# Cisco UCS Scale-Up Solution for SAP HANA on M5 Rack Servers



Design and Deploy an SAP HANA Single-Node Solution Based on Standalone Cisco UCS M5 Rack Servers with SLES 12 for SAP SP2.

February 2018

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# **Executive summary**

Organizations in every industry are generating and using more data than ever before: from customer transactions and supplier delivery considerations to real-time user-consumption statistics. Without reliable infrastructure that can store, process, and analyze big data sets in real time, companies are unable to use this information to their advantage. The Cisco<sup>®</sup> Scale-Up Solution for SAP HANA with the Cisco Unified Computing System<sup>™</sup> (Cisco UCS<sup>®</sup>) using the Cisco UCS M5 Rack Server helps companies more easily harness information and make better business decisions that let them stay ahead of the competition. Our solutions help improve access to all your data to accelerate business decision making with policy-based, simplified management, lower deployment risk, and reduced total cost of ownership (TCO). Our innovations help enable you to unlock the intelligence in your data and interpret it with a new dimension of context and insight to help you gain a sustainable, competitive business advantage.

The Cisco solution for SAP HANA with the Cisco UCS M5 rack-mount server provides a robust platform for SAP HANA workloads in a single node.

# **Solution overview**

This section introduces the solution discussed in this document.

# Introduction

The Cisco UCS C480 M5 scale-up solution provides prevalidated, ready-to-deploy infrastructure, reducing the time and complexity involved in configuring and validating a traditional data center deployment. The reference architecture detailed in this document highlights the resiliency and ease of deployment of an SAP HANA solution.

SAP HANA is SAP's implementation of in-memory database (IMDB) technology. The SAP HANA database takes advantage of the low-cost main memory (RAM), faster access, and data-processing capabilities of multicore processors to provide better performance for analytical and transactional applications. SAP HANA offers a multiple-engine, query-processing environment that supports relational data (with both row- and column-oriented physical representations in a hybrid engine) as well as graph and text processing for semistructured and unstructured data management within the same system. As an appliance, SAP HANA combines software components from SAP optimized for certified hardware. However, this solution has a preconfigured hardware setup and preinstalled software package that is dedicated to SAP HANA.

In 2013, SAP introduced the SAP HANA Tailored Datacenter Integration (TDI) option. TDI offers a more open and flexible way to integrate SAP HANA into the data center by reusing existing enterprise storage hardware, thereby reducing hardware costs. With the introduction of SAP HANA TDI for shared infrastructure, the Cisco UCS Integrated Infrastructure solution provides the advantages of an integrated computing, storage, and network stack and the programmability of Cisco UCS. The TDI option enables organizations to run multiple SAP HANA production systems on a shared infrastructure. It also enables customers to run SAP application servers and an SAP HANA database hosted on the same infrastructure.

For more information about SAP HANA, see the SAP help portal: <u>http://help.sap.com/hana/</u>

# Audience

The intended audience for this document includes sales engineers, field consultants, professional services staff, IT managers, partner engineers, and customers deploying the Cisco solution for SAP HANA. External references are provided wherever applicable, but readers are expected to be familiar with the technology, infrastructure, and database security policies of the customer installation.

# **Purpose of this document**

This document describes the steps required to deploy and configure a Cisco data center solution for SAP HANA. This document showcases one of the variants of Cisco's solution for SAP HANA. Although readers of this document are expected to have sufficient knowledge to install and configure the products used, configuration details that are important to the deployment of this solution are provided in this document.

# Solution summary: Cisco UCS C480 M5 Rack Server

The Cisco Scale-Up Solution for SAP HANA can use the Cisco UCS C480 M5 Rack Server. Tables 1, 2, and 3 summarize the server specifications and show proposed disk configurations for the SAP HANA use case.

| CPU specifications                                       | 2.50-GHz Intel® Xeon® Platinum 8180 processor<br>Quantity: 2 or 4  |  |  |
|--|--|--|--|
| Possible memory configurations                           | Analytics<br>• 16-GB DDR4: Quantity 12 (192 GB)<br>• 32-GB DDR4: Quantity 12 (384 GB)<br>• 32-GB DDR4: Quantity 24 (768 GB)<br>• 64-GB DDR4: Quantity 24 (1.5 TB)<br>• 128-GB DDR4: Quantity 24 (3 TB)<br>• 128-GB DDR4: Quantity 24 (3 TB)<br>• 128-GB DDR4: Quantity 48 (6 TB) |  |  |
| Hard-disk drive (HDD) type and quantity                  | <ul> <li>Any of the following:</li> <li>1.8-TB 10,000-rpm SAS drive: Quantity 20</li> <li>3.8-TB solid-state disk (SSD): Quantity 8</li> <li>3.8-TB SSD: Quantity 3 (for up to 1.5-TB memory configurations)</li> </ul>  |  |  |
| BIOS   | C480M5.3.1.0.248.0518171057  |  |  |
| Cisco Integrated Management Controller<br>(IMC) firmware | Version 3.1(0.213)   |  |  |
| LSI MegaRAID controller                                  | Cisco 12-Gbps SAS modular RAID controller  |  |  |
| Network card   | Cisco UCS Virtual Interface Card (VIC) 1385: Quantity 1<br>For 10-Gbps connectivity:<br>Onboard Intel 1 Gigabit Ethernet controller: Quantity 2<br>Onboard Intel 10BASE-T Ethernet controller: Quantity 2  |  |  |
| Power supply   | Redundant power supplies: Quantity 4   |  |  |

| Table I. Overview of Ci3co 003 0400 MJ Rack Server configuration | Table 1. | Overview of Cisco UCS C480 M5 Rack Server configuration |
|--|----------|---|
|--|----------|---|

# Table 2. Cisco UCS C480 M5 proposed disk layout

| Disk                                    | Disk type | Drive group | RAID level | Virtual drive |
|---|-----------|-------------|------------|---------------|
| Slot (1 through 20)                     | SAS       | DG0         | 50         | VD0           |
|   | HDD       |             |            |               |
| Slot (1 through 8)                      | SSD       | DG0         | 5          | VD0           |
| Slot (1 through 3; up to 1.5 TB of RAM) | SSD       | DG0         | 5          | VD0           |

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|----------|-----------|----------|----------|---------|---------------|
| Table 3. | CISCO UCS | C480 M5  | proposed | aisk    | configuration |

| Drives used   | RAID type   | Used for                    | File system |
|---|---|-----------------------------|-------------|
| Any of the following:   | Any of the following:                                       | Operating system            | Ext3        |
| <ul> <li>20 x 1.8-TB SAS HDD</li> <li>8 x 3.8 TB SSD</li> </ul> | <ul> <li>RAID 50</li> <li>RAID 5</li> <li>RAID 5</li> </ul> | Data file system            | XFS         |
| • 3 x 3.8 TB SSD  |   | Log file system             | XFS         |
|   |   | SAP HANA shared file system | XFS         |

# Solution summary: Cisco UCS C240 M5 Rack Server

The Cisco Scale-Up Solution for SAP HANA can also use the Cisco UCS C240 M5 Rack Server. Tables 4, 5, and 6 summarize the server specifications and show proposed disk configurations for the SAP HANA use case.

| Table 4. | Overview of Cisco UCS C240 M5 Rack Server configuration  |
|----------|--|
|          | o for the fit of the of the fit o |

| CPU specifications                | 2.50-GHz Intel Xeon Platinum 8180 processor<br>Quantity: 2   |
|-----------------------------------|--|
| Possible memory<br>configurations | Analytics<br>• 16-GB DDR4: Quantity 12 (192 GB)<br>• 32-GB DDR4: Quantity 12 (384 GB)<br>• 32-GB DDR4: Quantity 24 (768 GB)<br>• 64-GB DDR4: Quantity 24 (1.5 TB)<br>• 128-GB DDR4: Quantity 24 (3 TB) |
| HDD type and quantity             | <ul> <li>Any of the following:</li> <li>1.8-TB 10,000-rpm SAS drive: Quantity 20</li> <li>3.8-TB SSD: Quantity 8</li> <li>3.8-TB SSD: Quantity 3 (for up to 1.5-TB memory configurations)</li> </ul>   |
| BIOS                              | C480M5.3.1.0.248.0518171057  |
| Cisco IMC firmware                | Version 3.1(1d)  |
| Network card                      | Cisco UCS VIC 1385: Quantity 1<br>For 10-Gbps connectivity:<br>• Onboard Intel 1 Gigabit Ethernet controller: Quantity 2<br>• Onboard Intel 10BASE-T Ethernet controller: Quantity 2                   |
| Power supply                      | Redundant power supplies: Quantity 2   |

## Table 5. Cisco UCS C240 M5 proposed disk layout

| Disk                                    | Disk type | Drive group | RAID level | Virtual drive |
|---|-----------|-------------|------------|---------------|
| Slot (1 through 20)                     | SAS       | DG0         | 50         | VD0           |
|   | HDD       |             |            |               |
| Slot (1 through 8)                      | SSD       | DG0         | 5          | VD0           |
| Slot (1 through 3; up to 1.5 TB of RAM) | SSD       | DG0         | 5          | VD0           |



#### Table 6. Cisco UCS C240 M5 proposed disk configuration

| Drives used   | RAID type   | Used for         | File system |
|---|---|------------------|-------------|
| Any of the following:   | Any of the following:                                       | Operating system | Ext3        |
| <ul> <li>20 x 1.8-TB SAS HDD</li> <li>8 x 3.8-TB SSD</li> </ul> | <ul> <li>RAID 50</li> <li>RAID 5</li> <li>RAID 5</li> </ul> | Data file system | XFS         |
| • 3 x 3.8-TB SSD  |   | Log file system  | XFS         |
|   | SAP HANA shared file system                                 | XFS              |             |

# Solution Summary: Cisco UCS C220 M5 Rack Server

The Cisco Scale-Up Solution for SAP HANA can also use the Cisco UCS C220 M5 Rack Server. Tables 7, 8, and 9 summarize the server specifications and show proposed disk configurations for the SAP HANA use case.

| Table 7. | Overview of Cisco UCS C220 M5 Rack Server configuration |
|----------|---|
|----------|---|

| CPU specifications             | 2.50-GHz Intel Xeon Platinum 8180 processor<br>Quantity: 2   |
|--------------------------------|--|
| Possible memory configurations | Analytics<br>• 16-GB DDR4: Quantity 12 (192 GB)<br>• 32-GB DDR4: Quantity 12 (384 GB)<br>• 32-GB DDR4: Quantity 24 (768 GB)<br>• 64-GB DDR4: Quantity 24 (1.5 TB)<br>• 128-GB DDR4: Quantity 24 (3 TB) |
| HDD type and quantity          | <ul> <li>Any of the following:</li> <li>3.8-TB SSD: Quantity 8</li> <li>3.8-TB SSD: Quantity 3 (for up to 1.5-TB memory configurations)</li> </ul>   |
| BIOS                           | C480M5.3.1.0.248.0518171057  |
| Cisco IMC firmware             | Version 3.1(1d)  |
| Network card                   | Cisco UCS VIC 1385: Quantity 1<br>For 10-Gbps connectivity:<br>• Onboard Intel 1 Gigabit Ethernet controller: Quantity 2<br>• Onboard Intel 10BASE-T Ethernet controller: Quantity 2                   |
| Power supply                   | Redundant power supplies: Quantity 2   |

#### Table 8. Cisco UCS C220 M5 proposed disk layout

| Disk                                    | Disk type | Drive group | RAID level | Virtual drive |
|---|-----------|-------------|------------|---------------|
| Slot (1 through 8)                      | SSD       | DG0         | 5          | VD0           |
| Slot (1 through 3; up to 1.5 TB of RAM) | SSD       | DG0         | 5          | VD0           |

# ılıılı cısco

#### Table 9. Cisco UCS C220 M5 proposed disk configuration

| Drives used  | RAID type                                  | Used for                    | File system |
|--|--|-----------------------------|-------------|
| Any of the following:                                      | Any of the following:                      | Operating system            | Ext3        |
| <ul> <li>8 x 3.8-TB SSD</li> <li>3 x 3.8-TB SSD</li> </ul> | <ul> <li>RAID 5</li> <li>RAID 5</li> </ul> | Data file system            | XFS         |
|  |  | Log file system             | XFS         |
|  |  | SAP HANA shared file system | XFS         |

# Infrastructure overview

The Cisco Scale-Up Solution for SAP HANA uses the Cisco UCS M5 generation of rack servers.

# Cisco UCS C480 M5 Rack Server

The Cisco UCS C480 M5 Rack Server (Figure 1) can be deployed as a standalone server or in a Cisco UCS managed environment. When used in combination with Cisco UCS Manager, the C480 M5 brings the power and automation of unified computing to enterprise applications, including Cisco SingleConnect technology, drastically reducing switching and cabling requirements. Cisco UCS Manager uses service profiles, templates, and policy-based management to enable rapid deployment and help ensure deployment consistency. It also enables end-to-end server visibility, management, and control in both virtualized and bare-metal environments.

- IMDBs
- Big data analytics
- Virtualization and virtual desktop infrastructure (VDI) workloads
- Bare-metal applications

The C480 M5 is a storage- and I/O-optimized enterprise-class rack server that delivers industry-leading performance for IMDBs, big data analytics, virtualization, VDI, and bare-metal applications. It delivers outstanding levels of expandability and performance for standalone or Cisco UCS managed environments in a 4-rack-unit (4RU) form factor. And because of its modular design, you pay for only what you need.

The C480 M5 offers these capabilities:

- Latest Intel Xeon Scalable processors with up to 28 cores per socket and support for two- or four-processor configurations
- 2666-MHz DDR4 memory and 48 DIMM slots for up to 6 TB of total memory
- 12 PCI Express (PCIe) 3.0 slots
- Six x8 full-height, full length slots
- Six x16 full-height, full length slots
- Flexible storage options with support up to 32 small-form-factor (SFF) 2.5-inch, SAS, SATA, and PCIe Non-Volatile Memory Express (NVMe) disk drives
- Cisco 12-Gbps SAS modular RAID controller in a dedicated slot
- Internal Secure Digital (SD) and M.2 boot options
- Dual embedded 10 Gigabit Ethernet LAN-on-motherboard (LOM) ports



## Cisco UCS C240 M5 Rack Server

The Cisco UCS C240 M5 Rack Server (Figure 2) is a 2-socket, 2RU rack server offering industry-leading performance and expandability. It supports a wide range of storage and I/O-intensive infrastructure workloads, from big data and analytics to collaboration. Cisco UCS C-Series Rack Servers can be deployed as standalone servers or as part of a Cisco UCS managed environment to take advantage of Cisco's standards-based unified computing innovations that help reduce customers' TCO and increase their business agility.

In response to ever-increasing computing and data-intensive real-time workloads, the enterprise-class C240 M5 server extends the capabilities of the Cisco UCS portfolio in a 2RU form factor. It incorporates the Intel Xeon Scalable processors, supporting up to 20 percent more cores per socket, twice the memory capacity, and five times more

NVMe PCle SSDs compared to the previous generation of servers. These improvements deliver significant performance and efficiency gains that will improve your application performance. The C240 M5 delivers outstanding levels of storage expandability with exceptional performance, with:

- Latest Intel Xeon Scalable CPUs with up to 28 cores per socket
- Up to 24 DDR4 DIMMs for improved performance
- Intel 3D XPoint-ready support, with built-in support for next-generation nonvolatile memory technology
- Up to 26 hot-swappable SFF 2.5-inch drives, including 2 rear hot-swappable SFF drives (up to 10 support NVMe PCle SSDs on the NVMe-optimized chassis version), or 12 large-form-factor (LFF) 3.5-inch drives plus 2 rear hot-swappable SFF drives
- Support for a 12-Gbps SAS modular RAID controller in a dedicated slot, leaving the remaining PCIe Generation 3.0 slots available for other expansion cards
- Modular LOM (mLOM) slot that can be used to install a Cisco UCS VIC without consuming a PCIe slot, supporting dual 10or 40-Gbps network connectivity
- Dual embedded Intel x550 10GBASE-T LOM ports
- Modular M.2 or SD cards that can be used for bootup

# High performance for data-intensive applications

The Cisco UCS C240 M5 Rack Server is well-suited for a wide range of enterprise workloads, including:

- Big data and analytics
- Collaboration
- Small and medium-sized business (SMB) databases
- Virtualization and consolidation
- Storage servers
- High-performance appliances

C240 M5 servers can be deployed as standalone servers or in a Cisco UCS managed environment. When used in combination with Cisco UCS Manager, the C240 M5 brings the power and automation of unified computing to enterprise applications, including Cisco SingleConnect technology, drastically reducing switching and cabling requirements.

Cisco UCS Manager uses service profiles, templates, and policy-based management to enable rapid deployment and help ensure deployment consistency. If also enables end-to-end server visibility, management, and control in both virtualized and bare-metal environments.

## Figure 2. Cisco UCS C240 M5 Rack Server



#### Cisco UCS C220 M5 Rack Server

The Cisco UCS C220 M5 Rack Server (Figure 3) is among the most versatile general-purpose enterprise infrastructure and application servers in the industry. It is a high-density 2-socket rack server that delivers industry-leading performance and efficiency for a wide range of workloads, including virtualization, collaboration, and bare-metal applications. The Cisco UCS C-Series Rack Servers can be deployed as standalone servers or as part of Cisco UCS to take advantage of Cisco's standards-based unified computing innovations that help reduce customers' TCO and increase their business agility.

The C220 M5 server extends the capabilities of the Cisco UCS portfolio in a 1RU form factor. It incorporates the Intel Xeon Scalable processors, supporting up to 20 percent more cores per socket, twice the memory capacity, 20 percent greater storage density, and five times more PCIe NVMe SSDs compared to the previous generation of servers. These improvements deliver significant performance and efficiency gains that will improve your application performance. The C220 M5 delivers outstanding levels of expandability and performance in a compact package, with:

- Latest Intel Xeon Scalable CPUs with up to 28 cores per socket
- Up to 24 DDR4 DIMMs for improved performance

- Intel 3D XPoint-ready support, with built-in support for next-generation nonvolatile memory technology
- Up to 10 SFF 2.5-inch drives or 4 LFF 3.5-inch drives (77 TB of storage capacity with all NVMe PCIe SSDs)
- Support for a 12-Gbps SAS modular RAID controller in a dedicated slot, leaving the remaining PCIe Generation 3.0 slots available for other expansion cards
- mLOM slot that can be used to install a Cisco UCS VIC without consuming a PCIe slot, supporting dual 10- or 40-Gbps network connectivity
- Dual embedded Intel x550 10GBASE-T LOM ports

# High performance for data-intensive applications

The Cisco UCS C220 M5 Rack Server is well-suited for a wide range of enterprise workloads, including:

- Big data and analytics
- Collaboration
- SMB databases
- Virtualization and consolidation
- Storage servers
- High-performance appliances

C220 M5 servers can be deployed as standalone servers or in a Cisco UCS managed environment. When used in combination with Cisco UCS Manager, the C220 M5 brings the power and automation of unified computing to enterprise applications, including Cisco SingleConnect technology, drastically reducing switching and cabling requirements.

Cisco UCS Manager uses service profiles, templates, and policy-based management to enable rapid deployment and help ensure deployment consistency. If also enables end-to-end server visibility, management, and control in both virtualized and bare-metal environments.

# Figure 3. Cisco UCS C220 M5 Rack Server



# **Solution design**

This section describes the SAP HANA system requirements defined by SAP and the architecture of the Cisco UCS solution for SAP HANA.

# **SAP HANA system**

An SAP HANA scale-up system on a single server is the simplest of the installation types. You can run an SAP HANA system entirely on one host and then scale the system up as needed. All data and processes are located on the same server and can be accessed locally. The network requirements for this option are at least one 1 Gigabit Ethernet access network and one 10 Gigabit Ethernet storage network.

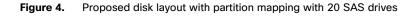
## Hardware requirements for the SAP HANA database

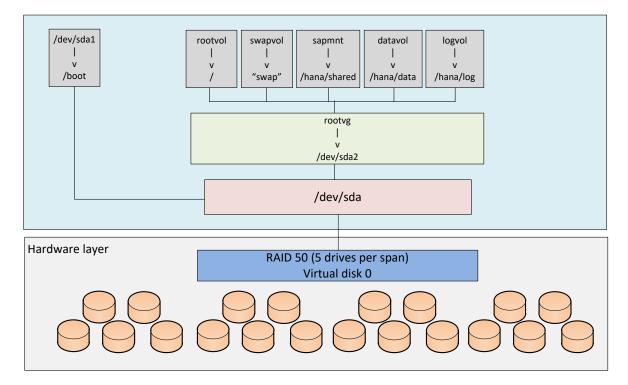
SAP defines hardware and software requirements for running SAP HANA systems. For the latest information about the CPU and memory configurations supported for SAP HANA, see <a href="https://global.sap.com/community/ebook/2014-09-02-hana-hardware/enEN/index.html">https://global.sap.com/community/ebook/2014-09-02-hana-hardware/enEN/index.html</a>.

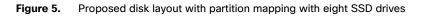
**Note:** This document does not cover the updated information published by SAP. Additional information is available at <a href="http://saphana.com">http://saphana.com</a>.

#### File system layout

Figures 4, 5, and 6 show the file system layouts and the storage sizes required to install and operate SAP HANA. When installing SAP HANA on a host, specify the mount point for the installation binaries (/hana/shared/<sid>), data files (/hana/data/<sid>), and log files (/hana/log/<sid>), where sid is the instance identifier of the SAP HANA installation.







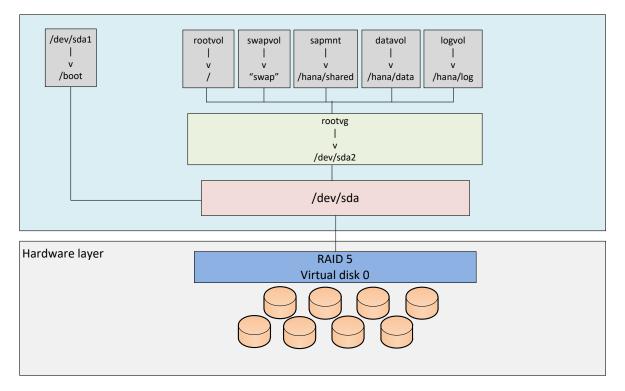
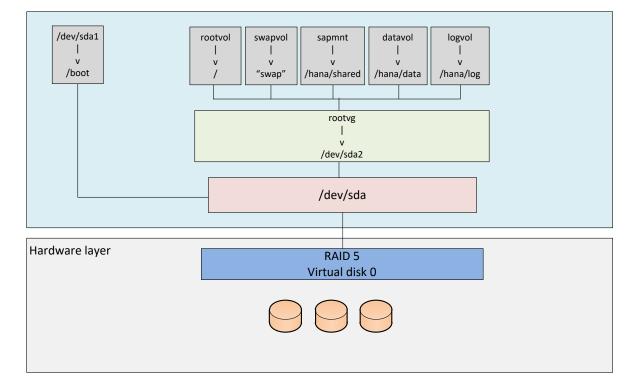


Figure 6. Proposed disk layout with partition mapping with three SSD drives (up to 1.5-TB memory configurations)



The storage size for the file system is based on the amount of memory on the SAP HANA host.

Here are some sample file system sizes for a single-node system with 3 TB of memory:

- /hana/shared: 1 x memory (3 TB)
- /hana/data: 3 x memory (9 TB)
- /hana/log: 1 x memory (512 GB)

Note: For solutions based on the Intel Xeon Platinum processor, the size of the log volume (/hana/log) must be as follows:

- Half of the server memory for systems ≤ 256 GB of memory
- Minimum of 512 GB for systems with  $\geq$  512 GB of memory

## **Operating system**

SAP HANA supports the following operating systems:

- •SUSE Linux Enterprise Server (SLES) for SAP applications
- Red Hat Enterprise Linux (RHEL) for SAP HANA

Note: This document provides installation steps for SLES for SAP 12 SP2.

# Deployment hardware and software configuration guidelines

This section is intended to enable you to fully configure the customer environment. In this process, various steps require you to insert customer-specific naming conventions, IP addresses, and VLAN schemes, as well as to record appropriate MAC addresses. Table 10 lists the configuration variables that are used throughout this document. You can complete this table using your specific site variables and use it in implementing the configuration steps presented in this document.

#### Table 10. Configuration variables

| Variable  | Description   | Customer implementation value |
|---|---|-------------------------------|
| < <var_cimc_ip_address>&gt;</var_cimc_ip_address>         | Cisco UCS C480 M5 server's IMC IP address   |                               |
| < <var_cimc_ip_netmask>&gt;</var_cimc_ip_netmask>         | Cisco UCS C480 M5 server's IMC network netmask                                      |                               |
| < <var_cimc_gateway_ip>&gt;</var_cimc_gateway_ip>         | Cisco UCS C480 M5 server's IMC network gateway IP address                           |                               |
| < <var_raid50_vd_name>&gt;</var_raid50_vd_name>           | Name for virtual drive VD0 during RAID configuration                                |                               |
| < <var_hostname.domain>&gt;</var_hostname.domain>         | SAP HANA node's fully qualified domain name (FQDN)                                  |                               |
| < <var_sys_root-pw>&gt;</var_sys_root-pw>                 | SAP HANA node's root password   |                               |
| < <var_lvm_vg_name>&gt;</var_lvm_vg_name>                 | SAP HANA node's OS logical volume management (LVM) volume group name                |                               |
| < <var_mgmt_ip_address>&gt;</var_mgmt_ip_address>         | SAP HANA node's management and administration IP address                            |                               |
| < <var_mgmt_nw_netmask>&gt;</var_mgmt_nw_netmask>         | SAP HANA node's management network netmask  |                               |
| < <var_mgmt_gateway_ip>&gt;</var_mgmt_gateway_ip>         | Cisco UCS C480 M5 server's management and administrative network gateway IP address |                               |
| < <var_mgmt_netmask_prefix>&gt;</var_mgmt_netmask_prefix> | Netmask prefix in Classless Inter-Domain Routing (CIDR) notation                    |                               |



# Preparing the SAP HANA scale-up node

This section discusses how to prepare the SAP HANA scale-up node for the SAP HANA installation.

#### **Configuring the Cisco Integrated Management Controller**

To configure the on-board IMC, you should connect a keyboard, video, and mouse (KVM) switch to the server.

1. After everything is connected, turn on the power to the server (Figures 7 and 8).

Figure 7. BIOS POST screen

Cisco Systems, Inc. Configuring and testing memory..

> Cisco IMC IPv4 : Not Available Cisco IMC IPv6 : Not Available MAC ADDR: Not Available

#### Figure 8. BIOS POST screen (continued)



2. Press F8 to display the IMC configuration (Figure 9).

Figure 9. Cisco UCS C480 IMC configuration view (local display)

| NIC mode                            |                   |                               |                  |              |
|-------------------------------------|-------------------|-------------------------------|------------------|--------------|
|                                     |                   | NIC redundancy                |                  |              |
|                                     | [X]               |                               | [ <u>×</u> ]     |              |
|                                     | []                |                               | []               |              |
|                                     |                   |                               | []               |              |
|                                     | []                | VLAN (Advanced)               |                  |              |
| Shared LOM Ext:                     | []                | VLAN enabled:                 | []               |              |
| Default VIC                         |                   | VLAN ID:                      |                  |              |
| Slot:                               | 1                 |                               |                  |              |
| IP (Basic)                          | 5×3               |                               |                  |              |
|                                     | [X] IPV6:         | []                            |                  |              |
|                                     | []                |                               |                  |              |
|                                     | 173.36.215.117    |                               |                  |              |
|                                     | 255.255.255.0     |                               |                  |              |
|                                     | 173.36.215.1      |                               |                  |              |
|                                     | 0.0.0.0           |                               |                  |              |
| xolakolakolakolakolakolakolakolakol |                   |                               |                  | akokokokokok |
| <up down="">Selectio</up>           | n <f10>Save</f10> | <space>Enable/Disable</space> | <f5>Refresh</f5> | ESC>Exit     |
| <f1>Additional se</f1>              | ttings            |                               |                  |              |

- 3. Use the console network IP address <<var\_cimc\_ip\_address>>, netmask <<var\_cimc\_ip\_netmask>>, and gateway <<var\_cimc\_gateway\_ip>> for the IPv4 settings of the IMC. Select None for network interface card (NIC) redundancy.
- 4. Press F10 to save the configuration and exit the utility.
- 5. Open a web browser on a computer on the same network with Java and Adobe Flash installed.
- 6. Enter the IMC IP address of the Cisco UCS C480 M5 server: http://<<var\_cimc\_ip\_address>>.
- 7. Enter the login credentials as updated in the IMC configuration. The default username and password are **admin** and **password** (Figure 10).

# Figure 10. Cisco IMC login screen

| ոիժը  |
|---|
| cisco   |
|   |
| C480-FCH2111W00K  |
| Cisco Integrated Management Controller  |
| Version: 3 1(0 213)   |
| Unimaine<br>Paspeord  |
| Ling for  |
| C480 M5 - 216 (System 1)<br>SAP HAVA Centrication. In Progress  |
| Order Development and the operation of the operation |
|   |
|   |
|   |

Figure 11 shows the results.

# Figure 11. Cisco IMC summary screen

| dds: Osco Integrated Manage                         |  |                     |                                   |  |             | A 0 0 3  |
|---|--|---------------------|-----------------------------------|--|-------------|--|
| ← → C ▲ Not sec                                     | ure   bkgs://173.36.215.35/index.html#CIMC   |                     |                                   |  |             | ☆ 1  |
| 😕 📲 Cisco   |  |                     |                                   |  |             | admin@173.36.215.50 - C480-FCH2111W00K 🔅                 |
| A / Chassis / Sum                                   | mary 🖈   |                     |                                   |  | Refresh Hos | t Power   Launch KVM   Ping   Reboot   Locator LED   @ 🛛 |
| Server Proper                                       | ties   | Cisco Integrated N  | lanagement Controller (Cis        | sco IMC) Information   |             |  |
| Product Name:                                       | UCS C480 M5  | Hostname:           | C480-FCH2111W00K                  |  |             |  |
| Serial Number:                                      | FCH2111W00K  | IP Address:         | 173.36.215.35                     |  |             |  |
| PID:  | UCSC-C480-MS   | MAC Address:        | 00:6B:F1:41:E2:6E                 |  |             |  |
| UUID:   | 16E477E8-5853-4599-AEA5-AF3453F8EB0C   | Firmware Version:   | 3.1(0.213)                        |  |             |  |
| BIOS Version:                                       | C480M5.3.1.0.248.0518171057  | Current Time (UTC): | Mon Jul 10 03:59:16 2017          |  |             |  |
| Description   |  | Local Time:         | Sun Jul 9 20:59:16 2017 PDT -0700 |  |             |  |
| Asset Tag:  | Unknown  | Timezone:           | America/Los_Angeles               | Select Timezone  |             |  |
| Overall Server<br>Tempe<br>Overall DIMM<br>Power Su | Status: Con<br>Status: Cood<br>rature: Cood<br>Status: Cood<br>Status: Cood<br>Status: Cood<br>Fame: Cood<br>orf | Server Utilization  | sine                              | Consert Utilization (%)<br>Consert Utilization (%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>Conserts<br>(%)<br>C |             |  |
|   |  |                     |                                   |  |             |  |

#### Launching the KVM console

You next need to launch the KVM console and map the SLES 12 for SAP SP2 DVD ISO file for the installation.

1. Click Launch KVM in the top-left corner of the IMC homepage (Figure 12).

Starting the IMC Release 3.0, two options are available for launching the KVM: one using the Java console and other using the browser-based HTML KVM console. In this example, the HTML KVM console has been used.

Figure 12. Cisco IMC homescreen

[[PLS SUPPLY THE MISSING FIGURE]]

 After you select the HTML-based console, a certificate confirmation window appears. Click the provided hyperlink to continue (Figure 13).

Figure 13. Click the hyperlink to load the KVM application

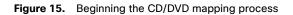
KVM server certificate has been accepted. Click this link to continue loading the KVM client application: https://173.36.215.35/html/kvmViewer.html

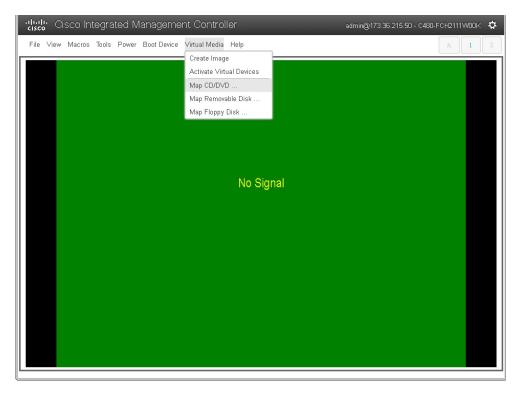
The KVM window will appear (Figure 14).

# Figure 14. KVM window

| l | cisc | <b>;</b> Ci | sco In | tegra | ted M | lanageme    | nt Control    | ller      | admin@173.36.215.50 - C480-F | FCH2111 | wook | 4 |
|---|------|-------------|--------|-------|-------|-------------|---------------|-----------|------------------------------|---------|------|---|
|   | File | View        | Macros | Tools | Power | Boot Device | Virtual Media | Help      |                              | A       | 1    | S |
|   |      |             |        |       |       |             |               | No Signal |                              |         |      |   |

3. In the menu bar at the top of the KVM window, choose Virtual Media > Activate Virtual Devices > Map CD/DVD (Figure 15).





4. Browse for the SLES 12 for SAP SP2 DVD ISO file and click Map Drive (Figure 16).

# Figure 16. Click Map Drive

| cisco Integrated Management Controller   | admin@173.36.215.50 - C480-FCH2111WOOK 🔅 |
|--|--|
| File View Macros Tools Power Boot Device Virtual Media Help                                | A I S                                    |
| Virtual Media - CD/DVD<br>Image File : SLE-12-SP2-SAP-x86_64-GM-DVD1.iso<br>♥<br>Map Drive | Arwse Cancel                             |

# **Configuring BIOS settings**

You need to power on the server and configure some BIOS settings before proceeding with the RAID configuration.

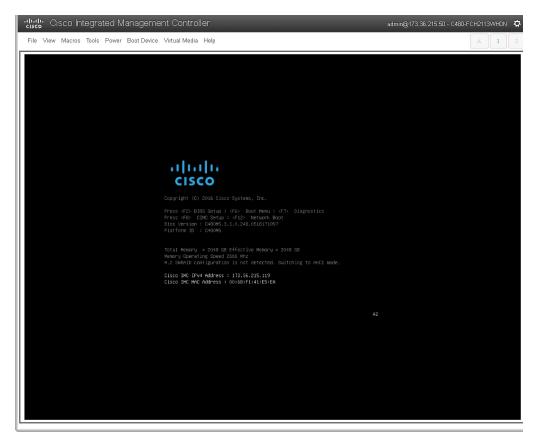
1. From the menu bar at the top of the KVM window, choose Power > Power On System (Figure 17).

# Figure 17. Powering on the system

| ului<br>cisco | <mark>;</mark> Cisc | o Int | egrate  | ed M | anageme  | nt Controll   | er        | admin@173.36.215.50 - C480-F | CH2113W | /HON 🍄     |
|---------------|---------------------|-------|---------|------|--|---------------|-----------|------------------------------|---------|------------|
| File          | View M              | acros | Tools F |      |  | Virtual Media | Help      |                              | A       | <b>1</b> S |
|               |                     |       |         |      | <pre>     On System     Off System     System (warn     Cycle System     C</pre> |               |           |                              |         |            |
|               |                     |       |         |      |  |               | No Signal |                              |         |            |
|               |                     |       |         |      |  |               |           |                              |         |            |
|               |                     |       |         |      |  |               |           |                              |         |            |

2. After the server has booted, press F2 to enter the BIOS menu (Figure 18).

#### Figure 18. Press F2



3. For a better keyboard experience, from the View menu select the on-screen keyboard (Figure 19).

# Figure 19. On-screen keyboard

| cisco Ci  | sco Int | egra  | ted M | lanageme    | nt Control   | ler .             |   |   |                       |              |   |  |  |                             |     | admin@ | 2173.36.3 | 215.50 | - C480-FC | H2113WHON 🕇 |
|-----------|---------|-------|-------|-------------|--|-------------------|---|---|-----------------------|--------------|---|--|--|-----------------------------|-----|--------|-----------|--------|-----------|-------------|
| File View | Macros  | Tools | Power | Boot Device | Virtual Media  | Help              |   |   |                       |              |   |  |  |                             |     |        |           |        |           | A 1 5       |
|           |         |       |       |             | Main Adv<br>System BIO<br>Product Na<br>Version<br>Build Date    | nformation<br>n   | Mgmt<br>UCSC-(<br>C480M9<br>05/18/<br>50654 | Secur.<br>0480-M<br>15.3.1.0<br>1/2017 :<br>1 - SKX<br>1S/PRQ - | 5<br>0.248<br>LO:57:4 | <u>ot Op</u> | cions<br>Set<br>to<br>eli<br>Det<br>Yei<br>Hon<br>Day | Save<br>t the<br>switc<br>ements<br>fault<br>ar: 20<br>nths:<br>ys: de | & Exit<br>Date. Us<br>h betwee<br>Ranges:<br>05–2099 | se Tab<br>en Date<br>on mor | e   |        |           |        |           |             |
|           |         |       |       |             | Total Memo<br>Effective<br>Logged in<br>System Dat<br>System Tim | Memory<br>as<br>e |   | GB<br>(istrat)<br>()5/12/2                                      |                       |              | Ent<br>+/-<br>F1:<br>F9:<br>F1:<br>ESI                | ter: S<br>-: Cha<br>: Gene<br>: Opti<br>0: Sav<br>C: Exi               | nge Opt<br>ral Help<br>mized De<br>e & Rese          | o<br>efaults<br>et Syst     | tem |        |           |        |           |             |
|           |         |       |       |             | Versi  | on 2.19.1268.     | Copyr:                                      | ight ((   | 0) 2017               | 'Amer.       | ican Mi   | egatre   | nds, Ind   | в.                          | AB  |        |           |        |           |             |
|           |         |       |       |             |  | Eng               | lish  |   |                       |              |   |  |  |                             |     |        | -         |        |           | # U A X     |
|           |         |       |       |             |  | ESC               | F1  | F2 F  | -3   F4               | F5           | F6  | F7   | F8   F9  | F10                         | F1  | 1 F12  | Num       | 1      | *         |             |
|           |         |       |       |             |  | ×                 | 1 2   | 2 3   | 4                     | 5 6          | 7   | 8  | 9 0  | -                           | =   | Bksp   | 7         | 8      | 9         | +           |
|           |         |       |       |             |  | тар               | q   | w   | e r                   | t            | у   | u  | i o  | p                           | []  | ] / [  | 4         | 5      | 6         | Scroll      |
|           |         |       |       |             |  | Cap               | os a  | s   | d f                   | 9            | h   | j  | < 1  | [;]                         | ' E | Enter  | 1         | 2      | 3         | Prnt Scrn   |
|           |         |       |       |             |  | Shi               | ift   | z×  | c                     | V            | bI  | n m  | Τ, Ι   | . 17                        | / s | hift   | 0         | 1.     | Enter     | 1           |

4. From the BIOS menu, choose Boot Options > Boot Mode > UEFI Mode (Figure 20). This setting selects the Unified Extensible Firmware Interface (UEFI).

# Figure 20. Choose UEFI Mode

| Lulu Cisco Integrated Managemer            | it Controller                              |                                      |  | admin@173.36. | 215.50 - C480-FC | H2113WHON 🛱 |
|--|--|--------------------------------------|--|---------------|------------------|-------------|
| File View Macros Tools Power Boot Device ' | √irtual Media Help                         |                                      |  |               | ſ                | A 1 S       |
|  |  |                                      |  |               |                  |             |
|  |  |                                      |  |               |                  |             |
|  |  |                                      |  |               |                  |             |
|  |  |                                      |  |               |                  |             |
|  |  |                                      |  |               |                  |             |
|  |  |                                      |  |               |                  |             |
|  |  |                                      |  |               |                  |             |
|  | Aptic Setup Utility                        | - Copyright (C) 2017 Americ          | an Megatrends, Inc.                              |               |                  |             |
|  | Main Advanced Server<br>Boot Configuration | Hgmt Security Boot Option            | s Save & Exit                                    |               |                  |             |
|  |  | 3                                    | mode or Legacy Boot<br>Mode. In UEFI Boot        |               |                  |             |
|  |  | Disabled                             | mode, only UEFI<br>BootOptions, UEFI OpROM       |               |                  |             |
|  | Boot Mode<br>CDN Support for VIC           | [Disabled]                           | will load and display.<br>LEGACY BOOTOPTIONS and |               |                  |             |
|  | Boot Option Priorities                     | UEFI Mode                            | PCIOpROM will load and                           |               |                  |             |
|  | Boot Option #1<br>Boot Option #2           | UE LEGACY Mode                       | ++: Select Screen<br>++: Select Item             |               |                  |             |
|  | BOOL ODITION #2                            | Ethernet Controller                  | Enter: Select<br>+/-: Change Opt.                |               |                  |             |
|  | Boot Option #3                             | [UEFI: PXE IP4 Intel(R)              | F1: General Help<br>F9: Optimized Defaults       |               |                  |             |
|  |  | x550]                                | F10: Save & Reset System<br>ESC: Exit            |               |                  |             |
|  |  |                                      | K/M: Scroll help UP/DOWN                         |               |                  |             |
|  |  |                                      | AB   |               |                  |             |
|  |  |                                      |  |               |                  |             |
|  | Eng  | Sh<br>   F1   F2   F3   F4   F5   F1 | 6   F7   F8   F9   F10   F11                     | L F12 Num     | / *              | # U A X     |
|  | · · · · · ·                                |                                      |  | Bksp 7        | 8 9              | +           |
|  | тар  | qwerty                               | uiop[  | ] \ 4         | 5 6              | Scroll      |
|  | Cap  |                                      |  | nter 1        | 2 3              | Prnt Scrn   |
|  |  |                                      |  | hift 0        | . Enter          |             |
|  | - Ctr                                      |                                      |  |               |                  |             |

5. Disable the C-states of the CPU as recommended in the SAP for HANA requirements. From the BIOS menu, choose Advanced > Socket Configuration (Figure 21).

# Figure 21. Choose Socket Configuration

| sco C    | isco In | tegra | ited N | lanager  | mer    | it Contro   | ller  |  |  |                                     |                        |       |   |   |  |   |                             |     | admir    | @173.3 | 36.215.5 | 50 - C480-F | CH2113VVHO | N 🛱 |
|----------|---------|-------|--------|----------|--------|---|---|--|--|-------------------------------------|------------------------|-------|---|---|--|---|-----------------------------|-----|----------|--------|----------|-------------|------------|-----|
| ile View | Macros  | Tools | Power  | Boot Dev | vice ` | √irtual Media   | Help  |  |  |                                     |                        |       |   |   |  |   |                             |     |          |        |          |             | A 1        |     |
|          |         |       |        |          |        | Apt Le<br>Main RC<br>> Trusted C<br>> PCI Subsy<br>> USB Confi<br>> USB Confi<br>> Network S<br>> USB Confi<br>> Diver He<br>> Socket Co<br>> Driver He<br>> Socket Co<br>> Intel(N<br>> ANBO ME<br>> AVBO ME<br>Controlle<br>Configure | vanced<br>omputin<br>t Consistem Se<br>tack Co<br>guratio<br>Defigura<br>figura<br>alth<br>figurat<br>/irtual<br>format<br>are RAI<br>#RAID &<br>with | server<br>g<br>ole Red<br>ttings<br>nfigura<br>n<br>ts Conf<br>ration<br>tion<br>RAID or<br>ion<br>D Confi<br>Clsco 11<br>4GB cacl | irection<br>tion<br>Iguratio<br>CPU<br>guration<br>26 Modul<br>re (max | n<br>n<br>util.<br>ar Ra.<br>26 dr. | ty Bo<br>ity (Si<br>Id | atta) | ions<br>▲ Se<br>In<br>Co<br>+++<br>+/1<br>En<br>+/1<br>F19<br>F11<br>▼ ES | Save<br>lect<br>tel S<br>nfigu<br>: Sel<br>: Sel<br>: Ser<br>: Ch<br>: Gen<br>: Opt<br>: Gen<br>: Capt<br>: Capt<br>: Save<br>: Sel<br>: Sel | & Exi<br>to nav<br>ocket<br>ration<br>ect Sci<br>ect Iti<br>Select<br>ange Op<br>eral H<br>imized<br>ve & Ro | t<br>igat<br>pag<br>reen<br>em<br>ot.<br>elp<br>Def<br>eset | e to<br>es<br>aults<br>Syst | em  |          |        |          |             |            |     |
|          |         |       |        |          |        | Vers  | lon 2.1   | 9.1268.  | Copyrig  | ht (C                               | 2017                   | Amen. | can M   | egatr   | ends,  | Inc.  |                             |     |          |        |          |             |            |     |
|          |         |       |        |          |        |   |   |  |  |                                     |                        |       |   |   |  |   |                             |     |          |        |          |             |            |     |
|          |         |       |        |          |        |   |   | Eng  | lish   |                                     |                        |       |   |   |  |   |                             |     |          |        |          |             | # U îì     | X   |
|          |         |       |        |          |        |   |   | _  | F1 F   | 2   F                               | 3   F4                 | F5    | F6  | F7  | F8 F   | -9  | F10                         | F1  | L1   F12 | Num    | 1        | *           |            |     |
|          |         |       |        |          |        |   |   |  | 1 2  | 3                                   | 4 5                    |       | 7   | 8   |  | 0   | - 1                         | =   | Bksp     | 7      |          |             | +          |     |
|          |         |       |        |          |        |   |   | Tab  | 1 1  |                                     | ≘   r                  | t     | y y   | <br>u   | i (  | -   | p                           | E   | 1 1      | 4      | 5        | 6           | scroll     |     |
|          |         |       |        |          |        |   |   | Cap  | l-i-l-   |                                     | d f                    | g     | h   |   | k   1  |   | ·                           | - 1 | Enter    | 1 1    |          |             | Prnt Sc    | rn  |
|          |         |       |        |          |        |   |   | shi  |  |                                     |                        |       |   | n   r   |  | Τ.  |                             |     | Shift    |        |          | Enter       |            |     |
|          |         |       |        |          |        |   |   |  |  |                                     |                        |       |   |   | ,  |   | <u> </u>                    |     |          |        | ·        |             |            |     |
|          |         |       |        |          |        |   |   | Ctr  | 1 Wi   | in L                                | Alt                    |       |   |   |  |   | Alt                         | · 1 | Ctrl     |        |          |             |            |     |

6. Choose Advanced Power Management Configuration (Figure 22).

- Cisco Integrated Management Controller admin@173.36.215.50 - C480-FCH2113WH0N 🛛 🔅 🛛 File View Macros Tools Power Boot Device Virtual Media Help 1 Aptio Setup Utility – Copyright (C) 2017 American Megatrends, Inc. Processor Configuration
   Common RefCode Configuration
   UFL Configuration
   HENORY Configuration
   Hild Configuration
   Hild Configuration
   Advanced Power Management Configuration Displays and provides option to change the Power Management Settings +: Select Screen 14: Select Item Enter: Select +/-: Change Opt. F1: General Help F9: Optimized Defaults F10: Save & Reset System ESC: Exit K/M: Scroll help UP/DOWN English # U A X Esc F1 F2 F3 F4 F5 F6 F7 F8 F9 F10 F11 F12 Num / \* -1 2 3 4 5 6 7 8 9 0 - = Bksp 7 8 9 + 
   Tab
   q
   w
   e
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   o
   p
   [
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   Caps
   a
   s
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   f
   g
   h
   j
   k
   l
   ;
   '
   Enter
   4 5 6 scroll 2 1 3 Prnt Scrn shift z x c v b n m , . / shift 0 . Enter Ctrl Win Alt Alt Ctrl
- Figure 22. Choose Advanced Power Management Configuration

7. Disable the C-states as shown in Figure 23.

#### Figure 23. Disabling C-states

| Lisco Integrated Managemei               | nt Controller   | admin@173.36.215.50 - C480-FCH2113WHON 🔅 |
|--|---|--|
| File View Macros Tools Power Boot Device | Virtual Media Help  | A 1 S                                    |
|  | Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.         CPU C State Control         Autonomous Cone [Disable]         C-State         CPU D S report [Disable]         Enhanced Hait State [Enable]         (CIE)         DS ACPI CX         ACPI C2 |  |
|  | K/M: Scroll help UP/DOWN  |  |
|  | Version 2.19.1258. Copyright (C) 2017 American Megatrends, Inc.<br>AB   |  |
|  | English   | # U A X                                  |
|  | Esc F1 F2 F3 F4 F5 F6 F7 F8 F9 F10 F1   |  |
|  | <u>`</u> 1234567890-=   | Bksp 7 8 9 +                             |
|  | Tab q w e r t y u i o p [   | ] \ 4 5 6 scroll                         |
|  | Caps a s d f g h j k l ; '  | Enter 1 2 3 Prnt Scrn                    |
|  | shift z x c v b n m , . / s   | shift 0 . Enter                          |
|  |   |  |

8. After disabling the C-states, press F10 and save the BIOS settings.

# Rebooting the server to implement BIOS changes

To make the boot options and CPU C-states take effect, reboot the server.

You are now ready to configure RAID.

#### **RAID options**

This document covers all scale-up solutions with 2- and 4-socket configurations of the Cisco UCS M5 platform.

Table 11 lists the RAID options and the available platforms.

#### Table 11.RAID options

| Platform       | SAS (20 drives) | SSD (3 or 8 drives) |
|----------------|-----------------|---------------------|
| Cisco UCS C480 | RAID 50         | RAID 5              |
| Cisco UCS C240 | RAID 50         | RAID 5              |
| Cisco UCS C220 | -               | RAID 5              |

Table 12 lists the settings that you need to configure when you create the virtual drives.

#### Table 12.RAID settings

| RAID settings | RAID 50    | RAID 5     |
|---------------|------------|------------|
| Stripe size   | 256        | 128        |
| Read policy   | Read ahead | Read ahead |
| Write policy  | Write back | Write back |
| I/O policy    | Cached     | Default    |

# **Configuring RAID**

The following procedure shows the RAID 50 configuration with SAS drives on the Cisco UCS C480 M5 server used for SAP HANA.

The same procedure applies to the creation of RAID 5 virtual drives with SSD-based options except that the number of drives will be three or eight and the RAID level will be RAID 5.

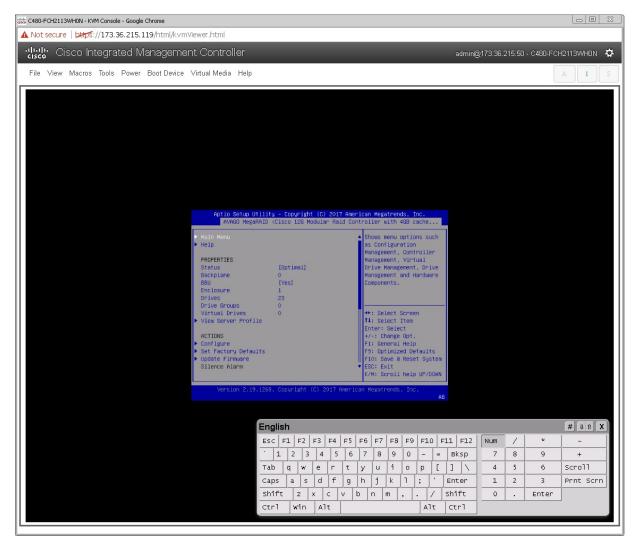
- 1. Boot the server and press F2 to enter the BIOS menu.
- 2. Select the Avago MegaRAID Utility to proceed with the RAID configuration Figure 24).

#### Figure 24. Select Avago MegaRAID

| disco Integrated Management Controller   | admin@173.36.2  | 215.50 - C480-FCH | 2113WHON          | \$ |
|--|---|-------------------|-------------------|----|
| File View Macros Tools Power Boot Device Virtual Media Help  |   |                   | A 1               | S  |
| Actio Setus Utility - Copuright (C) 2017 American Megatrends, Inc.<br>Kain Rovanced Server Kant Security Boot Options Save & Exit<br>Trusted Computing<br>= Serial Fort Console Redirection<br>= For Stave Contiguration<br>= For Stave Contiguration<br>= For Form Configuration<br>= For Form Configuration<br>= For Form Configuration<br>= For Health<br>= Socket Configuration<br>= Intel(R) Virtual RAD on CPU<br>= All Cpu Information<br>= LSI Software RAD Configuration Utility (SATA)<br>= All Regearm Configuration Rad                                |   |                   | 15 J              |    |
| Controller with 48B cache (max 26 drives)> [F9: Optimized Default<br>Configuration Utility - 07.01.12.00 Files Reset Syst<br>ESC: Exit<br>K/M: Scroll Help UP/D  |   |                   |                   |    |
| Controller with 400 cache (max 26 drives)> F9: Optimized Default<br>Configuration Utility - 07.01.12.00 ¥ F0: Save 8 Reset Sys<br>▼ ECC: Exit  |   |                   |                   |    |
| Controller with 48B cache (max 26 drives)> [F9: Optimized Default<br>Configuration Utility - 07.01.12.00 Files Reset Syst<br>ESC: Exit<br>K/M: Scroll Help UP/D  | HN  |                   | # U ft X          |    |
| Controller with 408 cache (max 26 drives)><br>Configuration utility - 07.01.12.00<br>Version 2.19.1268. Copyright (C) 2017 American Megatrends. Inc.<br>English  | HN  | / *               | # U îì X          |    |
| Controller with 408 cache (max 26 drives)><br>Configuration Utility - 07.01.12.00<br>Version 2.19.1268, Copyright (C) 2017 American Megatrends, Inc.<br>English  | AB  | / ¥<br>8 9        | # U f X<br>-<br>+ |    |
| Controller with 488 cache (max 26 drives)><br>Configuration Utility - 07.01.12.00<br>Version 2.19.1268. Copyright (C) 2017 Amarican Regatereds. Inc.<br>English<br>Esc F1 F2 F3 F4 F5 F6 F7 F8 F9 F10  | AB  |                   | -                 |    |
| Controller with 488 cache (max 26 drives)>       F9: dptinized default         Configuration Utility - 07.01.12.00       F0: Sove 8 Reset Sys         Version 2.19.1268. Copyright (C) 2017 Amarican Regatrends, Inc.         English         Esc F1       F2       F3       F4       F5       F6       F7       F8       F9       F10         ` 1       2       3       4       5       6       7       8       9       0       -   | AB<br>F11 F12 Num<br>= Bksp 7                             | 8 9               | -+                |    |
| Controller uith 488 cache (max 26 drives)>       F9: 0ptilized Default         Configuration utility - 07.01.12.00       F9: 0ptilized Default         Version 2.19.1268, Copyright (C) 2017 American Regatrends, Inc.         English         Esc       F1         F2       F3       F4       F5       F6       F7       F8       F9       F10         Version 2.19.1268, Copyright (C) 2017 American Regatrends, Inc.       F5       F6       F7       F8       F9       F10         Tab       q       w       e       r       t       y       1       0       p | AU<br>AU<br>F11 F12 Num<br>= Bksp 7<br>[ ] \ 4<br>Enter 1 | 8 9<br>5 6        | -<br>+<br>Scroll  |    |

3. Choose Main Menu (Figure 25).

#### Figure 25. Choose Main Menu

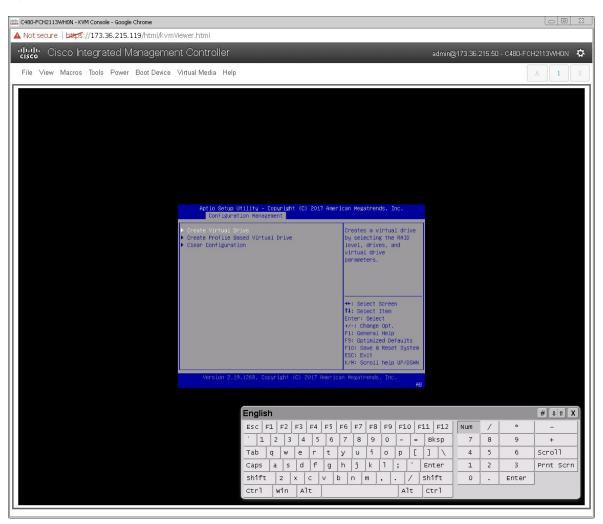


4. Choose Configuration Management (Figure 26).

#### Figure 26. Choose Configuration Management

| 號 C480-FCH2113WH0N - KVM Console - Google Chrome |   |   |
|--|---|---|
| A Not secure   bttps://173.36.215.119/html/kvmVi | wer.html  |   |
| Cisco Integrated Managemen                       | t Controller  | admin@173.36.215.50 - C480-FCH2113WH0N 🛛 🌞  |
| File View Macros Tools Power Boot Device         | irtual Media Help   | A I S   |
|  | Aptio Setup Utility - Copyright (C) 2017 American Megatrends, J         Main Menu         • Configuration Management         > Displays configuration Management         > Drive Management         > Handware Components         Handware Components         + : Select Screet         Set | mation<br>tions<br>he<br>mots<br>ve:<br>Wased<br>preate<br>preate<br>on<br>faults<br>tt System<br>b UP/DOWN |
|  |   | AB  |
|  | English   | # Un X  |
|  | ESC F1 F2 F3 F4 F5 F6 F7 F8 F9  | F10 F11 F12 Num / * -   |
|  | <u>1</u> 234567890  | - = Bksp 7 8 9 +  |
|  | Tab q w e r t y u i o   | p [ ] \ 4 5 6 scroll  |
|  | Caps a s d f g h j k l  | ; 'Enter 1 2 3 Prnt Scrn  |
|  | shift z x c v b n m ,   | . / Shift 0 . Enter   |
|  | Ctrl Win Alt  | Alt Ctrl  |
|  |   |   |

5. Choose Create Virtual Drive (Figure 27).

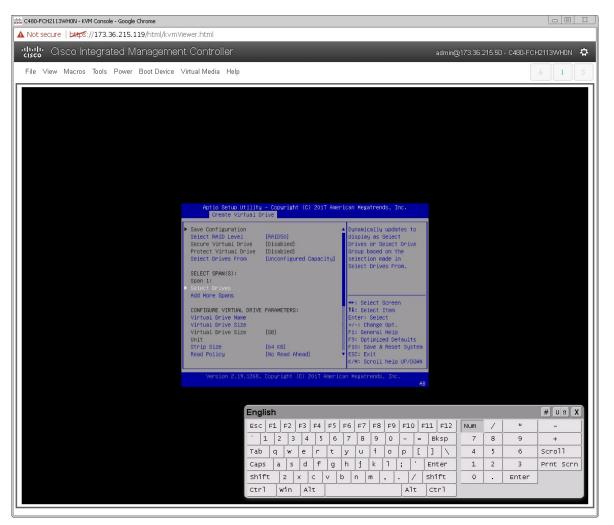


#### Figure 27. MegaRAID Configuration Utility: Create Virtual Drive

- Choose the following options to create a RAID 50 virtual drive with 20 disks and five spans:
   a. For RAID Level, choose RAID50.
  - b. Choose Select Drives (Figure 28).

# ılıılı cısco

#### Figure 28. Choosing RAID options



c. Select the first five disks by choosing Enabled as shown in Figure 29.

# iliilii cisco

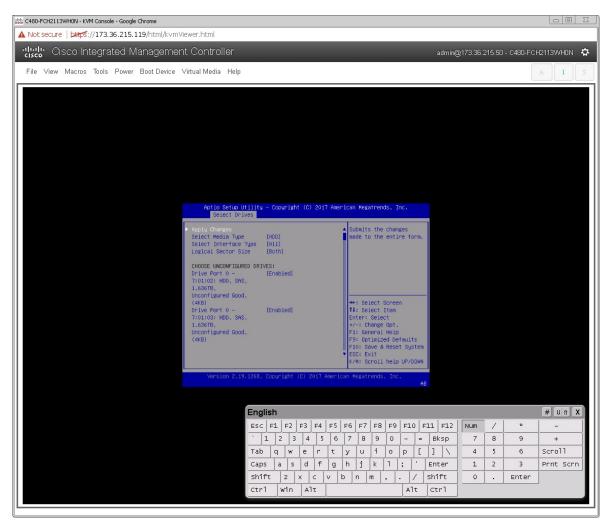
# Figure 29. Choose Enabled

| C480-FCH2113WH0N - KVM Console - Google Chrome   |                             |              |
|--|-----------------------------|--------------|
| A Not secure bit S://173.36.215.119/html/kvmViewer.html  |                             |              |
| directory Cisco Integrated Management Controller adm   | nin@173.36.215.50 - C480-Fi | СН2113WHON 🌣 |
| File View Macros Tools Power Boot Device Virtual Media Help  |                             | A I S        |
|  |                             |              |
|  |                             |              |
|  |                             |              |
|  |                             |              |
|  |                             |              |
|  |                             |              |
|  |                             |              |
| Aptio Setup Utility – Copyright (C) 2017 American Megatrends, Inc.   |                             |              |
| Select Drives  |                             |              |
| Drive Port 0 - (Enabled)  7:01:04: HDD, SAS,   |                             |              |
| 1.686TB,<br>Unconfigured Good,<br>(4KB)  |                             |              |
| Drive Port 0 - [Enabled]<br>7:01:05: HDD, SAS,   |                             |              |
| Drive Port O - 7:01:05: HDD, SAS, 1.636TB, Unconfigured Good, (4KB) Disabled   |                             |              |
| Enabled  |                             |              |
| 7<br>1.686TB, Enter: Select  |                             |              |
| Unconfigured Good, +/-: Change Opt.<br>(4KB) F1: General Help<br>F3: Optimized Defaults  |                             |              |
| F10: Save & Reset System<br>▼E00: Save & Reset System  |                             |              |
| K/M: Scroll help UP/DOHN   |                             |              |
| Version 2.19.1268. Copyright (C) 2017 American Megatrends, Inc.<br>AB  |                             |              |
|  |                             |              |
| English  |                             | # U ft X     |
| ESC F1 F2 F3 F4 F5 F6 F7 F8 F9 F10 F11 F1  |                             |              |
| ` 1 2 3 4 5 6 7 8 9 0 -  = Bksp<br>Tab q w e r t y u i o p [ ] \   |                             | +<br>scroll  |
| $\begin{array}{c cccc} \hline 1 & ab & q & b & c & y & d & r & 0 & p & c & y \\ \hline Caps & a & s & d & f & g & h & j & k & 1 & ; & ' & Enter \end{array}$ |                             | Prnt Scrn    |
| shift z x c v b n m , . / shift  | 0 . Enter                   |              |
| Ctrl win Alt Alt Ctrl  |                             |              |
|  |                             |              |

d. Scroll up or down and on the Select Drives screen, choose Apply Changes (Figure 30).

# ılıılı cısco

#### Figure 30. Apply the changes



e. Choose OK in the confirmation window.

7. Add four more spans using the same process as in step 6 (Figure 31).

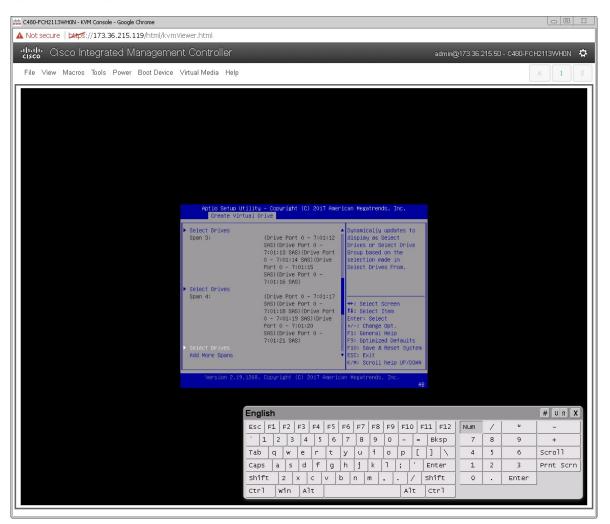
# iliilii cisco

#### Figure 31. Add more spans

| 480-FCH2113WH0N - KVM Console - Google Chrome    |   |  |                          |            |
|--|---|--|--------------------------|------------|
| Not secure   bttps://173.36.215.119/html/kvmViev | ver.html  |  |                          |            |
| Isto Cisco Integrated Management                 | Controller  | admin@   | 173.36.215.50 - C480-FCH | 2113WHON 🌣 |
|  |   |  |                          |            |
| File View Macros Tools Power Boot Device Vir     | tual Media Help   |  |                          | A I S      |
|  |   |  |                          |            |
|  |   |  |                          |            |
|  |   |  |                          |            |
|  |   |  |                          |            |
|  |   |  |                          |            |
|  |   |  |                          |            |
|  |   |  |                          |            |
|  |   |  |                          |            |
|  | Aptio Setup Utility – Copyright (C) 2017 Americ<br>Create Virtual Drive | an Megatrends, Inc.                              |                          |            |
|  | Secure Virtual Drive [Disabled]   | Active when configuring                          |                          |            |
|  |   | a spanned virtual<br>drive, it allows the        |                          |            |
|  |   | user to add additional spans. There should be    |                          |            |
|  |   | an even number of spans<br>and an even number of |                          |            |
|  |   | drives per span for a                            |                          |            |
|  | Port 0 - 7:01:05  | ++: Select Screen                                |                          |            |
|  | 7:01:06 SAS)  | t4: Select Item                                  |                          |            |
|  | Add More Spans  | Enter: Select<br>+/-: Change Opt.                |                          |            |
|  | CONFIGURE VIRTUAL DRIVE PARAMETERS:                                     | F1: General Help<br>F9: Optimized Defaults       |                          |            |
|  |   | F10: Save & Reset System<br>ESC: Exit            |                          |            |
|  |   | K/M: Scroll help UP/DOWN                         |                          |            |
|  |   | i Megatrends, Inc.<br>AB                         |                          |            |
|  |   |  |                          |            |
|  | English   |  |                          | # U A X    |
|  | ESC F1 F2 F3 F4 F5 F  | 6 F7 F8 F9 F10 F11 F12                           | Num / ] * ]              | -          |
|  | <u>123456</u>   | 7 8 9 0 - = Bksp                                 | 7 8 9                    | +          |
|  | Tab q w e r t y   |  | 4 5 6                    | Scroll     |
|  | Caps a s d f g h  |  | 1 2 3                    | Prnt Scrn  |
|  | Shift z x c v b   | n m , . / shift                                  | 0 . Enter                |            |
|  | Ctrl Win Alt  | Alt Ctrl   |                          |            |

8. After repeating the steps to add spans and drives, verify that four spans with five drives per span have been added (Figure 32).

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#### Figure 32. Verifying that the spans and drives have been added

- 9. Configure the virtual drive parameters as shown in Figure 33.
  - a. Name the virtual drive <<var\_raid50\_vd\_name>>.
  - b. For Strip Size, choose 256KB.
  - c. For Read Policy, choose Read Ahead.
  - d. For Write Policy, choose Write Back.

When you are done, choose Save Configuration and press Enter.

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### Figure 33. Virtual drive parameters

| H2113WHON - KV | M Console                | - Google                               | Chrome   |                           |   |  |  |   |   |   |  |  |  |  |   |  | 00  | 5  |
|----------------|--------------------------|--|--|---------------------------|---|--|--|---|---|---|--|--|--|--|---|--|---|--|
| ecure   bttps  | //173.36                 | 5.215.1                                | .19/html/kvm                                     | Viewer.html               |   |  |  |   |   |   |  |  |  |  |   |  |   |  |
| Cisco In       | tegrat                   | ed M                                   | anageme  | ent Contro                | ller  |  |  |   |   |   |  |  | admin@   | 2)173.36.2   | 215.50  | - C480-FC  | H2113WHON   | 4  |
|                |                          |  |  |                           |   |  |  |   |   |   |  |  |  |  |   | [  |   | 6  |
| inderes        | 10010                    | 1 Ower                                 | Boot Bonce                                       | Virtual Modia             | Theip   |  |  |   |   |   |  |  |  |  |   |  |   |  |
|                |                          |  |  |                           |   |  |  |   |   |   |  |  |  |  |   |  |   |  |
|                |                          |  |  |                           |   |  |  |   |   |   |  |  |  |  |   |  |   |  |
|                |                          |  |  |                           |   |  |  |   |   |   |  |  |  |  |   |  |   |  |
|                |                          |  |  |                           |   |  |  |   |   |   |  |  |  |  |   |  |   |  |
|                |                          |  |  |                           |   |  |  |   |   |   |  |  |  |  |   |  |   |  |
|                |                          |  |  |                           |   |  |  |   |   |   |  |  |  |  |   |  |   |  |
|                |                          |  |  |                           |   |  |  |   |   |   |  |  |  |  |   |  |   |  |
|                |                          |  |  |                           |   |  |  |   |   |   |  |  |  |  |   |  |   |  |
|                |                          |  |  | Aptio                     | Setup Utility   | y – Copyrigh   |  | 017 Amer  | ∙ican Me  | gatrends,   |  |  |  |  |   |  |   |  |
|                |                          |  |  |                           |   |  |  |   | A Submi   | te the ch   | 222200   |  | 1  |  |   |  |   |  |
|                |                          |  |  |                           |   |  | 3:   |   | iii made  | to the er   | ntire fo   |  |  |  |   |  |   |  |
|                |                          |  |  | Virtual Dr                | ive Size  | 26.178   |  |   | drive   | with the  | е  |  |  |  |   |  |   |  |
|                |                          |  |  | Virtual Dr<br>Unit        | ive Size  | [TB]   |  |   | speci   | fied para   | ameters.   |  |  |  |   |  |   |  |
|                |                          |  |  | Strip Size                |   | [256 KB]   |  |   |   |   |  |  |  |  |   |  |   |  |
|                |                          |  |  | Write Poli                | cy  | [Write Bad   |  |   |   |   |  |  |  |  |   |  |   |  |
|                |                          |  |  |                           |   | [Cached]<br>[Read/Writ   | el   |   | ++: S   | elect Scr   | reen   |  |  |  |   |  |   |  |
|                |                          |  |  | Drive Cach                | ie  | [Unchanged   |  |   | tl: s   | elect Ite   | em   |  |  |  |   |  |   |  |
|                |                          |  |  |                           |   | [NO]   |  |   | +/-:  | Change Op   | ot.  |  |  |  |   |  |   |  |
|                |                          |  |  | Default<br>Initializa     | tion  | [NO]   |  |   |   |   |  | te la  |  |  |   |  |   |  |
|                |                          |  |  | Emulation                 | Туре  | [Default]  |  |   | F10:  | Save & Re   |  |  |  |  |   |  |   |  |
|                |                          |  |  | ► save cont.              |   |  |  |   |   |   | elp UP/O   | OOMN   |  |  |   |  |   |  |
|                |                          |  |  | Vers.                     | on 2.19.1268.   | . Copyright  | (C) 201  | Ameri   | an Mega   | trends, 1   | Inc.   |  | 1  |  |   |  |   |  |
|                |                          |  |  |                           |   |  |  |   |   |   |  |  |  |  |   |  |   |  |
|                |                          |  |  |                           | _   |  |  |   |   |   |  |  |  |  |   |  |   |  |
|                |                          |  |  |                           | Eng   | lish   |  | _   |   |   |  |  |  |  |   |  | # ₩ Ո   | X  |
|                |                          |  |  |                           |   | = F1 F2  | F3 F4  | 4 F5  |   |   | -9 F1  | 0 F:   | 11 F12   | Num  | /   | *  | -   |  |
|                |                          |  |  |                           | ×   | 1 2 3  | 4  | 5 6   | 7 8   | 9 (   | 0 ] -  | =  | Bksp   | 7  | 8   | 9  | +   |  |
|                |                          |  |  |                           | Так   | o q w  | e r  | t   | y u   | ic  | o p  | ][   | ]] \   | 4  | 5   | 6  | Scroll  |  |
|                |                          |  |  |                           | Cap   | os a s   | d 1  | g   | h j   | k   1   | ;  | · ]  | Enter  | 1  | 2   | 3  | Prnt Scr  | 'n   |
|                |                          |  |  |                           | Shi   | ift z  | x c  | V   | b n   | m  ,  | 1.1  | 1  | shift  | 0  | •   | Enter  |   |  |
|                |                          |  |  |                           |   |  |  |   |   |   |  |  |  |  |   |  |   |  |
|                | cure   bttps<br>Cisco In | cure   bttps://173.3<br>Cisco Integrat | cure   buts://173.36.215.1<br>Cisco Integrated M | Cisco Integrated Manageme | cure ber S.//173.36.215.119/html/kvmViewer.html<br>Cisco Integrated Management Contro<br>iew Macros Tools Power Boot Device Virtual Media<br>Configure<br>Virtual Dr<br>Virtual Dr<br>V | cure best //173.36.215.119/html/kvm/kewer.html Cisco Integrated Management Controller iew Macros Tools Power Boot Device Virtual Media Help Configure Virtual Control Utilit Configure Virtual Device Virtual Device Virtual Device Name Virtual Device Name Virtual Device Name Virtual Device Size Unit Strip Size Read Policy Ref Policy Size Configuration Utilitation Defout Thilalization Defout Version 2.19.1268 Esc | cure bergs://173.36.215.119/html/kvmViewer.html  Cisco Integrated Management Controller  iew Macros Tools Power Boot Device Virtual Media Help  Constent Virtual Drive Constent Virtual | cure bety :://173.36.215.119/html/kvmViewer.html<br>Cisco Integrated Management Controller<br>iew Macros Tools Power Boot Device Virtual Media Help<br>Confidure Virtual Drive Copyright (c) 20<br>Create Virtual Drive Seture Virtual Drive Copyright (c) 20<br>Confidure Virtual Drive Seture Controller<br>Virtual Drive Name<br>Virtual Drive Size (C) KB<br>Virtual Drive Size (C) KB<br>Read Policy (Read Ahead)<br>Read Ahead)<br>Read Ahead<br>Read Policy (Read Ahead)<br>Read Ahead<br>Read Policy (Read Ahead)<br>Read Ahead<br>Read Policy (Read Ahead)<br>Read Ahead<br>Not (Not)<br>Initialization<br>Default (Not)<br>Initialization<br>Emplish<br>Esc F1 F2 F3 F4<br>1 2 3 4<br>Tab q w e r<br>Caps a s d 1 | cure       bttp:://173.36.215.119/html/kvmVlewer.html         Cisco Integrated Management Controller         iew Macros Tools Power Boot Device Virtual Media Help         Correct Virtual Drive         Unit Drive Size         Virtual Drive Size | cure bkp5://173.36.215.119/html/kvmVlewer.html         Cisco Integrated Management Controller         iew Macros Tools Power Boot Device Virtual Media Help         Disco Integrated Management Controller         iew Macros Tools Power Boot Device Virtual Media Help         DowFisuRe Virtual Drive         DowFisuRe Virtual Drive         Virtual Drive Size         Disble Background         Nol         Brisble Background         Nol         Brisble Background         Version 2.15.1268. 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Certificate Virtual Device         Virtual Leve Macros Tools Power Boot Device Virtual Media Help         Anticol Scale Utility - Sognight (G) 2017 AverCan Vesatrends, Inc.         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Certificate Virtual Device         Virtual Leve Macros Tools Power Boot Device Virtual Media Help         Anticol Scale Utility - Sognight (G) 2017 AverCan Vesatrends, Inc.         Certificate Virtual Device         Utrust Device         Virtual Leve Martinal Device         Utrust Device Virtual Media         Virtual Device         Utrust Device Virtual Media         Virtual Device         Utrust Device         Virtual Leve Virtual Device         Device Device Virtual Media         Device Device Virtual Device         Virtual Device         Device Device Device Virtual Device         Virtual Device </td |

10. In the next window, the utility will ask for confirmation. Choose OK to proceed.

**Note:** The RAID settings described here apply only to a configuration using 20 SAS drives with RAID 50. Refer to Table 12 for the RAID options for SSD drives with RAID 5 settings.

- 11. Wait for the initialization process for VD0 to complete, which may take several minutes.
- 12. Press Esc and choose OK to exit the RAID configuration utility.
- 13. Press Ctrl+Alt+Del to reboot the server.

# Installing the operating system

This section shows the installation procedure for SLES 12 for SAP SP2 on local drives.

1. Follow the steps in the section "Launching the KVM console" [[PLS ADD LINK]] to mount and boot the ISO image (Figure 34).

## Figure 34. Booting to the ISO image

| A 173.36.215.117 - KVM Console       |  |  |
|--------------------------------------|--|--|
| File View Macros Tools Power Virtual | Media Help   |  |
|                                      |  |  |
| <sup>©</sup> SUSE                    |  |  |
|                                      |  |  |
|                                      | Boot from Hard Disk  |  |
|                                      | Installation   |  |
|                                      | Upgrade  |  |
|                                      | Rescue System  |  |
|                                      | Check Installation Media   |  |
|                                      | Memory Test  |  |
|                                      |  |  |
|                                      |  |  |
|                                      |  |  |
|                                      |  |  |
|                                      |  |  |
| Boot Optio                           | ns   |  |
|                                      |  |  |
| El Holo El Languago El V             | lidee Mede E4 Source E5 Kernel E   | 6 Driver                                 |
|                                      | Video Mode F4 Source F5 Kernel F<br>Default DVD Default  | No                                       |
|                                      | a the second | 73.36.215.117 admin 0.6 fps 0.001 KB/s 🗎 |

- 2. On the Language, Keyboard and License Agreement page, select your preferred language and keyboard Layout, agree to the license terms, and select Next.
- 3. On the Network Settings page, select Next. You will return to the network configuration as part of the post-installation tasks.
- 4. On the Registration page, select Skip Registration. You will register later as part of the post-installation tasks.
- On the Product Installation Mode page, select the "Proceed with standard SLES for SAP Applications installation" option (Figure 35).

# Figure 35. Product Installation Mode page



- 6. On the Add On Product page, select Next. In this configuration example, there are no additional products to install.
- 7. On the Suggested Partitioning page, select Expert Partitioner (Figure 36).

# Figure 36. Suggested partitioning initial proposal: Select Expert Partitioner

|        | Sugge<br>Partitio | Create sloS grub volume /dev/sda2 (1     Create volume group syste     Create roat volume dev/sda2 (1)     Create solvolume g/boot//     Create subvolume @/boot//     Create subvolume @/boot//     Create subvolume @/boot//     Create subvolume @/srv or     Create subvolume @/srv or     Create subvolume @/war/cr     Create subvolume @/war/cr     Create subvolume @/war/lib     Create subvolume @/war/lib     Create subvolume @/war/lib     Create subvolume @/war/lib     write"     Create subvolume @/war/lib     write"     Create subvolume @/war/lib     write" | 6.00 TIB)<br>m (16.00 TIB) from /dev/edzi<br>stem/root (60.00 GIB) with b<br>/dev/system/swap (2.00 GIB<br>grub2/1366-pc on device /dev<br>grub2/1366-f64-efi on device /<br>n device /dev/system/root<br>n device /dev/system/root<br>n device /dev/system/root<br>n device /dev/system/root<br>ash on device /dev/system/ro<br>/flibvirt/images on device /dev<br>/mariadb on device /dev/system/<br>/mariadb on device /dev/system/ | trfs<br>))<br>v/system/root<br>dev/system/root<br>v/system/root<br>tem/root<br>tem/root with opt<br>am/root | with option "<br>option "no co | py on |
|--------|-------------------|---|--|---|--------------------------------|-------|
|        |                   |   | Create Partition Setup.  |   |                                |       |
|        |                   |   |  |   |                                |       |
|        |                   |   |  |   |                                |       |
|        |                   |   |  |   |                                |       |
| Help   | Release Notes     |   | *  | Abort   | Back                           | Next  |
| Treats | neicuse notes     |   |  |   |                                | TOAL  |

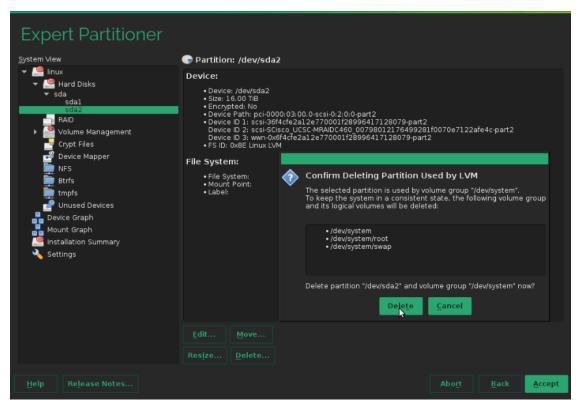
- 8. At the the left, choose System View > Linux > Hard Disks > sda.
- 9. Clear the suggested partitions. The example here shows two suggested partitions: sda1 and sda2. Use the following steps to delete sda1 and sda2.
  - a. Delete partition sda2 (Figures 37 and 38).

# Figure 37. Expert Partitioner: Delete partition sda2

| Expert Partitioner   | Partition: /dev/sda2  |                       |        |                |
|--|---|-----------------------|--------|----------------|
| <ul> <li>Inux</li> <li>Hard Disks</li> <li>sda</li> <li>sda1</li> <li>Copic Files</li> <li>Crypt Files</li> <li>Device Mapper</li> <li>NFS</li> <li>Btrfs</li> <li>tmpfs</li> <li>Unused Devices</li> <li>Device Graph</li> <li>Mount Graph</li> <li>Installation Summary</li> <li>Settings</li> </ul> | Device:<br>• Device: /dev/sda2<br>• Stre: 16:00 TIB<br>• Encrypted: No<br>• Device Path: pci-0000:03:00.0-scsi-0:2:0:0-part2<br>Device ID 1: scsi-36f4cfe2a12e770001f28996417128079-part2<br>Device ID 3: wwn-0x6f4cfe2a12e770001f28996417128079-part2<br>• FS ID: 0x8E Linux LVM<br>File System:<br>• File System:<br>• Mount Point:<br>• Label: | Lf0070e7122afe4c<br>2 | -part2 |                |
|  | Edit Move<br>Res <u>i</u> ze Delete   |                       |        |                |
|  |   |                       |        | <u>A</u> ccept |

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# Figure 38. Expert Partitioner: Confirm deletion of partition sda2



b. Delete partition sda1 (Figures 39 and 40).

### Figure 39. Expert Partitioner: Delete partition sda1

| SUSE.   |   |                       |                 |      |
|---|---|-----------------------|-----------------|------|
| Expert Partitioner  |   |                       |                 |      |
| <u>S</u> ystem View   | 🕞 Partition: /dev/sda1  |                       |                 |      |
| <ul> <li>Inux</li> <li>Inux</li> <li>Inux</li> <li>Fad Disks</li> <li>sda</li> <li>Solution</li> <li>RAID</li> <li>Volume Management</li> <li>Crypt Files</li> <li>Device Mapper</li> <li>NFS</li> <li>Btrfs</li> <li>Thrfs</li> <li>Device Graph</li> <li>Mount Graph</li> <li>Installation Summary</li> <li>Settings</li> </ul> | Device:<br>• Device: /dev/sda1<br>• Size: 400.06 Mi8<br>• Encrypted: No<br>• Device Path: pci-0000:03:00.0-scsi-0:2:0:0-part1<br>• Device Path: pci-0000:03:00.0-scsi-0:2:0:0-part1<br>Device ID 2: scsi-36f4cfe2a12e770001f28996417128079-part<br>• FS ID: 0x107 BIOS Grub<br>File System:<br>• File System:<br>• Mount Point:<br>• Label: | 1f0070e7122afe4c<br>1 | part1           |      |
|   | Edit Move<br>Res <u>i</u> ze  |                       |                 |      |
| Help Release Notes  |   |                       | <u>B</u> ack Ac | cept |

Figure 40. Expert Partitioner: Confirm deletion of partition sda1

| Expert Partitioner   |  |
|--|--|
| System View  | 🕞 Partition: /dev/sda1   |
| <ul> <li>Inux</li> <li>Hard Disks</li> <li>sda</li> <li>Sda1</li> <li>RAID</li> <li>Volume Management</li> <li>Crypt Files</li> <li>Device Mapper</li> <li>NFS</li> <li>Btrfs</li> <li>tmpfs</li> <li>Unused Devices</li> <li>Device Graph</li> <li>Mount Graph</li> <li>Installation Summary</li> <li>Settings</li> </ul> | Device:            • Device: /dev/sdal         • Size: 400.06 Mi8         • Encrypted: No         • Device Path: pc1-0000:03:00.0-scsi-0:2:0:0-part1         • Device ID 1: scsi-36f4cfe2al2e770001f28996417128079-part1         Device ID 2: scsi-Scisco UCSC-MRAIDC460_00798012176499281f0070e7122afe4c-part1         Device ID 3: wwn-0x6f4cfe2al2e770001f28996417128079-part1         • File System:         • File System:         • File System:         • Mount Point:         • Label: |

Now, from the unpartitioned device sda, you will use the steps here to do the following:

• Create a 200-MB /boot partition (/dev/sda1) from the disk device available (/dev/sda).



- Create another partition (/dev/sda2), assigning the rest of the available space in the device (/dev/sda). Assign this partition to Linux LVM, hence making it a physical volume.
- Create a volume group (hanavg) and assign the available physical volume (/dev/sda2) to it.
- Create a logical volume for /filesystem with a size of 100 GB and using the Ext3 file system.
- • Create a swap volume with a size of 2 GB.

10. In the Expert Partitioner, choose the device /dev/sda and click Add (Figure 41).

## Figure 41. Add new partition

| <u>S</u> ystem View   | 🦉 Hard                                   | Disk:       | /dev/so | a      |         |                       |             |       |     |
|---|--|-------------|---------|--------|---------|-----------------------|-------------|-------|-----|
| ▼ <sup>[S]</sup> linux ▼ <sup>[S]</sup> Hard Disks  |  | <u>O</u> ve | rview   |        |         | <u>P</u> artitio      | ns          |       |     |
| sda<br>RAID   |  |             |         |        |         | Unpartitic<br>16.00 T | oned<br>īB  |       |     |
| Volume Management<br>Crypt Files<br>Device Mapper<br>NFS<br>Btrfs<br>Tmpfs<br>Unused Devices<br>Device Graph<br>Mount Graph<br>Installation Summary<br>Settings | Device                                   | Size        | F Er    | с Туре | FS Type | Label                 | Mount Point | Start | End |
|   | A <u>d</u> d<br>Move<br>Dele <u>t</u> e. |             |         |        |         |                       |             |       |     |

11. Create a partition with a size of 200 MB for /boot (Figure 42).

Figure 42. Adding a partition: Specify the new partition size

| Add Partition on /dev/sda |   |
|---------------------------|---|
|                           |   |
|                           |   |
| New P                     | Partition Size  |
|                           | <u>M</u> aximum Size (16.00 TiB)<br><u>C</u> ustom Size<br><u>S</u> ize |
|                           | 200 MiB   |
| 0                         | C <u>u</u> stom Region<br>Start Cylinder                                |
|                           | 0   |
|                           |   |
|                           | 2138406   |
|                           |   |

12. Click Next. For Role, select Operating System (Figure 43).

Figure 43. Adding a partition: Specify the role

| Add Partition on /dev/sda |  |
|---------------------------|--|
|                           |  |
| ▶                         |  |
| Role                      |  |
| O Swap                    | ystem<br>V Applications<br>e (unformatted) |

13. Click Next. Select Ext3 as the file system and /boot for the mount point (Figure 44).

Figure 44. Adding a partition: Select formatting and mounting options

| Add Partition on /de | v/sda   |      |   |
|----------------------|---|------|---|
| e Fo                 | ng Options<br>rm <u>a</u> t partition<br>File <u>S</u> ystem  |      | Options<br>unt partition<br>Mount Point |
|                      | Ext3<br>O <u>p</u> tions                                      |      | /boot -<br>Fs <u>t</u> ab Options       |
| O <u>D</u> o         | not format partition<br>File system <u>I</u> D:<br>0x83 Linux | O Do | not mount partition                     |
| Er                   | crypt Device  |      |   |

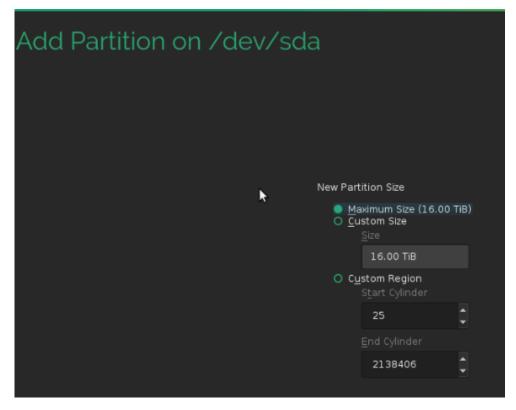
14. Click Finish. Then click Add to add another partition (Figure 45).

# Figure 45. Expert Partitioner: Add another partition

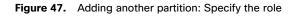
| SUSE.                                 |              |                  |     |     |                |                           |       |             |       |                               |
|---------------------------------------|--------------|------------------|-----|-----|----------------|---------------------------|-------|-------------|-------|-------------------------------|
| Expert Partitioner                    |              |                  |     |     |                |                           |       |             |       |                               |
| <u>S</u> ystem View                   | / Hard D     | isk: /dev/       | sda | a – |                |                           |       |             |       |                               |
|                                       |              | <u>O</u> verview |     |     | P              | artitions                 |       |             |       |                               |
| sda                                   |              |                  |     |     |                | npartitioned<br>16.00 TiB |       |             |       |                               |
| Volume Management                     | Device       | Size             | F   | Enc | Туре           | FS Type                   | Label | Mount Point | Start | End                           |
| Device Mapper                         | /dev/sdal    | 196.11 MiB       | F   |     | 🕞 Linux native | Ext3                      |       | /boot       | 0     | 24                            |
| nfs                                   |              |                  |     |     |                |                           |       |             |       |                               |
| 📕 Btrfs                               |              |                  |     |     |                |                           |       |             |       |                               |
| 뻱 tmpfs                               |              |                  |     |     |                |                           |       |             |       |                               |
|                                       |              |                  |     |     |                |                           |       |             |       |                               |
| Device Graph                          |              |                  |     |     |                |                           |       |             |       |                               |
| Mount Graph                           |              |                  |     |     |                |                           |       |             |       |                               |
| Settings                              |              |                  |     |     |                |                           |       |             |       |                               |
| • • • • • • • • • • • • • • • • • • • |              |                  |     |     |                |                           |       |             |       |                               |
|                                       |              |                  |     |     |                |                           |       |             |       |                               |
|                                       |              |                  |     |     |                |                           |       |             |       |                               |
|                                       |              |                  |     |     |                |                           |       |             |       |                               |
|                                       | A <u>d</u> d | <u>E</u> dit     |     |     |                |                           |       |             |       |                               |
|                                       | Move         | Res <u>i</u> ze. |     |     |                |                           |       |             |       |                               |
|                                       |              |                  |     |     |                |                           |       |             |       | E <u>x</u> pert… <del>▼</del> |

15. Allocate the rest of available space to the partition (Figure 46).

### Figure 46. Adding another partition: Specify the partition size



16. Click Next. For Role, choose Data and ISV Applications (Figure 47).





17. Assign the partition with the file system ID 0x8E Linux LVM (Figure 48).

| Figure 48. | Adding anot | her partition | : Specify | formatting | and mounting | options |
|------------|-------------|---------------|-----------|------------|--------------|---------|
|------------|-------------|---------------|-----------|------------|--------------|---------|

| Add Partition on /de | v/sda   |   |   |
|----------------------|---|---|---|
|                      | <b>ng Options</b><br>rm <u>a</u> t partition<br>File System       | И | <b>founting Options</b><br>O Mount partition<br>Mount Point |
|                      | XFS<br>Options  |   |   |
| • <u></u> ם<br>-     | not format partition<br>File system <u>I</u> D:<br>0x8E Linux LVM |   | Do not mount partition                                      |
|                      | ncrypt Device   |   |   |

18. Click Finish. You will see an overview of your partitions (Figure 49).

| ystem View<br>– 🤷 linux<br>– 🎦 Hard Disks  | 🧏 Hard I                     | D <b>isk:</b> /dev,<br>Overview |      | P | artitions                            |       |                      |                  |                      |
|--|------------------------------|---------------------------------|------|---|--------------------------------------|-------|----------------------|------------------|----------------------|
| <ul> <li>sda</li> <li>RAID</li> <li>Volume Management</li> <li>Crypt Files</li> <li>Device Mapper</li> <li>NFS</li> <li>Btrfs</li> <li>tmpfs</li> <li>Unused Devices</li> <li>Device Graph</li> <li>Mount Graph</li> <li>Installation Summary</li> <li>Settings</li> </ul> |                              | Size<br>196.11 MB<br>16.00 TB   | F Er |   | sda2<br>16.00 TiB<br>FS Type<br>Ext3 | Label | Mount Point<br>/boot | Start<br>0<br>25 | End<br>24<br>2138406 |
|  | A <u>d</u> d<br><u>M</u> ove |                                 |      |   |                                      |       |                      |                  |                      |

Figure 49. Expert Partitioner: Hard disk /dev/sda partitions overview

19. In the System View pane on the left, select Volume Management. Click Add > Volume Group (Figure 50).



Figure 50. Expert Partitioner volume management: Add a volume group

20. Provide a name for the volume group, select /dev/sda2 from the list of available physical volumes, and click Add (Figures 51 and 52).

Figure 51. Add Volume Group: Select an available physical volume

|                     |             | um    | e Grou      | p |                       |            |           |        |      |
|---------------------|-------------|-------|-------------|---|-----------------------|------------|-----------|--------|------|
| ⊻olume Gr<br>hanavg | oup Name    |       |             |   |                       |            |           |        |      |
| Physical E          | dent Size   |       |             |   |                       |            |           |        |      |
| 4 MiB               |             |       |             |   |                       |            |           |        |      |
| Available F         | hysical Vol | umes: |             |   |                       | Selected F | physical  | Volume | 3S:  |
| Device              | Size        | Enc   | Туре        |   |                       | Device     | Size      | Enc    | Туре |
| /dev/sda2           | 16.00 TiB   |       | 🕞 Linux LVM |   |                       |            |           |        |      |
|                     |             |       |             |   |                       |            |           |        |      |
|                     |             |       |             |   |                       |            |           |        |      |
|                     |             |       |             |   | <u>A</u> dd → 🍃       |            |           |        |      |
|                     |             |       |             |   | A <u>d</u> d All →    |            |           |        |      |
|                     |             |       |             |   |                       |            |           |        |      |
|                     |             |       |             |   |                       |            |           |        |      |
|                     |             |       |             |   | ← Re <u>m</u> ove All |            |           |        |      |
|                     |             |       |             |   |                       |            |           |        |      |
|                     |             |       |             |   |                       |            |           |        |      |
|                     |             |       |             |   |                       |            |           |        |      |
|                     |             |       |             |   |                       |            |           |        |      |
| Total size:         | 16.00 TiB   |       |             |   |                       | Resulting  | size: 0 B |        |      |

# Figure 52. Add Volume Group (continued)

| Add Volume Group<br>Volume Group Name<br>hanavg<br>Physical Extent Size<br>4 MiB<br>Available Physical Volumes: |   | Selected Physical Volumes: |           |                |
|---|---|----------------------------|-----------|----------------|
| Device Size Enc Type  |   | Device Size Enc            | Туре      |                |
|   | <u>A</u> dd →<br>A <u>d</u> d All →<br>← R <u>e</u> move<br>← Re <u>m</u> ove All | /dev/sda2 16.00 TiB        | Linux LVM |                |
| Total size: 0 B   |   | Resulting size: 16.00 TiB  |           |                |
|   |   |                            |           | <u>F</u> inish |

- 21. Click Finish.
- 22. Under Volume Management, click Add and select Logical Volume (Figure 53).



| Expert Partitioner   |   |        |                |                   |         |       |                |                  |       |
|--|---|--------|----------------|-------------------|---------|-------|----------------|------------------|-------|
| <u>S</u> ystem View  | 🔮 Volume                                | Manage | ment           |                   |         |       |                |                  |       |
| System View<br>System View<br>Hard Disks<br>Sda1<br>Sda2<br>RAID<br>Volume Management<br>Crypt Files<br>Device Mapper<br>NFS<br>Btrfs<br>Unused Devices<br>Device Graph<br>Mount Graph<br>Mount Graph<br>Mount Graph<br>Settings | Sevice<br>Device<br>(dev/hanevg         | Size   | ment<br>F Enc  | Type              | FS Type | Label | Mount Point    | Metadata<br>LVM2 | PE t  |
| Help Release Notes   | A <u>d</u> d<br>Volume Gr<br>Logical Vo |        | Res <u>i</u> z | e Dele <u>t</u> e | ]       |       | Abo <u>r</u> t | <u>B</u> ack A   | ccept |

23. Add a logical volume with the name rootly in the volume group (Figures 54).

Figure 54. Adding a logical volume: Specify the name and type

| Add Logical Volume on A | /dev/hanavg  |
|-------------------------|--|
|                         | Name<br>Logical Volume   |
|                         | Type<br>Normal Volume<br>O Thin Pool<br>O Thin Volume<br>Used Pool |

24. Click Next. Specify a size of 100 GB and 1 stripe (Figure 55).

Figure 55. Adding a logical volume: Specify the size and stripe

| Add Logical volume rootlv on /dev/hanavg                            |
|---|
|   |
|   |
| Size<br>○ <u>M</u> aximum Size (16.00 TiB)<br>● <u>C</u> ustom Size |
| Size  |
| 100 58  |
| Stripes   |
| N <u>u</u> mber Size  |

25. Click Next. For Role, specify Operating System (Figure 56).

Figure 56. Adding a logical volume: Specify the role

| Add Logical volume rootlv on /dev/hanavg  |
|---|
|   |
|   |
|   |
| Role  |
| <ul> <li>Operating System</li> <li>Data and ISV Applications</li> <li>Swap</li> <li>Raw Volume (unformatted)</li> </ul> |
|   |

26. Click Next. Specify the formatting and mouting options. Format the 100–GB logical volume rootlv with the Ext3 file system and assign the / mount point (Figure 57).

Figure 57. Adding a logical volume: Specify formatting and mounting options

| Add Logical volume roo | otlv on /de   | ev/hanavg   |
|------------------------|---|---|
| Formattir              | ng Options  | Mounting Options  |
| For                    | rm <u>a</u> t partition<br>File <u>S</u> ystem<br>Ext3 •<br>Options | Mount partition     Mount Point     /     Fstab Options |
|                        | not format partition  | O Do not mo <u>u</u> nt partition                       |

27. Click Finish.

28. Create a swap volume with a size of 2 GB. Under Volume Management, click Add and select Logical Volume (Figure 58).

Figure 58. Expert Partitioner volume management: Add another logical volume

| Expert Partitioner   |   |                   |       |                     |                 |       |             |                  |
|--|---|-------------------|-------|---------------------|-----------------|-------|-------------|------------------|
| <u>S</u> ystem View  | 🔮 Volume Mana                               | igement           |       |                     |                 |       |             |                  |
| ystem view<br>✓ Signature<br>✓ Signature<br>✓ Signature<br>✓ Signature<br>✓ RAID<br>✓ Volume Management<br>✓ Crypt Files<br>✓ Device Mapper<br>✓ NFS<br>✓ Device Mapper<br>✓ NFS<br>✓ Device Graph<br>Mount Graph<br>Mount Graph<br>✓ Installation Summary<br>✓ Settings | Device<br>/dev/hanavg<br>/dev/hanavg/rootiv | Size<br>16.00 TiB | F Enc | Type<br>LVM2 hanavg | FS Type<br>Ext3 | Label | Mount Point | Metadata<br>LVM2 |
|  | Add Edit                                    |                   |       |                     |                 |       |             |                  |
| Help Release Notes   | Volume Group<br>Logical Volume              |                   |       |                     |                 |       |             | Accept           |

29. Add a logical volume for swapping with the name swapvol (Figure 59). Then click Next.

Figure 59. Adding another logical volume: Specify the name and type

| Add Logical Volume on / | ′dev/hanavg  |
|-------------------------|--|
|                         | Name   |
|                         | Logical Volume   |
|                         | swapvol  |
|                         | Туре   |
|                         | <ul> <li>Normal Volume</li> <li>Thin Pool</li> <li>Thin Volume</li> <li>Used Pool</li> </ul> |

30. Assign a space of 2 GB and one stripe (Figure 60). Then click Next.

Figure 60. Adding another logical volume: Specify size and stripe information

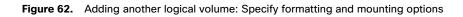
| Size<br>Maximum Size (15.90 TiB)<br>Size<br>Size<br>Size<br>2 GiB           | Add Logical volume sw | apvol on /dev/hanavg       |
|---|-----------------------|----------------------------|
| O <u>M</u> aximum Size (15.90 TiB)<br>● <u>C</u> ustom Size<br><u>S</u> ize |                       | •                          |
| Size  |                       | O Maximum Size (15.90 TiB) |
|   |                       | Size                       |
| Stripes<br>Number Size  |                       | Number Size                |

31. For Role, select Swap (Figure 61). Then click Next.

Figure 61. Adding another logical volume: Specify the role

| Add Logical volume swapvol on /dev/hanavg   |
|---|
|   |
|   |
|   |
| Role  |
| <ul> <li>Operating System</li> <li>Data and ISV Applications</li> <li>Swap</li> <li>Raw Volume (unformatted)</li> </ul> |

32. Specify the formatting a mounting options (Figure 62).



| Add Logical volume sw | /apvol on /                                   | /dev/hanavg  |
|-----------------------|---|--|
|                       | ng Options<br>rmat partition                  | Mounting Options   |
| r.                    | File System Swap Options not format partition | Mount Point     Mount Point     Swap     Fstab Options      Do not mount partition |
|                       | ncrypt Device                                 |  |

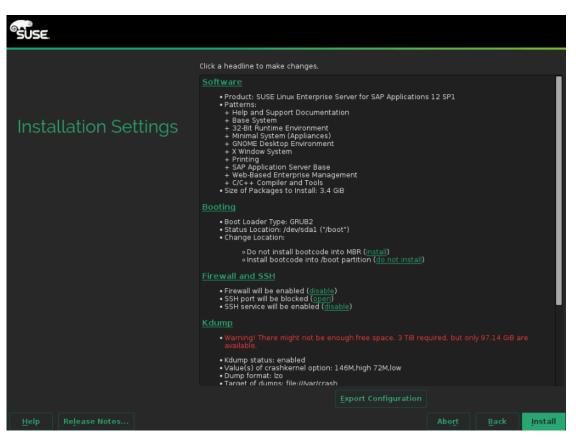
33. Click Finish. A summary page appears (Figure 63).

| Expert Partitioner   | 🚔 Volume Manag                            | iomont                  |     |                       |         |       |             |                |
|--|---|-------------------------|-----|-----------------------|---------|-------|-------------|----------------|
| ystem view<br>▼ Set linux                                  | -   |                         |     |                       |         |       |             |                |
| 👻 🤐 Hard Disks   | Device                                    | Size                    | Enc | Туре                  | FS Type | Label | Mount Point | Metada         |
| ▼ sda<br>sdal  | /dev/hanavg                               | 16.00 TiB<br>100.00 GiB |     | 볼 LVM2 hanavg<br>🕞 LV | Ext3    |       |             | LVM2           |
| sda2   | /dev/hanavg/rootlv<br>/dev/hanavg/swapvol |                         |     |                       | Swap    |       | swap        |                |
| RAID   | /det/manarg/smaptor                       | 2100 015                |     | 0                     | onup    |       | owap        |                |
| <ul> <li>Volume Management</li> <li>Crypt Files</li> </ul> |   |                         |     |                       |         |       |             |                |
| Device Mapper  |   |                         |     |                       |         |       |             |                |
| NFS  |   |                         |     |                       |         |       |             |                |
| 💻 Btrfs  |   |                         |     |                       |         |       |             |                |
| tmpfs  |   |                         |     |                       |         |       |             |                |
| 🛃 Unused Devices   |   |                         |     |                       |         |       |             |                |
| Mount Granh  |   |                         |     |                       |         |       |             |                |
| Installation Summary                                       |   |                         |     |                       |         |       |             |                |
| Notes the settings   |   |                         |     |                       |         |       |             |                |
|  |   |                         |     |                       |         |       |             |                |
|  |   |                         |     |                       |         |       |             |                |
|  |   |                         |     |                       |         |       |             |                |
|  |   |                         |     |                       |         |       |             |                |
|  |   |                         |     |                       |         |       |             |                |
|  |   |                         |     |                       |         |       | _           |                |
|  | <u>Ad</u> d ▼ <u>E</u> dit.               |                         |     |                       |         |       |             |                |
|  |   |                         |     |                       |         |       |             | <u>A</u> ccept |

Figure 63. Expert Partitioner: Volume management summary page

- 34. Click Accept to return to the Installation Settings page.
- 35. Review the updated partition information (Figure 64). Then click Next.
- 36. For Clock and Time Zone, choose the appropriate time zone and select the hardware clock set to UTC.
- 37. For the password for the system administrator root, enter the appropriate password using <<var\_sys\_root-pw>>.
- 38. On the Installation Settings screen, review the default information (Figure 65).

# Figure 64. Installation Settings: Default proposal



- 39. Now customize the software selection. Click the Software headline to make changes as shown in Figure 66:
  - a. Deselect Gnome Desktop Environment.
  - b. Select C/C++ Compiler and Tools.
  - c. Select SAP HANA Server Base.

........

| SUSE                                  |                          |                                       |         |
|---------------------------------------|--------------------------|---------------------------------------|---------|
| Software Selection ar                 | nd System <sup>-</sup>   | Tasks                                 |         |
| Pattern .                             | SAP HANA Ser             | ver Base                              |         |
| GNOME Desktop Environment             | Set up the server for in | staling SAP HANA systems.             |         |
| 🗟 🔀 X Window System                   |                          |                                       |         |
| <ul> <li>Base Technologies</li> </ul> |                          |                                       |         |
| 2 📥 Base System                       | × .                      |                                       |         |
| E P AppArnor                          |                          |                                       |         |
| 🗟 🚰 32-01 Runtime Environment         |                          |                                       |         |
| XEN Virtualization Host and tools     |                          |                                       |         |
| KVM Virtualization Host and tools     |                          |                                       |         |
| 😰 💼 Hinimal System (Appliances)       |                          |                                       |         |
| 📰 🚘 SAP Businesone Server Base        |                          |                                       |         |
| 🛷 🏪 SAP HANA Server Base              |                          |                                       |         |
| SAP NetWeaver Server Base             |                          |                                       |         |
| Development                           |                          |                                       |         |
| 🖉 🌇 C/C++ Compiler and Tools          |                          |                                       |         |
| Primary Functions                     | Name Disk Usage          |                                       |         |
| High Availability                     | 50-0E 39%                | 107.0 MB 176.1 MB<br>93.6 GB 100.0 GB |         |
| Details                               |                          |                                       |         |
|                                       |                          |                                       |         |
| Help Rejease Notes                    |                          |                                       | Back OK |
|                                       |                          |                                       |         |

Figure 65. Software Selection and System Tasks: Customized settings

- 40. Click OK.
- 41. Under then Firewall and SSH headline, disable the firewall. This selection will automatically enable Secure Shell (SSH) service (Figure 67).

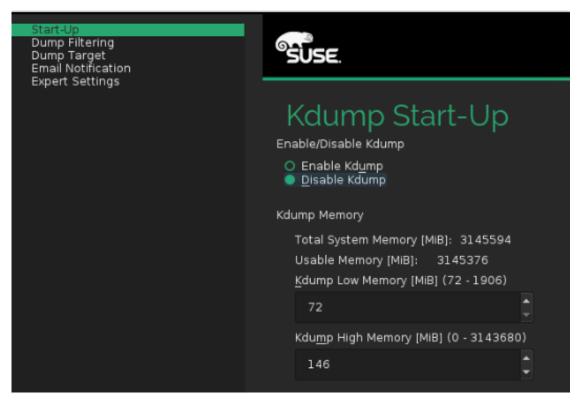
Figure 66. Firewall and SSH service customized



42. Click the Kdump headline and select Disable Kdump (Figure 68).

# cisco

# Figure 67. Disabling Kdump



43. Click OK.

44. Click the "Default systemd target" headline and choose "Text mode" (Figure 69).

### Figure 68. Setting the default systemd target to Text mode

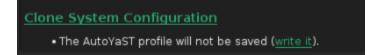
| Set Default Systemd Target |  |
|----------------------------|--|
|                            |  |
|                            |  |
|                            |  |
|                            |  |
|                            | Available Targets                            |
|                            | ○ <u>G</u> raphical mode ■ <u>T</u> ext mode |
|                            |  |

45. Click OK.

46. Click the Clone System Configuration headline and click "do not write it" (Figures 70 and 71).

# Figure 69. Clone system configuration selection





47. Leave the Booting and System default selections unchanged (Figure 72).

| SUSE                  |   |
|-----------------------|---|
|                       | Click a headline to make changes.   |
| Installation Settings | + X window System<br>+ Printing<br>+ SAP HANA Server Base<br>+ SAP Application Server Base<br>+ Web-Based Enterprise Management<br>+ C/C++ Compiler and Tools<br>• Size of Packages to Install: 3.2 GiB |
|                       | Booting   |
|                       | • Boot Loader Type: GRUB2<br>• Status Location: /dev/sda1 (*/boot*)<br>• Change Location:   |
|                       | ∘Do not install bootcode into MBR ( <u>install</u> )<br>∘Install bootcode into <i>f</i> boot partition ( <u>do not install</u> )  |
|                       | Firewall and SSH  |
|                       | Firewall will be disabled ( <u>enable</u> )     SSH service will be enabled ( <u>disable</u> )  |
|                       | Kdump   |
|                       | • Kdump status: disabled  |
|                       | Default systemd target  |
|                       | The installer is recommending you the default target 'Graphical mode'     X11 packages have been selected for installation  |
|                       | • Text mode   |
|                       | <u>System</u>   |
|                       | <u>System and Hardware Settings</u>   |
|                       | Clone System Configuration  |
|                       | The AutoYaST profile will be written under /root/autoinst.xml ( <u>do not write it</u> ).   |
|                       | Export Configuration  |
| Help Release Notes    | Abo <u>r</u> t <u>B</u> ack <mark>Install</mark>  |

48. Click Install. Also select Install at subsequent Confirm Installation prompts. The installation starts, and you can monitor the status (Figures 73 and 74).

alata

CISCO

# Figure 72. Performing the installation

| SUSE.                      |  |  |  |  |                                   |              |
|----------------------------|--|--|--|--|-----------------------------------|--------------|
|                            | Media  | Remaining  | Packages   | Time   |                                   |              |
|                            | Total  | 2.483 GiB  | 685  | 16:56  |                                   |              |
|                            | SLE-12-SP1-SAP-12.1-0<br>Medium 1  | 2.483 GiB  | 685  | 16:56  |                                   |              |
| Performing<br>Installation |  |  |  |  |                                   |              |
|                            | Actions performed  |  |  |  |                                   |              |
|                            | Actions performed:<br>Installing supportutils-:<br>Installing sg3 utils-1.41<br>Installing gs3 utils-1.41<br>Installing grocmail-3.22<br>Installing flex-2.5.37-6.<br>Installing bison-2.7-6.1<br>Installing bison-2.7-6.1<br>Installing libtasn1-3.7-4<br>Installing libtasn1-3.7-4<br>Installing libtasn1-3.7-4<br>Installing vibtasn1-3.7-4<br>Installing vibtasn1-3.7-4<br>Inst | -32.x86_64.rpm<br>-267.12.x86_64.<br>261.noarch.rpr<br>208.x86_64.rpm<br>07.x86_64.rpm (<br>9-97.1.noarch.rp<br>1.x86_64.rpm (in<br>5.x86_64.rpm (in<br>.52.x86_64.rpm (in<br>.62.x86_64.rpm (in<br>.62.x86_64.rpm (in | n' (installed si<br>rpm (installed si<br>(installed size<br>installed size<br>installed size<br>installed size<br>nstalled size 1<br>pm (installed<br>stalled size 1<br>(installed size<br>4.rpm (installed size | ze 1.82 MiB<br>d size 282.3<br>ize 338.3 KiB<br>e 789.3 KiB<br>1.67 MiB)<br>size 2.19 Mi<br>120.5 KiB)<br>size 6.18 M<br>size 397.2 f<br>951.8 KiB)<br>size 397.2 f<br>95 MiB)<br>e 2.59 MiB)<br>ed size 1.1 | )<br>3 KIB)<br>B)<br>(IB)<br>(IB) |              |
|                            | Installing tcsh-6.18.01-   | 7.4.x86_64.rpm (   | (installed size  | 518 KiB)   |                                   |              |
|                            |  |  | 1009   | 6  |                                   |              |
|                            | Installing Packages (F   | lemaining: 2.483   | 3 GiB / 16:56,<br>27%  |  | iges)                             |              |
| Help                       |  |  |  |  |                                   | <u>N</u> ext |

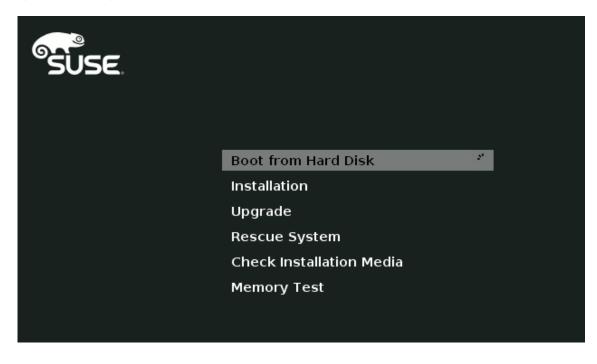
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| Ø                  |                     |                           |          |                 |      |                     |
|--------------------|---------------------|---------------------------|----------|-----------------|------|---------------------|
| <sup>©</sup> SUSE. |                     |                           |          |                 |      |                     |
|                    |                     |                           |          |                 |      |                     |
|                    |                     | Slide Sho <u>w</u>        |          | <u>D</u> etails |      | <u>s</u> les R₁ ∢ → |
|                    |                     |                           |          |                 |      |                     |
|                    |                     |                           |          |                 |      |                     |
| Per 💡<br>Inst      | The system will reb | oot now                   |          |                 |      |                     |
| Inst               |                     |                           |          |                 |      |                     |
|                    |                     |                           |          |                 |      |                     |
|                    |                     |                           |          |                 |      |                     |
|                    |                     |                           |          |                 |      |                     |
|                    |                     |                           |          |                 |      |                     |
|                    |                     | 2                         |          |                 |      |                     |
|                    |                     | <u>о</u> к                |          |                 |      |                     |
|                    |                     |                           |          |                 |      |                     |
|                    |                     | Preparing system for init | ial boot |                 |      |                     |
|                    |                     |                           |          | 100%            |      |                     |
|                    |                     |                           |          |                 | ]    |                     |
| Help               |                     |                           |          | Abo <u>r</u> t  | Back | <u>N</u> ext        |

Figure 73. Performing the installation: Reboot alert when installation is complete

The system will reboot and boot from disk on startup (Figure 75).

### Figure 74. Booting from hard disk



The system then displays the login prompt (Figure 76).

# Figure 75. Login prompt



49. Use the KVM console to log in to the installed system as the user root with the password <<var\_sys\_root-pw>> (Figure 77).

## Figure 76. Login using root



50. Configure the host name and disable IPv6 (Figure 78):

#yast2

## Figure 77. YaST Control Center: Network Settings

| YaST2 – menu 🛛 linux-wh5e  |   |
|--|---|
|  |   |
|  | YaST Control Center   |
|  |   |
| Software<br>System<br>Hardware<br>Network Services<br>Security and Users<br>Virtualization<br>Support<br>Hiscellaneous | <pre>&gt;etc/sysconfig Editor Boot Loader Date and Time Rernel Kdump Language Network Settings Partitioner Services Manager</pre> |

51. Choose System > Network Settings and press Alt+S to select the Hostname/DNS tab (Figure 79).

### Figure 78. YaST Control Center: Hostname/DNS

| AST2 - Ian @ linux-wh5e<br>Network Settings<br>FGlobal Options—Overview—Hostname>DNS—Routing—<br>Hostname and Donain Name—<br>Hostname<br>cishama01<br>[x] Change Hostname via DHCPNo interface with dhcp<br>[ ] Assign Hostname to Loopback IP | Dona in Name<br>custdon.local |
|---|-------------------------------|
| Modify DNS Configuration Custom Policy Rule<br>Use Default Policy 4<br>Mame Servers and Domain Search List  |                               |
| Name Server 1   | Domain Search                 |
| Name Server 2   |                               |
| Name Server <b>3</b>  |                               |
|   |                               |

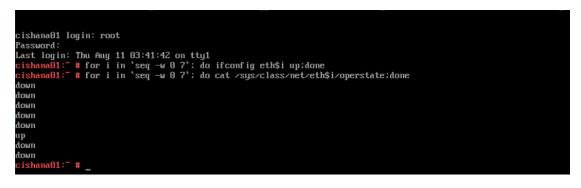
- 52. Enter <<var\_hostname.domain>>. Also enter the Domain Name System (DNS) server address of your network for resolution, if necessary. Then press Alt+O.
- 53. On the Global Options tab, using Alt+G, disable IPv6 by deselecting the Enable IPv6 option as shown in Figure 80. Note that changing the IPv6 setting requires a reboot to make the change take effect.

### Figure 79. YaST: IPv6 setting

| work Settin               |  |
|---------------------------|--|
| <b>≜</b>                  | s—Overview—Hostname/DNS—Routing-<br>work Settings— |
| Network Set               |  |
| Wicked Serv               |  |
| wiched offv               |  |
|                           |  |
| IPu6 Protoc               | ol Settings  |
|                           | ol Settings  |
| IPv6 Protoc<br>[ ] Dnable |  |
| [] Enable                 | IPv6   |
|                           | IPv6<br>Options                                    |
| [ ] Enable<br>DHCP Client | IPv6<br>Options                                    |
| [ ] Enable<br>DHCP Client | IPv6<br>Options<br>Identifier                      |

- 54. Press Alt+O to save the network configuration. Press Alt+Q to quit the YaST Control Center.
- 55. Reboot the server to make the IPv6 selection and the host-name settings take effect: #reboot
- 56. Identify the Ethernet interface port that is connected to the top-of-the-rack (ToR) switch. For now, you can use that port for management connectivity to the host. You can also check the port by using the **ifconfig** command, as shown in the example in Figure 81.

### Figure 80. Network interface configuration



- 57. Assign <**var\_mgmt\_ip\_address>>** as the IP address and enter <**var\_mgmt\_nw\_netmask>>** as the subnet mask for the available interface (for example, eth5 .You can use this configuration temporarily until you port it to a high-availability bond device and create another with the Cisco VIC's 10-Gbps ports.
- 58. Go to the network configuration directory and create a configuration for eth5:

```
#cd /etc/sysconfig/network
#vi ifcfg-eth5
BOOTROTO='static'
IPADDR='<<var_mgmt_ip_address>>'
NETMASK='<<var_mgmt_nw_netmask>>'
NETWORK=''
```

```
MTU=''
REMOTE_IPADDR=''
STARTMODE='auto'
USERCONTROL='no'
```

59. Add the default gateway:

```
#cd /etc/sysconfig/network
# vi routes
```

default <<var\_mgmt\_gateway\_ip>> - -

Note: Be sure that the system has access to the Internet or a SUSE update server to install the patches.

60. Verify /etc/hosts as shown in the example in Figure 82.

# Figure 81. Verifying /etc/hosts

| cishana01:~ # :<br>*                         | more /etc/hosts  |
|--|--|
| <pre># hosts # # # # # # # # Syntax: #</pre> | This file describes a number of hostname-to-address<br>mappings for the TCP/IP subsystem. It is mostly<br>used at boot time, when no name servers are running.<br>On small systems, this file can be used instead of a<br>"named" name server. |
| # IP-Address<br>#                            | Full-Qualified-Hostname Short-Hostname   |
| 127.0.0.1                                    | localhost  |
| <pre># special IPv6</pre>                    | addresses  |
| ::1  | localhost ipv6-localhost ipv6-loopback   |
| fe00::0                                      | ipv6-localnet  |
| ff00::0                                      | ipv6-mcastprefix   |
| ff02::1                                      | ipv6-allnodes  |
| ff02::2                                      | ipv6-allrouters  |
| ff02::3                                      | ipv6-allhosts  |
| 173.36.215.118<br>cishana01:~ #              | cishana01.custdom.local cishana01  |

61. Set up a proxy service so that the appliance can reach the Internet (Figure 83):

# #yast2

# Figure 82. YaST: Proxy configuration

|                    | YaST Control Center         |
|--------------------|-----------------------------|
|                    |                             |
| Software           | Authentication Client       |
| System             | Authentication Server       |
| Hardware           | DHCP Server                 |
| Network Services   | DNS Server                  |
| Security and Users | FTP Server                  |
| Virtualization     | HTTP Server                 |
| Support            | Hostnames                   |
| Miscellaneous      | Mail Server                 |
|                    | NFS Client                  |
|                    | NFS Server                  |
|                    | NIS Client                  |
|                    | NIS Server                  |
|                    | NTP Configuration           |
|                    | Network Services (xinetd)   |
|                    | OpenLDAP MirrorMode         |
|                    | Proxy                       |
|                    | Remote Administration (VNC) |
|                    | Samba Server                |
|                    | Squid                       |
|                    | TFTP Server                 |
|                    | Wake-on-LAN                 |
|                    | Windows Domain Membership   |
|                    | iSCSI Initiator             |
|                    | iSNS Server                 |

62. Enter the proxy server and port as shown in the sample configuration in Figure 84. Select OK and then quit YaST to save the configuration.

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#### Figure 83. YaST: Proxy configuration (continued)

| YaST2 -  | proxy @ cishana01                    |                |        |
|----------|--------------------------------------|----------------|--------|
| <b>D</b> |                                      |                |        |
| Proxy (  | Configuration                        |                |        |
|          |                                      |                |        |
|          |                                      |                |        |
| []       | K] Enable Proxy                      |                |        |
| г        | Proxy Settings                       |                | -      |
|          | HTTP Proxy URL                       |                |        |
|          | http://173.36.215.33:3128            |                |        |
|          | HTTPS Proxy URL                      |                |        |
|          | http://                              |                |        |
|          | FTP Proxy URL                        |                |        |
|          | http://                              |                |        |
|          | [x] Use the Same Proxy for All Proto | cols           |        |
|          | No Proxy Domains                     |                |        |
|          | localhost, 127.0.0.1                 |                |        |
| -        | Proxy Authentication                 |                |        |
|          | Proxy User Name                      | Proxy Password |        |
|          |                                      |                |        |
| L        |                                      |                |        |
|          | [Test Proxy                          | Settings]      |        |
|          |                                      |                |        |
|          |                                      |                |        |
|          |                                      |                |        |
| [Help]   |                                      | [Cancel]       | [ OK ] |

63. Register the system with SUSE to receive the latest patches. For more information, refer to the SUSE knowledgebase article at <a href="https://www.suse.com/de-de/support/kb/doc?id=7016626">https://www.suse.com/de-de/support/kb/doc?id=7016626</a>.

The system must have access to the Internet to proceed with this step.

```
#SUSEConnect -r <<registration code>> -e <<email address>>
```

- 64. Update the system with the following command. Again, the system must have access to the Internet to proceed with this step. #zypper update
- 65. Follow the on-screen instructions to complete the update process. Reboot the server and log in to the system again.

## Post-installation OS configuration

To optimize the use of the SAP HANA database with SLES 12 or SLES for SAP 12 SP1, apply the settings by referring this SAP HANA note: 2205917 - SAP HANA DB: Recommended OS settings for SLES 12 / SLES for SAP Applications 12.

#### Configuring bonding for high availability

To configure a bond for high availability, first view the Ethernet interfaces available in the system.

By examining the hardware and MAC addresses of the interfaces using the **ifconfig** command and the properties using **ethtool**, you can clearly differentiate the interfaces for the two dual-port Cisco UCS VIC 1225 adapters installed in the server as well as the onboard 1-Gbps interface.

A bond configured with two 1-Gbps ports can be used for the administration, management, and access networks, and a bond configured with two ports, using one port from each dual-port VIC, can be used for a backup network. Additional interfaces can be configured on the VICs based on needs.

In the example in Figure 85, the ethtool output for the interfaces showing Fibre Channel support and 10-Gbps indicates that eth0 through eth4 are VIC ports. In addition, a close observation of their MAC addresses reveals that eth0 and eth1 and that eth2 and eth3 are ports on the same VICs (in both cases, the last octet of the MAC address differs).

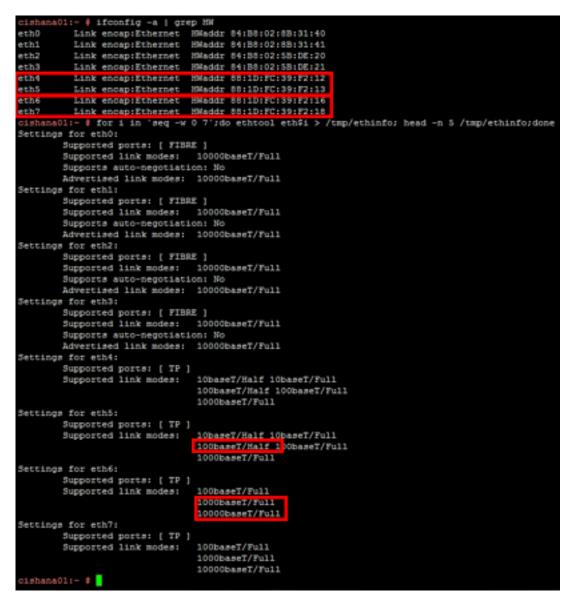
Therefore, for high availability, eth0 and eth2 form one possible slave pair for creating a 10-Gbps bond device.

Likewise, 1-Gbps interfaces eth4 and eth5 are potential slave interfaces for a 1-Gbps bond device.

In this section, you will manually create these two bond interfaces.

**Note:** In SLES, use of YaST is recommended. It provides an easier wizard like approach for creation of bond devices. For ease of implementation, this section provides steps manual configuration.

Figure 84. The ifconfig output provides an overview of the interfaces



- 1. Create 1-Gbps bond device ifcfg-bond0 with eth4 and eth5 as slaves.
  - a. Create a bond0 configuration file:

```
# vi /etc/sysconfig/network/ifcfg-bond0
BONDING_MASTER='yes'
BONDING_MODULE_OPTS='mode=active-backup miimon=100'
BOOTPROTO='static'
BROADCAST=''
ETHTOOL_OPTIONS=''
IPADDR='<<var_mgmt_ip_address>>/<<var_mgmt_netmask_prefix>>'
MTU=''
NAME=''
NAME=''
NETWORK=''
REMOTE_IPADDR=''
STARTMODE='auto'
USERCONTROL='no'
BONDING_SLAVE0='eth4'
BONDING_SLAVE1='eth5'
```

b. Modify the eth4 and eth5 configuration files:

```
# vi /etc/sysconfig/network/ifcfg-eth4
BOOTPROTO='none'
BROADCAST=''
ETHTOOL_OPTIONS=''
IPADDR=''
MTU=''
NAME='VIC Ethernet NIC'
NETMASK=''
NETWORK=''
REMOTE_IPADDR=''
STARTMODE='hotplug'
USERCONTROL='no'
```

```
# vi /etc/sysconfig/network/ifcfg-eth5
BOOTPROTO='none'
BROADCAST=''
ETHTOOL_OPTIONS=''
IPADDR=''
MTU=''
NAME='VIC Ethernet NIC'
NETMASK=''
NETWORK=''
REMOTE_IPADDR=''
```



STARTMODE='hotplug' USERCONTROL='no'

c. Test the configuration.

Restart the network service to bring up the bond0 interface. Then enter the following command:

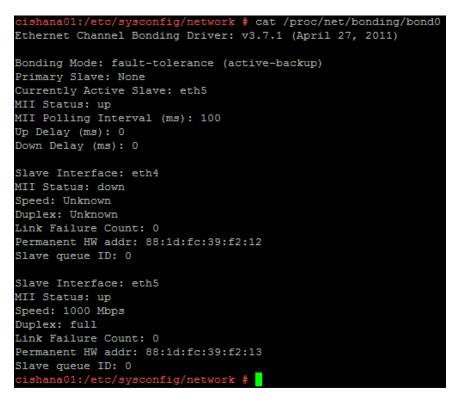
# rcnetwork restart

To query the current status of the Linux kernel bounding driver, enter the following command:

# cat /proc/net/bonding/bond0

Figure 86 shows sample output.

Figure 85. Sample bond0 configuration test output



- 2. Create 10-Gbps bond device ifcfg-bond1 with eth0 and eth2 as slaves.
  - a. Create a bond1 configuration file:

```
# vi /etc/sysconfig/network/ifcfg-bond1
BONDING_MASTER='yes'
BONDING_MODULE_OPTS='mode=active-backup miimon=100'
BOOTPROTO='static'
BROADCAST=''
ETHTOOL_OPTIONS=''
```



```
IPADDR='<<ip_address_customer_usecase>>/<<netmask_prefix>>'
MTU=''
NAME=''
NETWORK=''
REMOTE_IPADDR=''
STARTMODE='auto'
USERCONTROL='no'
BONDING_SLAVE0='eth0'
BONDING_SLAVE1='eth2'
```

b. Modify the eth0 and eth2 configuration files:

```
# vi /etc/sysconfig/network/ifcfg-eth0
BOOTPROTO='none'
BROADCAST=''
ETHTOOL_OPTIONS=''
IPADDR=''
MTU=''
NAME='VIC Ethernet NIC'
NETMASK=''
NETWORK=''
REMOTE_IPADDR=''
STARTMODE='hotplug'
USERCONTROL='no'
```

```
# vi /etc/sysconfig/network/ifcfg-eth2
BOOTPROTO='none'
BROADCAST=''
ETHTOOL_OPTIONS=''
IPADDR=''
MTU=''
NAME='VIC Ethernet NIC'
NETMASK=''
NETWORK=''
REMOTE_IPADDR=''
STARTMODE='hotplug'
USERCONTROL='no'
```

c. Test the configuration.

Restart the networking service to bring up the bond0 interface. Enter the following command:

# rcnetwork restart

To query the current status of Linux kernel bounding driver, enter the following command:

# cat /proc/net/bonding/bond1

Figure 87 shows sample output.

Figure 86. Sample bond1 configuration test output

```
cishana01:/etc/sysconfig/network # cat /proc/net/bonding/bond1
Ethernet Channel Bonding Driver: v3.7.1 (April 27, 2011)
Bonding Mode: fault-tolerance (active-backup)
Primary Slave: None
Currently Active Slave: None
MII Status: down
MII Polling Interval (ms): 100
Up Delay (ms): 0
Down Delay (ms): 0
Slave Interface: eth0
MII Status: down
Speed: Unknown
Duplex: Unknown
Link Failure Count: 0
Permanent HW addr: 84:b8:02:8b:31:40
Slave queue ID: 0
Slave Interface: eth2
MII Status: down
Speed: Unknown
Duplex: Unknown
Link Failure Count: 0
Permanent HW addr: 84:b8:02:5b:de:20
Slave queue ID: 0
cishana01:/etc/sysconfig/network #
```

## Preparing SAP HANA data, log, and shared file systems

To prepare the file systems, you start by carving out logical volumes for the data, log, and HANA shared files. Then you create the file systems. Then you update /etc/fstab and mount the volumes.

1. Use the following command to check for the available physical volume (PV), as shown in Figure 88:

#pvdisplay

Figure 87. Checking for the physical volume

| [root@cishana01 ~]#<br>Physical volum |  |
|---------------------------------------|--|
| PV Name                               | /dev/sda2                              |
| VG Name                               | hanavg                                 |
| PV Size                               | 16.00 TiB / not usable 0               |
| Allocatable                           | уез                                    |
| PE Size                               | 4.00 MiB                               |
| Total PE                              | 4193418                                |
| Free PE                               | 4167306                                |
| Allocated PE                          | 26112                                  |
| PV UUID                               | zvb8AK-Dyf8-fkyU-Xznt-1XHx-RgmZ-9q6qI6 |

 Use the following command to check for the available volume group (VG) hanavg (Figure 89): #vgdisplay Figure 88. Checking for the volume group

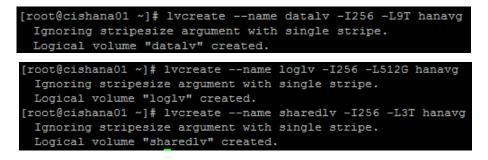
| [root@cishana01 ~]# vgd | isplay                                 |
|-------------------------|--|
| Volume group            |  |
| VG Name                 | hanavg                                 |
| System ID               |  |
| Format                  | lvm2                                   |
| Metadata Areas          | 1                                      |
| Metadata Sequence No    | 3                                      |
| VG Access               | read/write                             |
| VG Status               | resizable                              |
| MAX LV                  | 0                                      |
| Cur LV                  | 2                                      |
| Open LV                 | 2                                      |
| Max PV                  | 0                                      |
| Cur PV                  | 1                                      |
| Act PV                  | 1                                      |
| VG Size                 | 16.00 TiB                              |
| PE Size                 | 4.00 MiB                               |
| Total PE                | 4193418                                |
| Alloc PE / Size         | 26112 / 102.00 GiB                     |
| Free PE / Size          | 4167306 / 15.90 TiB                    |
| VG UUID                 | 4sIS1V-tpWq-cSse-qjaY-0V1V-0dFu-38jYrV |

3. Create logical volumes (LVs) for the data, log, and HANA shared file systems (Figure 90):

lvcreate -name <<lvname>> -I<<stripesize>> -L<<volume-size>> <<pre>rame>>

- # lvcreate --name datalv -I256 -L9T hanavg
- # lvcreate --name loglv -I256 -L512G hanavg
- # lvcreate --name sharedlv -I256 -L3T hanavg

Figure 89. Creating logical volumes



4. Create file systems in the data, log and HANA shared volumes (Figure 91):

#mkfs.xfs -f /dev/hanavg/datalv
#mkfs.xfs -f /dev/hanavg/loglv
#mkfs.xfs -f /dev/hanavg/sharedlv

#### Figure 90. Creating file systems

| [root@cishana01 ~]# mkfs.xfs -f /dev/hanavg/datalv |  |               |                                       |  |  |  |
|--|--|---------------|---------------------------------------|--|--|--|
| meta-dat   | <pre>meta-data=/dev/hanavg/datalv isize=256 agcount=9, agsize=268435455 blks</pre> |               |                                       |  |  |  |
|  | =  | sectsz=512    | attr=2, projid32bit=0                 |  |  |  |
| data   | =  | bsize=4096    | blocks=2415919095, imaxpct=5          |  |  |  |
|  | =  | sunit=0       | swidth=0 blks                         |  |  |  |
| naming   | =version 2   | bsize=4096    | ascii-ci=0                            |  |  |  |
| log  | =internal log  | bsize=4096    | blocks=521728, version=2              |  |  |  |
|  | =  | sectsz=512    | <pre>sunit=0 blks, lazy-count=1</pre> |  |  |  |
| realtime   | =none  | extsz=4096    | blocks=0, rtextents=0                 |  |  |  |
| [root@ci   | shana01 ~]# mkfs.xfs -f  | /dev/hanavg/l | oglv                                  |  |  |  |
| meta-dat   | a=/dev/hanavg/loglv  | isize=256     | agcount=4, agsize=33554432 blks       |  |  |  |
|  | =  | sectsz=512    | attr=2, projid32bit=0                 |  |  |  |
| data   | =  | bsize=4096    | blocks=134217728, imaxpct=25          |  |  |  |
|  | =  | sunit=0       | swidth=0 blks                         |  |  |  |
| naming   | =version 2   | bsize=4096    | ascii-ci=0                            |  |  |  |
| log  | =internal log  | bsize=4096    | blocks=65536, version=2               |  |  |  |
|  | =  | sectsz=512    | <pre>sunit=0 blks, lazy-count=1</pre> |  |  |  |
| realtime   | =none  | extsz=4096    | blocks=0, rtextents=0                 |  |  |  |
| [root@ci   | shana01 ~]# mkfs.xfs -f  | /dev/hanavg/s | haredlv                               |  |  |  |
| meta-dat   | a=/dev/hanavg/sharedlv   | isize=256     | agcount=4, agsize=201326592 blks      |  |  |  |
|  | =  | sectsz=512    | attr=2, projid32bit=0                 |  |  |  |
| data   | =  | bsize=4096    | blocks=805306368, imaxpct=5           |  |  |  |
|  | =  | sunit=0       | swidth=0 blks                         |  |  |  |
| naming   | =version 2   | bsize=4096    | ascii-ci=0                            |  |  |  |
| log  | =internal log  | bsize=4096    | blocks=393216, version=2              |  |  |  |
|  | =  | sectsz=512    | <pre>sunit=0 blks, lazy-count=1</pre> |  |  |  |
| realtime   | =none  | extsz=4096    | <pre>blocks=0, rtextents=0</pre>      |  |  |  |

5. Create mount directories for the data, log, and HANA shared file systems:

#mkdir -p /hana/data
#mkdir -p /hana/log
#mkdir -p /hana/shared

6. Mount options vary from the default Linux settings for XFS for SAP HANA data and log volumes. The following is a sample /etc/fstab entry. Make sure that you use the same mount options for the data and log file systems as shown in the example.

| /dev/mapper/hanavg-rootlv                        | /                                | ext3                      | defaults     | 1 1             |     |
|--|----------------------------------|---------------------------|--------------|-----------------|-----|
| UUID=fc2e52c4-e6f6-4e9a-9ad<br>1 2               | 1-86aeb3369942                   | /boot                     |              | ext3 default    | s   |
| /dev/mapper/hanavg-swapvol                       | swap                             | swap                      | defaults     | 0 0             |     |
| /dev/hanavg/datalv                               | /hana/data                       |                           |              |                 |     |
| xfs nobarrier, noatime, nod                      | iratime,logbufs=8,lo             | ogbsize=256k,async        | ,swalloc,all | locsize=131072k | 12  |
| /dev/hanavg/loglv<br>nobarrier,noatime,nodiratim | /hana/log<br>e,logbufs=8,logbsiz | xfs<br>e=256k,async,swall | oc,allocsize | e=131072k       | 1 2 |
| /dev/hanavg/sharedlv /h                          | ana/shared xfs                   | defaults 1 2              |              |                 |     |

- Use the following command to mount the file systems:
   #mount -a
- 8. Use the df -h command to check the status of all mounted volumes (Figure 92).

Figure 91. Checking the status of mounted volumes

| [root@cishana01 ~]#         | df -h  |      |       |      |              |
|-----------------------------|--------|------|-------|------|--------------|
| Filesystem                  | Size   | Used | Avail | Use∛ | Mounted on   |
| /dev/mapper/hanavg-1        | cootlv |      |       |      |              |
|                             | 99G    | 882M | 93G   | 1%   | /            |
| /dev/sda1                   | 485M   | 47M  | 414M  | 11%  | /boot        |
| tmpfs                       | 1.5T   | 0    | 1.5T  | 0%   | /dev/shm     |
| /dev/mapper/hanavg-o        | latalv |      |       |      |              |
|                             | 9.0T   | 33M  | 9.0T  | 1%   | /hana/data   |
| /dev/mapper/hanavg-l        | Loglv  |      |       |      |              |
|                             | 512G   | 33M  | 512G  | 1%   | /hana/log    |
| /dev/mapper/hanavg-sharedlv |        |      |       |      |              |
|                             | 3.0T   | 33M  | 3.OT  | 1%   | /hana/shared |
| [root@cishana01 ~]#         |        |      |       |      |              |

9. Change the directory permissions **before** you install SAP HANA. Use the **chown** command on each SAP HANA node after the file systems are mounted:

#chmod -R 777 /hana/data
#chmod -R 777 /hana/log
#chmod -R 777 /hana/shared

# **Installing SAP HANA**

Use the official SAP documentation, which describes the installation process with and without the SAP unified installer.

For the SAP HANA installation documentation, see SAP HANA Server Installation Guide.

All other SAP installation and administration documentation is available at <u>http://service.sap.com/instguides</u>.

# **Important SAP Notes**

Read the following SAP Notes before you start the installation. These SAP Notes contain the latest information about the installation, as well as corrections to the installation documentation.

The latest SAP Notes can be found at: <u>https://service.sap.com/notes</u>.

## SAP HANA IMDB notes

- SAP Note 1514967: SAP HANA: Central note
- SAP Note 2298750: SAP HANA Platform SPS 12 Release Note
- SAP Note 1523337: SAP HANA database: Central note
- SAP Note 2000003: FAQ: SAP HANA
- <u>SAP Note 2380257</u>: SAP HANA 2.0 Release Notes
- SAP Note 1780950: Connection problems due to host name resolution
- SAP Note 1755396: Released disaster tolerant (DT) solutions for SAP HANA with disk replication
- SAP Note 1890444: HANA system slow due to CPU power save mode
- SAP Note 1681092: Support for multiple SAP HANA databases on a single SAP HANA appliance

- SAP Note 1514966: SAP HANA: Sizing the SAP HANA database
- SAP Note 1637145: SAP BW on HANA: Sizing the SAP HANA database
- <u>SAP Note 1793345</u>: Sizing for Suite on HANA

# Linux notes

- SAP Note 2205917: SAP HANA DB: Recommended OS settings for SLES 12 and SLES for SAP Applications 12
- SAP Note 2235581: SAP HANA: Supported operating systems
- <u>SAP Note 1944799</u>: SAP HANA guidelines for the SLES operating system
- SAP Note 1731000: Nonrecommended configuration changes
- <u>SAP Note 1557506</u>: Linux paging improvements
- SAP Note 1726839: SAP HANA database: Potential crash when using XFS file system
- SAP Note 1740136: SAP HANA: Wrong mount option may lead to corrupt persistency
- SAP Note 1829651: Time-zone settings in SAP HANA scale-out landscapes

# Third-party software notes

- SAP Note 1730928: Using external software in an SAP HANA appliance
- SAP Note 1730929: Using external tools in an SAP HANA appliance
- SAP Note 1730930: Using antivirus software in an SAP HANA appliance
- SAP Note 1730932: Using backup tools with Backint for SAP HANA

## SAP HANA virtualization notes

• SAP Note 1788665: SAP HANA running on VMware vSphere virtual machines

# Performing an SAP HANA post-installation checkup

For an SAP HANA system installed with <SID> set to SKL and the system number <nr> set to 00, log in as <sid>adm ir bwladm and run the commands presented here.

## Commands for checking SAP HANA services

```
bwladm@cishana01:/usr/sap/BWL/HDB00> /usr/sap/hostctrl/exe//sapcontrol -nr 00 -function
GetProcessList
19.05.2016 11:29:27
GetProcessList
OK
name, description, dispstatus, textstatus, starttime, elapsedtime, pid
hdbdaemon, HDB Daemon, GREEN, Running, 2016 04 13 08:51:49, 866:37:38, 41691
hdbcompileserver, HDB Compileserver, GREEN, Running, 2016 04 13 08:51:56, 866:37:31, 41837
hdbindexserver, HDB Indexserver, GREEN, Running, 2016 04 13 08:52:00, 866:37:27, 41863
hdbnameserver, HDB Nameserver, GREEN, Running, 2016 04 13 08:51:50, 866:37:37, 41711
hdbpreprocessor, HDB Preprocessor, GREEN, Running, 2016 04 13 08:51:56, 866:37:31, 41839
hdbwebdispatcher, HDB Web Dispatcher, GREEN, Running, 2016 04 13 08:53:11, 866:36:16, 42431
hdbxsengine, HDB XSEngine, GREEN, Running, 2016 04 13 08:52:00, 866:37:27, 41865
bwladm@cishana01-bwl:/usr/sap/BWL/HDB00>
```

# Commands for checking SAP HANA database (HDB) information

| bwladm@cisha | na01:/usr/s | ap/BWL/HDB00> HDB                   | info   |
|--------------|-------------|-------------------------------------|--|
| USER         | PID PPID    | %CPU VSZ RSS                        | COMMAND  |
| bwladm 59    | 578 59577   | 0.0 108472 1944                     | -sh  |
| bwladm 59    | 663 59578   | 0.0 114080 2020                     | \_ /bin/sh /usr/sap/BWL/HDB00/HDB info   |
|              |             |                                     | \_ ps fx -U bwladm -o  |
| user,pid,ppi | d,pcpu,vsz, | rss,args                            |  |
|              |             | 0.0 22188 1640<br>file/BWL_HDB00_ci |  |
|              |             |                                     | 8 \_ /usr/sap/BWL/HDB00/cishana01-<br>r/sap/BWL/HDB00/cishana01-bwl/daemon.ini |
| bwladm 41    | 711 41691   | 0.3 54292416 205                    | 8900 \_ hdbnameserver  |
| bwladm 41    | 837 41691   | 0.1 4278472 1243                    | 356 \_ hdbcompileserver  |
| bwladm 41    | 839 41691   | 0.2 11773976 826                    | 2724 \_ hdbpreprocessor  |
| bwladm 41    | 863 41691   | 6.2 22143172 181                    | 84604 \_ hdbindexserver  |
| bwladm 41    | 865 41691   | 0.5 8802064 2446                    | 612 \_ hdbxsengine   |
| bwladm 42    | 431 41691   | 0.1 4352988 8232                    | 20 \_ hdbwebdispatcher   |
|              |             |                                     | /usr/sap/BWL/HDB00/exe/sapstartsrv<br>shana01-bwl -D -u bwladm                 |
| bwladm@cisha | na01-bwl:/u | sr/sap/BWL/HDB00>                   |  |

# **Tuning the SAP HANA performance parameters**

After SAP HANA is installed, tune the parameters as shown in Table 13 and explained in the following SAP Notes.

#### Table 13.Tuning parameters

| Parameters                | Data file system | Log file system |
|---------------------------|------------------|-----------------|
| max_parallel_io_requests  | 256              | Default         |
| async_read_submit         | On               | On              |
| async_write_submit_blocks | All              | All             |
| async_write_submit_active | Auto             | On              |

- SAP Note 2399079: Elimination of hdbparam in HANA 2
- SAP Note 2186744: FAQ: SAP HANA Parameters

# **Maintenance operations**

This section discusses how to maintain and operate SUSE and SAP HANA.

## Maintaining the operating system

The customer is responsible for implementing security updates and patches, adding software components, and changing OS settings that may be requested by SAP for future releases of SAP HANA or that may be required by SUSE to help ensure system security and stability. See the related SAP OSs notes for required OS settings.

This section describes how to update the OS and the implications of updating OS components. It is not meant to replace the Linux administration documentation.

# Prerequisites

Whenever you change the OS or parts of the OS such as drivers and kernel parameters, be sure that you have at least a backup copy of your SAP HANA system, preferably not stored on the appliance. You also should check the related OS notes or Cisco support channels for additional information.

Some changes may require a reboot and should be applied when SAP HANA is shut down.

# Updating the OS and kernel

Not all updates and patches update the OS kernel. But if a kernel update is necessary, you need to take specific precautions. During the entire update process, SAP HANA must be shut down.

These are the general steps for updating the kernel:

- Perform these tasks before updating the kernel:
  - Stop SAP HANA and back up the existing log area (in case the device causes a problem and needs to be re-created).
  - Unmount /hana/log and clean /etc/fstab.
- Update the kernel using YaST (or a manual procedure).
- Perform these tasks after updating the kernel:
  - Check the GRUB file and boot sector (menu.lst).
  - Reboot and check /etc/fstab.

The following steps present the tasks in more detail.

- 1. Back up the SAP HANA log area.
  - a. Stop SAP HANA. Then move to the log area and back up the HANA log partition.

```
cishana01 :~ # cd /hana/log
cishana01 :/hana/log # find . -xdev | cpio -oav > /backup/hana.log.cpio
```

- b. If the backup partition has enough room, choose it. Otherwise, choose an appropriate location for the backup.
- 2. Unmount /hana/log.

```
cishana01 :~ #umount /hana/log
```

# Updating SUSE and the kernel online

You can update the operating system and kernel either through YaST or manually.

# Option 1: Using YaST

You can update the OS online using YaST. This method will update all OS components; a kernel update may also be included.

1. Set up a proxy service, if necessary, so that the appliance can reach the Internet. Make sure that **PROXY\_ENABLED** is set to **"yes"** and that the appropriate proxy server host, IP address, and port are configured and used.

```
cishana01:~ # cd /etc/sysconfig/
cishana01:/etc/sysconfig # vi proxy
PROXY_ENABLED="yes"
HTTP_PROXY="http://<Proxy_server_IP>:<Proxy_Service_port>"
HTTPS_PROXY="http://<Proxy_server_IP>:<Proxy_service_port>"
FTP_PROXY="http://<Proxy_server_IP>:<Proxy_service_port>"
```

- 2. Start YaST and choose Software > Online Update.
  - a. Select Yes to configure the update repository (Figure 93).

## Figure 92. YaST: Online update

| YaST2 - online_u  | update @ cishana01 |                             |        |  |  |
|---|--------------------|-----------------------------|--------|--|--|
| Initializing O  | nline Update       |                             |        |  |  |
| <pre>x Initialize the target system x Refresh software repositories =&gt; Check for available updates</pre> |                    |                             |        |  |  |
|   |                    | configuration workflow now? |        |  |  |
| Checking for a  | vailable updates   | 100%                        |        |  |  |
|   |                    |                             |        |  |  |
| [Help]  | [Back]             | [Abort]                     | [Next] |  |  |

b. Log in with the Novel account you used for licensing to register the server (Figure 94). Then click Next.

#### Figure 93. YaST online update: Registration

| YaST2 - online_update  | @ cishana01                  |                                   |                |  |  |  |
|--|------------------------------|-----------------------------------|----------------|--|--|--|
| Registration   |                              | [Network C                        | Configuration] |  |  |  |
| SUSE Linux Enterprise Server for SAP Applications 12 SP1<br>Please enter a registration or evaluation code for this product and your<br>User Name/E-mail address from the SUSE Customer Center in the fields below.<br>Access to security and general software updates is only possible on |                              |                                   |                |  |  |  |
| a registered system  | E-mail Addre<br>Registration |                                   |                |  |  |  |
|  |                              | stration Server]<br>Registration] |                |  |  |  |
| [Help]   | [Back]                       | [Abort]                           | [Next]         |  |  |  |

c. An overview of the available extension and modules is displayed (Figure 95). Click Next.

Figure 94. YaST online update: Extension and Module Selection

| YaST2 - online_update @ cish  | uana01  |  |                  |
|---|---|--|------------------|
| Extension and Module Selecti  | lon   |  |                  |
| Available Extensions and Mod  | iules   |  |                  |
| <pre>[ ] SUSE Enterprise Storage [ ] SUSE Enterprise Storage [ ] SUSE Linux Enterprise Hi [ ] SUSE Linux Enterprise Hi [ ] SUSE Linux Enterprise Wo [ ] SUSE Linux Enterprise So [ ] Advanced Systems Managem [ ] Certifications Module 12 [ ] Containers Module 12 x86</pre> | 3 x86_6<br>.gh Availability GEO E<br>.ve Patching 12 x86_6<br>prkstation Extension 1<br>oftware Development Ki<br>ment Module 12 x86_6<br>2 x86_6 | Extension 12 S[ ] Public C<br>L2 SP1 x86_6 [ ] Toolchain<br>it 12 SP1 x86_ |                  |
| Details<br>SUSE Linux Enterprise Works<br>Enterprise Server with pack<br>applications (office suite,<br>to combine both products to   | ages of SUSE Linux Er<br>email client, graphi   | nterprise Desktop, like add<br>ical editor) and libra:                     | ditional desktop |
| [Help]  | [Back]  | [Abort]  | [Next]           |

d. A list of the available patches form the online repository is displayed (Figure 96). Click Accept.

# cisco

# Figure 95. YaST online update: Patches list

|  | [Actionsâ]   | [Viewâ]   | [Dependenciesâ]                        |  |
|--|--|---|--|--|
| Name   |  | Kind  | Summary                                |  |
| SUSE-SLE   | -HA-12-SP1-2016-1010   | recommended   | Recommended update for libdlm          |  |
| SUSE-SLE   | -HA-12-SP1-2016-102  | recommended   | Recommended update for sle-ha-manuals_ |  |
| SUSE-SLE   | -HA-12-SP1-2016-1049   | recommended   | Recommended update for crmsh           |  |
| SUSE-SLE   | -HA-12-SP1-2016-1052   | recommended   | Recommended update for libdlm          |  |
| SUSE-SLE   | -HA-12-SP1-2016-1121   | recommended   | Recommended update for pssh            |  |
| SUSE-SLE   | -HA-12-SP1-2016-1142   | security  | Security update for hawk2              |  |
| SUSE-SLE   | -HA-12-SP1-2016-1158   | recommended   | Recommended update for resource-agents |  |
| SUSE-SLE   | -HA-12-SP1-2016-1204   | recommended   | Recommended update for crmsh           |  |
| SUSE-SLE   | -HA-12-SP1-2016-284  | recommended   | Recommended update for fence-agents    |  |
| SUSE-SLE   | -HA-12-SP1-2016-312  | recommended   | Recommended update for yast2-drbd      |  |
| SUSE-SLE   | -HA-12-SP1-2016-360  | recommended   | Recommended update for hawk2 and yast2 |  |
| SUSE-SLE   | -HA-12-SP1-2016-365  | recommended   | Recommended update for crmsh           |  |
| SUSE-SLE   | -HA-12-SP1-2016-390  | optional  | Initial release of aws-vpc-move-ip     |  |
| ilter: Online  | Update Patches   |   | Total Download Size: 18.5 MB           |  |
| Patch: SUSE-SLE-HA-12-SP1-2016-1010 Kind: recommended Version: 1<br>This update for libdlm to version 4.0.4 includes the following                     |  |   |  |  |
| This update fo   | r libdlm to version 4.0  | 0.4 includes th   |  |  |
|  | r libdlm to version 4.0  | 0.4 includes th   |  |  |
| This update fo<br>changes:   |  | 0.4 includes th   |  |  |
| This update fo<br>changes:<br>- Don't SIGKIL   | L dlm_controld   |   |  |  |
| This update fo<br>changes:<br>- Don't SIGKIL<br>- Make systemd   | L dlm_controld<br>stop dlm on corosync i   | restart   |  |  |
| This update fo<br>changes:<br>- Don't SIGKIL<br>- Make systemd<br>- dlm_controld   | L dlm_controld<br>stop dlm on corosync :<br>don't log error from   | restart<br>cpg_dispatch   | ne following                           |  |
| This update fo<br>changes:<br>- Don't SIGKIL<br>- Make systemd<br>- dlm_controld<br>- Fix rejectio   | L dlm_controld<br>stop dlm on corosync :<br>don't log error from<br>n of valid connections   | restart<br>cpg_dispatch<br>in dlm_contro:                           | ne following                           |  |
| This update fo<br>changes:<br>- Don't SIGKIL<br>- Make systemd<br>- dlm_controld<br>- Fix rejectio<br>- Make fail_ti                                   | L dlm_controld<br>stop dlm on corosync :<br>don't log error from   | restart<br>cpg_dispatch<br>in dlm_contro<br>pnal                    | he following<br>Id                     |  |
| This update fo<br>changes:<br>- Don't SIGKIL<br>- Make systemd<br>- dlm_controld<br>- Fix rejectio<br>- Make fail_ti                                   | L dlm_controld<br>stop dlm on corosync i<br>don't log error from<br>n of valid connections<br>me in dlm_stonith optic<br>tion fault during state | restart<br>cpg_dispatch<br>in dlm_contro<br>pnal                    | he following<br>Id                     |  |
| This update fo<br>changes:<br>- Don't SIGKII<br>- Make systemd<br>dlm_controld<br>- Fix rejectio<br>- Make fail_ti<br>- Fix segmenta<br>- Add dlm_ston | L dlm_controld<br>stop dlm on corosync i<br>don't log error from<br>n of valid connections<br>me in dlm_stonith optic<br>tion fault during state | restart<br>cpg_dispatch<br>in dlm_contro:<br>onal<br>is printing in | he following<br>Id<br>libdlmcontrol    |  |

The system will download all available patches (Figures 97 and 98).

Figure 96. YaST online update: Package update

| YaST2 - online_update @ cishana01   |  |
|---|--|
|   |  |
|   |  |
|   |  |
|   |  |
|   |  |
|   |  |
|   |  |
|   |  |
|   |  |
|   |  |
|   |  |
|   |  |
|   |  |
| Packages for package management were updated.<br>Finishing and restarting YaST now. |  |
|   |  |
|   |  |
|   |  |
|   |  |
|   |  |
|   |  |

|   | erâ] [Actionsâ]   | [Viewâ]                | [Dependenciesâ]                        |  |  |
|---|---|------------------------|--|--|--|
|   | Name  | Kind                   | Summary                                |  |  |
| a+  | SUSE-SLE-HA-12-SP1-2016-1010  | recommended            | Recommended update for libdlm          |  |  |
| a+  | SUSE-SLE-HA-12-SP1-2016-1049  | recommended            | Recommended update for crmsh           |  |  |
| a+  | SUSE-SLE-HA-12-SP1-2016-1052  | recommended            | Recommended update for libdlm          |  |  |
| a+  | SUSE-SLE-HA-12-SP1-2016-1158  | recommended            | Recommended update for resource-agent; |  |  |
| a+  | SUSE-SLE-HA-12-SP1-2016-1204  | recommended            | Recommended update for crmsh           |  |  |
| a+  | SUSE-SLE-HA-12-SP1-2016-284   | recommended            | Recommended update for fence-agents    |  |  |
| a+  | SUSE-SLE-HA-12-SP1-2016-365   | recommended            | Recommended update for crmsh           |  |  |
| a+  | SUSE-SLE-HA-12-SP1-2016-423   | recommended            | Recommended update for resource-agent  |  |  |
| a+  | SUSE-SLE-HA-12-SP1-2016-595   | recommended            | Recommended update for pacemaker       |  |  |
| a+  | SUSE-SLE-HA-12-SP1-2016-681   | recommended            | Recommended update for sbd             |  |  |
| a+  | SUSE-SLE-HA-12-SP1-2016-758   | recommended            | Recommended update for resource-agent  |  |  |
| a+  | SUSE-SLE-HA-12-SP1-2016-799   | recommended            | Recommended update for crmsh           |  |  |
| a+  | SUSE-SLE-HA-12-SP1-2016-954   |                        | Recommended update for python-dateuti  |  |  |
| atch  | 1: SUSE-SLE-HA-12-SP1-2016-1010 H   | Kind: recomment        | ded Version: 1                         |  |  |
| This update for libdlm to version 4.0.4 includes the following changes:     |   |                        |  |  |  |
| - Don't SIGKILL dlm controld  |   |                        |  |  |  |
| - Don't Sigkill dim_controid<br>- Make systemd stop dlm on corosync restart |   |                        |  |  |  |
|   | a controld: don't log error from  |                        |  |  |  |
| Mal   | <ul> <li>- dlm_controld: don't log error from cpg_dispatch</li> <li>- Fix rejection of valid connections in dlm controld</li> </ul> |                        |  |  |  |
| Ma)<br>dlr  | rejection of valid connections  | -                      |  |  |  |
| Ma)<br>dlr<br>Fix   | -   | -                      |  |  |  |
| Ma)<br>dlr<br>Fix<br>Ma)  | e fail_time in dlm_stonith option   | onal -                 | libdlmcontrol                          |  |  |
| Ma)<br>dlr<br>Fix<br>Ma)<br>Fix   | ce fail_time in dlm_stonith optic<br>c segmentation fault during statu  | onal -                 | libdlmcontrol                          |  |  |
| Ma)<br>dlr<br>Fix<br>Ma)<br>Fix<br>Ado                                      | e fail_time in dlm_stonith option   | onal<br>us printing in |  |  |  |

e. Some patches may require a reboot after installation. Select Continue (Figure 99).

## Figure 98. YaST online update: Package update

| [Filter  | â] [Actionsâ]  | [Viewâ]   | [Dependenciesâ]  |  |
|--|--|---|--|--|
|  | Name   | Kind  | Summary  |  |
| a+   | SUSE-SLE-HA-12-SP1-2016-1010   | recommended   | Recommended update for libdlm  |  |
| a+   | SUSE-SLE-HA-12-SP1-2016-1049   | recommended   | Recommended update for crmsh   |  |
| a+   | SUSE-SLE-HA-12-SP1-2016-1052   | recommended   | Recommended update for libdlm  |  |
| a+   | SUSE-SLE-HA-12-SP1-2016-1158   | recommended   | Recommended update for resource-agents   |  |
| a+   | SUSE-SLE-HA-12-SP1-2016-1204   | recommended   | Recommended update for crmsh   |  |
| a+   | SUSE-SLE-HA-12-SP1-2016-284  | recommended   | Recommended update for fence-agents  |  |
| a+   | SUSE-SLE-HA-12-SP1-2016-365  | recommended   | Recommended update for crmsh   |  |
| a+   | SUSE-SLE-HA-12-SP1-2016-423  | recommended   | Recommended update for resource-agents   |  |
| a+   |  |   | r  |  |
| a+   | These patches will   | need rebootin   | g after installation   |  |
| a+   | SUSE-SLE-SERVER-12-SP1-2016  |   | agents   |  |
| a+       Kernel       teutil         SUSE-SLE-SERVER-12-SP1-2016-1004: Security update for the Linux       GB         Filter:       Kernel       GB         Patch:       Kernel       GB |  |   |  |  |
| ilter:   | SUSE-SLE-SERVER-12-SP1-2016<br>Kernel<br>SUSE-SLE-SERVER-12-SP1-2016   |   | ty update for the Linux GB   |  |
| filter:  | SUSE-SLE-SERVER-12-SP1-2016<br>Kernel<br>SUSE-SLE-SERVER-12-SP1-2016<br>Kernel   |   | ty update for the Linux GB   |  |
| Patch:<br>This u<br>chan<br>- Don'   | SUSE-SLE-SERVER-12-SP1-2016<br>Kernel<br>SUSE-SLE-SERVER-12-SP1-2016<br>Kernel<br>[Contin  | 5-600: Securit<br>nue] [Back] [S  | ty update for the Linux<br>gupdate for the Linux                                     |  |
| Patch:<br>This u<br>chan<br>- Don'<br>- Make   | SUSE-SLE-SERVER-12-SP1-2016<br>Kernel<br>SUSE-SLE-SERVER-12-SP1-2016<br>Kernel<br>[Contin<br>t<br>systemd stop dlm on corosync r   | -600: Securit<br>nue] [Back] [S<br>cestart  | ty update for the Linux<br>gupdate for the Linux                                     |  |
| Patch:<br>This u<br>chan<br>- Don'<br>- Make<br>- dlm_   | SUSE-SLE-SERVER-12-SP1-2016<br>Kernel<br>SUSE-SLE-SERVER-12-SP1-2016<br>Kernel<br>[Contin<br>t<br>systemd stop dlm on corosync r<br>controld: don't log error from   | -600: Securit<br>ue] [Back] [S<br>cestart<br>cpg_dispatch                                       | ty update for the Linux<br>gupdate for the Linux<br>kip All]                         |  |
| Filter:<br>Patch:<br>This u<br>chan<br>- Don'<br>- Make<br>- dlm_<br>- Fix   | SUSE-SLE-SERVER-12-SP1-2016<br>Kernel<br>SUSE-SLE-SERVER-12-SP1-2016<br>Kernel<br>[Contin<br>t<br>systemd stop dlm on corosync r<br>controld: don't log error from<br>rejection of valid connections   | -600: Securit<br>ue] [Back] [S<br>cestart<br>cpg_dispatch<br>in dlm_contro                      | ty update for the Linux<br>g update for the Linux<br>kip All]                        |  |
| ilter:<br>Patch:<br>This u<br>char<br>- Don'<br>- Make<br>- dlm_<br>- Fix<br>- Make  | SUSE-SLE-SERVER-12-SP1-2016<br>Kernel<br>SUSE-SLE-SERVER-12-SP1-2016<br>Kernel<br>[Contin<br>t<br>systemd stop dlm on corosync r<br>controld: don't log error from<br>rejection of valid connections<br>fail_time in dlm_stonith optic   | -600: Securit<br>ue] [Back] [S<br>cestart<br>cpg_dispatch<br>in dlm_contro<br>onal              | ty update for the Linux<br>y update for the Linux<br>kip All]                        |  |
| Filter:<br>Patch:<br>This u<br>chan<br>- Don'<br>- Make<br>- dlm_<br>- Fix<br>- Make<br>- Fix  | SUSE-SLE-SERVER-12-SP1-2016<br>Kernel<br>SUSE-SLE-SERVER-12-SP1-2016<br>Kernel<br>t<br>systemd stop dlm on corosync r<br>controld: don't log error from<br>rejection of valid connections<br>fail_time in dlm_stonith optic<br>segmentation fault during statu                         | -600: Securit<br>ue] [Back] [S<br>cestart<br>cpg_dispatch<br>in dlm_contro<br>onal              | ty update for the Linux<br>y update for the Linux<br>kip All]                        |  |
| Filter:<br>Patch:<br>This u<br>char<br>- Don'<br>- Make<br>- dlm<br>- Fix<br>- Make<br>- Fix<br>- Add  | SUSE-SLE-SERVER-12-SP1-2016<br>Kernel<br>SUSE-SLE-SERVER-12-SP1-2016<br>Kernel<br>t<br>systemd stop dlm on corosync r<br>controld: don't log error from<br>rejection of valid connections<br>fail_time in dlm_stonith optic<br>segmentation fault during statu<br>dlm_stonith man page | estart<br>[Back] [Back] [S<br>estart<br>cpg_dispatch<br>in dlm_contro<br>onal<br>is printing in | ty update for the Linux<br>y update for the Linux<br>kip All]<br>ld<br>libdlmcontrol |  |
| Patch:<br>This u<br>chan<br>- Don'<br>- Make<br>- dlm<br>- Fix<br>- Fix<br>- Fix<br>- Add<br>- Outp  | SUSE-SLE-SERVER-12-SP1-2016<br>Kernel<br>SUSE-SLE-SERVER-12-SP1-2016<br>Kernel<br>controld: don't log error from<br>rejection of valid connections<br>fail_time in dlm_stonith optic<br>segmentation fault during statu<br>dlm_stonith man page<br>out of dlm_tool ls should distin    | estart<br>[Back] [Back] [S<br>estart<br>cpg_dispatch<br>in dlm_contro<br>onal<br>is printing in | ty update for the Linux<br>y update for the Linux<br>kip All]<br>ld<br>libdlmcontrol |  |
| Patch:<br>This u<br>chan<br>- Don'<br>- Make<br>- dlm<br>- Fix<br>- Fix<br>- Fix<br>- Add<br>- Outp  | SUSE-SLE-SERVER-12-SP1-2016<br>Kernel<br>SUSE-SLE-SERVER-12-SP1-2016<br>Kernel<br>t<br>systemd stop dlm on corosync r<br>controld: don't log error from<br>rejection of valid connections<br>fail_time in dlm_stonith optic<br>segmentation fault during statu<br>dlm_stonith man page | estart<br>[Back] [Back] [S<br>estart<br>cpg_dispatch<br>in dlm_contro<br>onal<br>is printing in | ty update for the Linux<br>y update for the Linux<br>kip All]<br>ld<br>libdlmcontrol |  |

Patches are downloaded and installed at this time (Figure 99).

## Figure 99. YaST online update: Package update progress

| YaST2 - online update @ cishana01    |         |          |
|--------------------------------------|---------|----------|
|                                      |         |          |
| Patch Download and Installation      |         |          |
| FProgress Log                        |         |          |
| Retrieving python-dateutilOK         |         |          |
| Retrieving crmsh-scriptsOK           |         |          |
| Retrieving glibcOK                   |         |          |
| Retrieving glibc-i18ndataOK          |         |          |
| Retrieving insserv-compatOK          |         |          |
| Retrieving kernel-macrosOK           |         |          |
| Retrieving man-pagesOK               |         |          |
| Retrieving nfs-docOK                 |         |          |
| Retrieving python-enum34OK           |         |          |
| Retrieving python-requestsOK         |         |          |
| Retrieving release-notes-slesOK      |         |          |
| Retrieving sles-admin_en-pdfOK       |         |          |
| Retrieving sles-deployment_en-pdfOK  |         |          |
| Retrieving sles-installquick_en-pdf( | OK      |          |
| Retrieving sles-manuals_en           |         |          |
|                                      |         |          |
|                                      |         |          |
|                                      |         |          |
|                                      |         |          |
|                                      |         |          |
|                                      |         |          |
|                                      |         |          |
|                                      |         |          |
|                                      |         |          |
|                                      |         |          |
|                                      |         |          |
|                                      |         |          |
| Package Download Progress            |         |          |
|                                      | 65%     |          |
| Total Progress                       |         |          |
|                                      | 1%      |          |
| C Deck 1                             | [2]     | (Risish) |
| [ Help ] [ Back ]                    | [Abort] | [Finish] |

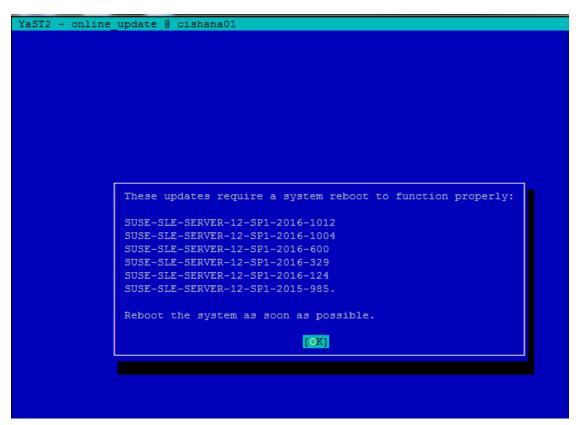
f. When the packages have been updated, the release notes are displayed (Figure 101). Select Close.

# Figure 100. YaST online update: Release Notes

| YaST2 - online_update @ cishana01  |  |  |  |
|--|--|--|--|
| Release Notes  |  |  |  |
| Language   |  |  |  |
| English (US) <sup>2</sup> a  |  |  |  |
| Release Notes  |  |  |  |
| 12.1.20160801  |  |  |  |
| Abstract   |  |  |  |
| This document provides guidance and an overview to high level general features<br>and updates for SUSE Linux Enterprise Server 12 SP1. Besides architecture or<br>product-specific information, it also describes the capabilities and<br>limitations of SLES 12 SP1. General documentation may be found at: http://<br>www.suse.com/documentation/sles-12/. |  |  |  |
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|  |  |  |  |
| [Help] [Back] [Abort] [Close   |  |  |  |

g. Click OK to acknowledge the reboot prompt (Figure 102).





h. Quit YaST.

i. Reboot the system to make the patch installation take effect.

# **Operating and maintaining SAP HANA**

SAP HANA operation and maintenance are described in detail in many related SAP documents. For a complete list of the documentation, see <u>http://help.sap.com/hana</u>.

This document summarizes only a few important operation and maintenance procedures. Most of the procedures described in this document are command-line interface (CLI) procedures and are independent of any GUI requiring an X terminal or other GUI front end (Microsoft Windows PC, Linux desktop, etc.). CLI procedures can be started using the KVM or any SSH tool such as PuTTY (for Windows) or Terminal (for Mac OS), or any Linux terminal window to connect to the SAP HANA database system (the appliance).

# Monitoring SAP HANA

Three easy CLI methods are available to check the running SAP HANA database.

## saphostagent

Start a shell and connect to the SAP HANA system as the root user.

```
cishana01:~ # /usr/sap/hostctrl/exe/saphostctrl -function ListDatabases
Instance name: HDB00, Hostname: cishana01, Vendor: HDB, Type: hdb, Release: 1.00.60.0379371
Database name: HAN, Status: Error
cishana01:~ #
```

Get a list of installed SAP HANA instances or databases.

```
cishana01:~ # /usr/sap/hostctrl/exe/saphostctrl -function ListInstances
Inst Info : HAN - 00 - cishana01 - 740, patch 17, changelist 1413428
cishana01:~ #
```

Using this information (system ID [SID] and system number), you can use sapcontrol to gather more information about the running SAP HANA database.

#### sapcontrol

In a shell, use the sapcontrol function GetProcessList to display a list of running SAP HANA OS processes.

```
cishana01:~ # /usr/sap/hostctrl/exe/sapcontrol -nr 00 -function GetProcessList
19.07.2016 14:54:45
GetProcessList
OK
name, description, dispstatus, textstatus, starttime, elapsedtime, pid
hdbdaemon, HDB Daemon, GREEN, Running, 2016 07 15 11:57:45, 98:57:00, 8545
hdbnameserver, HDB Nameserver, GREEN, Running, 2016 07 15 12:05:27, 98:49:18, 11579
hdbpreprocessor, HDB Preprocessor, GREEN, Running, 2013 08 15 12:05:27, 98:49:18, 11580
hdbindexserver, HDB Indexserver, GREEN, Running, 2016 07 15 12:05:27, 98:49:18, 11581
hdbstatisticsserver, HDB Statisticsserver, GREEN, Running, 2016 07 15 12:05:27, 98:49:18, 11582
hdbxsengine, HDB XSEngine, GREEN, Running, 2016 07 15 12:05:27, 98:49:18, 11583
sapwebdisp_hdb, SAP WebDispatcher, GREEN, Running, 2016 07 15 12:05:27, 98:49:18, 11584
hdbcompileserver, HDB Compileserver, GREEN, Running, 2016 07 15 12:05:27, 98:49:18, 11584
```

You see processes such as hdbdaemon, hdbnameserver, and hdbindexserver that belong to a running SAP HANA database.

You can also get a system instance list, which is more useful for a scale-out appliance.

```
cishana01:~ # /usr/sap/hostctrl/exe/sapcontrol -nr 00 -function GetSystemInstanceList
19.07.2016 15:03:12
GetSystemInstanceList
OK
hostname, instanceNr, httpPort, httpsPort, startPriority, features, dispstatus
cishana01, 0, 50013, 0, 0.3, HDB, GREEN
```

# HDB info

Another important tool is the **HDB** command, which needs to be issued by the <SID>adm user: the OS user who owns the SAP HANA database.

As the root user on the SAP HANA appliance, enter the command shown here.

cishana01:~ # su - hanadm

```
cishana01:/usr/sap/HAN/HDB00> HDB info
                                 RSS COMMAND
         PID PPID %CPU
                           VSZ
USER
        61208 61207 1.6 13840 2696 -sh
hanadm
hanadm
       61293 61208 0.0 11484 1632 \_ /bin/sh /usr/sap/HAN/HDB00/HDB info
hanadm 61316 61293 0.0 4904
                                 872
                                      \ ps fx -U hanadm -o
user,pid,ppid,pcpu,vsz,rss,args
hanadm
       8532
                  1 0.0 20048 1468 sapstart pf=/hana/shared/HAN/profile/HAN HDB00 cishana01
hanadm
         8545 8532 1.5 811036 290140 \ /usr/sap/HAN/HDB00/cishana01/trace/hdb.sapHAN HDB00
-d -nw -f /usr/sap/HAN/HDB00/cis
hanadm 11579 8545 6.6 16616748 1789920
                                              \ hdbnameserver
hanadm 11580 8545 1.5 5675392 371984
                                            \ hdbpreprocessor
hanadm
       11581 8545 10.9 18908436 6632128
                                              \ hdbindexserver
       11582 8545 8.7 17928872 3833184
                                              \ hdbstatisticsserver
hanadm
hanadm 11583 8545 7.4 17946280 1872380
                                              \ hdbxsengine
       11584 8545 0.0 203396 16000
                                          \ sapwebdisp hdb
hanadm
pf=/usr/sap/HAN/HDB00/cishana01/wdisp/sapwebdisp.pfl -f /usr/sap/H
                                            \ hdbcompileserver
hanadm 11585 8545 1.5 15941688 475708
hanadm
         8368
                  1 0.0 216268 75072 /usr/sap/HAN/HDB00/exe/sapstartsrv
pf=/hana/shared/HAN/profile/HAN HDB00 cishana01 -D -u
```

This command produces output similar to that from the **sapcontrol GetProcessList** function, with a bit more information about the process hierarchy.

## Starting and stopping SAP HANA

Before you stop the SAP HANA appliance, you must be able to stop and start the SAP HANA database. You can use the commands shown here.

#### sapcontrol

You can use the sapcontrol functions StartSystem and StopSystem to start and stop a SAP HANA database.

Stop the system with the **StopSystem** function.

```
cishana01:~ # /usr/sap/hostctrl/exe/sapcontrol -nr 00 -function StopSystem HDB
19.07.2016 15:05:35
StopSystem
OK
```

Use the following command to check that the database has stopped.

```
cishana01:~ # /usr/sap/hostctrl/exe/sapcontrol -nr 00 -function GetSystemInstanceList
19.07.2016 15:05:58
GetSystemInstanceList
OK
hostname, instanceNr, httpPort, httpsPort, startPriority, features, dispstatus
cishana01, 0, 50013, 0, 0.3, HDB, YELLOW
Wait for the status to be GRAY.
cishana01:~ # /usr/sap/hostctrl/exe/sapcontrol -nr 00 -function GetSystemInstanceList
19.07.2016 15:07:52
GetSystemInstanceList
OK
hostname, instanceNr, httpPort, httpsPort, startPriority, features, dispstatus
cishana01, 0, 50013, 0, 0.3, HDB, GRAY
```

Alternatively, use the **HDB info** command.

cishana01:~ # su -l hanadm cishana01:/usr/sap/HAN/HDB00> HDB info USER PID PPID %CPU VSZ RSS COMMAND hanadm 61477 61476 2.0 13840 2692 -sh hanadm 61562 61477 0.0 11484 1632 \\_ /bin/sh /usr/sap/HAN/HDB00/HDB info hanadm 61585 61562 0.0 4904 872 \\_ ps fx -U hanadm -o user,pid,ppid,pcpu,vsz,rss,args hanadm 8368 1 0.0 216784 75220 /usr/sap/HAN/HDB00/exe/sapstartsrv pf=/hana/shared/HAN/profile/HAN\_HDB00\_cishana01 -D -u cishana01:/usr/sap/HAN/HDB00>

You can start the database again with the sapcontrol command StartSystem function.

```
cishana01:~ # /usr/sap/hostctrl/exe/sapcontrol -nr 00 -function StartSystem HDB
19.07.2016 15:08:48
StartSystem
OK
```

To check the system status, use the sapcontrol command GetSystemInstanceList function. Wait for the status to be GREEN.

```
cishana01:~ # /usr/sap/hostctrl/exe/sapcontrol -nr 00 -function GetSystemInstanceList
19.07.2016 15:10:19
GetSystemInstanceList
OK
hostname, instanceNr, httpPort, httpsPort, startPriority, features, dispstatus
cishana01, 0, 50013, 0, 0.3, HDB, GREEN
```

#### HDB

You can use the HDB start and stop commands to stop and start the SAP HANA database.

Use HDB stop to stop the database.

cishana01:~ # su - hanadm cishana01:/usr/sap/HAN/HDB00> HDB stop hdbdaemon will wait maximal 300 seconds for NewDB services finishing. Stopping instance using: /usr/sap/HAN/SYS/exe/hdb/sapcontrol -prot NI\_HTTP -nr 00 -function 19.07.2016 19:10:37 Stop OK StopWait 400 2

In contrast to sapcontrol, this command waits until the database is stopped or started.

```
cishana01:/usr/sap/HAN/HDB00> HDB start
StartService
Impromptu CCC initialization by 'rscpCInit'.
   See SAP note 1266393.
OK
OK
Starting instance using: /usr/sap/HAN/SYS/exe/hdb/sapcontrol -prot NI_HTTP -nr 00 -function
StartWait 2700 2
19.07.2016 19:11:20
Start
OK
```

# **Downloading revisions**

To download revisions, you need to connect to the service marketplace and select the software download area to search for available patches.

Refer to <a href="http://help.sap.com/hana/SAP\_HANA\_Master\_Update\_Guide\_en.pdf">http://help.sap.com/hana/SAP\_HANA\_Master\_Update\_Guide\_en.pdf</a> for update procedures for SAP HANA.

# For more information

For information about SAP HANA, see <u>https://hana.sap.com/abouthana.html</u>.

For information about certified and supported SAP HANA hardware, see <u>https://global.sap.com/community/ebook/2014-09-02-hana-hardware/enEN/index.html</u>.

# Appendix: Solution variables used in this document

Before starting the configuration process, you need to collect some specific configuration information. Table 14 provides information to help you assemble the required network and host address, numbering, and naming information. This worksheet can also be used as a "leave behind" document for future reference.

| Table 14. Solution variables used in this documen |
|---|
|---|

| Variable  | Description   | Value used in the lab for this document |
|---|---|---|
| < <var_cimc_ip_address>&gt;</var_cimc_ip_address>         | Cisco UCS C480 M5 server's IMC IP address   | 173.36.215.117                          |
| < <var_cimc_ip_netmask>&gt;</var_cimc_ip_netmask>         | Cisco UCS C480 M5 server's IMC network netmask                                      | 255.255.255.0                           |
| < <var_cimc_gateway_ip>&gt;</var_cimc_gateway_ip>         | Cisco UCS C480 M5 server's IMC network gateway IP address                           | 173.36.215.1                            |
| < <var_raid50_vd_name>&gt;</var_raid50_vd_name>           | Name for virtual drive VD0 during RAID configuration                                | ucs_hana                                |
| < <var_hostname.domain>&gt;</var_hostname.domain>         | SAP HANA node FQDN  | cishana01.custdom.local                 |
| < <var_sys_root-pw>&gt;</var_sys_root-pw>                 | SAP HANA node's root password   | Saphana1!                               |
| < <var_lvm_vg_name>&gt;</var_lvm_vg_name>                 | SAP HANA node's OS LVM volume group name  | hanavg                                  |
| < <var_mgmt_ip_address>&gt;</var_mgmt_ip_address>         | SAP HANA node's management and administration IP address                            | 173.36.215.118                          |
| < <var_mgmt_nw_netmask>&gt;</var_mgmt_nw_netmask>         | SAP HANA node's management network netmask  | 255.255.255.0                           |
| < <var_mgmt_gateway_ip>&gt;</var_mgmt_gateway_ip>         | Cisco UCS C480 M5 server's management and administration network gateway IP address | 173.36.215.1                            |
| < <var_mgmt_netmask_prefix>&gt;</var_mgmt_netmask_prefix> | Netmask prefix in CIDR notation   | 24                                      |

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