape Alexts Performance Volumes Configuration System Information Diagnosis Files Trace Configuration									
Services Redistribution									
Redistribution Operations Executed Operations									
i You are advised to save your current configuration before performing a redistribution	Save	i You can see how tables are distributed in the Table Distribution editor.							
		Start Time	End Time	Durati	Finished (Failed)/All	User	Operation	S	
Redistribute tables after adding host(s)	Execute	8/24/17 10:04 PM		2	17930 (0) / 17950	SYSTEM	Redistribute table		
Optimize Table Distribution									
Optimize Table Partitioning									
ID: 14									

Figure 40: REORG job status

Check status of the reorg. Here, it is finished.

HN1@HN1 (SYSTEM) atssg86.svl.ibm.com 00				Last Upda
Overview Landscape Alerts Serformance Volumes Configuration System Information Diagno	osis Files T	Frace Configurat	on	
Services Redistribution				
Redistribution Operations		Exect	ted Operatio	ns
i You are advised to save your current configuration before performing a redistribution	Save	i Yo	ı can see how	tables are distribut
		ID	Status	Start Time
Redistribute tables after adding host(s)	Execut	te 1	FINISHED	8/24/17 10:04 PM
Optimize Table Distribution				

Figure 41: Reorg is finished

After the reorg has finished, the volume status shows the tables have been removed.

ŀ	HN1@HN1 (SYSTEM) atssg86.svl.ibm.com 00										
SQL	SQL Result Result										
	sele	ct * f	rom m_v	volumes							
	H	HOST	PORT	SERVICE_NAME	VOLUME_ID	SUBPATH	LIVECACHE_STORE	REMOVE_STATUS			
1	а	atssg86	30,007	xsengine	2	mnt00001/hdb00002.00003	NO				
2	a	atssg86	30,003	indexserver	3	mnt00001/hdb00003.00003	SHARED				
3	a	atssg86	30,040	indexserver	NA	mnt00001/hdb00004.00003	NO	REORG FINISHED			
4	a	atssg86	30,043	indexserver	5	mnt00001/hdb00005.00003	NO	REORG FINISHED			

Figure 42: check volume status

Now we can remove the indexservers, which will also remove their volumes.



```
      Image: Solution of the solution
```

Figure 43: Remove the indexservers

Display the volumes for the HN1 tenant. There is now only one indexserver for HN1.



Figure 44: volume status after extra indexservers removed

Rather than using HANA reorg to move all tables off an indexserver, one can move individual tables and partitions using SQL command line.



Figure 45: move partition with SQL

Note that reducing the number of indexservers as done above does not affect the partitioning of tables. Tables that were partitioned on the scale-out configuration will still be partitioned. Partitioning a large table in a single indexserver may improve performance, so it is best to test the performance impact before converting a table from partitioned to unpartitioned.

HN1@HN1 (SAPABAP1) atssg86.svl.ibm.com 00									
Iable Name:									
/BI0/F0D_FI_C01	/BI0/F0D_FI_C01								
Columns Indexes Further Properties Runtime Information									
General									
Total Memory Consumption (K	B): -								
Number of Entries:	Number of Entries: 36,000,000								
Size on Disk (KB):	341,108								
Partition Specification:									
ROUNDROBIN 3; RANGE KEY_	ROUNDROBIN 3; RANGE KEY 0D FI C01P 0,1,2,*								
Details for Table									
Parts Columns									
Host:Port/Partition/Sub-Parti	Part ID	Range	Total Si						
▲ atssg86:30003									
> 1	1, 2, 3, 4								
> 2	5, 6, 7, 8								
> 3	9, 10, 11, 12								

Figure 46: Partitioned table on single indexserver

8. Summary

Our goal for this paper was to demonstrate the recently available backup-based migration process to HANA on POWER. For systems where the SAP software version supports HANA 1.0 on x86 and HANA 2.0 on POWER, this can offer a fast and simple DB migration path to HANA on POWER.

The key steps were:

- convert the source DB to multi-tenant
- backup tenant on source x86 HANA DB
- install HANA on POWER
- add HANA server processes (e.g. indexservers) on POWER to match x86 topology
- restore tenant into HANA DB on POWER
- (optional) remove HANA on POWER server processes added to match source system topology.