SAP HANA Restore Guide
(for Ivy-Bridge Model)
for SLES11

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SAP Global Competence Center

<table>
<thead>
<tr>
<th>Revision Record</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014/05/23</td>
</tr>
<tr>
<td>2014/12/03</td>
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</tbody>
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Preparation

1.1. **Objective of this document**

This document describes a restore procedure of a HANA system from a full backup media.

1.2. **Assumptions**
- SAP HANA should be SPS08.
- Backup data has been taken SUSE Linux Enterprise Server 11 for SAP Applications SP3.
- Backup data should be saved on a USB memory storage.

1.3. **Scope**
This procedure can be applied to any single node server.

2. **Planning**

2.1. **SAP HANA data allocation**
This chapter describes the disk and filesystem layout.

2.1.1. **Appliances up to 1TB**

All data except those on devices “/dev/sda2” and “/dev/sda3” in the following table will be restored.

<table>
<thead>
<tr>
<th>H/W RAID</th>
<th>amount</th>
<th>Device/File name</th>
<th>Partition name</th>
<th>Software RAID</th>
<th>File system</th>
<th>amount</th>
<th>Usage</th>
<th>Mount point</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAID5</td>
<td>650GB</td>
<td>/dev/sda</td>
<td>/dev/sda1</td>
<td>ext3</td>
<td>300GB</td>
<td>OS/AP</td>
<td>/</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>/dev/sda2</td>
<td>swap</td>
<td>50GB</td>
<td>SWAP</td>
<td>(swap)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>/dev/sda3</td>
<td>ext3</td>
<td>300GB</td>
<td>Backup</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4TB</td>
<td>/dev/sdb</td>
<td>/dev/sdb1</td>
<td>xfs</td>
<td>4TB</td>
<td>HANA Data and Shared</td>
<td>/hana/disk</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1TB</td>
<td>/dev/sdc</td>
<td>/dev/sdc1</td>
<td>xfs</td>
<td>1TB</td>
<td>HANA Log</td>
<td>/hana/log</td>
<td></td>
</tr>
</tbody>
</table>
2.1.2.  2TB appliance

All data except those on devices "/dev/sda2" and "/dev/sda3" in the following table will be restored.

<table>
<thead>
<tr>
<th></th>
<th>HW RAID</th>
<th>Size</th>
<th>Device</th>
<th>Partition name</th>
<th>File system</th>
<th>Size</th>
<th>Usage</th>
<th>Mount point</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal disks</td>
<td>6</td>
<td>1800GB</td>
<td>/dev/sda</td>
<td>/dev/sda1</td>
<td>ext3</td>
<td>1,4TB</td>
<td>OS/AP</td>
<td>/</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>/dev/sda2</td>
<td>swap</td>
<td>50GB</td>
<td>SWAP (SWAP)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>/dev/sda3</td>
<td>ext3</td>
<td>300GB</td>
<td>BACKUP</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2,1TB</td>
<td>/dev/sdb</td>
<td>/dev/sdb1</td>
<td>xfs</td>
<td>2,1TB</td>
<td>Shared</td>
<td>/hana/shared</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1,2TB</td>
<td>/dev/sdc</td>
<td>/dev/sdc1</td>
<td>xfs</td>
<td>1,2TB</td>
<td>Log</td>
<td>/hana/log</td>
</tr>
<tr>
<td>External disks</td>
<td>60</td>
<td>6,5TB</td>
<td>/dev/sdd</td>
<td>/dev/sdd1</td>
<td>xfs</td>
<td>6,5TB</td>
<td>Data</td>
<td>/hana/data</td>
</tr>
</tbody>
</table>

2.2. Overview

The restore procedure exists of the following 4 phases:

1. Boot up to the rescue mode.
2. Read-write mount each volume.
3. Restore each volume with the tar command.
4. Reboot server and start SAP HANA.

Note: it is possible to restore directly from external media, but you should copy backup data files to local disks in order to reduce restore time.
3. Restore Procedure

3.1. Before you start

Before you proceed with the restore please confirm that you have these media as below.

- “SUSE Linux Enterprise Server 11 SP3 for SAP applications” DVD
  You can download from the official SUSE website.
  https://www.suse.com/products/sles-for-sap/
- The media which has backup data.
  (In this document it is assumed to be an USB memory)

3.2. Restore all volumes

3.2.1. Boot to rescue mode

Start your NEC SAP HANA appliance with the rescue mode:

① Insert the "SUSE Linux 11 Enterprise Server for SAP applications" media and boot from DVD.
  Note: Make sure that USB device is not mounted at this time.

② Select “Rescue System” at the boot menu
③ Login as a “root” user.

3.2.2. Copy backup data

① Connect the USB media with the backup data to the server.
As soon as the system is running in the rescue mode please connect the USB storage to your SAP HANA server.

② Open the Terminal console and confirm whether USB memory has been detected by typing “dmesg”.

```bash
[ 96.121558] sd 5:0:0:0: [sdf] 7903232 512-byte logical blocks: (1.01 GB, 3.76 GB)
[ 96.121558] sd 5:0:0:0: [sdf] Write Protect is off
[ 96.121554] sd 5:0:0:0: [sdf] Mode Sense: 23 00 00 00
[ 96.121558] sd 5:0:0:0: [sdf] Assuming drive cache: write through
[ 96.121559] sd 5:0:0:0: [sdf] Assuming drive cache: write through
[ 96.12549] usb-storage: device scan complete
[ 96.123675] sd 5:0:0:0: [sdf] Assuming drive cache: write through
[ 96.123581] sdf: sdf1
[ 96.12542] sd 5:0:0:0: [sdf] Assuming drive cache: write through
[ 96.125345] sd 5:0:0:0: [sdf] attached SCSI removable disk
```

In this example the USB memory has been detected as “sdf”.

③ Create a temporary mount point to attach the USB memory:

```bash
mkdir /tmp/usbdevice
```

④ Mount the USB memory to the temporary mount:

```bash
mount /dev/sdf1 /tmp/usbdevice
```

⑤ Create a temporary mount point to store the backup:

```bash
mkdir /tmp/backup
```

⑥ Mount the backup data partition to the temporary mount:

```bash
mount -o rw /dev/sdc3 /tmp/backup
```

⑦ Verify that the backup data files exist in the correct directory:

```bash
ls -l /tmp/usbdevice
```
```
• hana-root.tar.gz
• hana-log.tar.gz
```
For up to 1TB there should be additionally:
- hana-disk.tar.gz

For 2TB there should be additionally:
- hana-shared.tar.gz
- hana-data.tar.gz

⑧ Copy all tar files to the backup data device to speed up the restore process.

    cp /tmp/usbdevice/hana-*.tar.gz /tmp/backup/

3.2.3. Restore
This chapter describes the restore procedure of the different partitions.

① Create a temporary mount point for every device:

    mkdir /tmp/osmount
    mkdir /tmp/logmount

    For up to 1TB additionally:
    mkdir /tmp/diskmount

    For 2TB additionally:
    mkdir /tmp/datamount
    mkdir /tmp/sharedmount

② For up to 1TB:
Format the following partitions OS/AP (/dev/sda1), HANA data (/dev/sdb1), HANA log
(/dev/sdc1) with the appropriate filesystem and create a swap partition:

    mkfs.ext3 /dev/sda1 -L HANA_ROOT
    mkswap /dev/sda2
    mkfs.xfs -f /dev/sdb1 -d sunit=2048,swidth=14336,agcount=51
             -L HANA_DISK
    mkfs.xfs -f /dev/sdc1 -L HANA_LOG
For 2TB:
Format the following partitions OS/AP (/dev/sda1), HANA shared (/dev/sdb1), HANA log (/dev/sdc1) and HANA data (/dev/sdd1) with the appropriate filesystem and create a swap partition:

```
mkfs.ext3 /dev/sda1 -L HANA_ROOT
mkswap /dev/sda2
mkfs.xfs -f /dev/sdb1 -L HANA_SHARED
mkfs.xfs -f /dev/sdc1 -d sunit=64,swidth=384,agcount=51 -L HANA_LOG
mkfs.xfs -f /dev/sdd1 -d sunit=2048,swidth=24576,agcount=51 -L HANA_DATA
```

③ Mount all devices to their relevant mount point:

```
mount -o rw /dev/sda1 /tmp/osmount
mount -o rw /dev/sdc1 /tmp/logmount
```

For up to 1TB additionally:
```
mount -o rw /dev/sdb1 /tmp/diskmount
```

For 2TB additionally:
```
mount -o rw /dev/sdd1 /tmp/datamount
mount -o rw /dev/sdb1 /tmp/sharedmount
```

④ Change the current directory to “/tmp/osmount” and restore the OS/AP partition:
```
    cd /tmp/osmount
    tar -zxvf /tmp/backup/hana-root.tar.gz
```

⑤ Verify if the last operation was successful. The following command should give you a “0”.
```
echo $?
```

⑥ For up to 1TB only:
Change the current directory to “/tmp/diskmount” and restore the partition for HANA data and shared:
```
    cd /tmp/diskmount
    tar -zxvf /tmp/backup/hana-disk.tar.gz
```

For 2TB only:
Change the current directory to “/tmp/datamount” and restore the partition for HANA data:
Verify if the last operation was successful. The following command should give you a “0”.
```
echo $?
```

For 2TB only:
Change the current directory to “/tmp/sharedmount” and restore the partition for HANA shared:
```
cd /tmp/sharedmount
tar -zxvf /tmp/backup/hana-shared.tar.gz
```
Verify if the last operation was successful. The following command should give you a “0”.
```
echo $?
```
Change the current directory to “/tmp/log” and restore the HANA log partition:
```
cd /tmp/log
tar -zxvf /tmp/backup/hana-log.tar.gz
```
Verify if the last operation was successful. The following command should give you a “0”.
```
echo $?
```

### 3.2.4. Reboot and HANA startup
After the recovery finished you will restart your NEC HANA appliance and start HANA in this chapter.

① Reboot your server by typing
```
shutdown -r now
```
② Remove all DVD / USB medias used in the previous steps before the bios boots up.
③ Login to the OS, open a terminal and change to /usr/sap/hostctrl/exe/:
```
 cd /usr/sap/hostctrl/exe
```
④ Start your HANA instance and verify the command output is “OK”:
```
./sapcontrol -nr <instance no> -function Start
```
Run this command and check its output says “OK” and all listed processes have the status "Green". If some are still “Initializing”, wait a while and issue the same command again:

```bash
./sapcontrol -nr <instance no> -function GetProcessList
```

```
mechan01:/usr/sap/hostctrl/exe # ./sapcontrol -nr 00 -function GetProcessList
22.08.2012 10:34:08
GetProcessList
OK
name, description, dispstatus, textstatus, starttime, elapsedtime, pid
hdbdaemon, HDB Daemon, GREEN, Running, 2012 08 22 10:33:17, 0:00:51, 36340
hdbnameserver, HDB Nameserver, GREEN, Running, 2012 08 22 10:33:19, 0:00:49, 36372
hdbpreprocessor, HDB Preprocessor, GREEN, Running, 2012 08 22 10:33:20, 0:00:39, 36466
hdbindexserver, HDB Indexserver, GREEN, Running, 2012 08 22 10:33:32, 0:00:35, 36465
hdbstatisticsserver, HDB Statisticsserver, GREEN, Running, 2012 08 22 10:33:33, 0:00:35, 36453
hdbxengine, HDB XSEngine, GREEN, Running, 2012 08 22 10:33:34, 0:00:34, 36512
sapwebdisp_hdb, SAP WebDispatcher, GREEN, Running, 2012 08 22 10:33:50, 0:00:18, 37447
```