How to Configure Hardware Platforms for SUSE Linux Enterprise Server

All Countries

Typographic Conventions

Type Style	Description
Example	Words or characters quoted from the screen. These include field names, screen titles, pushbuttons labels, menu names, menu paths, and menu options. Textual cross-references to other documents.
Example	Emphasized words or expressions.
EXAMPLE	Technical names of system objects. These include report names, program names, transaction codes, table names, and key concepts of a programming language when they are surrounded by body text, for example, SELECT and INCLUDE.
Example	Output on the screen. This includes file and directory names and their paths, messages, names of variables and parameters, source text, and names of installation, upgrade and database tools.
Example	Exact user entry. These are words or characters that you enter in the system exactly as they appear in the documentation.
<Example>	Variable user entry. Angle brackets indicate that you replace these words and characters with appropriate entries to make entries in the system.
EXAMPLE	Keys on the keyboard, for example, F2 or ENTER.

Document History

Version	Date	Change
1.0	2014-04-14	First version
1.1	2014-05-05	Huawei servers certified for use with SAP Business One products powered by SAP HANA
1.2	2014-07-28	IBM configuration changes
1.3	2014-12-02	• Add configurations for Dell R920 and IBM x3850 X6 • Update Fujitsu configuration from RAID 1/RAID 0 to RAID 5
1.4	2015-03-06	• Add configurations for Dell R630, T630, R730, and T730 • Increase the Dell boot partition to 53 GB
1.4.1	2015-03-31	Increase the boot partition of all models to 53 GB
1.4.2	2015-05-04	Correct the instructions for Dell R630/T630/R730/T730: One disk must be reserved for hot spares.
1.5.1	2015-07-03	• Add configurations for Fujitsu Primergy RX 2540 M1, RX2560 M1, TX2560 M1 • Remove references to Fujitsu pre-installation
1.5.2	2015-08-24	• Add configurations for Dell R630, T60, R730, and T730 • Add configurations for HPE ProLiant DL360/DL380/ML350 Gen9
1.5.3	2015-11-16	• Add configurations for System x AND Lenovo ThinkServer • Merge IBM and Lenovo chapters
1.5.4	2016-04-26	• Add Dell R930 configuration • Add Lenovo x3550 M5 configuration
1.5.5	2016-11-11	• Update for Broadwell configurations (Fujitsu , Dell, Lenovo) • Restructure Lenovo chapter
1.5.6	2017-04-08	• Change HPE power management settings
1.5.7	2018-04-10	Add reference to hardware configurations for Huawei servers
1.5.8	2018-08-15	Add configurations for HPE ProLiant DL360 Gen10 servers
1.5.9	2018-09-10	Add configurations for Dell PowerEdge R640, T640, R740, R740xd and R940

Table of Contents

1   Introduction

The SAP HANA database for SAP Business One products (SAP Business One, version for SAP HANA and SAP Business One analytics powered by SAP HANA) runs on SUSE Linux Enterprise Server (SLES). The following vendors are certified to provide server hardware for SLES:

- Lenovo (formerly IBM)
- HPE
- Dell
- Fujitsu
- Huawei

For details on the certified configurations, please consult the Certified SAP HANA Hardware Directory and filter for appliance type "SAP Business One".

When configuring your hardware platform, you can refer to the instructions in the section corresponding to your hardware vendor.

> ⚠ Caution
>
> Deviations from the documented and certified RAID configurations that change (reduce) the storage capacity or I/O characteristics are not allowed. Adding extra hot spare disks is allowed because it does not affect the storage size or the I/O performance.

2   Lenovo (Formerly IBM) Servers

2.1   Defining BIOS Settings

Follow the procedure below to optimize the server performance based on the included table:

1. In the UEFI/BIOS, select System Settings.
2. Select the appropriate Subsection, Setting and Value from the table below.
   - o Pay attention to the platform for which the parameter applies.

Subsection	Setting	Value	Platform
Operating Modes	Choose Operating Mode	`Performance Mode`	Sandy Bridge (S)
Operating Modes	Choose Operating Mode	`Custom Mode`	Haswell (H), Broadwell (B)
Operating Modes	Hyper Threading	`Enable`	S
Processors	QPI Speed	`Max Performance`	S
Memory	Memory Mode	`Independent`	H,B
Memory	Memory Speed	`Max Performance`	H,B
Memory	Memory Power Management	`Automatic`	H,B
Memory	Patrol Scrub	`Enable`	S,H,B
Processors	Processor Performance States	`Enable`	H
Processors	CPU P-state Control	`None`	B (E5 processors)
Processors	CPU P-State Control	`Legacy`	B (E7 processors)
Processors	C1 Enhanced Mode	`Disable`	H,B
Processors	QPI Link Frequency	`Max Performance`	H,B
Processors	Turbo Mode	`Enable`	H,B
Processors	CPU States	`Enable`	H
Processors	C-States	`Legacy`	B
Processors	Package ACPI C-State Limit	`ACPI C3`	H,B
Power	Power/Performance Bias	`Platform Controlled`	H,B
Power	Platform Controlled Type	`Max Performance`	H,B

3. Choose ESC to return to the settings menu. Continue with the remaining parameters.

4. Choose ESC to return to the main menu.

2.2 Configuring Storage

> ⚠️ Caution
>
> Proper RAID configuration with one virtual device and two virtual drives per system is vital for successful SAP software installations.

Lenovo System x3650 M5, x3550 M5 based on Intel V4 Family (Broadwell)

The servers based on the Intel Xeon v4 (Broadwell) family of processors are configured with an all flash or hybrid storage layout. The all flash design is equipped with a set of enterprise solid state disks (SSD) drive technology. The hybrid design used SSD disks to improve the performance of the classical spinning disk (HDD) technology. Both designs will store all SAP HANA shared file systems, including data, log and shared. There is no external storage attached.

The all flash design provides a hardware-based RAID virtual device with two virtual drives for the operating system and for SAP HANA. The hybrid design uses a hardware-based caching mechanism based on ServeRAID CacheCade technology.

SAP Business One, version for SAP HANA now allows a flexible storage configuration. The values given in the tables below are the starting configurations. You may use up to a total of 8 disks (SSD and HDD included) to provide enough space for installation of your SAP Business One, version for SAP HANA. The installation by SUSE Linux Enterprise Server assumes that you have two drives available for a single operating system image.

Feature on Demand Activation

To be able to configure the RAID adapters correctly, some Feature on Demand (FoD) keys need to be installed and activated before continuing. It is possible that they are already activated when shipped.

* ServeRAID M5100/M5200 Series Performance Key for Lenovo System x (required for all solutions)
* ServeRAID M5100/M5200 Series SSD Caching Enabler for Lenovo System x (required for hybrid solution)

The necessary documentation was shipped with the servers to the customer. You can activate the FoD keys via the IMM. After a login to the IMM, go to IMM Management > Activation Key Management to install and activate the FoD keys.

What follows are the storage configurations based on SAP Business One user count and Memory configurations servers based on these designs.
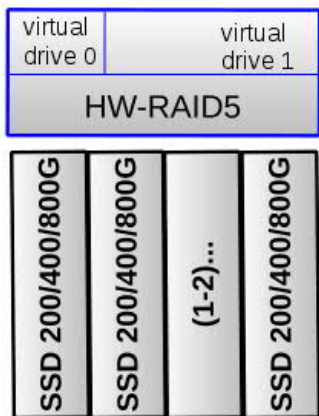
System x M5 All Flash Intel Xeon Broadwell EP Models							
B1 Users	25	50	75	100	150	200	250
Memory	64	128	192	256	384	512	768
SSD3	4 × 200GB SSD	4 × 200GB SSD	5 × 200GB SSD	5 × 400GB SSD	4 × 800GB SSD	4 × 800GB SSD	2 × 3.84TB SSD

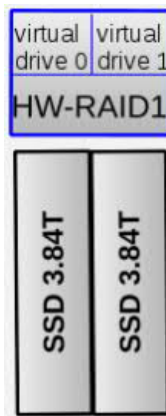| System x M5 Cached Spinning Disk Intel Xeon Broadwell EP Models							
B1 Users	25	50	75	100	150	200	250
Memory	64	128	192	256	384	512	768
HDD	3 × 1.2TB HDD	3 × 1.2TB HDD	3 × 1.2TB HDD	3 × 1.2TB HDD	5 × 1.2TB HDD	5 × 1.2TB HDD	5 × 1.2TB HDD
SSD	2 × 200GB SSD	2 × 200GB SSD	2 × 200GB SSD	2 × 200GB SSD	2 × 200GB SSD	2 × 200GB SSD	2 × 200GB SSD

System x X6 All Flash Intel Xeon Broadwell EX Models							
B1 Users	50	75	100	150	200	250	300
Memory	128	192	256	384	512	768	1024
SSD3	4 × 200GB SSD	5 × 200GB SSD	5 × 400GB SSD	4 × 800GB SSD	4 × 800GB SSD	2 × 3.84TB SSD	2 × 3.84TB SSD

System x X6 Cached Spinning Disk Intel Xeon Broadwell EX Models							
B1 Users	50	75	100	150	200	250	300
Memory	128	192	256	384	512	768	1024
HDD	6 × 1.2TB HDD	6 × 1.2TB HDD	6 × 1.2TB HDD	6 × 1.2TB HDD	6 × 1.2TB HDD	6 × 1.2TB HDD	6 × 1.2TB HDD
SSD	2 × 200GB SSD	2 × 200GB SSD	2 × 200GB SSD	2 × 200GB SSD	2 × 200GB SSD	2 × 200GB SSD	2 × 200GB SSD

RAID configuration for System x M5 and X6 all flash storage

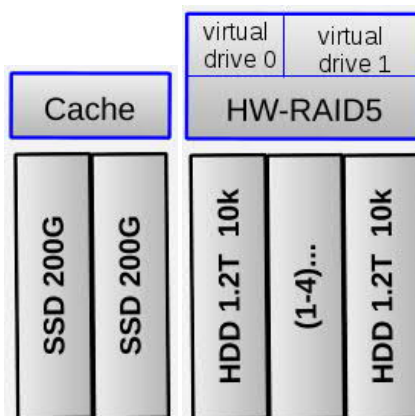How to Configure Hardware Platforms for SUSE Linux Enterprise Server
Lenovo (Formerly IBM) Servers

RAID configuration for System x M5 and X6 (Broadwell) with cached spinning disk storage

Lenovo System x3650 M5, x3550 M5, x3500 M5 and ThinkServer RD650, RD550 based on Intel V3 Family (Haswell)
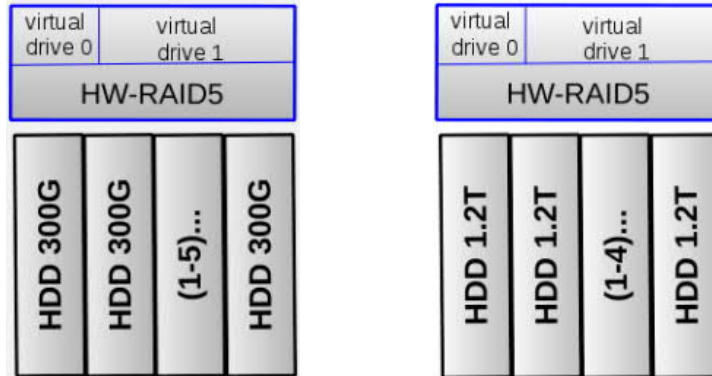
The servers based on the Intel Xeon v3 (Haswell) family of processors are equipped with a set of 10k SAS HDD spinning drive technology. These internal HDDs will store all SAP HANA shared file systems, including data, log and shared. There is no external storage attached.

What follows are the storage configurations based on SAP Business One user count and Memory configurations servers based on these designs.

System x M5 & ThinkServer Spinning Disk Intel Haswell EP Models					
Model	64	128	256	384	512
HDD Option 1	4 × 300GB HDD	4 × 300GB HDD	6 × 300GB HDD	8 × 300GB HDD	8 × 300GB HDD
HDD Option 2	4 × 1.2TB HDD	4 × 1.2TB HDD	4 × 1.2TB HDD	4 × 1.2TB HDD	4 × 1.2TB HDD

System x X6 Spinning Disk Intel Xeon Haswell EX Models						
Model	128	256	384	512	768	1024
HDD	5 × 1.2TB HDD	5 × 1.2TB HDD	5 × 1.2TB HDD	5 × 1.2TB HDD	7 × 1.2TB HDD	7 × 1.2TB HDD

RAID configuration for System x M5 and X6 (Haswell) with HDD storage


IBM System x3650 M4, x3550 M4 and x3500 M4 based on Intel Xeon E5-2670 Processors (Sandy Bridge)

The servers based on the Intel Xeon E5 (Sandy Bridge) processors are equipped with 120-GB or 240-GB Enterprise Entry SSD drives. These internal SSDs will store all SAP HANA file systems, including data, log and shared. There is no external storage.

What follows are the storage configurations based on SAP Business One user count and Memory configurations servers based on these designs.

SSD Disk Intel Xeon Sandy Bridge EP Models				
Model	64	96	128	256
SSD	8 × 120GB	8 × 120GB	8 × 120GB	8 × 240GB

RAID configuration for System x M4 (Sandy Bridge) with SSD storage
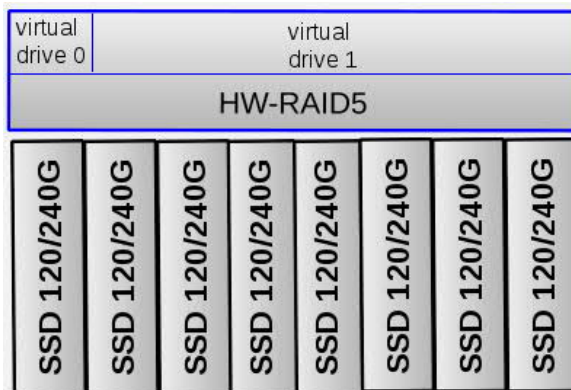
Lenovo Cache Setup of ServeRAID M5210 for Lenovo Servers

If you plan to configure a hybrid storage layout for the Lenovo System x M5 or X6 systems based on Intel Xeon Broadwell processors, configure first the ServeRAID CacheCade settings of the ServeRAID M5210 adapter as follows:

1. In the UEFI/BIOS, select the following menu entries depending on the server model:
2. System x:
   - o Select System Settings
   - o Select Adapters and UEFI Drivers (or Storage)
     - o Select the LSI MegaRAID <ServeRAID M5210> adapter attached to the storage to be configured
3. Select Main Menu
4. Select Configuration Management
5. If an existing configuration exists, select Clear Configuration to delete it
6. Select Save Configuration and then Confirm [X]
7. Select Yes and then OK
8. Select Configuration Management
9. Select Create CacheCade Virtual Drive
10. Select RAID Level: **RAID1**
11. Select Write Cache Policy: **Write Back**
12. Select the two listed SSD drives using Check All
13. Select Create CacheCade Virtual Drive
14. To confirm your selection, select OK
15. Select Save Configuration and then Confirm [X]
16. Select Yes and then OK
17. Exit the configuration management
18. Now begin to configure the storage setup below

Lenovo Storage Setup for ServeRAID M5210 / AnyRAID 720i(x) Adapters for Lenovo and IBM Servers

To configure the RAID settings of the ServeRAID M5210 and AnyRAID 720i(x) RAID controllers, proceed as follows:

1. In the UEFI/BIOS, select the following menu entries depending on the server model:
   System x:
   - o Select System Settings
   - o Select Adapters and UEFI Drivers (or Storage)
     - o Select the LSI MegaRAID <ServeRAID M5210> adapter attached to the storage to be configured
   - o Select Main Menu
   ThinkServer:
   - o Select Boot Manager
   - o Select Adapters and UEFI Drivers
     - o Select the LSI EFI SAS Driver adapter attached to the storage to be configured
2. Select Configuration Management
3. If an existing configuration exists, select Clear Configuration to delete it

4. Select Create Virtual Drive

5. Select the appropriate RAID Level:

    o RAID1 for 3.84 TB Enterprise Capacity drives (Intel Xeon Broadwell all flash configurations)

    o RAID5 for all other configurations

6. Select Drives From: Unconfigured CapacityMake sure that the following properties are selected for the virtual drives:

    o Virtual Drive Size: `53 GB`

    o Stripe Size: `256 KB`

    o Read Policy: `Read Ahead`

    o Write Policy: `Write Back`

    o I/O Policy: `Cached`

    o Access Policy: `Read/Write`

    o Drive Cache: `Enable`

    o Disable Background: `No`

7. Select Drives

8. Select Check All

9. Select Apply Changes

10. To confirm your selection, select OK

11. Save the Configuration

    o System x: Select Save Configuration and then Confirm [X]

    o ThinkServer: Select Confirm [Enabled]

12. Select Yes and then OK

13. To add the second virtual drive, select Create Virtual Drive

14. Select RAID Level: RAID5

15. Select Drives From: Free Capacity

16. System x: Select Drive Group 0: RAID5 [X]

    ThinkServer: Select Drive Group 0: RAID5 [Enabled]

17. Make sure that the following properties are selected for the virtual drives:

    o Virtual Drive Size: `remaining capacity`

    o Stripe Size: `64 KB`

    o Read Policy: `Read Ahead`

    o Write Policy: `Write Back`

    o I/O Policy: `Cached`

    o Access Policy: `Read/Write`

    o Drive Cache: `Enable`

    o Disable Background: `No`

18. Select Apply Changes and then OK

19. Select Save Configuration

20. System x: Select Confirm [X] , then Yes, then OK

    ThinkServer: Select Confirm [Enabled], then Yes, then OK

21. If using the ServeRAID CacheCade Virtual Drive to improve HDD performance:
    Select Virtual Drive Operations

    1. Select Virtual Drive to be used for the SAP HANA partition (with remaining capacity)

    2. Select the Operation Enable SSD Caching

    3. Select Go and then OK

22. While the virtual drives are being initialized in the background, the installation can proceed

23. Exit the configuration management

24. Exit UEFI/BIOS with "Y" to save, and continue with booting the server

IBM Storage Setup for ServeRAID M5110 Adapters on IBM System x M4 servers

To configure the ServeRAID settings of the M5110 RAID controller, proceed as follows:

1. In the UEFI/BIOS, select System Settings

2. Select Adapters and UEFI Drivers

3. Select LSI EFI SAS Driver in the list

4. Select WebBIOS

5. One RAID controller has already been selected. Keep the selection and choose Start

6. Select Configuration Wizard

7. Select New Configuration

8. Select Yes to clear the existing configuration

9. Select Manual Configuration

10. Select Redundancy when possible

11. Select Drive Security Method: No Encryption

12. Select Data Protection: Disabled

13. For the IBM x3500 M4 / x3550 M4 model with 128-GB RAM, select all 8 drives (slots 0-7), and then select Add to Array

    For the IBM x3500 M4 / x3550 M4 model with 256-GB RAM, select all 13 128-GB drives (slots 0-12) or all 8 240-GB drives (slots 0-7), and then select Add to Array

14. Select Accept DG

15. Select Next

16. Select Add to Span

17. Select Next

18. Specify the capacity (`53 GB`) for the first virtual drive. This drive will be used for the operating system and swap space

19. Select Accept

20. Select Yes for Write Back with BBU mode

21. Select Back to configure the next virtual drive

22. Select Add to Span

23. Select Next

24. Select Update Size

25. Allocate the remaining capacity to the second virtual drive. This drive will be used for storing the SAP application data

26. Select Accept

27. Select Yes for Write Back with BBU mode

28. Select Next

29. Select Accept

30. Select Yes to save the configuration

31. Select Cancel for SSD Caching

32. Select Yes to initialize the virtual drives

33. Make sure that the following properties are selected for the virtual drives:

    o RAID Level:**5**

    o Stripe Size: **128 KB**

    o Access: **RW**

    o Read: **Always Read Ahead**

    o Default Write: **Write Back with BBU**

    o Disable BGI: **No**

    o I/O:**Direct**

    o Disk Cache: **Unchanged**

    o Advanced Properties, SSD Cache: **Disable**

34. While the virtual drives are being initialized in the background, the installation can proceed

35. Exit WebBIOS

36. Exit UEFI/BIOS with "**Y**" to save, and continue with booting the server

3 HPE Servers

3.1 Defining BIOS Settings

HPE ProLiant ML350p Gen8 and DL360/DL380/ML350 Gen9

1. Disable ASR by choosing Server Availability → ASR Status → Disabled.
2. Set the power profile to "OS Controlled" by choosing Power Management → Power Profile → Custom, then select Power Regulator → OS Controlled Mode.

HPE ProLiant DL360 Gen10

HPE recommends the following BIOS settings:

Workload Profile: General Peak Frequency Compute

ASR status: Disabled

Processor_x2APIC_Support: Disabled

Intel VT: Disabled

Intel VT-d: Disabled

SR-IOV: Disabled

Boot Mode: UEFI Mode

Power Regulator: Static High Performance Mode

Energy/Performance Bias: Maximum Performance

> **i** Note
>
> Make sure you have installed the latest firmware for BIOS, the Smart Array controller, network cards, and hard drives.

For more information, see the user guide for HPE ProLiant Gen10 servers:

http://h20566.www2.hpe.com/hpsc/doc/public/display?sp4ts.oid=1009955118&docLocale=en_US&docId=emr_na-a00016407en_us.

3.2 Configuring Storage

HPE ProLiant ML350p Gen8 and DL360/DL380/ML350 Gen9

The ProLiant ML350p Gen8 model for SAP HANA is equipped with a Smart Array P420 RAID controller and 8 x 300 GB HDDs, which store both the SAP HANA log and the data.

The ProLiant DL360/DL380/ML350 Gen9 model for SAP HANA is equipped with a Smart Array P440ar RAID controller and 8 x 600 GB HDDs, which store both the SAP HANA log and the data.
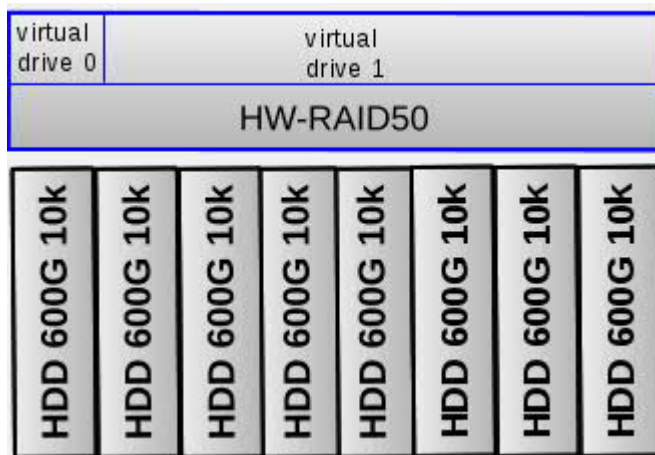
There is no external storage.

Once the system is installed, there is a hardware-based RAID50 with two virtual disks for the operating system and for SAP HANA.

Configuration for ProLiant ML350p Gen8, 300-GB memory, 8 HDDs
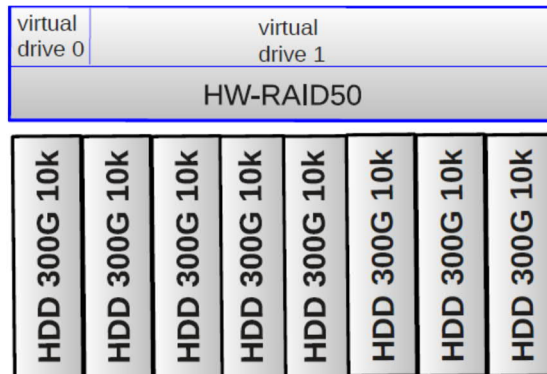
Configuration for ProLiant DL360/DL380/ML350 Gen9, 600-GB memory, 8 HDDs

To configure the Smart Array P420 (or P440ar) RAID controller, proceed as follows:

⚠️ Caution

Proper RAID configuration with two virtual drives is vital for successful SAP software installations.

1. Boot the machine.
2. During the boot process, press F5 to enter the Array Configuration Utility (ACU).
3. Select Smart Array P420 in slot x.
4. Select Create Array.
5. Select all 8 drives.
6. Select OK.
7. Select Create Logical Drive (or Create Array).

8. Specify the properties as follows:
   - o Fault Tolerance (or RAID Level): **RAID50**
   - o NPG:**2**
   - o Stripe Size:**256 KB**
   - o Sectors/Tracks:**32**
   - o Size: **Other** (or **Custom Size**) → **53 GB**
   - o Caching: **Enabled**
9. Select Save (or Create Logical Drive). This drive will be used for the operating system and swap space.
10. Create a second drive by repeating steps 6 to 8 and choosing **Max Size** for Size.

   This drive will be used for the SAP application data.
11. Select Exit ACU (or Finish).
12. Reboot the machine.

HPE ProLiant DL360 Gen10

The ProLiant DL360 Gen10 model for SAP HANA is equipped with a Smart Array P816i-a RAID controller and 10 disks, 7 x 1.8TB HDDs and 3 x 400GB SSDs, which store both the SAP HANA log and the data.

Configuration for ProLiant DL360 Gen10

virtual drives 1-4			virtual drive 5				CACHE		
HW RAID 5			HW RAID 5				HW RAID 5		
HDD 1.8TB 10k	HDD 1.8TB 10k	HDD 1.8TB 10k	HDD 1.8TB 10k	HDD 1.8TB 10k	HDD 1.8TB 10k	HDD 1.8TB 10k	SSD 400GB	SSD 400GB	SSD 400GB

To configure the HPE Smart Array P816i-a RAID controller, proceed as follows:

⚠️ Caution

   Proper RAID configuration with five virtual drives on two arrays is vital for successful SAP software installations.

1. Boot the machine.
2. During the boot process, press `F10` to enter Intelligent Provisioning.
3. Select Smart Storage Administrator.
4. Select HPE Smart Array P816i-a SR Gen10.
5. Select Configure.
6. Select Create Array to create the first array.
   1. Select 3 HDDs.
   2. Select Create Array.
   3. Create 4 logical drives on the array with the following properties:

- RAID Level: **RAID 5**
- Size: set the sizes of Logical Drive 1 to 4 to **Custom Size** of **256GB**, **512GB**, **1536GB**, and **65GB**, respectively.

  Logical Drive 1 will be used for the operating system and swap space.

  Logical Drive 2 will be used for the SAP-related file system "/hana/log".

  Logical Drive 3 will be used for the SAP-related file system "/hana/shared".

  Logical Drive 4 will be used for the SAP-related file system "/usr/sap/".

4. Select Finish.

7. Select Create Array to create the second array with the 4 remaining HDDs. Create one logical drive (Logical Drive 5), which will be used for the SAP-related file system "/hana/data", on the array and specify its properties as follows:
   - RAID Level: **RAID 5**
   - Size: **Maximum Size**

   Select Finish.

   ⚠ Caution

   The steps for creation of the five virtual drives must be strictly followed, because the subsequent cache assignment and installation of SUSE Linux Enterprise Server rely on these drive numbers.

8. Select Cache Manager.
   1. Enable HPE Smart Cache.
   2. Select all 3 SSDs.
   3. Select Logical Drive to Cache - Logical Drive 5 and set its size to **Recommended Size.**
   4. Select Create SmartCache for Logical Drive
   5. Select Logical Drive to Cache - Logical Drive 2 and set its size to **Maximum Size.**
   6. Select Create SmartCache for Logical Drive
   7. Select Finish.

9. Reboot the machine.

How to Configure Hardware Platforms for SUSE Linux Enterprise Server
HPE Servers

4   Dell Servers

4.1   Defining BIOS Settings

Dell PowerEdge R620 and T620

1. Boot the machine.
2. During the boot process, press F2 to enter the system setup.
3. In the main menu, choose System BIOS and then choose Integrated Devices.
4. Choose Disable for the internal SD card port.

    > **i Note**
    >
    > This option is available only if IDSDM (Internal Dual SD Module) is installed on the system board.

5. Choose Back and then Finish.
6. To save your changes, choose Yes.
7. Choose Finish.
8. To confirm to leave the system setup, choose Yes.

Dell PowerEdge R640, T640, R740, R740xd, R910, R920, R930 and R940

Keep the default BIOS settings.

4.2   Configuring Storage

The DELL PowerEdge R620 andT620 models for SAP HANA are each equipped with an H710P RAID controller and 8 300-GB disks.

The DELL PowerEdge R910model for SAP HANA is equipped with an H710P RAID controller and 14 300-GB disks. The operating system and the SAP HANA data require separate RAID configurations from the SAP HANA log on each model. On each model, RAID configurations for the operating system and the SAP HANA data must be different from the RAID configurations for the SAP HANA log.

The DELL PowerEdge R920 model for SAP HANA is equipped with an H730P RAID controller and 10 900-GB disks.

The DELL PowerEdge R930 model for SAP HANA is equipped with an H730P RAID controller and 9 1200-GB disks.

The DELL PowerEdge R630, T630, R730, T730 models for SAP HANA are equipped with an H730P RAID controller and 8 600-GB disks.

The DELL PowerEdge R640, T640, R740, R740xd, R940 models for SAP HANA are equipped with an H730P/H740P RAID controller and a varying number of disks, depending on the size of the machine (see the section PowerEdge R640, T640, R740, R740xd, R940 (Based on Skylake CPUs) in this chapter).

There is no external storage.

⚠ Caution

Proper RAID configuration with two virtual drives is vital for successful SAP software installations.

PowerEdge R620 and T620

Dell PowerEdge R620 and T620 require the following configuration:

- Hardware-based RAID5 with 6 disks for the operating system and for the SAP HANA data
- Hardware-based RAID0 for each individual disk of the 2 virtual drives for the SAP HANA log

Configuration for R620/T620, 8HDDs
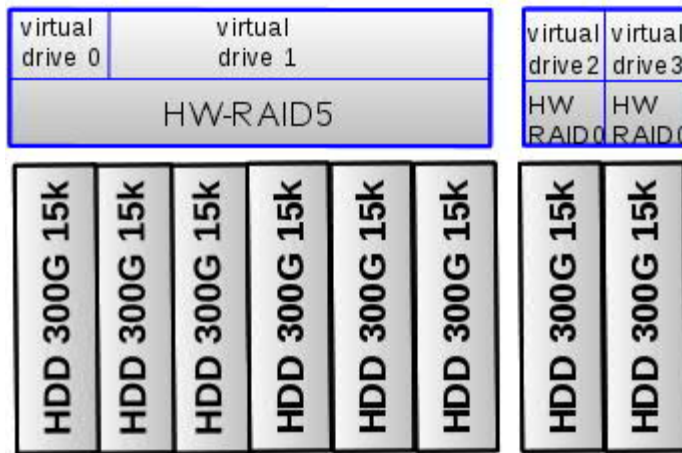
PowerEdge R910

Dell PowerEdge R910 requires the following configuration:

- Hardware-based RAID6 with 10 disks for the operating system and the SAP HANA data
- Hardware-based RAID0 for each individual disk of the 4 virtual drives for the SAP HANA log

Configuration for PowerEdge R910, 512-GB memory, 14 HDDs
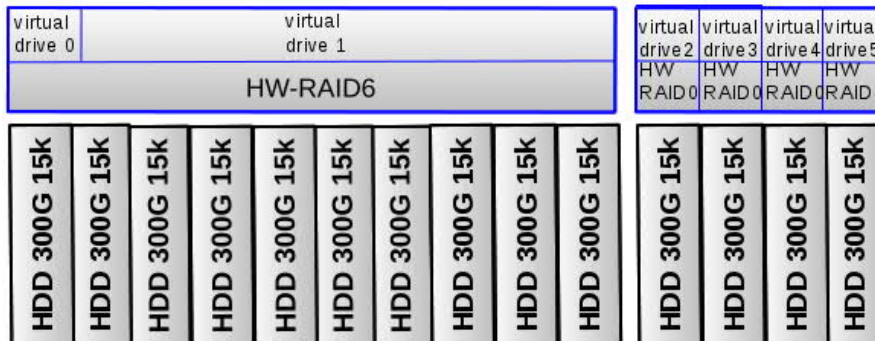
PowerEdge R920

Dell PowerEdge R920 requires the following configuration: hardware-based RAID5 with 10 disks for the operating system, the SAP HANA data, and the SAP HANA log.
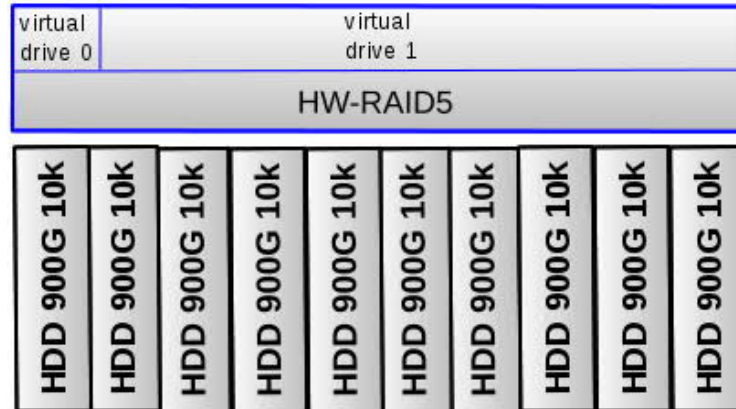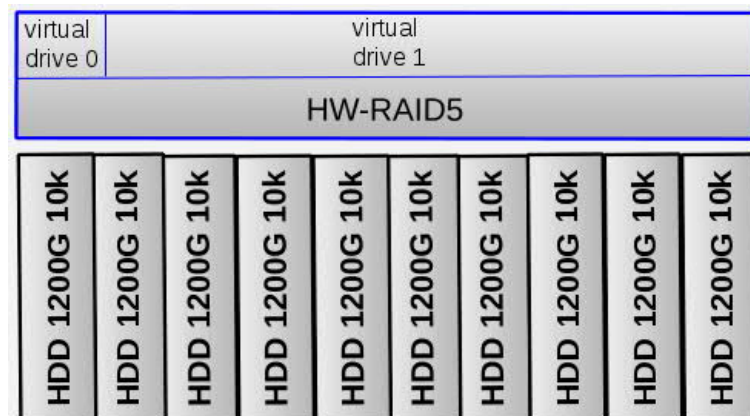

Configuration for PowerEdge R920, 1 TB memory, 10 HDDs

PowerEdge R930

Dell PowerEdge R920 requires the following configuration: hardware-based RAID5 with 9 disks for the operating system, the SAP HANA data, and the SAP HANA log.

Configuration for PowerEdge R930, 64 GB - 1 TB memory, 10 HDDs

PowerEdge R630, T630, R730, T730

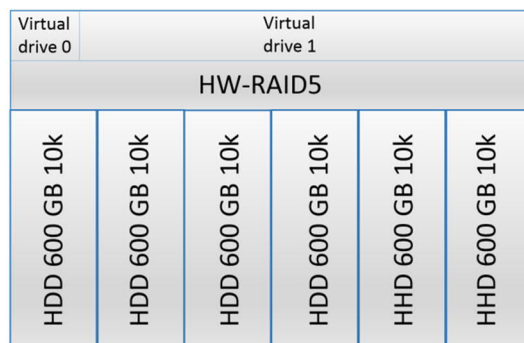Depending on the main memory, these models can have the following configuration:

- 7 disks (for the operating system, the SAP HANA data, and the SAP HANA log) as RAID5 and 1 disk as a hot spare
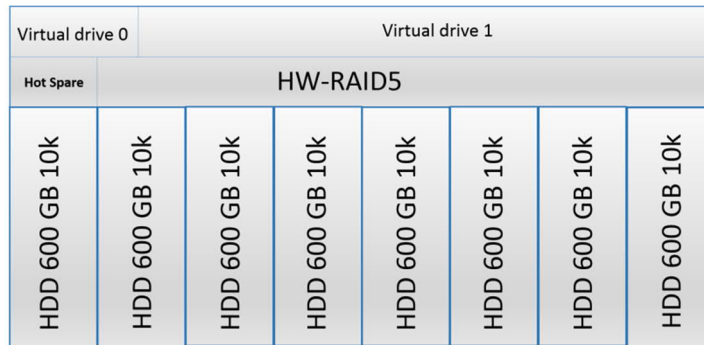
- 4 disks as RAID5 (no hot spare)
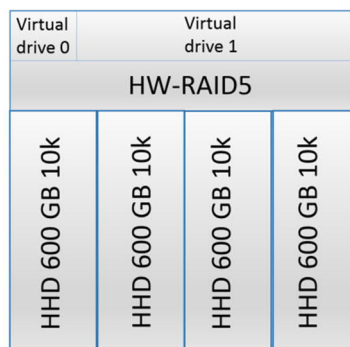
- 6 disks as RAID5 (no hot spare)

To configure the RAID settings of the H710P or H730P RAID controller, proceed as follows:

1. Boot the machine.
2. When prompted, press `CTRL`+`R` to enter the RAID adapter configuration utility.
3. If there are configured RAID arrays and virtual drives that do not conform to the certified storage layout as described below, you must delete them as follows:
   8. Select PERC H710P Adapter.
   9. Press `F2`.
   10. Select Clear Config.
   11. Select YES.
4. Select PERC H710P Adapter.

5. Press `F2`.

6. Select Create New VD.

7. Select RAID Level and press `Enter`.

8. R620/T620/R920/R930/R630/T630/R730/T730: Select RAID-5.

   R910: Select RAID-6.

9. Press `Enter`.

10. R620/T620: Mark the first 6 disks as part of the RAID 5 array by selecting a disk and pressing `Space`; repeat the action for all 6 disks.

    R910: Mark the first 10 disks as part of the RAID 6 array.

    R920/R930: Mark the first 9 disks as part of the RAID 5 array.

    R630/T630/R730/T730: Mark the first 7 disks as part of the RAID 5 array.

11. Select VD Size: 53 GB.

12. R620/T620/R910: Select Advanced Settings → Initialize and press `Space` to mark the drive for initialization.
    R920/R930/R630/T630/R730/T730: Select Configure Hot Spare.

13. Select OK to confirm initialization.

14. Select OK to create a 53-GB virtual drive. This drive will be used for the Linux root file system and swap space.

15. R920/R930/R630/T630/R730/T730: In the Dedicated Hot Spare for Disk Group 0 window, press `Space` to mark the disk and select OK.

16. Select OK to confirm completion.

17. Select Disk Group 0 and press `F2` to create another virtual drive on this disk group.

18. Select Add New VD.

    The remaining disk size is displayed; do not change the value.

19. R620/T620/R910: Select Advanced Settings → Initialize and press `Space` to mark the drive for initialization.
    R920/R930/R630/T630/R730/T730: Select Configure Hot Spare.

20. R920/R930/R630/T630/R730/T730: In the Dedicated Hot Spare for Disk Group 0 window, press `Space` to mark the disk and select OK.

21. R620/T620/R910: Select OK to confirm initialization.

    R920/R930/R630/T630/R730/T730: The RAID configuration is now finished and you can exit the configuration utility. The final RAID configuration for R920/R930 is 1 disk group with 2 virtual drives.

Note that the remaining steps are only for R620, T620, and R910.

22. Select OK to create the larger virtual drive. This drive will be used for the SAP HANA log.

23. Select OK to confirm completion.

24. Create 2 or 4 RAID-0 drives by repeating the following steps twice (R620 and T620) or four times (R910).

    1. Select PERC H710P Adapter.

    2. Press `F2`.

    3. Select `Create New VD`.

    4. Select RAID Level, press `Enter`, select RAID-0, and then press `Enter`.

    5. Select and mark one of the remaining disks as part of the RAID 0 array.

       Do not change the VD size.

    6. Select Advanced Settings → Initialize and press `Space` to mark the drive for initialization.

   7. Select OK to confirm initialization.

    The final RAID configuration should be as follows:

- o R620/T620: 3 disk groups with 4 virtual drives
- o R910: 5 disk groups with 6 virtual drives

25. Press `ESC` and select OK to exit the RAID configuration utility.

26. Press `CTRL`+`ALT`+`DEL` to reboot the machine.

PowerEdge R630, T630, R730, T730 and R930 (Based on Broadwell CPUs)

Depending on the main memory these models can have the following configuration:

- 64GB: 3 x 400GB SSD as RAID5 (no hot spare)
- 128GB: 3 x 400GB SSD as RAID5 (no hot spare)
- 192GB: 3 x 800GB SSD as RAID5 (no hot spare)
- 256GB: 3 x 800GB SSD as RAID5 (no hot spare)
- 384GB: 4 x 800GB SSD as RAID5 (no hot spare)
- 512GB: 5 x 800GB SSD as RAID5 (no hot spare)
- 768GB: 6 x 800GB SSD as RAID5 (no hot spare)
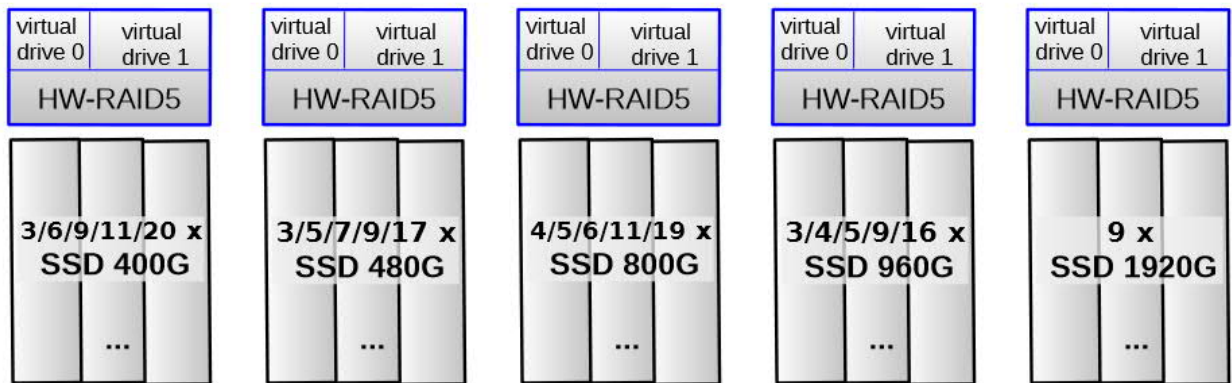- 1TB: 8 x 800GB SSD as RAID5 (no hot spare)
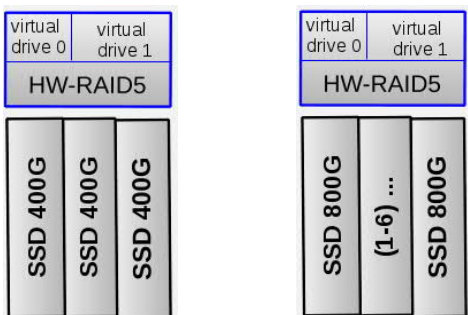
To configure the RAID settings of the H730P RAID controller, proceed as follows:

1. Boot the machine.

2. During the booting process, press `F11` and choose System Setup.

3. Select Device Settings and then RAID controller settings

4. Select Configuration Management

5. Select Create Virtual Disk

6. Choose RAID Level RAID5

7. Select Physical Disks and choose all available SSD drives. The number of drives depends on the main memory of the machine as documented above.

8. Create one virtual disk with 53 GB capacity. This disk will be used for the Linux root file system and swap space.

9. Choose Confirm, then select Yes to create the disk.

10. The remaining capacity should be assigned to a second virtual disk. This drive will be used for storing the SAP application data.

11. Select Create Virtual Disk

12. Select physical disks from Free Capacity

13. Select Disk Groups

14. Choose Disk Group 0: RAID5

15. Select Apply Changes

16. Select Create Virtual Disk

17. Choose Confirm, then select Yes to create the disk.

18. Leave the configuration utility and continue the booting process.

PowerEdge R640, T640, R740, R740xd and R940 (Based on Skylake CPUs)

Depending on the main memory, these models can have the following configuration:

- 96GB: 3 x 400GB or 480GB SSD as RAID5 (no hot spare)
- 192GB: 3 x 400GB or 480GB SSD as RAID5 (no hot spare)
- 384GB: 6 x 400GB or 5 x 480GB or 4 x 800GB SSD or 3 x 960GB
  as RAID5 (no hot spare)
- 576GB: 9 x 400GB or 7 x 480GB or 5 x 800GB SSD or 4 x 960GB
  or 3 x 1920GB as RAID5 (no hot spare)
- 768GB: 11 x 400GB or 9 x 480GB or 6 x 800GB SSD or 5 x 960GB
  or 3 x 1920GB as RAID5 (no hot spare)
- 1.5TB: 20 x 400GB or 17 x 480GB or 11 x 800GB SSD or 9 x 960GB
  or 5 x 1920GB as RAID5 (no hot spare)
- 3TB: 19 x 800GB SSD or 16 x 960GB or 9 x 1920GB as RAID5 (no hot spare)

virtual drive 0	virtual drive 1		virtual drive 0	virtual drive 1		virtual drive 0	virtual drive 1		virtual drive 0	virtual drive 1		virtual drive 0	virtual drive 1
HW-RAID5			HW-RAID5			HW-RAID5			HW-RAID5			HW-RAID5	
3/6/9/11/20 x SSD 400G ...			3/5/7/9/17 x SSD 480G ...			4/5/6/11/19 x SSD 800G ...			3/4/5/9/16 x SSD 960G ...			9 x SSD 1920G ...	

To configure the RAID settings of the H730P/H740P RAID controller, proceed as follows:

1. Boot the machine.
2. During the booting process, press `F11` and choose System Setup.
3. Select Device Settings and then RAID controller settings.
4. Select Configuration Management.
5. Select Create Virtual Disk.
6. Choose RAID Level RAID5.
7. Select Physical Disks and choose all available SSD drives. The number of drives depends on the main memory of the machine as documented above.
8. Create one virtual disk with 53 GB capacity. This disk will be used for the Linux root file system and swap space.
9. Choose Confirm, then select Yes to create the disk.

   The remaining capacity should be assigned to a second virtual disk. This drive will be used for storing the SAP application data.
10. Select Create Virtual Disk.
11. Select physical disks from Free Capacity.
12. Select Disk Groups.

13. Choose Disk Group 0: RAID5.

14. Select Apply Changes

15. Select Create Virtual Disk.

16. Choose Confirm, then select Yes to create the disk.

17. Leave the configuration utility and continue the booting process.

5 Fujitsu Servers

5.1 Defining BIOS Settings

Make sure the following requirements have been met:

- The BIOS boot sequence is set and RAID LUN is at first place "(Bus 01 Dev 00) PCI RAID Adapter".
- The hardware clock is set to the correct time in the UTC-time zone.
- The IPMI IP address for remote management is set. The chosen address is unique in this network segment.

5.2 Configuring Storage

The Fujitsu Server TX300 S6 is equipped with a RAID controller with BBU and 6 x 146 GB 15k disks (internal). There is no external storage.

The Fujitsu Servers TX300 S7/S8 and RX350 S7/S8 are equipped with a RAID controller with BBU and 8x 300 GB 10k disks (internal). There is no external storage.

The Fujitsu Servers RX2540 M1, RX2560 M1 and TX2560 M1are equipped with a PRAID EP400i controller with BBU and, depending on the memory size, 4x 600 or 6x600 GB 10k disks (internal). There is no external storage.

Once the system is installed, there is a hardware-based RAID 5with two virtual disks for the operating system and for SAP HANA.
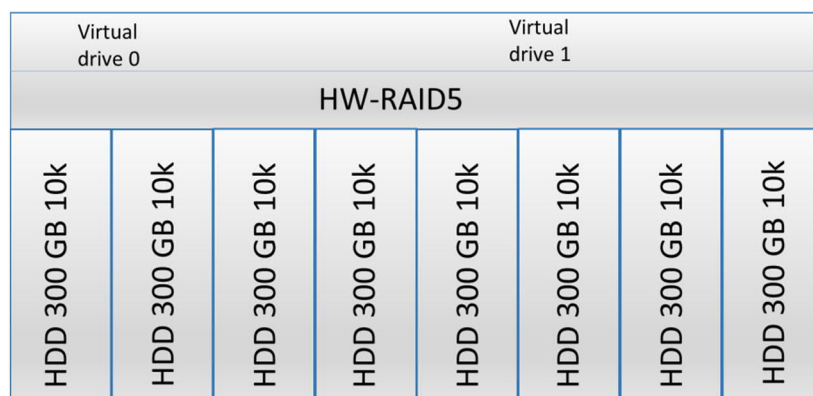
Fujitsu Primergy TX300 S6, TX300 S7/S8, RX350 S7/S8

These servers require the following configuration: hardware-based RAID5 with 6 or 8 disks for the operating system, the SAP HANA data, and the SAP HANA log.

Configuration for TX300 S6, 6 HDDs

Virtual drive 0	Virtual drive 1				
HW-RAID5					
HDD 146 GB 15k	HDD 146 GB 15k	HDD 146 GB 15k	HDD 146 GB 15k	HHD 146 GB 15k	HHD 146 GB 15k
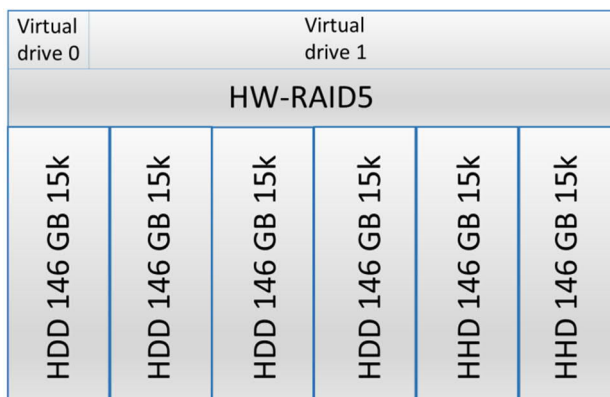
Configuration for TX300 S7/8, RX350 S7/8, 8HDDs

Virtual drive 0	Virtual drive 1						
HW-RAID5							
HDD 300 GB 10k	HDD 300 GB 10k	HDD 300 GB 10k	HDD 300 GB 10k	HDD 300 GB 10k	HDD 300 GB 10k	HDD 300 GB 10k	HDD 300 GB 10k

To configure the RAID settings of the RAID controller, proceed as follows:

1. In the UEFI/BIOS, select System Settings.

2. Select Adapters and UEFI Drivers.

3. From the list, select LSI EFI SAS Driver.

4. Select WebBIOS.

5. One RAID controller has already been selected. Keep the selection and choose Start.

6. Select Configuration Wizard.

7. Select New Configuration.

8. Select Yes to clear the existing configuration.

9. Select Manual Configuration.

10. Select Redundancy when possible.

11. Select Drive Security Method: No Encryption.

12. Select Data Protection: Disabled.

13. Select all 8 drives (slots 0-7), and then select Add to Array.

14. Select Accept DG.

15. Select Next.

16. Select Add to Span.

17. Select Next.

18. Specify the capacity (`53GB`) for the first virtual drive. This drive will be used for the operating system and swap space.

19. Select Accept.

20. Select Yes for Write Back with BBU mode.

21. To configure the next virtual drive, select Back.

22. Select Add to Span.

23. Select Next.

24. Select Update Size.

25. Allocate the remaining capacity to the second virtual drive. This drive will be used for storing the SAP application data.

26. Select Accept.

27. Select Yes for Write Back with BBU mode.

28. Select Next.

29. Select Accept.

30. Select Yes to save the configuration.

31. Select Cancel for SSD Caching.

32. Select Yes to initialize the virtual drives.

33. Make sure that the following properties are selected for the virtual drives:

    o RAID Level: **5**

    o Stripe Size: **256 KB**

    o Access: **RW**

    o Read: **Normal**

    o Default Write: **Write Back with BBU**

    o Disable BGI: **No**

    o I/O: **Cached**

    o Disk Cache: **Disable**

    o Advanced Properties, SSD Cache: **Disable**

    While the virtual drives are being initialized in the background, the installation can proceed.

34. Exit WebBIOS.

35. Exit UEFI/BIOS with "**Y**" to save the settings, and continue with booting the server.

Fujitsu Primergy RX2540 M1, RX2560 M1, TX2560 M1 (based on Intel Haswell CPUs)

These servers require the following configuration: hardware-based RAID5 with 4 or 6 disks SSDs (depending on memory capacity) for the operating system, the SAP HANA data, and the SAP HANA log. A hot spare disk is not included by default but could optionally be added.
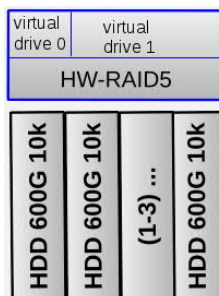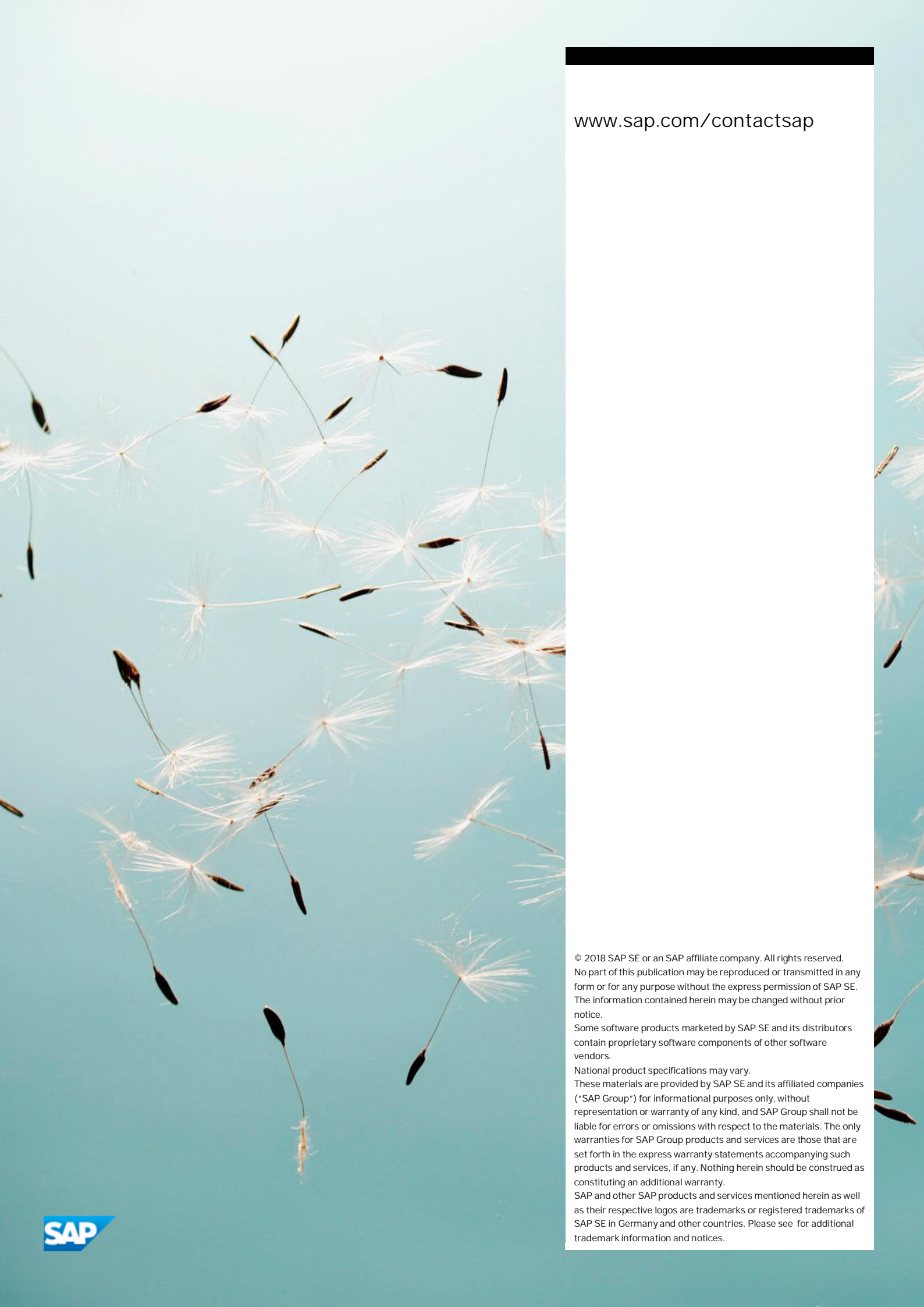

Configuration for RX2540 M1, RX2560 M1, TX2560 M1 with 4-6 disks

Fujitsu Primergy RX2540 M2, RX2560 M2, TX2560 M2 (based on Intel Broadwell CPUs)

These servers require the following configuration: hardware-based RAID5 with 4- 7 SSDs (depending on memory capacity) for the operating system, the SAP HANA data, and the SAP HANA log. A hot spare disk is not included by default but could optionally be added.

Configuration for RX2540 M2, RX2560 M2,   TX2560 M2 with 4-7 disks
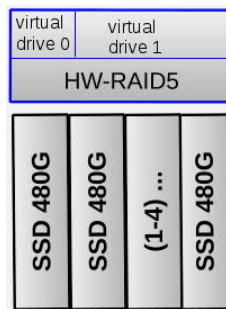
To configure the RAID settings of the RAID controller, proceed as follows:

1. Boot the machine.

2. When prompted, press `CTRL`+ `R` to enter the RAID adapter configuration utility.

3. If there are configured RAID arrays and virtual drives that do not conform to the certified storage layout as described below, you must delete them as follows:

    1. Select PRAID EP240i.

    2. Press `F2`.

    3. Select Clear Config.

    4. Select YES.

4. Select PRAID EP240i.

5. Press `F2`.

6. Select Create New VD.

7. Select RAID Level and press `Enter`.

    Select RAID-5.

8. Press `Enter`.

9. Mark each disk as part of the RAID 5 array by selecting the disk and pressing `Space`; repeat the action for all disks.

10. Select Size: 53 GB.

11. Select OK to confirm initialization.

12. A 53-GB virtual drive is now created. This drive will be used for the Linux root file system and swap space.

13. Select Disk Group 0 and press `F2` to create another virtual drive on this disk group.

14. Select Add New VD.

    The remaining disk size is displayed; do not change the value.

15. Select OK.

16. Select OK to confirm initialization.

17. The RAID configuration is now finished; press ESC to exit the configuration utility and then reboot the machine.

How to Configure Hardware Platforms for SUSE Linux Enterprise Server
Fujitsu Servers

6   Huawei Servers

If you are using a Huawei server, please go to http://support.huawei.com/enterprise/en/server/huawei-solutions-for-sap-hana-pid-9332560 and search by the code name of your Intel processor, for example, Broadwell, for the relevant SAP HANA appliance guide to find the hardware configuration.