

SAP HANA Platform SPS 06
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SAP HANA Server Installation Guide

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1 Installing SAP HANA Overview

This SAP HANA installation guide describes how to install SAP HANA with the SAP HANA unified installer. Before starting the installation of SAP HANA, make sure that you have read the SAP HANA Master Guide.

Related Information

[SAP HANA Master Guide](#)

1.1 Software Components

The [SAP HANA Platform Edition](#) is the foundation of various other SAP HANA editions, like the SAP HANA Enterprise Edition. These editions bundle additional components that customers might require, for example, for data replication. The SAP HANA Platform Edition is composed of the following components:

- SAP HANA database
- SAP HANA client
- SAP HANA client for Microsoft Excel
- SAP HANA studio
- SAPUI5 Tools IDE PLUGIN
- SAP Host Agent
- Diagnostics Agent
- SAP HANA information composer
- SAP HANA AFL
- SAP HANA LCApps
- SAP HANA lifecycle manager
- SAP HANA RDL
- SAP HANA smart data access
- SAP HANA INA Toolkit HTML
- SAP HANA unified installer
- LM structure inst SAP HANA
- SAP HANA Direct Extractor Connection (DXC)

The SAP HANA Platform Edition is bundled together with other products into editions as license bundles for special purposes. This is a subset of the available editions:

- SAP HANA Enterprise Edition (containing SAP Data Services and SAP LT Replication Server)
- SAP Sybase Replication Server, SAP HANA edition
- Real-time-data edition for SAP HANA (includes SAP Sybase Replication Server, SAP HANA edition)
- SAP HANA Database edition for BW
- SAP HANA Limited edition for Apps / Accelerators
- SAP HANA EDGE edition

Note

SAP HANA information composer is a Web-based environment that allows business users to upload data to the SAP HANA database and to manipulate that data by creating information views. The SAP HANA information

composer is installed separately from the SAP HANA system. For more information, see the [SAP HANA Information Composer – Installation and Configuration Guide](#).

1.2 Software Download

The components of SAP HANA can only be installed by certified hardware partners on validated hardware running a specific operating system. Any other system or content developed with such systems is not supported by SAP. For more information, see the information page of the product version. Support Package Stacks (SPS) can be downloaded and applied to appliances according to agreements with the respective hardware partner.

1.3 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.

Make sure that you have the most up-to-date version of each SAP Note, which you can find on SAP Service Marketplace at <https://service.sap.com/notes>.

SAP Note Number	Title
SAP Note 1514967	SAP HANA: Central Note
SAP Note 1848976	SAP HANA Appliance Software SPS 06 Release Note
SAP Note 1523337	SAP HANA Database: Central Note
SAP Note 1681092	Support for multiple SAP HANA databases on a single SAP HANA appliance
SAP Note 1661202	Support for multiple applications on SAP HANA
SAP Note 1828400	SAPUI5 tools disappeared after updating HANA Studio
SAP Note 1577128	Supported clients for SAP HANA
SAP Note 1514966	SAP HANA: Sizing SAP HANA Database
SAP Note 1637145	SAP BW on HANA: Sizing SAP HANA Database
SAP Note 1793345	Sizing for Suite on HANA
SAP Note 1824819	Optimal settings for SLES 11 SP2 and SLES 11 for SAP SP2
SAP Note 1597355	Swap space recommendation for Linux

SAP Note Number	Title
	For the SAP HANA system there are no special requirements regarding swap space.

Check the current SAP Notes for the various parts of SAP HANA by searching for any of the following application areas:

SAP HANA Platform

- [BC-DB-HDB](#) SAP HANA Database
- [BC-DB-HDB-AFL](#) SAP HANA Application Function Library
- [BC-DB-HDB-AFL-DQ](#) SAP HANA Data Quality Library
- [BC-DB-HDB-AFL-PAL](#) SAP HANA Predictive Analysis Library
- [BC-DB-HDB-AFL-SOP](#) SAP HANA Sales and & Operations Planning
- [BC-DB-HDB-BAC](#) SAP HANA Backup & Recovery
- [BC-DB-HDB-CCM](#) CCMS for SAP HANA
- [BC-DB-HDB-CLI](#) SAP HANA Clients (JDBC, ODBC)
- [BC-DB-HDB-DBA](#) SAP HANA database administration (DBA cockpit)
- [BC-DB-HDB-DXC](#) SAP HANA direct extractor connector
- [BC-DB-HDB-ENG](#) SAP HANA database engine
- [BC-DB-HDB-MDX](#) MDX Engine / MS Excel client
- [BC-DB-HDB-HLM](#) SAP HANA Lifecycle Manager
- [BC-DB-HDB-PER](#) SAP HANA database persistence
- [BC-DB-HDB-PLE](#) Planning Engine
- [BC-DB-HDB-POR](#) DB Porting for SAP HANA
- [BC-DB-HDB-R](#) SAP HANA Integration with R
- [BC-DB-HDB-SCR](#) SAP HANA SQL Script
- [BC-DB-HDB-SCR-CLT](#) SAP HANA SQL Script Editor/Debugger Client
- [BC-DB-HDB-SEC](#) SAP HANA Security & User Management
- [BC-DB-HDB-SYS](#) SAP HANA database interface/DBMS
- [BC-DB-HDB-TXT](#) SAP HANA Text & Search Features
- [BC-DB-HDB-XS](#) SAP HANA Application Services
- [BC-DB-HDB-XS-WB](#) Workbench / Team Provider SAP HANA DB
- [BC-DB-LCA](#) SAP HANA liveCache Applications
- [BC-HAN-MOD](#) SAP HANA studio / information modeler
- [BC-HAN-3DM](#) SAP HANA information composer
- [BC-HAN-SRC](#) SAP HANA UI Toolkit
- [BC-CCM-HAG](#) SAP Host Agent
- [SV-SMG-DIA](#) SAP Solution Manager Diagnostics Agent

SAP HANA Lifecycle Management

- [BC-HAN-SL-STP](#) SAP HANA unified installer
- [BC-DB-HDB-INS](#) SAP HANA database installation (hdbinst)
- [BC-HAN-UPD](#) Software Update Manager for SAP HANA
- [BC-DB-HDB-UPG](#) SAP HANA database upgrade (hdbupd)

SAP HANA Enterprise

- *BC-HAN-LOA* SAP HANA load controller (log-based replication)
- *BC-HAN-REP* Sybase rep. server (log-based replication)
- *BC-HAN-LTR* SAP Landscape Transformation (trigger-based replication)
- *BC-HAN-DXC* SAP HANA Direct Extractor Connection
- *EIM-DS* Data Services (ETL-based replication)

End User Clients

- *BI-BIP, BI-BIP-CMC* Business intelligence platform (formerly known as BOE)
- *BI-RA-EXP* SAP BusinessObjects Explorer
- *BI-RA-CR, BI-BIP-CRS* SAP Crystal Reports
- *BI-RA-XL* Dashboard Designer
- *BI-BIP-IDT* Information design tool
- *BI-RA-WBI* Web Intelligence
- *BI-RA-AO-XLA* MS Excel Add-In

The search also supports using the wildcard asterisk (*), so you can, for example, also search for BC-DB-HDB* or similar and you will get results for all sub-components.

Customer Messages

If you encounter any problems with the software, create a customer message on the SAP Service Marketplace at <http://service.sap.com/message>.

In addition, the Customer Interaction Center (CIC) is available 24 x 7 in every region to help you resolve any issues you may run into (<https://service.sap.com/supportcenters>).

The CIC requires a valid S-user number. To create an S-user ID, follow the steps in this guide (<https://service.sap.com/~sapidp/011000358700000905192010E.pdf>).

When creating a customer message, you can choose from the above list of components for the relevant software part.

1.4 Hardware and Software Requirements

i Note

You can find a complete list of all SAP HANA components and the respective SAP HANA hardware and software requirements in the [Product Availability Matrix \(PAM\)](#) on the SAP Service Marketplace.

Software Requirements

i Note

Only the software installed by hardware partners is recommended for use on the SAP HANA system. Do not install additional software on the SAP HANA system.

Operating System for SAP HANA

SUSE Linux Enterprise Server (SLES) 11 (see [Product Availability Matrix \(PAM\)](#)) – for information about installing SLES 11 in an SAP environment, see [SAP Note 1310037](#). For information about optimal settings for SLES 11, see [SAP Note 1824819](#).

For the SAP HANA system there are no specific requirements regarding swap space (see [SAP Note 1597355](#)).

The following additional components need to be installed on the SAP HANA system:

- `gtk2` (use version as provided with operating system distribution)
- `java-1_6_0-ibm` (use version as provided with operating system distribution, necessary for the SAP HANA studio on the SAP HANA system)
- `libc6` (use version as provided with operating system distribution)
- `mozilla-xulrunner192-1.9.2.xx-x.x.x` (use version as provided with operating system, but at given minimum version)
- `ntp`
- `sudo`
- `syslog-ng` (use version as provided with operating system distribution)
- `tcsh`
- `libssh2-1`
- `expect`
- `autoyast2-installation`
- `yast2-ncurses`

Observe the following requirements:

- Turn off the SLES kernel dump function (`kdump`) if not needed for specific reasons (for example, root cause analysis).
- Configure the following SLES kernel parameter as follows:
`net.ipv4.tcp_slow_start_after_idle=0`
- Adhere to the following shared memory settings (if not already set during installation):

Size	shmmni value	Physical Memory
S(mall)	4096	>= 24 GB & < 64 GB
M(edium)	65536	> 64 GB & < 256 GB
L(arge)	524288	> 256 GB

- When using unixODBC for ODBC on Linux, install release 2.3.0 or higher (check with command `isql --version`).

Network Time Protocol (NTP)

We strongly recommend that you set up an NTP server for the SAP HANA system landscape.

i Note

If an NTP server is not available this means that, for example, trace files from distributed hosts cannot be displayed in the correct chronological order.

Hardware Requirements

Hardware Check

During the update and the installation of the SAP HANA database (part of installation by the unified installer), a hardware check is performed. For more information, see [SAP Note 1652078](#).

Hardware Requirements for SAP HANA Network Connection

We recommend dedicated server network communication of 10 GBit/s between the SAP HANA landscape and the source system for efficient data replication.

i Note

For more information about validated hardware configurations see the Product Availability Matrix (PAM) on SAP Service Marketplace at <https://service.sap.com/pam>.

1.5 SAP HANA Guides

For more information about SAP HANA landscape, security, installation, and administration, see the resources listed below:

Topic	Location	Quick Link
SAP HANA landscape, deployment, and installation	SAP HANA Knowledge Center on the SAP Help Portal	http://help.sap.com/hana_platform : <ul style="list-style-type: none">• SAP HANA Master Guide• SAP HANA Server Installation Guide• SAP HANA Master Update Guide• SAP HANA Update and Configuration Guide
SAP HANA administration and security	SAP HANA Knowledge Center on the SAP Help Portal	http://help.sap.com/hana_platform : <ul style="list-style-type: none">• SAP HANA Technical Operations Manual• SAP HANA Administration Guide• SAP HANA Security Guide
SAP HANA documentation for previous Support Package Stacks	SAP HANA Knowledge Center on SAP Service Marketplace	https://service.sap.com/hana : <ul style="list-style-type: none">• SAP HANA SPS 05 Documentation (ZIP)

Topic	Location	Quick Link
		<ul style="list-style-type: none"> • SAP HANA SPS 04 Documentation (ZIP) • SAP HANA SPS 03 Documentation (ZIP)

2 Running the SAP HANA Unified Installer

The SAP HANA unified installer is a tool to install the SAP HANA appliance software in a single, unified, and predefined way.

Related Information

[Performing a Distributed System Installation \(Optional\)](#) [page 18]

[Preparation](#) [page 10]

[Running the Installer](#) [page 21]

[Post-Installation](#) [page 26]

2.1 Preparation

To be able to run the SAP HANA unified installer, you need to perform the preparation steps described in the following sections :

Related Information

[Recommended File System Layout](#) [page 10]

[Installation Parameters](#) [page 13]

[Users Created During the Installation](#) [page 15]

[Preparing the Installer Configuration File](#) [page 16]

2.1.1 Recommended File System Layout

The installer requires a running operating system (OS) with file system partitions created as listed in the table below.

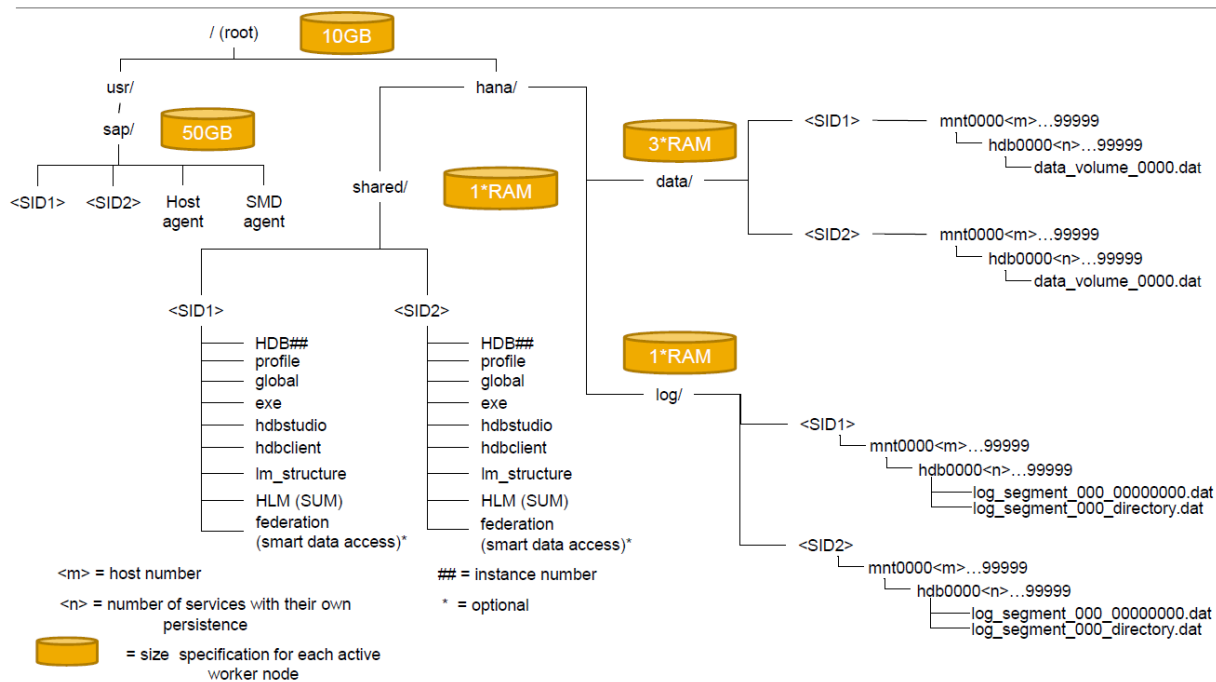
The directories for data volumes and log volumes are not automatically created by the installer. You must create them manually before you start the installation.

Table 1: Required File Systems

File System	Description	Recommended Disk Space
/	The root partition	10 GB
/hana/shared/	<p>The file system for the SAP mount directory for global files and profiles.</p> <p>The default name for the SAP mount directory is /hana/shared/, however you can also specify another name. This directory needs to be accessible by each of the servers in the SAP HANA cluster.</p>	

File System	Description	Recommended Disk Space
	The directory /hana/shared/ must be physically shared. The path to the SAP mount directory is a mandatory parameter to be filled in the installer configuration file. For more information, see Installation Parameters [page 13] and Preparing the Installer Configuration File [page 16].	
/usr/sap	The file system for local SAP system instance directories	50 GB
/hana/data/<SID>	<p>The directory for data volumes of the SAP HANA database. The path to the data directory depends on the configuration of the SAP HANA host.</p> <p>i Note This directory must exist before you start the installation.</p>	The data path needs to have space equivalent to three times the size of system RAM.
/hana/log/<SID>	<p>The directory for log volumes of the SAP HANA database. The path to the log directory depends on the configuration of the SAP HANA host.</p> <p>i Note This directory must exist before you start the installation.</p>	The log path needs to have RAM equal to the default system RAM.

We strongly recommend the SAP HANA file system layout shown in the figure below:



This is the most general case of a distributed multi SID landscape. All other types of installations can be derived from this general case.

Keep in mind that the production systems, which are always single SID installations, and single SID installations or multi SID installations used for other purposes (such as development, quality, or testing), must not share any infrastructure. Multi SID installations have to be configured for the total amount of RAM and disk space that they require, and not only the RAM and disk space required by one of the SIDs. Additional customer requests may change the disk space requirements.

The file system `/hana/shared` will be visible on all hosts. The file systems `/hana/data/<SID>` and `/hana/log/<SID>` may use shared file systems like `nfs`, or block storage using the SAP HANA Storage Connector API with non-shared file systems.

Backup directories have to be configured properly. By default, backup will go into the `/hana/shared` file system. This has to be a shared file system in a distributed landscape.

Note

The configuration path for data and log backup must be defined system-wide and not host-specifically.

We strongly recommend that you execute an initial system back up for later recovery of the initial system state. You can do this by mounting an external backup device/share into the file system of the SAP HANA server.

Related Information

[Installation Parameters](#) [page 13]

[Preparing the Installer Configuration File](#) [page 16]

2.1.1.1 Installation Parameters

The installer requires the following parameters:

- Parameters to be inserted in the configuration file
- Parameters to be entered at the command line

Table 2: Parameters to be inserted in the configuration file

Parameter ID	Description
sid	<p>The SAP system ID (SAPSID) is the identifier for the SAP HANA system.</p> <ul style="list-style-type: none">• The ID must be unique throughout your organization and consistent throughout your SAP system installation landscape.• If you want to install an additional application server instance, make sure that no gateway instance with the same SAPSID exists in your SAP system landscape.• The ID must consist of exactly three alphanumeric characters. Only uppercase letters are allowed. The first character must be a letter (not a digit).• The following IDs are reserved and cannot be used: ADD ALL AMD AND ANY ARE ASC AUX AVG BIT CDC COM CON DBA END EPS FOR GET GID IBM INT KEY LOG LPT MAP MAX MIN MON NIX NOT NUL OFF OLD OMS OUT PAD PRN RAW REF ROW SAP SET SGA SHG SID SQL SUM SYS TMP TOP UID USE USR VAR.
instanceNumber	<p>The instance number of the SAP HANA system</p> <p>An instance is an administrative unit that comprises the server software components. It is started and stopped as a unit.</p> <p>The instance number is a technical identifier for internal processes, and consists of a two-digit number between 00 and 97.</p>
sapmntPath	<p>The path to the SAP mount directory</p> <p>The SAP mount directory can be used as a shared directory between multiple hosts.</p> <p>By default, the installer sets sapmntPath to <code>/hana/shared</code>. Ensure that the required file system is available on the installation host. For more information, see Recommended File System Layout [page 10].</p> <p>If you want to install your SAP HANA system as a system distributed over several hosts, you have to set the sapmntPath to the path of the mount points on all hosts on which you want to install SAP HANA instances. For more information, see Performing a Distributed System Installation (Optional) [page 18].</p> <p>The installer will automatically create corresponding symbols from the local <code>/hana/shared/</code> folder. The folder is also created during installation.</p>

Parameter ID	Description
dataPath	<p>The path to the data directory of the SAP HANA system</p> <p>We recommend that you name this directory <code>/hana/data/<SID></code>.</p> <p>The path to the <code>data</code> directory depends on the configuration of the SAP HANA host. It is a mandatory parameter to be filled in the installer configuration file. For more information, see Installation Parameters [page 13] and Preparing the Installer Configuration File [page 16].</p> <div> <p>i Note</p> <p>This directory must exist before you start the installation (see also Recommended File System Layout [page 10]).</p> </div>
logPath	<p>The path to the log directory of the SAP HANA system</p> <p>We recommend that you name this directory <code>/hana/log/<SID></code>.</p> <p>The path to the <code>log</code> directory depends on the configuration of the SAP HANA host. It is mandatory that this parameter is filled in the installer configuration file. For more information, see Installation Parameters [page 13] and Preparing the Installer Configuration File [page 16].</p> <div> <p>i Note</p> <p>This directory must exist before you start the installation (see also Recommended File System Layout [page 10]).</p> </div>
hdbHost	<p>The fully qualified host name of the SAP HANA system</p> <p>Make sure that a fully qualified host name is assigned to the local machine, that is, the SAP HANA host.</p> <p>For more information about the restrictions that apply for host names in SAP systems, see SAP Note 611361 - Hostnames of SAP servers.</p>
externalHost	<p>Inserts the fully qualified host name that will be used for external access to the SAP HANA system. The fully qualified host name must be assigned to the local machine. For more information about the restrictions that apply for host names in SAP systems, see SAP Note 611361, as above.</p>
timezone	<p>Inserts a valid time zone for the <code><sid>adm</code> user. The default zone is set to UTC.</p>
storageConfigPath	<p>You can use this optional parameter to change the typical behavior of SAP HANA regarding shared resources (such as <code>hana/shared/log</code>, <code>hana/shared/data</code>). The parameter specifies a location where a <code>global.ini</code> is defined. In this configuration file it is possible to setup a Storage Connector, allowing SAP HANA to use hardware vendor-specific scripts for automated resource allocation and input/output fencing during failovers. The scripts</p>

Parameter ID	Description
	strongly depend on the hardware parameters used, and therefore only the hardware partners can provide correct scripts.
Distributed SAP HANA system parameters:	In the case of a distributed SAP HANA system:
1. additionalHostsRootUser	1. additionalHostsRootUser - specifies a root user to be used for the additional hosts. The user should exist on all of the hosts and should have the same password on every host.
2. host	2. host - additional host (where HDB server is located)
2.1. hostname	2.1. hostname - mandatory attribute. Inserts the fully qualified host name of the additional HDB server.
2.2. hostType	2.2. hostType - optional attribute. Can be either 'worker' or 'standby'. If not specified, the default value is worker.
2.3. haGroup	2.3. haGroup - optional attribute. Groups for high availability scenario.
2.4. storagePartition	2.4. storagePartition - optional attribute. Defines storage partition.

Table 3: Parameters to be entered at the command line

Parameter	Description
master password	<p>Common password for all users that are created during the installation (see also Users Created During the Installation [page 15])</p> <p>The master password must meet the following requirements:</p> <ul style="list-style-type: none"> • It must consist of at least eight characters • It must contain at least one lowercase character, one uppercase character, and one number. <p>The master password is verified by the installer. You are prompted to enter it at the command line while you are running the installer.</p>

Related Information

[Performing a Distributed System Installation \(Optional\)](#) [page 18]

[Recommended File System Layout](#) [page 10]

[Users Created During the Installation](#) [page 15]

2.1.1.2 Users Created During the Installation

The following users are automatically created during the installation. The <sid>adm and SYSTEM users are assigned the master password.

User	Description
<sid>adm	<p>The system administrator, <sid>adm, is the operating system user required for administrative tasks such as starting and stopping the system.</p> <p>The user ID and password of the <sid>adm user are defined during the system installation. The user ID and group ID of this operating system user must be unique and identical on each host of a distributed system.</p>
sapadm (it has a default password, which can be later changed by the root user)	<p>The SAP Host Agent administrator</p> <p>If there is no SAP Host Agent available on the installation host, it is created during the installation along with the user sapadm.</p> <p>If the host agent is already available on the installation host, the installer neither modifies the host agent, nor its sapadm user, nor the password of the sapadm user.</p>
SYSTEM	<p>The database superuser</p> <p>Initially, the SYSTEM user has all system permissions. Additional permissions can be granted to this user or revoked. However, only those permissions can be revoked that were granted in addition to the initial permissions.</p>

2.1.1.3 Preparing the Installer Configuration File

Prerequisites

Prerequisites

Make sure you have done the following before you start preparing the installer configuration file:

- You have set up the required file systems and directories. For more information, see [Recommended File System Layout](#) [page 10]
- You have specified installation parameters. For more information, see [Installation Parameters](#) [page 13].

Procedure

1. Copy the file `setuphana.slmodel.template`, which is available in the `HANA_IM_LINUX__X86_64` folder on the installation medium, to a local directory:

Example:

```
cp /HANA_DVD/DATA_UNITS/HANA_IM_LINUX__X86_64/setuphana.slmodel.template /tmp/
setuphana.slmodel
```

The optional parameters are in comments by default. For example, `<!-- <distributedSystem> -->`. To use them, remove the comments.

Regarding the values, the *haGroup* value can be any string that will be the name of a group of primary and secondary hosts, covering the high availability scenario. The *storagePartition* parameter can take any positive integer values, depending on the number of partitions you would like to have.

There is also a second file with an even simpler format that you can use. The name of this file is *setuphana.slmodel.template.v2*.

If you want to add an additional host, you can use the example below:

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<systemParameters>

<dataPath>/hana/shared/data</dataPath>
<logPath>/hana/shared/log</logPath>
<sapmntPath>/hana/shared</sapmntPath>
<instanceNumber>69</instanceNumber>
<sid>HAN</sid>
<hdbHost>hostname1</hdbHost>
<timezone>UTC</timezone>

<distributedSystem>
<additionalHostsRootUser>lroot</additionalHostsRootUser>
<hosts>
      <host hostname="hostname2" hostType="worker" haGroup="11"
storagePartition="3"/>
</hosts>
</distributedSystem>

</systemParameters>
```

2. Edit the *setuphana.slmodel* file and insert the required mandatory installation parameters. You can also use the optional parameters by removing the comment tags before and after the parameter in the file. For example, `<!-- distributedSystem -->`
 - The mandatory parameters are listed below. See also: [Recommended File System Layout](#) [page 10].
 - **dataPath**
 - **logPath**
 - **sapmntPath**
 - **instanceNumber**
 - **sid**
 - **hdbHost**
 - **timezone**
 - The optional parameters are:
 - **externalHost**
 - **distributedSystem**
 - **storageConfigPath**

Results

You have prepared the *setuphana.slmodel.v2* file. You can also see the descriptions in the file, marked by comment tags, for more details.

Related Information

[Performing a Distributed System Installation \(Optional\)](#) [page 18]

[Recommended File System Layout](#) [page 10]

[Installation Parameters](#) [page 13]

2.1.1.4 Performing a Distributed System Installation (Optional)

Prerequisites

You want to install your SAP HANA system as a distributed installation, that is, a system distributed over several hosts. Make sure you read the following information for reference, before you proceed.

"System" is the name for one or more nodes of a SAP HANA database on one or more hosts that use the same server software installation:

- If there is only one node, it is called a **single-host** system.
- If there are multiple connected nodes, it is called a **distributed** system.

Every system has a unique SAP system ID, <SID>.

The server software is based on a flexible architecture that enables a distributed installation. This means that load can be balanced between different hosts. If you want to create a distributed system, make sure that you set it up in a safe environment.

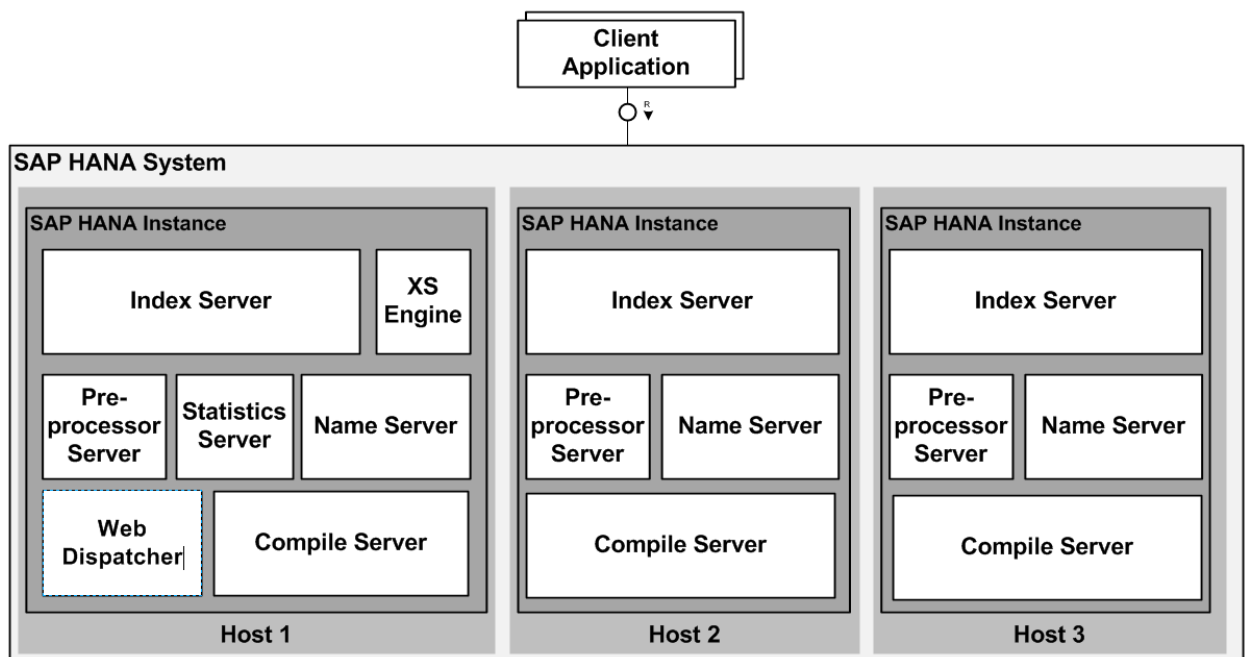
The server software has to be installed in a file system where all hosts that are part of the system can be mounted.

The following table shows a typical configuration for a distributed system:

Host	Name Server	Name Server	Index Server	Index Server
	Configured Role	Actual Role	Configured Role	Actual Role
Initial host	Master 1	Master	Worker	Master
1st host added	Master 2	Slave	Worker	Slave
2nd host added	Master 3	Slave	Worker	Slave
3rd host added	Slave	Slave	Worker	Slave
4th host added	Slave	Slave	Worker	Slave
5th host added	Slave	Slave	Worker	Slave
6th host added	Slave	Slave	Worker	Slave
7th host added	Slave	Slave	Standby	Standby

When setting up a distributed system, you need to make sure that the servers are synchronized to the same time. To achieve this, you can set up a Network Time Protocol (NTP) service.

The following figure shows the architecture of a distributed system:



Instance - an instance is an administrative unit that comprises the server software components. It is started and stopped as a unit.

Instance number - an instance is defined by an instance number. This is a two-digit identifier that is unique on a host. Therefore, an instance number can only be assigned once on a host.

Since all instances of a system have the same instance number, only instances of different systems can be configured on the same host.

Host - the server or blade on which you create an individual node of a system.

For more information about the restrictions that apply to host names in SAP systems, see SAP Note 611361 [Hostnames of SAP servers](#).

System Administrator -the system administrator, <sid>adm, is the operating system user that is needed for administrative tasks such as starting and stopping the system.

The user ID and password of the <sid>adm user are defined when installing the software and creating the system. The user ID and group ID of this operating system user must be unique and identical on each host of a distributed system.

System User - the `SYSTEM` user is the overall system administrator for the SAP HANA database. You specify the initial password during installation. The `SYSTEM` user is the initial bootstrap user for the SAP HANA database that is created during the installation of the SAP HANA database.

Do **not** use the `SYSTEM` user for day-to-day activities. Use this user to create dedicated administrator users and to assign privileges to the administrator users.

The `SYSTEM` user is also described in the [SAP HANA Security Guide](#).

SAP officially supports multiple databases ("multi-SID") on one SAP HANA appliance in non-production environments for both single-host and distributed systems.

Caution

SAP does not support running multiple SAP HANA databases on a production SAP HANA system.

For more information, see SAP Note [1681092](#) "Multiple SAP HANA databases on one appliance".

Context

Procedure

Procedure

1. Ensure that the `sapsys` user group exists and has the same ID on all hosts.
2. Prepare the installer configuration file in accordance with your landscape requirements. For more information, see [Preparing the Installer Configuration File](#) [page 16] .

Note

You (as administrator) need to configure the file systems `/hana/shared/`, `/hana/shared/data`, and `/hana/shared/log`, so that they are present and mounted on all hosts, including the primary host. This is a prerequisite for running the SAP HANA unified installer. If they are not present and mounted, you will not be able to continue with the installation.

Note

Also keep in mind that the secure connection confirmation (done using an RSA key fingerprint) is automatically accepted for all hosts in the distributed landscape.

3. On the primary host, run the SAP HANA unified installer as described in [Running the Installer](#) [page 21].
4. Finalize your customization by running the SAP HANA lifecycle manager to adapt the existing configuration, if necessary. For more information, see . [SAP HANA Update and Configuration Guide](#)
5. Execute an initial system backup for later recovery of the initial system state. For more information, see [Performing Initial Backup of SAP HANA System](#) [page 27].

Related Information

[Installation Parameters](#) [page 13]

[Preparing the Installer Configuration File](#) [page 16]

[Running the Installer](#) [page 21]

2.2 Running the Installer

Prerequisites

Prerequisites:

- Make sure you have installed the following rpm packages:
 - GTK2
 - Java-1_6_0-ibm (java_home path variable must be set)
 - Libicu
 - Mozilla-xulrunner1.9.2
 - Network Time Protocol (NTP time server must be configured)
 - Sudo
 - Syslog-ng
 - Tcsh
 - Libssh2
- You have specified the required installation parameters. For more information, see [Installation Parameters](#) [page 13].
- You have prepared the installer configuration file. For more information, see [Preparing the Installer Configuration File](#) [page 16].
- You have specified a <WORKING_DIRECTORY> for the installer. For more information, see [Recommended File System Layout](#) [page 10]

Example:

```
/tmp/hanainst
```

Make sure that the <WORKING_DIRECTORY> meets the following requirements:

- It has at least 200 MB of free disk space.
- It is empty before you start or restart the installer.

Procedure

1. Log on to the installation host as a user with `root` authorization.
2. Start the installer from the installation medium. To do this, proceed as follows:
 1. Change to the directory `HANA_IM_LINUX__X86_64` on the installation medium where the `setup.sh` script is located.
 2. Start the installer from the command line by entering the following command:

```
./setup.sh <WORKING_DIRECTORY> <MODEL_FILE>
```

where <WORKING_DIRECTORY> is the path to the directory where the installer is to be unpacked and <MODEL_FILE> is the path to the installer configuration file.

Example:

```
./setup.sh /tmp/hanainst /tmp/setuphana.slmodel
```

- During the installation process, you are prompted to enter and repeat the master password on the command line.

Results

Result:

The installation progress is displayed on the command line.

The SAP HANA system is now up and running.

Related Information

[Recommended File System Layout](#) [page 10]

[Installation Parameters](#) [page 13]

[Preparing the Installer Configuration File](#) [page 16]

[Installed SAP HANA Components and Directories](#) [page 22]

[Troubleshooting](#) [page 24]

2.2.1 Installed SAP HANA Components and Directories

Component	Directory	Description
SAP Host Agent	/usr/sap/hostctrl	For more information about the host agent and its elements, see SAP Note 1031096 - Installing Package SAPHOSTAGENT
SAP HANA database	/hana/shared/<SID>	Contains the following subdirectories: <ul style="list-style-type: none">• exe Contains executable kernel programs• global Contains globally shared data• profile Contains the profiles of all instances• HDB <instancenr> Contains HDB executables• lm_structure Contains the landscapeDescription.xml file
SAP HANA database	/usr/sap/<SID>	Contains the following subdirectories: <ul style="list-style-type: none">• home The home directory of the <sid>adm user• SYS Contains system executables

Component	Directory	Description
SAP HANA client	/hana/shared/<SID>/hdbclient	Only the client for the SAP HANA system, not clients on related SAP ERP systems
SAP HANA studio repository	/hana/shared/<SID>/hdbstudio_update	Only the SAP HANA studio repository is installed (not the complete SAP HANA studio). You can use this repository to update your local SAP HANA studio installation.
SAP HANA lifecycle manager (HLM)	/hana/shared/<SID>/HLM	<p>The SAP HANA lifecycle manager downloads new Support Package Stacks (SPS) for SAP HANA from the SAP Service Marketplace (SMP) and updates the components on your SAP HANA system.</p> <p>The tool now supports certain configuration functions. For example, renaming SAP HANA systems, or configuring the connection to System Landscape Directory. The tool also allows you to manage some SAP HANA application content.</p> <p>The automated update is performed again with the SAP HANA lifecycle manager, which is installed and configured with a default security configuration with the SAP HANA unified installer.</p>
SAP HANA studio	/hana/shared/<SID>/hdbstudio	SAP HANA studio installation.

2.2.2 Uninstall

Prerequisites

If required, you can also uninstall the SAP HANA components that have been set up by the installer. You can do this using the `uninstall.sh` script.

Note

The `uninstall.sh` script does **not** remove the SAP Host Agent and the SMD agent. If you need to uninstall the SMD agent, do this with the SAP HANA lifecycle manager, before running the `uninstall.sh`.

Prerequisites

Make sure you have done the following before you start the installer:

- You have specified the required installation parameters. For more information, see [Installation Parameters](#) [page 13].
- You have specified a <WORKING_DIRECTORY> for the uninstall. For more information, see [Recommended File System Layout](#) [page 10]

Example:

```
/tmp/hanainst
```

Make sure that the `<WORKING_DIRECTORY>` meets the following requirements:

- It has at least 200 MB of free disk space.
- It is empty before you start or restart the uninstall.

Procedure

1. Log on to the host where you want to perform the uninstall as a user with `root` authorization.
2. Start the `uninstall.sh` script from the installation medium. To do this, proceed as follows:
 1. Change to the directory `HANA_IM_LINUX__X86_64` on the installation medium where the `uninstall.sh` script is located.
 2. Start the uninstaller from the command line by entering the following command:
`./uninstall.sh <WORKING_DIRECTORY> <SID> <HANA_ROOT_USER>`
where `<WORKING_DIRECTORY>` is the path to the directory in which the installer is to be unpacked, `<SID>` is the system ID of the installed SAP HANA system, and `<HANA_ROOT_USER>` is an optional parameter that provides the SAP HANA root user for the additional hosts when uninstalling a distributed system.

Example:

```
./uninstall.sh /tmp/hanainst <SID>
```

Results

Result:

The uninstall progress is displayed on the command line.

Related Information

[Installation Parameters](#) [page 13]

[Preparing the Installer Configuration File](#) [page 16]

[Troubleshooting](#) [page 24]

2.2.3 Troubleshooting

Prerequisites

Prerequisites: The installation or uninstall did not finished correctly.

Context

Check the installation log file as follows:

Procedure

1. Change to the `<WORKING_DIRECTORY>/log` directory, where `<WORKING_DIRECTORY>` is the path to the directory where the installer has been unpacked.

Example:

```
/tmp/hanainst/log/setup.glf
```

2. Open the installation log file `setup.glf`. You can also use the log file `setup.log` for additional information.
3. Try to analyze the error.

Next Steps

Caution

If you need to restart the installation from scratch, make sure that the working directory is empty before you restart the installer.

3 Post-Installation

You can perform the post-installation steps of your choice, described in the following sections, after the SAP HANA unified installer has finished.

3.1 Starting and Stopping the SAP HANA System

Context

After the installation has finished successfully, the SAP HANA system is up and running. So you do not need to start the SAP HANA system.

However, if required, you can start and stop the SAP HANA system from the command line in one of the following ways:

Procedure

- By using the `sapcontrol` program:
 - a) Log on to the SAP HANA system host as a user with `root` authorization.
 - b) Execute one of the following commands:
 - Start the SAP HANA system by entering the following command: `/usr/sap/hostctrl/exe/sapcontrol -nr <Instance_Number> -function Start`
 - Stop the SAP HANA system by entering the following command: `/usr/sap/hostctrl/exe/sapcontrol -nr <Instance_Number> -function Stop`
- By using the `HDB` program:
 - a) Log on to the SAP HANA system host as user `<sapsid>adm`.
 - b) Execute one of the following commands:
 - Start the SAP HANA system by entering the following command: `/usr/sap/<SAPSID>/<Instance_Name>/HDB start`
Example:
`/usr/sap/KB1/HDB26/HDB start`
 - Stop the SAP HANA system by entering the following command: `/usr/sap/<SAPSID>/<Instance_Name>/HDB stop`
Example:
`/usr/sap/KB1/HDB26/HDB stop`

i Note

The SAP HANA database does not start automatically by default when the SAP HANA system is started. But you can enable an automated start of this kind. For more information, see [Enabling Automatic Start of the SAP HANA Database](#) [page 30].

3.2 Performing Initial Backup of SAP HANA System

Context

We strongly recommend that you perform an initial backup of your system once you have finished the installation.

For more information, see the section *Backing Up Systems* in the [SAP HANA Database Administration Guide](#).

3.3 Enabling Persistence Encryption

To ensure that the SAP HANA database can always be restored to its most recent committed state, all data is periodically copied to disk. Privacy of data on disk can be ensured by enabling persistence encryption.

Context

Data is stored in persistent disk volumes that are organized in pages. If persistence encryption is enabled, all pages that reside in the data area on the disk are encrypted using the AES-256-CBC algorithm. Pages are transparently decrypted as part of the load process. When pages reside in memory they are therefore not encrypted and there is no performance overhead for in-memory page accesses. When changes to data are persisted to disk, the relevant pages are automatically encrypted as part of the write operation.

Note

You must be logged on to the SAP HANA host as the operating system user, <sid>adm.

Procedure

1. Generate a root encryption key using the `hdbnsutil` program.

Caution

Do not generate the root encryption key after you have enabled persistence encryption, since this would render the SAP HANA database unusable.

The command is as follows:

```
#hdbnsutil -generateRootKeys --type=ALL
```

2. Enable persistence encryption by executing the following SQL command:

```
ALTER SYSTEM PERSISTENCE ENCRYPTION ON
```

Results

Encryption is now active. We recommend that you periodically change the encryption key used to encrypt pages in the data area in line with your organization's security policy.

Related Information

http://help.sap.com/hana/SAP_HANA_Security_Guide_en.pdf

http://help.sap.com/hana/SAP_HANA_Administration_Guide_en.pdf

3.4 Displaying the Process List

Prerequisites

Prerequisites

You are logged on to the SAP HANA host as the `root` user.

Context

Procedure

You can display SAP HANA system processes by executing the following commands from the command line:

```
/usr/sap/hostctrl/exe/sapcontrol -nr <instancenr> -function GetProcessList
```

Results

You can also display the SAP HANA system processes using the SAP Microsoft Management Console (SAP MMC) from a Microsoft Windows PC.

Example

Displaying the Process List

```
myhost.sap.com:/mnt/HANA_DVD/DATA_UNITS/HANA_IM_LINUX_X86_64 # /usr/sap/  
hostctrl/exe/sapcontrol -nr 39 -function GetProcessList
```

```
18.07.2011 13:13:34
```

```
GetProcessList
```

```
OK
```

```
name, description, dispstatus, textstatus, starttime, elapsedtime, pid
```

```
hdbdaemon, HDB Daemon, GREEN, Running, 2011 07 18 11:02:30, 2:11:04, 1598
```

```
hdbnameserver, HDB Nameserver, GREEN, Running, 2011 07 18 11:02:32, 2:11:02, 1627
```

```
hdbpreprocessor, HDB Preprocessor, GREEN, Running, 2011 07 18 11:02:39, 2:10:55,  
1671
```

```
hdbindexserver, HDB Indexserver, GREEN, Running, 2011 07 18 11:02:42, 2:10:52,  
1688
```

```
hdbstatisticsserver, HDB Statisticsserver, GREEN, Running, 2011 07 18 11:02:44,  
2:10:50, 1696
```

```
wdfldbmd0417:/mnt/HANA_DVD/DATA_UNITS/HANA_IM_LINUX_X86_64 #
```

3.5 Ensuring User Security

Context

After the installation has finished, the master password is assigned to all users that were created by the installer. Make sure that you replace the master password with passwords that comply with your security guidelines. For more information, see the [SAP HANA Security Guide](#).

Related Information

[Users Created During the Installation](#) [page 15]

3.6 Enabling Automatic Start of the SAP HANA Database

Prerequisites

By default the SAP HANA database is configured so that it is not started automatically when the SAP HANA host is rebooted.

Context

If required, you can change this configuration by modifying the profile of the SAP HANA database as follows:

Procedure

1. Log on to the SAP HANA host as a user with `root` authorization.
2. Change to the system profile directory `/usr/sap/<SAPSID>/SYS/profile`.
3. Edit the profile `<SID>_HDB<Instance_No>_<host_name>`.
4. Change the parameter setting `Autostart = 0` to `Autostart = 1`.
5. Save the profile `<SID>_HDB<Instance_No>_<host_name>`.

Results

The SAP HANA database is started automatically when the SAP HANA host is rebooted.

4 Appendix

4.1 Applying Single Support Package 02 for SAP HANA Unified Installer SPS 05

This section describes how to apply Single Support Package 02 (Single SP 02) for SAP HANA SPS 05 unified installer.

Procedure

1. Call SAP Service Marketplace using the following URL: <https://service.sap.com/swdc>.
2. Choose *Software Downloads*, then *Support Packages and Patches*.
3. Choose *Browse our Download Catalog*.
4. Choose *SAP In-Memory (SAP HANA)*, then your SAP HANA edition. For example, *SAP HANA Enterprise Edition* and its version *SAP HANA Enterprise Edition 1.0*.
5. Choose *SAP HANA Installation & Update*, then *HANA Unified Installer 1.0*.
6. Choose *Linux on x86 64 64bit*, then double-click on the *HANAINSTALL05_3-20009106.TAR*.
7. Save the archive to your custom location and extract it there.
8. Copy the *HANA_IM_LINUX__X86_64* folder, contained in the archive, and replace the original *HANA_IM_LINUX__X86_64* folder in the SAP HANA SPS 05 DVD.
9. Continue with the installation of SAP HANA as usual.

If you extract the archive in another location and you want to start the installation from there, you can use the `-d dvd_location` option to specify the location of the DVD content.

For example, `./setup.sh -d custom_folder/ /tmp/hana_setup/ /tmp/setuphana.slmodel`



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