Installation Guide | PUBLIC
Software Provisioning Manager 2.0 SP09
Document Version: 1.9.0 – 2021-06-21

Installation of SAP ABAP Systems on UNIX : SAP HANA 2.0 Database - Using Software Provisioning Manager 2.0

This Guide is Valid for SAP Systems based on the Following SAP Product Versions:
- **SAP S/4HANA 2020**
- **SAP S/4HANA 1909**
- **SAP S/4HANA 1809**
- **SAP BW/4HANA 2.0**
- **SAP BW/4HANA 1.0 Support Release 1**

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Document History

> **i Note**
>
> Before you start reading, make sure you have the latest version of this installation guide, which is available at: https://help.sap.com/viewer/swpm20guides

The following table provides an overview on the most important document changes:

Version	Date	Description
1.9.0	2021-06-21	Updated version for Software Provisioning Manager 2.0 SP09 (SL Toolset 1.0 SP32)
1.8.0	2021-02-15	Updated version for Software Provisioning Manager 2.0 SP08 (SL Toolset 1.0 SP31)
1.7.0	2020-10-05	Updated version for Software Provisioning Manager 2.0 SP07 (SL Toolset 1.0 SP30)
1.6.0	2020-06-08	Updated version for Software Provisioning Manager 2.0 SP06 (SL Toolset 1.0 SP29)
1.5.0	2020-01-20	Updated version for Software Provisioning Manager 2.0 SP05 (SL Toolset 1.0 SP28)
1.4.0	2019-09-16	Updated version for Software Provisioning Manager 2.0 SP04 (SL Toolset 1.0 SP27)
1.3.0	2019-05-27	Updated version for Software Provisioning Manager 2.0 SP03 (SL Toolset 1.0 SP26)
1.2.0	2019-01-21	Updated version for Software Provisioning Manager 2.0 SP02 (SL Toolset 1.0 SP25) • Updated documentation for the installation of standard systems **on Linux** on the **same host** as the SAP HANA database.
1.1.0	2018-09-17	Updated version for Software Provisioning Manager 2.0 SP01 (SL Toolset 1.0 SP24)
1.0.0	2018-04-23	Initial version for Software Provisioning Manager 2.0 SP00 (SL Toolset 1.0 SP23)

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1 About this Document - Installation of SAP Application Server ABAP Systems on UNIX : SAP HANA 2.0 Database - Using Software Provisioning Manager 2.0

This installation guide describes how to install SAP Application Server ABAP systems using Software Provisioning Manager 2.0 SP09 (the "installer" for short) on **UNIX** .

It covers the following SAP ABAP system product releases (see also SAP Products Supported by Software Provisioning Manager 2.0 [page 9]):

- SAP S/4HANA Server 2020 (based on SAP S/4HANA Foundation 2020)
- SAP S/4HANA Server 1909 (based on SAP S/4HANA Foundation 1909)
- SAP S/4HANA Server 1809 (based on foundation on ABAP Platform 1809, version for SAP HANA)
- SAP BW/4HANA 2.0 (based on SAP BW/4HANA Server 2.0)
- SAP BW/4HANA 1.0 Support Release 1 (based on SAP BW/4HANA Server 1.0 Support Release 1)

For information about supported operating system and database platforms, see the Product Availability Matrix at https://support.sap.com/pam .

Software Provisioning Manager 2.0 SP09 [page 8] is part of Software Logistics Toolset 1.0 SP32.

The SAP HANA database is part of the SAP HANA appliance. It is normally pre-installed by SAP partners before you start the installation. The installation accesses the SAP HANA database remotely to perform the necessary database-specific installation steps.

> **i Note**
>
> However, if you are installing a standard system **on Linux**, you can install your SAP systems on the **same host** as the SAP HANA database. In this case, you must make sure that you include the RAM requirements for the SAP HANA database instance. For more information, see SAP Note 1953429 .

> **i Note**
>
> As an alternative to using Software Provisioning Manager, you can install your system with a completely automated end-to-end framework available using SAP Landscape Management. For more information, see SAP Note 1709155 and https://help.sap.com/lama .

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1.1 About Software Provisioning Manager 2.0

Software Provisioning Manager 2.0 is the new release of Software Provisioning Manager 1.0. Software Provisioning Manager as such is the successor of the product- and release-specific delivery of provisioning tools, such as SAPinst and R3setup.

Make sure that you read the most recent version of SAP Note 2568783 (*Release Note for Software Provisioning Manager 2.0*).

Before you run Software Provisioning Manager 2.0, we recommend that you always download the latest version of it. Software Provisioning Manager 2.0 is - as Software Provisioning Manager 1.0 - part of the Software Logistics Toolset 1.0 ("SL Toolset" for short) which is quarterly shipped. This way, you automatically get the latest fixes and supported processes. For more information about Software Provisioning Manager 2.0 as well as products and releases supported by it, see SAP Note 2568783 and http://scn.sap.com/docs/DOC-30236 .

Software Provisioning Manager 2.0 Versus Software Provisioning Manager 1.0

The Software Provisioning Manager **2.0** SP09 exists in parallel to Software Provisioning Manager **1.0** SP32. Both Software Provisioning Manager versions are part of Software Logistics Toolset 1.0 SP 32. However, they cover system provisioning for different product versions. The decision matrix is as follows:

- Software Provisioning Manager **2.0** is used for:
  - **Installation, system copy, and system rename of ABAP single stack** systems on **SAP HANA 2.0** database, based on the following products:
    - SAP S/4HANA Server 2020
    - SAP S/4HANA Server 1909
    - SAP S/4HANA Server 1809
    - SAP BW/4HANA 2.0
    - SAP BW/4HANA 1.0 Support Release 1
  - SAP Web Dispatcher installation and rename.

    > **i Note**
    >
    > For SAP Web Dispatcher, you can either use Software Provisioning Manager **2.0** or Software Provisioning Manager **1.0**.

  - SAP Host Agent standalone installation.

    > **i Note**
    >
    > For SAP Host Agent standalone installation, you can either use Software Provisioning Manager **2.0** or Software Provisioning Manager **1.0**.

- Software Provisioning Manager **1.0** is used for:
  - Installation, system copy, system rename of SAP Solution Manager 7.X and Diagnostics Agent.
  - Installation of standalone engines and clients.

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> **i Note**
>
> For SAP Web Dispatcher or SAP Host Agent standalone installation, you can either use Software Provisioning Manager **1.0** or Software Provisioning Manager **2.0**.

- Installation, system copy, system rename, and dual-stack split of SAP systems whose **database is not SAP HANA**.
- Installation, system copy, and system rename of **Dual-stack** and **Java single stack** systems.
- Installation, system copy, and system rename of **ABAP single stack** systems whose database is **SAP HANA** database, but whose release is one of the following:
  - **SAP BW/4HANA 1.0 or lower**
  - **SAP S/4HANA 1709 or lower**
  - **SAP NetWeaver AS for ABAP 7.52 or lower**

For more information, see https://blogs.sap.com/2018/05/15/software-provisioning-manager-1.0-vs.-software-provisioning-manager-2.0/.

Naming Conventions

"SAPinst" has been renamed to "Software Provisioning Manager" ("installer" for short), but the terms "SAPinst" and "sapinst" are still used in:

- The name of the technical framework of Software Provisioning Manager. For more information about the SAPinst Framework, see SAP Note 2393060.
- Texts and screen elements in the Software Provisioning Manager GUI
- Names of executables, for example `sapinst`
- Names of command line parameters, for example `SAPINST_HTTPS_PORT`
- Names of operating system user groups, such as the additional group `sapinst`

In this documentation, we generally refer to Software Provisioning Manager as the "installer". We only use the term "Software Provisioning Manager" if this is required for technical reasons, and "Software Provisioning Manager **2.0**" if there is a significant difference compared to "Software Provisioning Manager **1.0**".

1.1.1 SAP Products Supported by Software Provisioning Manager 2.0

Here you can find the list of SAP products supported by Software Provisioning Manager 2.0.

SAP Product	Based on
• SAP S/4HANA Server 2020	SAP S/4HANA Foundation 2020
• SAP S/4HANA Server 1909	SAP S/4HANA Foundation 1909

SAP Product	Based on
• SAP S/4HANA Server 1809 • SAP ABAP Foundation 1809 on SAP HANA	foundation on ABAP Platform 1809, version for SAP HANA
SAP BW/4HANA 2.0	foundation on ABAP Platform 1809, version for SAP HANA FPS1
SAP BW/4HANA 1.0 Support Release 1	SAP NetWeaver 7.5

More Information

For more information about **recommended application server platforms**, see SAP Note 2620910 .

1.2 Naming Conventions

- "installer" refers to "Software Provisioning Manager 2.0" and to "Software Provisioning Manager" in general.
- "SAP system" or "ABAP system" refers to SAP systems based on:
    - SAP S/4HANA Server 2020 (based on SAP S/4HANA Foundation 2020)

    > **i Note**
    >
    > For the sake of simplicity, in the following we abbreviate this product as ABAP Platform 2020.

    - SAP S/4HANA Server 1909 (based on SAP S/4HANA Foundation 1909)

    > **i Note**
    >
    > For the sake of simplicity, in the following we abbreviate this product as ABAP Platform 1909.

    - SAP S/4HANA Server 1809 (based on foundation on ABAP Platform 1809, version for SAP HANA)

    > **i Note**
    >
    > For the sake of simplicity, in the following we abbreviate this product as ABAP Platform 1809.

    - SAP BW/4HANA 2.0 (based on SAP BW/4HANA Server 2.0)
    - SAP BW/4HANA 1.0 **Support Release 1**.

    > **i Note**
    >
    > For the sake of simplicity, in the following we abbreviate this product as SAP BW/4HANA.

- Since - from a Software Provisioning Manager 2.0 perspective - the "Standalone Enqueue Server 2" is installed with the ASCS instance the same way as the classic "Standalone Enqueue Server", both are addressed as "Standalone Enqueue Server" in this documentation.

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- Since - from a Software Provisioning Manager 2.0 perspective - the "Enqueue Replicator 2" is installed with the ERS instance the same way as the classic "Enqueue Replication Server", both are abbreviated as "ERS instance" in this documentation.

1.3 Constraints

This section lists the current restrictions for installation using Software Provisioning Manager 2.0.

Software Provisioning Manager 2.0 only supports the following products:

- SAP HANA 2.0 database; it does **not** support SAP HANA 1.0 database.
- SAP BW/4HANA 1.0 **SR1** ABAP; it does **not** support products based on SAP BW/4HANA 1.0 or lower.

1.4 Before You Start

Make sure that you have read the release-specific "Installation Guide" - also called "Master Guide" for SAP BW/4HANA - for your SAP S/4HANA application and the central release note 2568783 of Software Provisioning Manager 2.0, before you continue.

This guide is the central document leading you through the overall implementation process for your SAP system installation. It contains important information about the overall implementation sequence, that is activities you have to perform before and after the installation process described in this installation guide.

You can find a printed version of this guide in your installation package or you can download the latest version from https://help.sap.com.

The following table lists the "Installation Guide" - or "Master Guide" - of the SAP system application for which you can use this documentation, along with the available quick link or path to the appropriate download location:

Document	Internet Address
Installation Guide – SAP S/4HANA `<1809 or higher>`	https://help.sap.com/s4hana ▶▶ ❯ `<Version 1809 or higher>` ❯ *Product Documentation* ❯ *Installation Guide* ❯
Master Guide - SAP BW/4HANA `<1.0 SR1 or higher>`	https://help.sap.com/viewer/p/SAP_BW4HANA ▶▶ ❯ *Installation and Upgrade* ❯

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1.5   New Features

The sections below provide an overview of the new features in Software Provisioning Manager 2.0 (the" installer" for short).

Make sure that you also read the *Release Notes* for your SAP product at https://help.sap.com ↗ ▶ `<Search your SAP Product>` ▶ `<Select your SAP Product Version>` ▶ *What's New* ▶ .

Feature	Description	Availability
Support of SAP HANA SSL Certificates	Software Provisioning Manager 2.0 supports SAP HANA SSL Certificates for configuring secure access to the SAP HANA database.	Software Provisioning Manager 2.0 SP06 (SL Toolset 1.0 SP29)
New Option *Prepare Additional Cluster Node*	Software Provisioning Manager 2.0 comes with a new option *Prepare Additional Cluster Node* which prepares an additional cluster node for a high-availability cluster. i Note This option does **not** perform any follow-up activities for the additional cluster node . To perform these activities, you must follow the documentation of your HA-partner. For more information, see Installation Checklist [page 106], section *High-Availability System*.	Software Provisioning Manager 2.0 SP04 (SL Toolset 1.0 SP27)
Support of Secure Connection to SAP HANA database.	Software Provisioning Manager 2.0 supports configuring the SAP system to be installed to access the SAP HANA database using encryption.	Software Provisioning Manager 2.0 SP03 (SL Toolset 1.0 SP26)
New Look and Feel of SL Common GUI	As of version 2.0 SP01 Patch Level (PL) 5, Software Provisioning Manager comes with a new look and feel of the SL Common GUI. For more information, see https://blogs.sap.com/2018/11/10/new-look-for-software-provisioning-manager/ ↗ .	Software Provisioning Manager 2.0 SP01, PL05 (SL Toolset 1.0 SP24)

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Feature	Description	Availability
Support of Standalone Enqueue Server 2 and Enqueue Replicator 2	For SAP systems based on ABAP Platform 1809 and higher, Software Provisioning Manager 2.0 installs the ASCS instance by default with the new Standalone Enqueue Server **2**, and the ERS instance with the new Enqueue Replicator **2**. For more information about the Standalone Enqueue Server **2** and the Enqueue Replicator **2**, see the SAP Online Documentation [page 14] at ▶ *Application Server ABAP Infrastructure* ❯ *Components of the Application Server for ABAP* ❯ *SAP Lock Concept* ❯ *Standalone Enqueue Server 2* ◀.	Software Provisioning Manager 2.0 SP01 (SL Toolset 1.0 SP24)
ABAP Platform 1809 or higher: Archive-Based Installation of all Installation Software	For SAP systems based on ABAP Platform 1809 or higher, the database server and client software is provided as installation archives. which you can download from https://launchpad.support.sap.com/#/software-center . Physical SAP HANA 2.0 database server and client media, as well as physical database installation export media and language media are no longer required for the installation.	Software Provisioning Manager 2.0 SP01 (SL Toolset 1.0 SP24)
Homogeneous System Copy	Software Provisioning Manager 2.0 only supports homogeneous system copy using a SAP HANA database backup.	Software Provisioning Manager 2.0 SP00 (SL Toolset 1.0 SP23)
New Installer Option *Download Software Packages for Maintenance Planner Transaction*	If you perform an installation using a stack configuration file, you can now download the required software packages according to a Maintenance Plan. For more information, see https://blogs.sap.com/2018/06/01/software-provisioning-manager-new-option-for-standalone-download-service/ .	Software Provisioning Manager 2.0 SP00 (SL Toolset 1.0 SP23)
Validity Check for `SUM*.SAR` Archive	If you perform an installation using a stack configuration file and choose to extract the `SUM*.SAR` archive, the validity of this archive is now checked by the installer.	Software Provisioning Manager 2.0 SP00 (SL Toolset 1.0 SP23)

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1.6 Accessing the SAP Online Documentation

This section contains the paths for the product-specific online documentation referenced from this documentation.

The references to the SAP Online Documentation in this guide always refer to the following on the SAP Help Portal:

- SAP systems based on SAP S/4HANA Foundation 2020 ("ABAP Platform 2020" for short):
  https://help.sap.com/s4hana 〉 *<2020 Latest>* 〉 *Discover* 〉 *Product Assistance* 〉 *SAP S/4HANA* 〉 *Enterprise Technology* 〉 *ABAP Platform* 〉

- SAP systems based on SAP S/4HANA Foundation 1909 ("ABAP Platform 1909" for short):
  https://help.sap.com/s4hana 〉 *<1909 Latest>* 〉 *Discover* 〉 *Product Assistance* 〉 *SAP S/4HANA* 〉 *Enterprise Technology* 〉 *ABAP Platform* 〉

- SAP systems based on foundation on ABAP Platform 1809, version for SAP HANA ("ABAP Platform 1809" for short):
  https://help.sap.com/s4hana 〉 *<1809 Latest>* 〉 *Discover* 〉 *Product Assistance* 〉 *SAP S/4HANA* 〉 *Enterprise Technology* 〉 *ABAP Platform* 〉

- SAP systems based on SAP BW/4HANA 2.0:
  https://help.sap.com/viewer/p/SAP_BW4HANA 〉 *2.0 <Current SP>* 〉 *Application Help* 〉 *SAP BW/4HANA* 〉 *Application Server for ABAP* 〉 *ABAP Platform* 〉

- SAP systems based on SAP BW/4HANA 1.0 SR1 (<SP08 or higher>):
  https://help.sap.com/viewer/p/SAP_BW4HANA 〉 *1.0 <SP08 or higher>* 〉 *Application Help* 〉 *SAP BW/4HANA* 〉 *Application Server for ABAP* 〉 *SAP NetWeaver Library: Function-Oriented View* 〉

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2 Installation Options Covered by this Guide

This section shows the installation options covered by this installation guide. You have to decide what exactly you want to install because the steps you have to perform vary according to the installation option you choose.

> **i** Note
>
> Regardless of whether you are installing a standard, distributed, or high-availability system, the SAP HANA database is normally installed on a dedicated database server. It is normally pre-installed by SAP partners before you start the installation of the SAP system instances. During the installation of the SAP system, SoftwareProvisioning Manager (the "installer") accesses the SAP HANA database remotely to perform the necessary database-specific installation steps.
>
> However, if you are installing a standard system **on Linux**, you can install SAP systems on the **same host** as the SAP HANA database, without applying additional environment settings. For more information, see SAP Systems Based on Application Server ABAP on One Host with SAP HANA Database - High-Availability Setup Based on SAP HANA System [page 181] and SAP Note 1953429 .
>
> For more information about how to install the SAP HANA database, see the SAP HANA Server Installation and Update Guide at https://help.sap.com/hana_platform ▶ *Implement* ▶ *Installation and Upgrade* ▶ .

After you have decided on the installation option that you want to use, continue with Planning [page 29].

Standard System [page 15]

Distributed System [page 18]

High-Availability System [page 19]

Additional Application Server Instance [page 22]

ASCS Instance with Integrated SAP Web Dispatcher [page 25]

ASCS Instance with Integrated Gateway [page 27]

2.1 Standard System

In a standard system, all main instances except the SAP HANA database instance run on a single host.

There are the following instances:

- ABAP Central services instance (ASCS instance)
  Contains the ABAP message server and the Standalone Enqueue Server

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> **i Note**
>
> **ASCS instance with new "Standalone Enqueue Server 2" versus ASCS instance with classic "Standalone Enqueue Server":**
>
> - **SAP systems based on ABAP Platform 1809 or higher:** By default, the ASCS instance is installed with the new Standalone Enqueue Server **2**. From a Software Provisioning Manager 2.0 perspective, the installation procedure for the ASCS instance with "Standalone Enqueue Server **2**" is the same as for the ASCS instance with the classic "Standalone Enqueue Server" , there are no additional or different installation parameters.
>
>   For more information, see the SAP Online Documentation [page 14] at ▶ *Application Server ABAP Infrastructure* ▶ *Components of the Application Server for ABAP* ▶ *SAP Lock Concept* ▶ *Standalone Enqueue Server 2* ◀.
>
> - **SAP systems based on SAP BW/4HANA 1.0 SR1 (based on SAP NetWeaver 7.5):** The ASCS instance is installed with the classic "Standalone Enqueue Server" by default. You **cannot** switch to the new "Standalone Enqueue Server **2**" after the installation has completed.
>
> Since - from a Software Provisioning Manager 2.0 perspective - the "Standalone Enqueue Server 2" is installed with the ASCS instance the same way as the classic "Standalone Enqueue Server", both are abbreviated as "Standalone Enqueue Server" in this documentation.

   - Optionally, you can install the ASCS instance with an integrated SAP Web Dispatcher. For more information, see ASCS Instance with Integrated SAP Web Dispatcher [page 25].
   - Optionally, you can install the ASCS instance with an integrated gateway. For more information, see ASCS Instance with Integrated Gateway [page 27].
- SAP HANA database instance (DB)
- Primary application server instance (PAS instance)
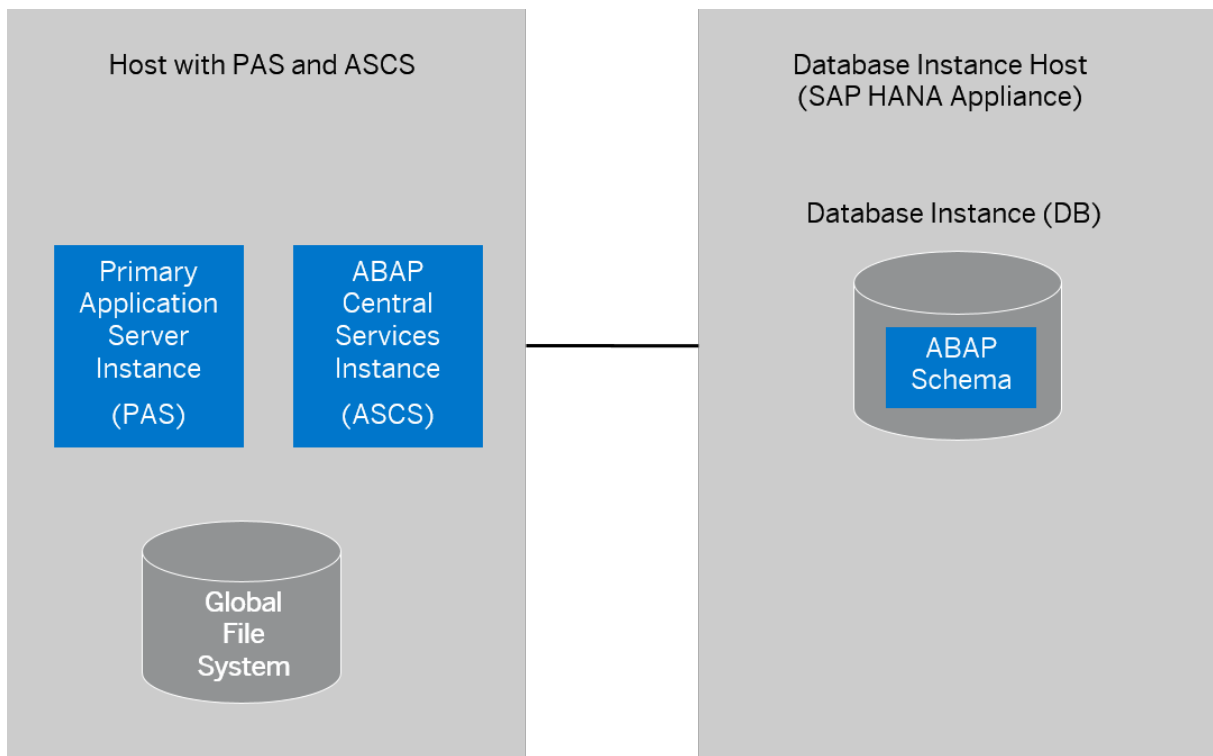
Standard ABAP System

> **i** Note
>
> If you are installing a standard system **on Linux**, you can install SAP systems on the **same host** as the SAP HANA database, without applying additional environment settings, as shown in the figure below. If the SAP HANA database does not yet exist, it is installed automatically by Software Provisioning Manager. For more information, see SAP Note 1953429 .
>
>
>
> Standard ABAP System

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2.2 Distributed System

An SAP system consists of SAP instances. An SAP instance is a group of processes that are started and stopped at the same time.

In a **distributed** system, every instance can run on a separate host:

- ABAP Central services instance (ASCS instance)
  Contains the ABAP message server and the Standalone Enqueue Server

> **i Note**
>
> **ASCS instance with new "Standalone Enqueue Server 2" versus ASCS instance with classic "Standalone Enqueue Server":**
>
> - **SAP systems based on ABAP Platform 1809 or higher:** By default, the ASCS instance is installed with the new Standalone Enqueue Server **2**. From a Software Provisioning Manager 2.0 perspective, the installation procedure for the ASCS instance with "Standalone Enqueue Server **2**" is the same as for the ASCS instance with the classic "Standalone Enqueue Server" , there are no additional or different installation parameters.
>
>   For more information, see the SAP Online Documentation [page 14] at ▶ *Application Server ABAP Infrastructure* ▶ *Components of the Application Server for ABAP* ▶ *SAP Lock Concept* ▶ *Standalone Enqueue Server 2* ▶.
>
> - **SAP systems based on SAP BW/4HANA 1.0 SR1 (based on SAP NetWeaver 7.5):** The ASCS instance is installed with the classic "Standalone Enqueue Server" by default. You **cannot** switch to the new "Standalone Enqueue Server **2**" after the installation has completed.
>
> Since - from a Software Provisioning Manager 2.0 perspective - the "Standalone Enqueue Server 2" is installed with the ASCS instance the same way as the classic "Standalone Enqueue Server", both are abbreviated as "Standalone Enqueue Server" in this documentation.
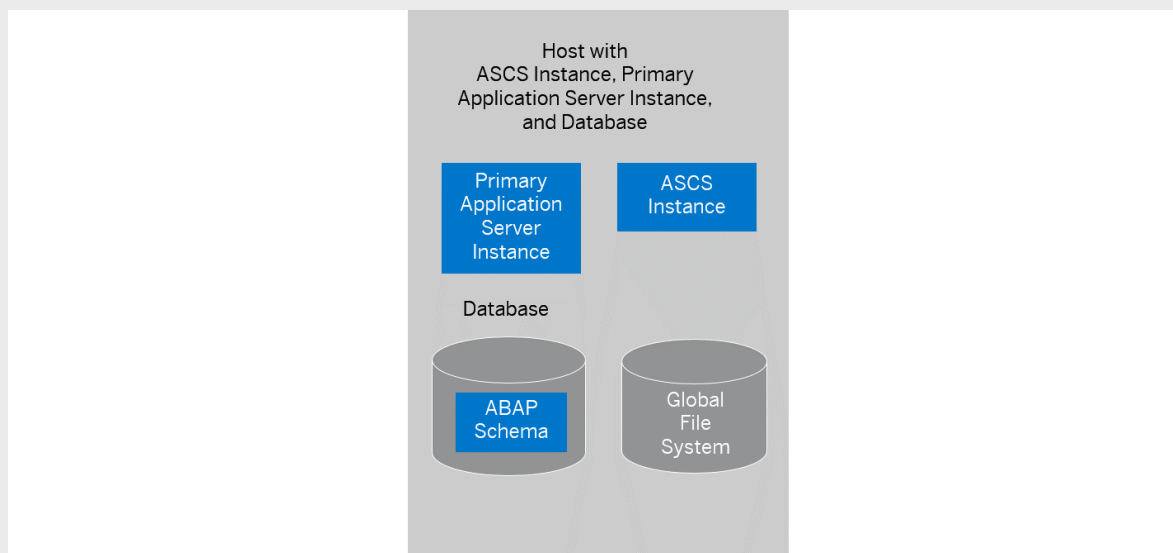
  - Optionally, you can install the ASCS instance with an integrated SAP Web Dispatcher. For more information, see ASCS Instance with Integrated SAP Web Dispatcher [page 25].
  - Optionally, you can install the ASCS instance with an integrated gateway. For more information, see ASCS Instance with Integrated Gateway [page 27].
- SAP HANA database instance (DB)
  The ABAP stack uses its own database schema in the database.
- Primary application server instance (PAS)

The graphics below assume that you use the global directories of the ASCS instance as global file system. That means that the host with the ASCS instance is the SAP global host. However, you can also separately install the global directories on any host of your SAP system landscape.

You can also use the SAP transport host or the host with the global file system (SAP global host) as your primary application server instance host.

Optionally, you can install one or more additional application server instances. For more information, see Installation of an Additional Application Server Instance [page 22].

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Distributed ABAP System

2.3 High-Availability System

> **i Note**
>
> SAP HANA can also have HA solutions. For more information contact your hardware partner and see the SAP HANA overview in the SAP HANA Data Center, which is available at http://www.saphana.com/docs/ DOC-2010 .

An SAP system consists of SAP instances. An SAP instance is a group of processes that are started and stopped at the same time.

In a **high-availability** system, every instance can run on a separate host.

There are the following instances:

- ABAP central services instance (ASCS instance)
  Contains the ABAP message server and the Standalone Enqueue Server

> **i Note**
>
> **ASCS instance with new "Standalone Enqueue Server 2" versus ASCS instance with classic "Standalone Enqueue Server":**
>
> ○ **SAP systems based on ABAP Platform 1809 or higher:** By default, the ASCS instance is installed with the new Standalone Enqueue Server **2**. From a Software Provisioning Manager 2.0 perspective, the installation procedure for the ASCS instance with "Standalone Enqueue Server **2**" is the same as for the ASCS instance with the classic "Standalone Enqueue Server" , there are no additional or different installation parameters.

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For more information, see the SAP Online Documentation [page 14] at ▶ *Application Server ABAP Infrastructure* ❭ *Components of the Application Server for ABAP* ❭ *SAP Lock Concept* ❭ *Standalone Enqueue Server 2* ❭.

- ○ **SAP systems based on SAP BW/4HANA 1.0 SR1 (based on SAP NetWeaver 7.5):** The ASCS instance is installed with the classic "Standalone Enqueue Server" by default. You **cannot** switch to the new "Standalone Enqueue Server **2**" after the installation has completed.
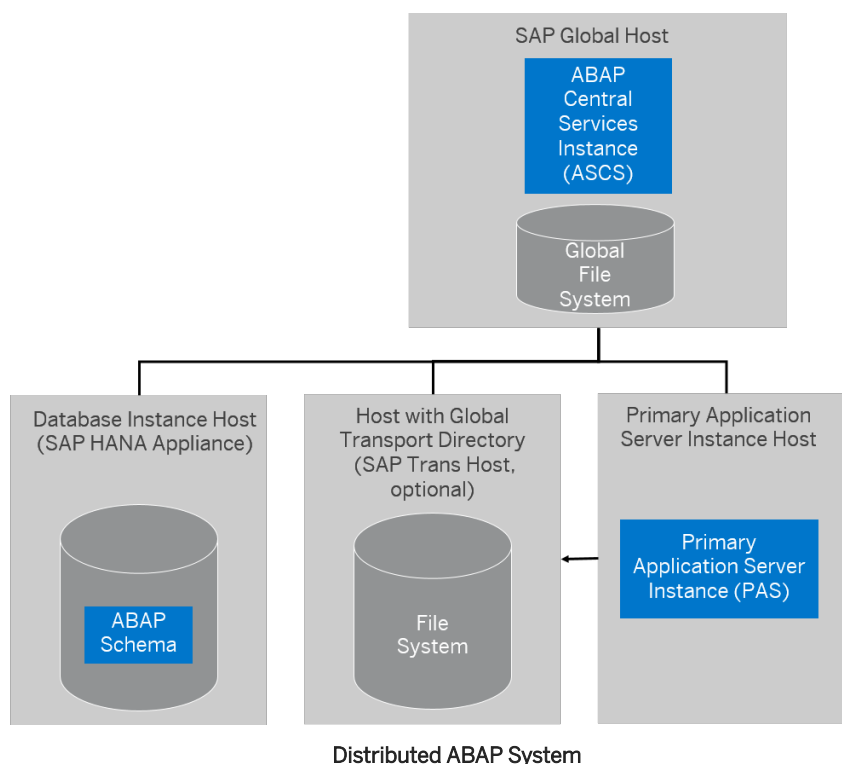
Since - from a Software Provisioning Manager 2.0 perspective - the "Standalone Enqueue Server 2" is installed with the ASCS instance the same way as the classic "Standalone Enqueue Server", both are abbreviated as "Standalone Enqueue Server" in this documentation.

- ○ Optionally you can install the ASCS instance with an integrated SAP Web Dispatcher. For more information, see ASCS Instance with Integrated SAP Web Dispatcher [page 25].
- ○ Optionally you can install the ASCS instance with an integrated gateway. For more information, see ASCS Instance with Integrated Gateway [page 27].
- ● ERS instance for the ASCS instance (mandatory)
  The ERS instance contains the replication table, which is a copy of the lock table of the Standalone Enqueue Server in the ASCS instance.

> **i Note**
>
> **ERS instance with new "Enqueue Replicator 2" versus ERS instance with classic "Enqueue Replication Server":**
>
> - ○ **SAP systems based on ABAP Platform 1809 or higher:** By default, the ERS instance is installed with the new "Enqueue Replicator 2". From a Software Provisioning Manager 2.0 perspective, the installation procedure for the ERS instance with the "Enqueue Replicator 2" is the same as for the ERS instance with the classic "Enqueue Replication Server", there are no additional or different installation parameters.
>
>   For more information, see the SAP Online Documentation [page 14] at ▶ *Application Server ABAP Infrastructure* ❭ *Components of the Application Server for ABAP* ❭ *Standalone Enqueue Server 2* ❭ and ▶ *Application Server ABAP Infrastructure* ❭ *Components of the Application Server for ABAP* ❭ *Standalone Enqueue Server 2* ❭ *High Availability with Standalone Enqueue Server 2* ❭.
>
> - ○ **SAP systems based on SAP BW/4HANA 1.0 SR1 (based on SAP NetWeaver 7.5):** The ERS instance is installed with the classic "Enqueue Replication Server" by default. You **cannot** switch to the new " Enqueue Replicator 2 " after the installation has completed.
>
> Since - from a Software Provisioning Manager 2.0 perspective - the "Enqueue Replicator 2" is installed with the ERS instance the same way as the classic "Enqueue Replication Server", both are abbreviated as "ERS instance" in this documentation.

- ● SAP HANA database instance (DB)
- ● Primary application server instance (PAS)

The graphics below each assumes that you run the ASCS instance and the ERS instance on the switchover cluster infrastructure. However, you can also run other SAP system instances that are a single point of failure (SPOF) on a switchover cluster infrastructure, for example the database instance.

Both the ERS instance and the ASCS instance must be controlled by the cluster software, but the ERS instance must be in a failover group different from the failover group of the ASCS instance.

> **i Note**
>
> With the classic Standalone Enqueue Server in principle the so-called "polling" interface could be used. The ERS instance would not be clustered in that case. But because the HA partners on Unix typically do not use this approach, it is not described in detail in this guide. For more information about the polling concept, see the SAP Online Documentation [page 14] at ▶ *SAP NetWeaver Application Server for ABAP* ❯ *Components of SAP NetWeaver Application Server for ABAP* ❯ *Standalone Enqueue Server* ❯ *High Availability with the Standalone Enqueue Server* ❯.

To increase high availability by creating redundancy, we recommend that you install additional application server instances on hosts different from the primary application server instance host. For more information, see Installation of an Additional Application Server Instance [page 22].

The following figure shows an example for the distribution of the SAP system instances in a high-availability system.

High-Availability System
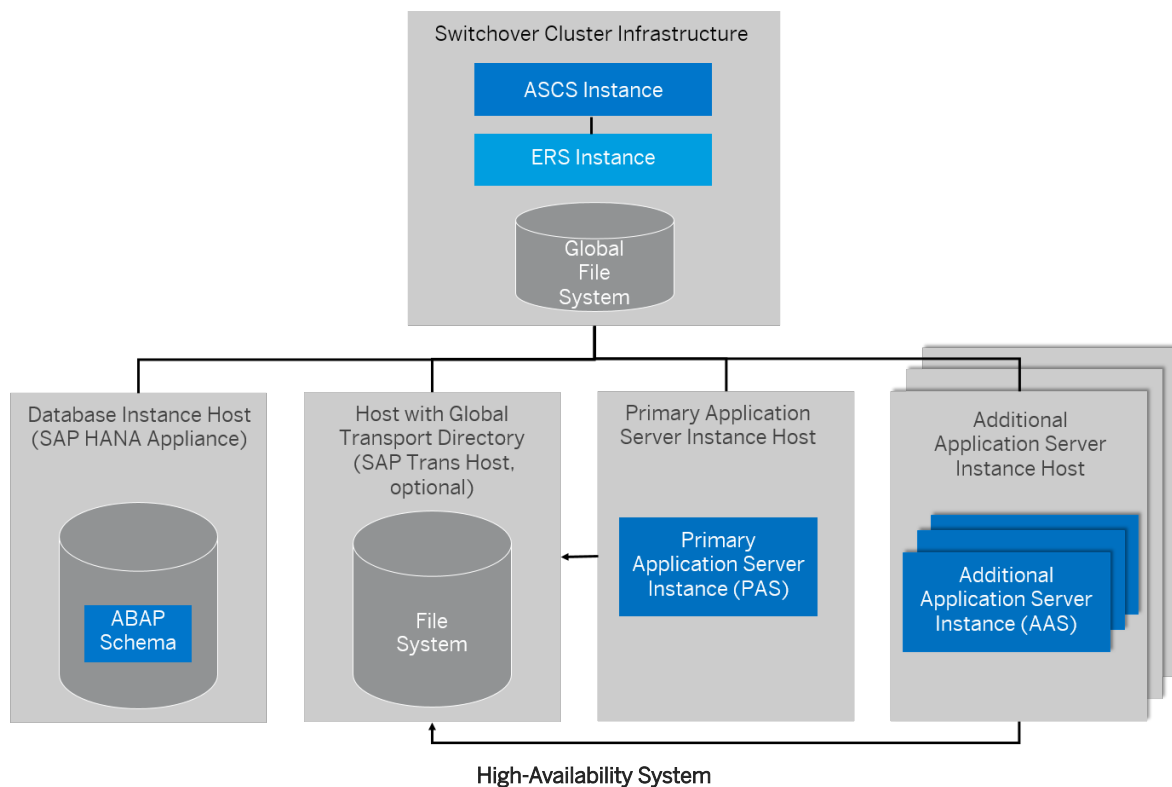
> **i Note**
>
> On **Linux**, you can install SAP systems on the **same host** as the SAP HANA database as a high-availability setup with system replication, as shown in the figure below. For more information, see SAP Note 1953429 ▸ . This approach is described as a special scenario setup in section SAP Systems Based on Application Server ABAP on One Host with SAP HANA Database - High-Availability Setup Based on SAP HANA System [page 181].

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Provisioning Manager 2.0
Installation Options Covered by this Guide   PUBLIC   **21**

Host A
PRIMARY

SAP AS ABAP

Primary application
server instance

ASCS Instance

[*Enqueue Replication
Server Instance*]

SAP HANA
database
instance

Shared file system

Host B
SECONDARY

SAP AS ABAP

Enqueue Replication
Server (ERS) Instance

[*Primary application
server instance*]

[*ASCS Instance*]

SAP HANA
database
instance

Note: instances shown as, for example,
[*ASCS instance*], are activated on failover

SAP Systems Based on Application Server ABAP on One Host with SAP HANA Database - High-Availability Setup Based
on SAP HANA System Replication

2.4   Additional Application Server Instance

You can install one or more additional application server instances for an existing SAP system. Additional
application server instances are optional and can be installed on separate hosts.

An additional application server instance can run on:

- The host of any instance of the existing SAP system (exceptions see below)
- On a dedicated host

> **i Note**
>
> If you want to install additional application server instances running on an operating system other than the
> primary application server instance, see Heterogeneous SAP System Installation [page 180]. For example,
> you need to do this if your primary application server instance runs on Linux for z System but the additional
> application server instance is to run on Windows.

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22   PUBLIC   **Installation Options Covered by this Guide**

Additional Application Server Instance for a Standard System

For example, the following figure shows a standard system with additional application server instances that run:

- On the main host of the SAP system, that is, on the host where the primary application server instance runs
- On dedicated hosts
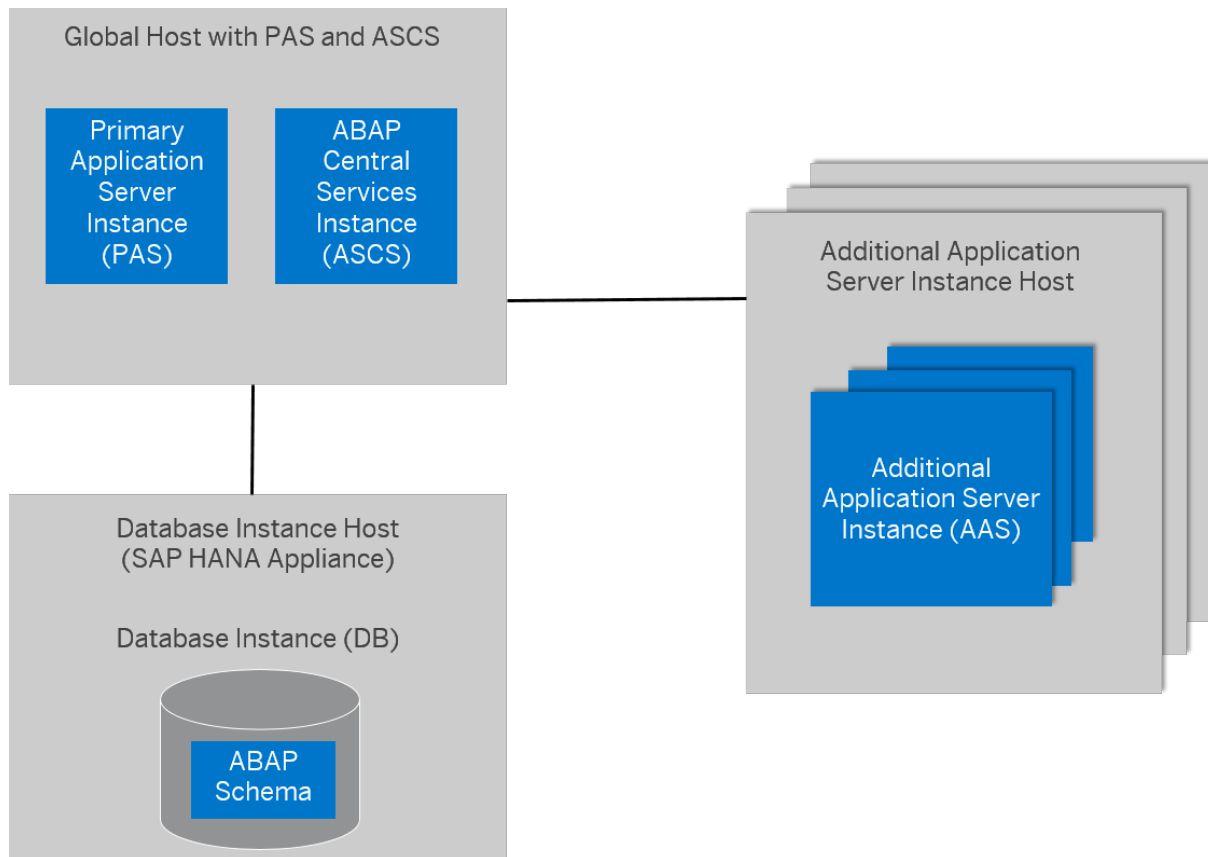
Additional Application Server for a Standard System

For more information, see Standard System [page 15].

Additional Application Server Instance for a Distributed System

The following figure shows a distributed system with additional application server instances that run:

- On the main host of the SAP system, that is, on the host on which the primary application server instance runs
- On dedicated hosts

We do **not** recommend installing additional application server instances on the SAP global host.

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Installation Options Covered by this Guide   PUBLIC   **23**

Additional Application Server Instance for a Distributed System
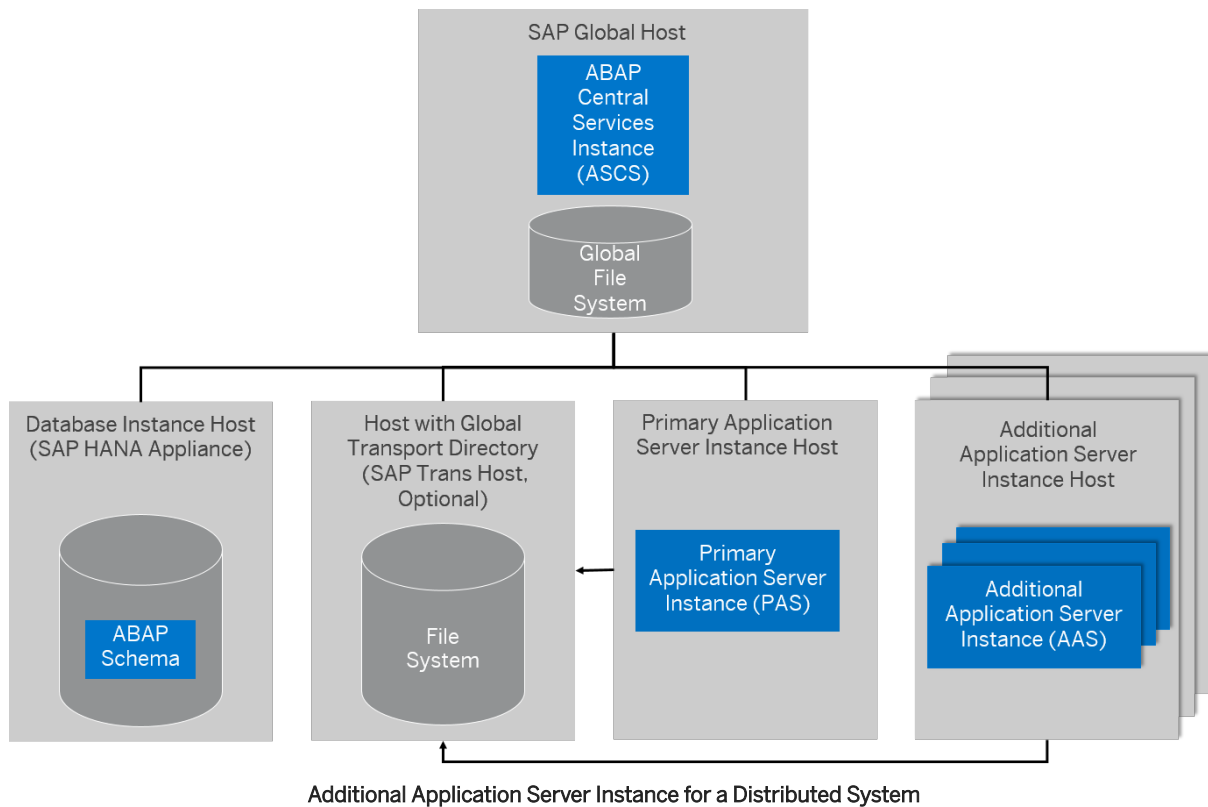
For more information, see Distributed System [page 18].

Additional Application Server Instance for a High-Availability System

The following figure shows a high-availability system with additional application server instances that run:

- On the host of the primary application server instance
- On dedicated hosts

Additional Application Server Instance for a High-Availability System
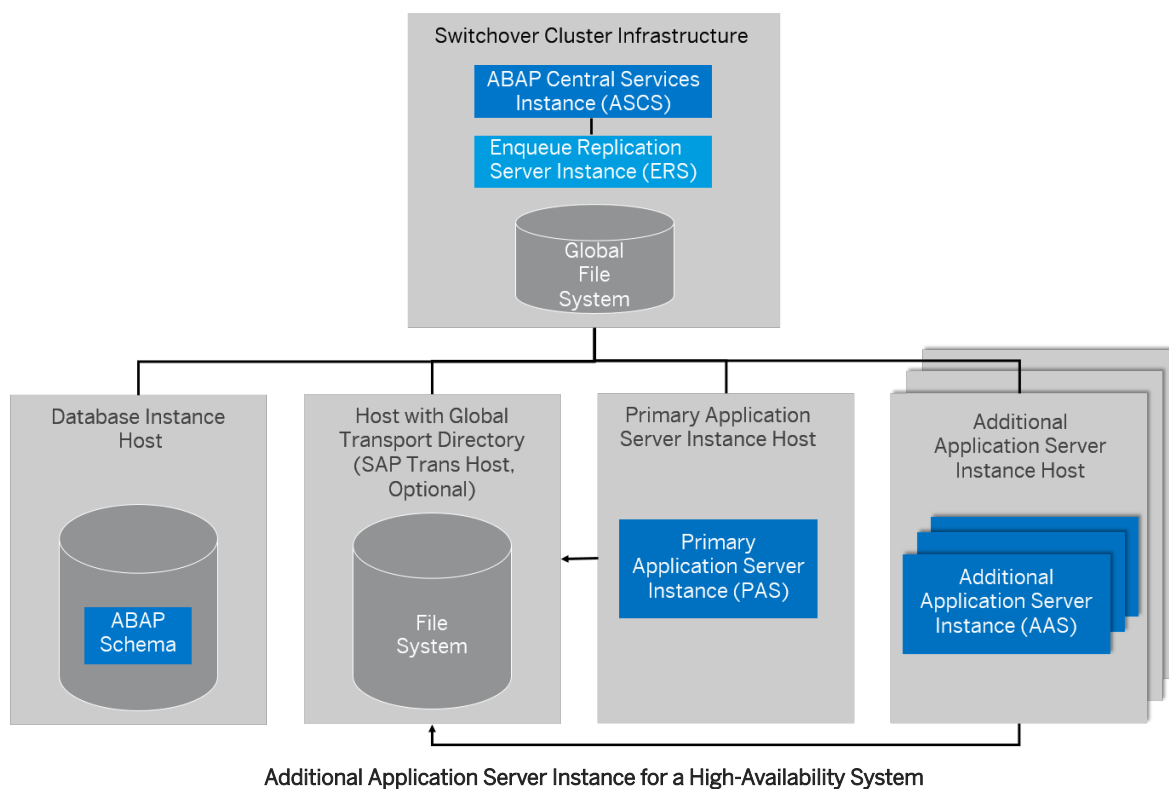
For more information, see High-Availability System [page 19].

2.5   ASCS Instance with Integrated SAP Web Dispatcher

You can install an SAP Web Dispatcher integrated in the ASCS instance. If you select this option, an SAP Web Dispatcher is installed running within the ASCS instance. No separate SAP Web Dispatcher instance and no dedicated `<SAPSID>` are created for the SAP Web Dispatcher. We recommend this if you want to use the SAP Web Dispatcher for the system to which the ASCS instance belongs.

> **i Note**
>
> We only recommend this option for special scenarios. For more information, see SAP Note 908097 . For an SAP Web Dispatcher installation, a standalone installation (see below) continues to be the default scenario.

Installation of SAP ABAP Systems on UNIX : SAP HANA 2.0 Database - Using Software
Provisioning Manager 2.0
Installation Options Covered by this Guide   PUBLIC   **25**
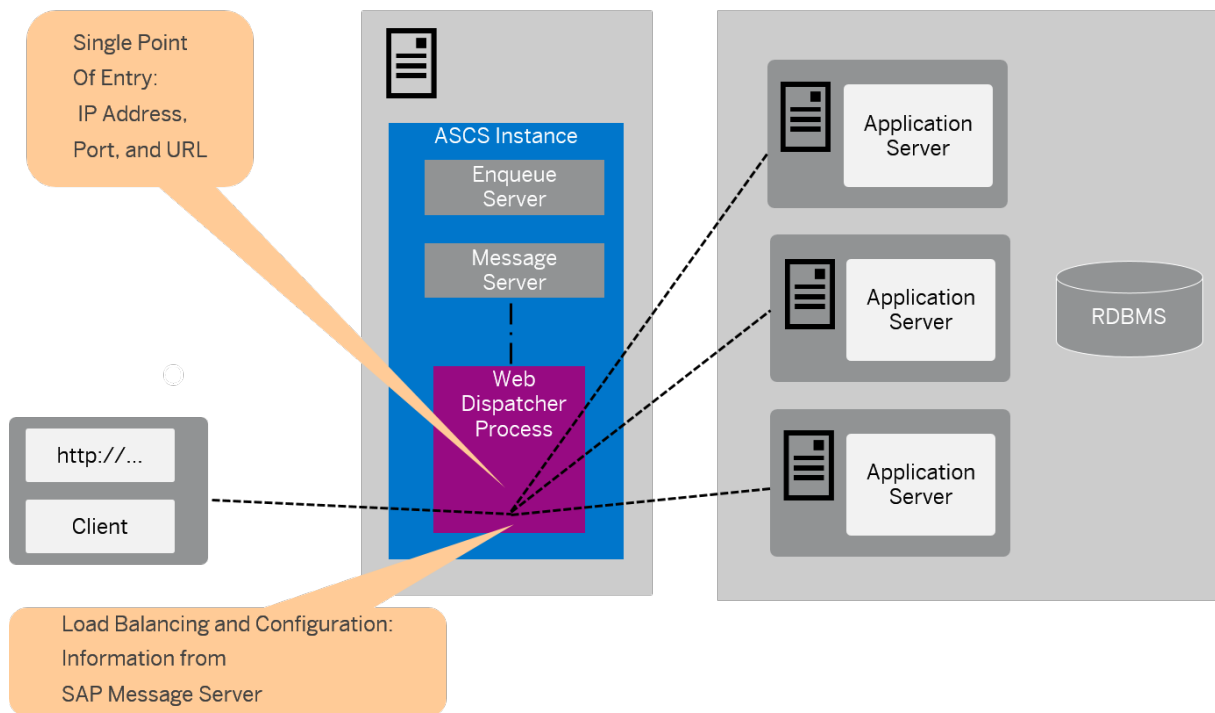
ASCS Instance with Integrated SAP Web Dispatcher

The SAP Web Dispatcher is located between the Web client (browser) and your SAP system that is running the Web application.

It acts as single point of entry for incoming requests (HTTP, HTTPS), defined by the IP address, port, and URL, and forwards them in turn to the application server (AS) of the SAP system.

The SAP Web Dispatcher receives information about the SAP system that it needs for load distribution (load balancing) from the message server and application server via HTTP.

Installation of "Standalone" SAP Web Dispatcher with its own `<SAPSID>` and Instance

If you want to install an SAP Web Dispatcher for another system - that is not for the system for which you use the ASCS instance and with its own SAP system ID and instance number - you have to install SAP Web Dispatcher separately as described in the documentation Installation of SAP Web Dispatcher on <OS> - Using Software Provisioning Manager 2.0 which you can find at https://help.sap.com/viewer/swpm20guides/ ▌▶ ❯ *Installation Option of Software Provisioning Manager 2.0* ❯ *Installation Guides - SAP Web Dispatcher - Software Provisioning Manager 2.0* ❯.

Installation of SAP ABAP Systems on UNIX : SAP HANA 2.0 Database - Using Software
Provisioning Manager 2.0
Installation Options Covered by this Guide

More Information

For more information about the architecture and the functions of SAP Web Dispatcher, see the SAP Web Dispatcher documentation in the at:

Release	SAP Library Path (Continued)
SAP systems based on foundation on ABAP Platform 1809, version for SAP HANA ("ABAP Platform 1809" for short) **and higher**	▶ *Application Server ABAP - Infrastructure* ❯ *Components of Application Server ABAP* ❯ *SAP Web Dispatcher* ❯ *Administration of the SAP Web Dispatcher* ❯
SAP systems based on SAP BW/4HANA 2.0	▶ *Application Server ABAP - Infrastructure* ❯ *Components of Application Server ABAP* ❯ *SAP Web Dispatcher* ❯ *Administration of the SAP Web Dispatcher* ❯
SAP systems based on SAP BW/4HANA 1.0 SR1 (`<SP08 or higher>`)	▶ *Application Server* ❯ *Application Server Infrastructure* ❯ *Components of SAP NetWeaver Application Server* ❯ *SAP Web Dispatcher* ❯ *Administration of the SAP Web Dispatcher* ❯

Related Information

2.6   ASCS Instance with Integrated Gateway

You can install a gateway integrated in the ASCS instance. If you select this option, a gateway is installed **within the ASCS instance**.

> **i Note**
>
> **No separate standalone gateway instance** and **no dedicated** `<SAPSID>` are created for the gateway.

Installation of SAP ABAP Systems on UNIX : SAP HANA 2.0 Database - Using Software
Provisioning Manager 2.0
Installation Options Covered by this Guide   PUBLIC   **27**
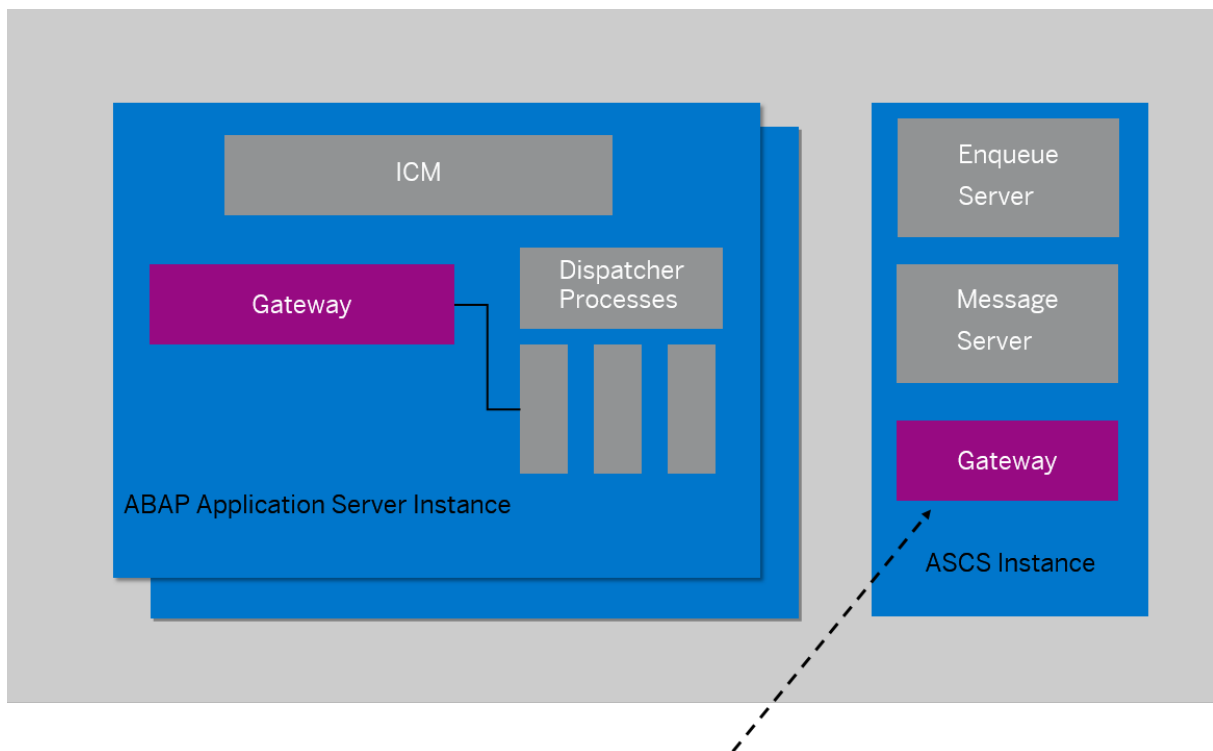
SAP Gateway Integrated in ASCS Instance

Gateway Integrated in the ASCS Instance

The gateway enables communication between work processes and external programs, as well as communication between work processes from different instances or SAP systems.

You can also install a **standalone** gateway instance. For more information, see the documentation Installation Guide – Installation of a Standalone Gateway Instance for SAP Systems Based on SAP NetWeaver 7.1 to 7.5x at https://help.sap.com/viewer/swpm10guides/ ▶ ▶ *Installation Option of Software Provisioning Manager 1.0* ▶ *Installation Guides - Standalone Engines and Clients - Software Provisioning Manager 1.0* ▶ *Standalone Gateway Instance* ▶ .

Related Information

Parameters for Additional Components to be Included in the ASCS Instance [page 61]

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Provisioning Manager 2.0
28   PUBLIC   **Installation Options Covered by this Guide**

3 Planning

3.1 Planning Checklist

This section includes the planning steps that you have to complete for the following installation options.

- Standard, distributed, or high-availability system
- Additional application server instance

Detailed information about the steps are available in the linked sections.

Prerequisites

1. You have planned your SAP system landscape according to the release-specific (Master) Installation Guide for your SAP NetWeaver application as described in Before You Start [page 11].
2. You have decided on your installation option (see Installation Options Covered by this Guide [page 15]).

Standard, Distributed, or High-Availability System

> **i Note**
>
> In a standard system [page 15], all mandatory instances except the database instance are normally installed on one host. Therefore, if you are installing a standard system, you can ignore references to other hosts.
>
> The SAP HANA database is normally pre-installed by SAP partners before you start the installation. For more information about how to install the SAP HANA database, see the SAP HANA Server Installation and Update Guide at https://help.sap.com/hana_platform ▶ *Implement* ❭ *Installation and Upgrade* ❭. The database instance is remotely installed by SoftwareProvisioning Manager (the "installer") from the primary application server host.
>
> However, if you are installing a standard system **on Linux**, you can install SAP systems on the **same host** as the SAP HANA database, without applying additional environment settings. For more information, see SAP Systems Based on Application Server ABAP on One Host with SAP HANA Database - High-Availability Setup Based on SAP HANA System [page 181] and SAP Note 1953429 .

> **i Note**
>
> You **cannot** install multiple SAP systems in a single tenant database (MCOD). Instead, you must use different tenant databases for each SAP System.

1. If you want to install an SAP ABAP system along with the required Support Package stack and ABAP Add-Ons in one implementation run, you need to plan the desired installation target using the maintenance planner at https://apps.support.sap.com/sap/support/mp.
   In the maintenance planner, a stack XML file with the desired Support Package stack and Add-On information is generated, which you then hand over to Software Provisioning Manager (the "installer" for short) by calling it with command line parameter
   `SAPINST_STACK_XML=<Absolute_Path_To_Stack_XML_File>`. Included constraints and defaults defined in the stack XML file are then used for the initial installation by Software Provisioning Manager and for the application of Support Package stacks and Add-Ons by the Software Update Manager (SUM).
   For more information, see Installation Using a Stack Configuration File (Optional) [page 30].

   > → Recommendation
   >
   > We recommend that you perform the installation using a stack configuration file for all new products such as SAP S/4HANASAP on Premise.

2. You check the hardware and software requirements [page 32] on every installation host.
3. You plan how to set up user and access management [page 45].
4. You identify Basic SAP System Installation Parameters [page 46].
5. You decide on the transport host to use [page 62].
6. You decide whether you want to integrate LDAP Directory Services in your SAP system [page 169].
7. To install a high-availability system, you read Planning the Switchover Cluster for High Availability [page 63].
8. Continue with Preparation [page 70].

Additional Application Server Instance

1. You check the hardware and software requirements [page 32] for every installation host on which you want to install one or more additional application server instances.
2. You identify Basic SAP System Installation Parameters [page 46].
3. Continue with Preparation [page 70].

3.2 Installation Using a Stack Configuration File

The option to perform an installation using a stack configuration file (also called "up-to-date installation" or "UDI" for short) improves the process of provisioning an up-to-date SAP system by creating a unified consumption experience and a direct close collaboration between the involved tools, namely:

- The Maintenance Planner
- Software Provisioning Manager (the "installer" for short)
- Software Update Manager 1.0 or Software Update Manager 2.0 (abbreviated as "SUM 1.0" respectively "SUM 2.0", or "SUM" when Software Update Manager is meant in general, without reference to a specific release)

The installer then can take over more default settings that are already predefined in the Maintenance Planner.

> **i Note**
>
> During Maintenace Planner stack generation, SAP HANA and non-SAP HANA SUM archives are provided. Exclude the SUM archive which is not applicable for the new system planning from the stack generation.

Prerequisites

- You must have an S-User with the authorization to access and use the Maintenance Planner at https://apps.support.sap.com/sap/support/mp🐾 .
- For additional information about involved tools and supported SAP system releases, see SAP Note 2277574 🐾 .

Features

An installation using a stack configuration file provides the following features:

- You can use a stack configuration file generated by the Maintenance Planner at https://apps.support.sap.com/sap/support/mp🐾 . The parameters contained in the stack configuration file can then be processed by the installer to get better integrated with SUM and to simplify the process of installation for a new system on a target software level. This makes IT administration easier by reducing the efforts in Total Cost of Ownership (TCO). For more information, see the *Best Practice Guide to Planning Landscape Changes* at https://support.sap.com/en/tools/software-logistics-tools/landscape-management-process.html🐾 .
- When processing a stack configuration file, the installer can take over more default settings that are already predefined in the Maintenance Planner and offers more possibilities for automation as compared to when running without it. For more information about the benefits by comparing the existing process with the new improved process, see *Up-To-Date Installation* at https://blogs.sap.com/2016/10/21/up-to-date-installation-2/🐾 .

  > **i Note**
  >
  > The procedure and the screenshots provided in the linked document are **only an example** to show how an up-to-date installation works in general for an example SAP product, and what the benefits are. This document is **not** intended to serve as a detailed instruction for an up-to-date-installation of any supported SAP product.

- You can also run an installation using a stack configuration file in **unattended mode** as described in System Provisioning Using a Parameter Input File [page 125] .
- You can use the installer to directly download the installation software from SAP by providing the Maintenance Plan to the installer while running installer option *Download Software Packages for Maintenance Planner Transaction*.
  For more information, see Downloading Software Packages for a Maintenance Planner Transaction [page 99].

Integration

For the additional input parameters that you need to specify, see *Additional Parameters When Using a Stack Configuration File (Optional)*. You can find the link to this section in *Related Information* below.

In addition, each section in this guide describing steps that are completely or at least partially automatized when using a stack configuration files is marked with an appropriate note at the beginning. These are the following sections as listed in the adjacent section *Related Information*:

Related Information

3.3 Hardware and Software Requirements

Ensure that your hosts meet the hardware and software requirements for your operating system and the SAP instances. Otherwise you might experience problems when working with the SAP system.

Prerequisites

- Make sure that the host name meets the requirements listed in SAP Note 611361 .
- Contact your OS vendor for the latest OS patches.
- Check your keyboard definitions.
- If you want to install a printer on a host other than the primary application server instance host (for example, on a separate database instance host), check whether the printer can be accessed under UNIX.

Procedure

1. Check the *Product Availability Matrix* at http://support.sap.com/pam for supported operating system releases.
2. Check the hardware and software requirements using:

Installation of SAP ABAP Systems on UNIX : SAP HANA 2.0 Database - Using Software
Provisioning Manager 2.0
Planning

- The **Prerequisite Checker**:
  - Standalone (optional) before the installation process
    For more information, see Running the Prerequisites Check Standalone [page 33].
  - Integrated in the installation tool (mandatory) as part of the installation process
    For more information, see Running the Installer [page 119].
- The hardware and software requirements tables in Requirements for the SAP System Hosts [page 34].

3. If you want to install a **production** system, the values provided by the Prerequisite Checker and the hardware and software requirements checklists are not sufficient. In addition, do the following:

- You use the `Quick Sizer` tool available at http://sap.com/sizing📌 .
- You contact your hardware vendor, who can analyze the load and calculate suitable hardware sizing depending on:
  - The set of applications to be deployed
  - How intensively the applications are to be used
  - The number of users

3.3.1 Running the Prerequisites Check in Standalone Mode (Optional)

This section describes how to run the prerequisites check in standalone mode. Running the prerequisites check in standalone mode is optional.

Context

When you install an SAP system, the installer automatically starts the prerequisites check and checks the hardware and software requirements in the background. As an optional step during planning, you can also run the prerequisites check in standalone mode to check the hardware and software requirements for your operating system and the SAP instances before the actual installation.

> → Recommendation
>
> We recommend that you use **both** the prerequisites check and the requirements tables for reference.

Procedure

1. Download and unpack the Software Provisioning Manager archive to a local directory as described in Downloading and Extracting the Software Provisioning Manager 2.0 Archive [page 94].
2. Make either the separate `SAPEXE<Version>.SAR` archive or the complete kernel medium available as described in Downloading the SAP Kernel [page 95] .
3. Start the installer as described in Running the Installer [page 119].

4. On the *Welcome* screen, choose ▌▶ `<SAP_Product>` ❯ `<Database>` ❯ *Preparations* ❯ *Prerequisites Check* ◀.

5. Follow the instructions in the installer dialogs and enter the required parameters.

> **i Note**
>
> To find more information on each parameter during the *Define Parameters* phase, position the cursor on the required parameter input field , and choose either `F1` or the *HELP* tab. Then the available help text is displayed in the *HELP* tab.

After you have finished, the *Parameter Summary* screen appears. This screen summarizes all parameters that you have entered and that you want to have checked. If you want to make a change, select the relevant parameters and choose *Revise*.

6. To start the prerequisites check, choose *Next*.

Results

The *Prerequisite Checker Results* screen displays the results found. If required, you can also check the results in file `prerequisite_checker_results.html`, which you can find in the installation directory.

Related Information

Downloading and Extracting the Software Provisioning Manager 2.0 Archive [page 94]
Downloading the SAP Kernel [page 95]

3.3.2 Requirements for the SAP System Hosts

Every installation host must meet at least the requirements listed in the following tables. Most of the requirements are valid for every installation host whereas some requirements are instance-specific and are marked accordingly.

> **i Note**
>
> The information here and in the following sections is **not** intended to replace the operating system documentation. For more information, see your operating system documentation.

Related Information

General Installation Information for Your Operating System [page 35]

3.3.2.1 General Installation Information for Your Operating System

Before checking the hardware and software requirements, we recommend that you make yourself familiar with some general information about installation of SAP systems on your operating system platform.

General Installation Information for Your Operating System

Operating System	Information
AIX	Before you start the installation, make sure that you have read SAP Note 1972803 . In addition, we also recommend that you check the information available in the *SAP on AIX* space on the SAP Community Network at https://www.sap.com/community/topic/aix.html .
HP-UX	Before you start the installation, make sure that you have read SAP Note 1075118 . In addition, we also recommend that you check the information available in the *SAP on HP-UX Best Practices* space on the SAP Community Network at https://www.sap.com/community/topic/hp-ux.html .
Linux	Before you start the installation, make sure that you have read the SAP Notes for your Linux distribution listed in the central SAP Note 2369910 . In addition, we also recommend that you check the information available in the *SAP on Linux* space on the SAP Community Network at https://www.sap.com/community/topic/linux.html . Only valid for 'Platform': Linux Software Provisioning Manager supports Linux on IBM Power Systems (little endian) as operating system platform. For more information, see SAP Note 2378874 . End of 'Platform': Linux
Solaris	Before you start the installation, make sure that you have read SAP Note 1669684 . In addition, we also recommend that you check the information available in the *SAP on Oracle Solaris* space on the SAP Community Network at https://www.sap.com/community/topic/oracle-solaris.html

3.3.2.2 Hardware Requirements

Every installation host must meet at least the hardware requirements listed in the following tables. Most of the requirements are valid for every installation host whereas some requirements are instance-specific and are marked accordingly.

Hardware Requirements

Requirement	Values and Activities
Hardware requirements	Your hardware must be 64-bit capable.
Processing units	**For application server instances and database instances**: The number of physical or virtual processing units usable by the operating system image must be equal to or greater than 2. **For an ASCS instance running on a separate host**: One physical or virtual processing unit usable by the operating system image might be sufficient. Examples of processing units are processor cores or hardware threads (multithreading). In a virtualized environment, ensure that adequate processor resources are available to support the workloads of the running SAP systems.
Optical media drive	ISO 9660 compatible

Requirement	Values and Activities

Hard disk space	• **General Requirements:**
	    ○ 2 GB of temporary disk space for each set of installation archives (SAP kernel, RDBMS client, database installation export, languages) or - if you want to install SAP BW/4HANA 1.0 SR1 - for each physical installation medium. For more information, see Getting the Installation Software [page 93].
	    ○ 2 GB of temporary disk space for the installation.
	    ○ If an advanced disk array is available (for example, RAID), contact your hardware vendor to make sure that the data security requirements are covered by this technology.
	• **Instance-Specific Requirements:**
	If you install **several instances** on **one host**, you have to add up the requirements accordingly.
	
	    i Note
	    If you are installing a standard system **on Linux**, you can install SAP systems on the **same host** as the SAP HANA database. In this case, you must make sure that you include the disk space requirements for the SAP HANA database instance. The host needs to be able to support the SAP HANA database plus AS ABAP . Before installation, carefully estimate the sizing for your system, making sure that the host meets these combined requirements. For more information on sizing, see SAP Note 1793345.
	
	• For more information about space requirements for the file systems and directories of the instances, see SAP Directories [page 79] and the appropriate database-specific information listed below.
	    ○ ABAP central services instance (ASCS):
	      Minimum 2 GB
	        ○ If you install the ASCS instance with an integrated SAP Web Dispatcher, for the installation as such you require at least 1 GB of hard disk space in addition. For production use of the SAP Web Dispatcher, you need to reserve at least 5 GB.
	        ○ If you install the ASCS instance with an integrated SAP Gateway, you require at least 1 GB of hard disk space in addition.
	    ○ ERS instance for the ASCS instance (if required):
	      Minimum 2 GB
	    ○ Primary application server instance:
	      Minimum 2 GB (SAP NetWeaver BW server: Minimum 30 GB)
	      Plus 1 GB for the SAP HANA database client software
	    ○ Additional application server instance:
	      Minimum 2 GB (SAP NetWeaver BW server: Minimum 30 GB)
	      Plus 1 GB for the SAP HANA database client software
	    ○ SAP Host Agent:
	      Minimum 0.5 GB

Requirement	Values and Activities

RAM	
	
	i Note
	
	AIX: Keep in mind that the operating system itself requires about 10% of the available RAM.
	
	The following lists the RAM requirements for each SAP instance.
	
	If you install **several instances** on **one host**, you have to add up the requirements accordingly.
	
	i Note
	
	If you are installing a standard system **on Linux**, you can install SAP systems on the **same host** as the SAP HANA database. In this case, you must make sure that you include the RAM requirements for the SAP HANA database instance. For more information, see SAP Note 1953429 .
	
	- ABAP central services instance (ASCS instance)
	  Minimum 1 GB
	  If you install the ASCS instance with an integrated SAP Web Dispatcher, see SAP Note 2007212 for memory consumption in productive use.
	- ERS instance for the ASCS instance (if required):
	  Minimum 1 GB
	- Primary application server instance:
	  Minimum 3 GB (BW server: Minimum 2 GB)
	- Additional application server instance:
	  Minimum 3 GB
	- SAP Host Agent:
	  Minimum 1 GB
	
	HP-UX: Refer to SAP Note 1112627 for the commands to display the RAM size on HP-UX.
	
	Linux: Refer to SAP Note 1382721 for the commands to display the RAM size on Linux.

Requirement	Values and Activities
AIX: Paging space	You need hard disk drives with sufficient paging space. You can calculate the required paging space as follows: • Optimistic strategy: You need at least 20 GB for the **primary application server instance** and at least another 10 GB for every **additional application server instance**. • Defensive strategy: 3 * RAM, at least 20 GB In addition, for the **database instance** you need: • 0.75 * RAM, if RAM is greater than 8 GB • 1 * RAM, if RAM is less than 8 GB For the latest information about recommended paging space, see SAP Note 1121904 .
HP-UX: Swap space	You need hard disk drives with sufficient space for swap. You can calculate the required swap space as follows: 2 * RAM, at least 20 GB **SAP NetWeaver Process Integration 7.5 or higher:** 2 * RAM or 80 GB, whichever is higher For more information about HP-UX swap space recommendations and about how to set up swap space, see SAP Note 1112627 .
Linux: Swap space	You need hard disk drives with sufficient space for swap. We recommend that you use the amount of swap space as described in SAP Note 1597355 . You might decide to use more or less swap space based on your individual system configuration and your own experience during daily usage of the SAP system.
Oracle Solaris: Swap space	You need hard disk drives with sufficient space for swap. At least 20 GB are required. For more information, see SAP Note 570375 .

3.3.2.3 Software Requirements

Every installation host must meet at least the software requirements listed in the following tables. Most of the requirements are valid for every installation host whereas some requirements are instance-specific and are marked accordingly.

Software Requirements

Requirement	Values and Activities
AIX: Operating system version	Your operating system platform must be 64-bit.
	Check the Product Availability Matrix (PAM) at http://support.sap.com/pam🖫 for supported operating system versions.
	Contact your OS vendor for the latest OS patches.
	Minimal OS requirements for the specific SAP Kernel releases are listed in SAP Note 1780629🖫.
	You require at least AIX 6.1 TL7 SP10 to be able to run the installer.
HP-UX: Operating system version	Your operating system platform must be 64-bit.
	Check the Product Availability Matrix (PAM) at http://support.sap.com/pam🖫 for supported operating system versions.
	To check the operating system version on your installation hosts, use the following command:
	`uname -r`
	See SAP Note 939891🖫 for information about support time frames of HP-UX.
Linux: Operating system version	Your operating system platform must be 64-bit.
	Check the Product Availability Matrix (PAM) at http://support.sap.com/pam🖫 for supported operating system versions.
	Operating systems supported by SAP HANA are listed in SAP Note 2235581🖫.
	Contact your OS vendor for the latest OS patches.
	To check the operating system version on your installation hosts, use the following command:
	`cat /etc/*-release`
	Only valid for 'Platform': Linux
	If you are installing on SUSE Linux Enterprise Server (SLES), see SAP Note 1275776 🖫 to prepare SLES for SAP environments.
	End of 'Platform': Linux

Requirement	Values and Activities
Oracle Solaris: Operating system version	Your operating system platform must be 64-bit.
	Check the Product Availability Matrix (PAM) at http://support.sap.com/pam 🔗 for supported operating system versions.
	To check the operating system version on your installation hosts, use the following command:
	`/bin/uname -r`
SAP Kernel Releases and Versions	For more information about release and roadmap information for the kernel versions, and how this relates to SAP NetWeaver support packages - including important notes on downward compatibility and release dates - see SAP Note 1969546 🔗.
	To use regular Software Provisioning Manager (`SWPM10<Version>.SAR`) with SAP kernel 7.49 or higher on RHEL 6 or SLES 11 or Oracle Linux 6, you must install the required `libstdc++` RPM packages. For more information, see SAP Note 2195019 🔗.
AIX: Kernel parameters	To adjust AIX Virtual Memory Management settings, see SAP Note 973227 🔗.
HP-UX: Kernel parameters	To run an SAP system, make sure that you check and, if necessary, modify the HP-UX kernel.

HP-UX kernel parameters continued:

> ⚠ Caution
>
> We recommend that a UNIX system administrator performs all kernel modifications.

Proceed as follows:

1. Check SAP Note 172747 🔗 for recommendations on current HP-UX kernel parameters.

   > ⚠ Caution
   >
   > If a kernel value is already larger than the one suggested in the SAP Note, do not **automatically** reduce it to match the SAP requirement.
   >
   > You have to analyze the exact meaning of such a parameter and, if required, to reduce the parameter value. In some cases this might improve the performance of your SAP applications.

2. If necessary, modify the kernel parameters in one of the following ways:
   - Manually, as described in SAP Note 172747 🔗.
   - Interactively, using the HP-UX System Administrator Manager (SAM) or System Management Homepage (SMH).

Requirement	Values and Activities
Linux: Kernel parameters	Check SAP Note 2369910 📄 for Linux kernel versions certified by SAP. To check the Linux kernel parameters for your Linux distribution, see one of the following SAP Notes: • SLES 15: SAP Note 2578899 📄 • SLES 12: SAP Note 1984787 📄 • SLES 11: SAP Note 1310037 📄 • RHEL8: SAP Note 2772999 📄 • RHEL7: SAP Note 2002167 📄 • RHEL6: SAP Note 1496410 📄
Oracle Solaris: Kernel parameters	To run an SAP system, you must check and, if necessary, modify the Oracle Solaris kernel parameters or resource controls. • Oracle Solaris 10: SAP Note 724713 📄 • Oracle Solaris 11: SAP Note 1797712 📄
HP-UX: OS patches	To check the minimum required OS patches, see SAP Note 837670 📄.
Oracle Solaris: OS patches	Check the relevant SAP Note for required Oracle Solaris patches: • Sun Solaris 10 on `SPARC`: SAP Note 832871 📄 • Oracle Solaris 11: SAP Note 1797712 📄
AIX: National Language Support (NLS)	Make sure that National Language Support (`NLS`) and corresponding `locales` are installed.
HP-UX: National Language Support (NLS)	Make sure that National Language Support (`NLS`) and corresponding `locales` are installed. You can check this as follows: • Enter the following commands to check whether National Language Support (NLS) is installed: **`swlist -v	grep -i nls`**   The output should contain the string `NLS-AUX ...` • Enter the following commands to check which locales are available:   **`locale -a`**   The following files must be available: `de_DE.iso88591`, `en_US.iso88591`.

Requirement	Values and Activities
Linux: National Language Support (NLS)	Make sure that National Language Support (`NLS`) and corresponding `locales` are installed. You can check this as follows: • Ensure that the required `locales` such as the following are available: `de_DE, en_US` • Check SAP Note 187864 for information about corrected operating system locales and `SAP blended Code Pages`.
Oracle Solaris: National Language Support (NLS)	Make sure that National Language Support (`NLS`) and corresponding `locales` are installed. Enter the following command to check which locales are available: **`locale -a`** The following locale must be available: `en_US.ISO8859-1`
System language	For the installation, you must choose English as the operating system language on all hosts that run SAP software.

3.3.2.4 Other Requirements

Every installation host must meet at least the requirements listed in the following tables. Most of the requirements are valid for every installation host whereas some requirements are instance-specific and are marked accordingly.

Other Requirements

Requirement	Values and Activities
Minimum Web Browser	Make sure that you have at least one of the following web browsers installed on the host where you run the installer GUI: • Microsoft Internet Explorer 11 or higher • Microsoft Edge • Mozilla Firefox • Google Chrome Always use the latest version of these web browsers. You need a web browser to be able to run the SL Common GUI, and to display the Evaluation Form and send it to SAP.

Requirement	Values and Activities
AIX: Additional software	Make sure that the following additional file sets are installed: • `bos.adt.*` – Base Application Development • `bos.perf.*` – performance and diagnostics tools • `perfagent.tools` – performance monitoring tools
Host name	To find out **physical** host names, open a command prompt and enter **`hostname`**. For more information about the allowed host name length and characters allowed for SAP system instance hosts, see SAP Note 611361. Only valid for 'Platform': HP-UX For HP-UX, see SAP Note 1503149 in addition. End of 'Platform': HP-UX If you want to use **virtual** host names, see SAP Note 962955.

Login shell	The installer only prompts you for this parameter if you use a login shell other than C shell (csh).
	
	For more information, see SAP Note 202227.
	
	Only valid for 'Platform': HP-UX
	
	For HP-UX, see SAP Note 1038842 in addition.
	
	End of 'Platform': HP-UX
	
	SAP Host Agent installation:
	
	• Make sure that `/bin/false` can be used as a login shell.
	• Only valid for 'Platform': AIX
	  AIX only: Add `/bin/false` to the list of valid login shells (attribute `shells`) in `/etc/security/login.cfg`.
	  End of 'Platform': AIX

HP-UX: Mount and file system configuration	For recommendations about block size and mount option configuration, see SAP Note 1077887.
Shared file systems for decentralized systems	If application servers are installed decentralized, a "shared" file system must be installed, for example Network File System (NFS).
AIX: C++ Runtime environment	Minimal C++ runtime requirements for the specific SAP Kernel releases are listed in SAP Note 1780629.
Linux: C compiler	Make sure that the C compiler gcc is installed.

3.4   Planning User and Access Management

You have to plan how to configure user and access management for the SAP system to be installed.

Before you add a newly installed SAP system to your system landscape, you must decide which kind of user management you want to use:

- Central User Administration (CUA)
- An LDAP directory as the data source for user data

Procedure

To specify the initial data source of the User Management Engine (UME), proceed as described in Specifying the Initial Data Source of the User Management Engine [page 115].

More Information

For more information about configuring the user management of your SAP system to be installed, see the SAP Online Documentation [page 14] at:

Release	SAP Library Path (Continued)
SAP systems based on foundation on ABAP Platform 1809, version for SAP HANA ("ABAP Platform 1809" for short) **and higher**	▶ *Securing the ABAP Platform* ❯ *ABAP Platform Security Guide* ❯ *User Administration and Authentication* ❯ *User Management* ❯ *Identity Management* ❯ *User and Role Administration of Application Server ABAP* ❯ *Configuration of User and Role Administration* ❯ *Directory Services* ❯ *Configuring Connection Data for the Directory Service* ❯ *Configuring Connection Data with the LDAP Connector* ❯ *Configuring the LDAP Connector* ❯
SAP systems based on SAP BW/4HANA 2.0	▶ *Securing the ABAP Platform* ❯ *ABAP Platform Security Guide* ❯ *User Administration and Authentication* ❯ *User Management* ❯ *Identity Management* ❯ *User and Role Administration of Application Server ABAP* ❯ *Configuration of User and Role Administration* ❯ *Directory Services* ❯ *Configuring Connection Data for the Directory Service* ❯ *Configuring Connection Data with the LDAP Connector* ❯ *Configuring the LDAP Connector* ❯

Release	SAP Library Path (Continued)
SAP systems based on SAP BW/4HANA 1.0 SR1 (`<SP08 or higher>`)	▶ *Security* ❯ *Identity Management* ❯ *User and Role Administration of Application Server ABAP* ❯ *Configuration of User and Role Administration* ❯ *Directory Services* ❯ *LDAP Connector* ❯

3.5 Basic Installation Parameters

The installer prompts for input parameters during the *Define Parameters* phase of the installation.

You can install your SAP system either in *Typical* or *Custom* mode:

- *Typical*

  If you choose *Typical*, the installation is performed with default settings. This means that the installer prompts you only for a small selection of installation parameters. These parameters include at least the following:

  - SAP system ID and database connectivity parameters
  - Master password
  - SAP system profile directory – only for systems with instances on separate hosts
  - Individual encryption key for the secure storage

  For more information about the installation parameters, see the corresponding tables below in this document. If you want to change any of the default settings, you can do so on the *Parameter Summary* screen.

- *Custom*

  If you choose *Custom*, you are prompted for all parameters. At the end, you can still change any of these parameters on the *Parameter Summary* screen.

> **i Note**
>
> You cannot change from *Custom* to *Typical* mode or from *Typical* to *Custom* mode on the *Parameter Summary* screen.

> **i Note**
>
> - If you want to install an ASCS instance with an integrated SAP Web Dispatcher [page 25], you must choose *Custom*. Otherwise, you are not prompted for the SAP Web Dispatcher installation parameters [page 61] during the *Define Parameters* phase of the ASCS instance installation.
> - If you want to install an ASCS instance with an integrated Gateway [page 27], you must choose *Custom*. Otherwise, you are not prompted for the SAP Gateway installation during the *Define Parameters* phase of the ASCS instance installation.

The tables in the sections below list the basic SAP system installation parameters that you need to specify before installing your SAP system. For all other installation parameters, use the tool help on the installer screens.

Related Information

3.5.1 SAP System Parameters

The tables in this section lists the basic SAP system installation parameters that you need to specify before installing your SAP system. For all other installation parameters, use the tool help on the installer screens.

General Parameters

Parameter	Description
SAP System ID `<SAPSID>`	The SAP system ID (`<SAPSID>`) identifies the entire SAP system. The installer prompts you for the `<SAPSID>` when you execute the **first** installation option to install a new SAP system. If there are further installation options to be executed, the installer prompts you for the `profile` directory. For more information, see the description of the parameter *SAP System Profile Directory*. ⁂ Example This prompt appears when you install the ASCS instance, which is the first instance to be installed in a distributed system. ⚠ Caution Choose your SAP system ID carefully since renaming requires considerable effort. Make sure that your SAP system ID: • Is unique throughout your organization. Do not use an existing `<SAPSID>` when installing a new SAP system. • Consists of exactly three alphanumeric characters • Contains only uppercase letters • Has a letter for the first character • Does not include any of the reserved IDs listed in SAP Note 1979280 . • If you want to install an additional application server instance, make sure that no Gateway instance with the same SAP System ID (SAPSID) exists in your SAP system landscape. ⚠ Caution If you are installing a standard system **on one Linux host**, you can install your SAP system on the **same host** as the SAP HANA database. In this case, you must use a **different** SAP system ID (SID) for the SAP HANA database than the one you later specify for the installation of the AS ABAP system. .

Parameter	Description
SAP System Instance Numbers	Technical identifier for internal processes. It consists of a two-digit number from 00 to 97.

The instance number must be unique on a host. That is, if more than one SAP instance is running on the same host, these instances must be assigned different numbers.

If you do not enter a specific value, the instance number is set automatically to the next free and valid instance number that has not yet been assigned to the SAP system to be installed or to SAP systems that already exist on the installation host.

To find out instance numbers of SAP systems that already exist on the installation host, look for subdirectories ending with `<Instance Number>` of local (not mounted) `/usr/sap/<SAPSID>` directories.

For more information about the naming of SAP system instances, see SAP Directories [page 79].

Only valid for 'Platform': AIX

> ⚠ Caution
>
> **AIX only:** If you are using NIM Service Handler (NIMSH), do not use 01 or 02 for the instance number. The installer uses the instance number for the internal message server port `39<Instance Number>`. The NIM client daemon uses reserved ports 3901 and 3902.

End of 'Platform': AIX

Only valid for 'Platform': HP-UX

> ⚠ Caution
>
> **HP-UX only:** Do **not** use:
>
> - 75 for the instance number because this number is already used by the operating system. For more information, see SAP Note 29972 .
> - 02 as the instance number because this number is used to determine the port number for report `RSLGCOLL`, which is `14<Instance Number>` by default. However, port 1402 is already used by the OS process `rstlisten`. If you still decide to use 02 as the instance number, the instance fails to start during the installation process. You then have to manually change the port number for report `RSLGCOLL` to continue with the installation. For more information, see Running the Installer [page 119].

End of 'Platform': HP-UX

Parameter	Description
Virtual Host Name	Virtual host name (network name) of the `SAP<SAPSID>` cluster group containing the ASCS instance.

Virtual host name (network name) of the `SAP<SAPSID> ERS` cluster group containing the ASCS instance (only applies if Enqueue Replicator 2 is used).

You can assign a virtual host name for the instance to be installed, by specifying it in the `<Instance_Name>` *Host Name* field of the `<Instance Name>` *Instance* screen. Then this instance is installed with this virtual host name.

After the installation has completed, all application servers can use this virtual host name to connect to the instance. If you do not provide the virtual host name, the instance is installed automatically using the physical host name of the host where you run the installer.

You must have already reserved the virtual host name (network name) and its IP address on a DNS server before you run the installer. For more information, see Using Virtual Host Names [page 88].

> i Note
> Fully qualified host names, `IPv4`, `IPv6` are not accepted as virtual host names. |
| SAP System Profile Directory | `/<sapmnt>/<SAPSID>/profile` or `/usr/sap/<SAPSID>/SYS/profile`

The installer retrieves parameters from the SAP system profile directory of an existing SAP system.

SAP profiles are operating system files that contain instance configuration information.

The installer prompts you to enter the location of the `profile` directory when the installation option that you execute is not the first one belonging to your SAP system installation, for example if you are installing a distributed system or an additional application server instance to an existing SAP system. See also the description of the parameters *SAP System ID* and *Database ID*.

`/usr/sap/<SAPSID>/SYS/profile` is the soft link referring to `/<sapmnt>/<SAPSID>/profile`. |

Parameter	Description
Master Password	Common password for all users that are created during the installation:

Common password for all users that are created during the installation:

- Operating system users (for example `<sapsid>adm`)

  > ⚠ Caution
  >
  > If you did not create the operating system users manually before the installation, the installer creates them with the common master password (see *Operating System Users*). In this case, make sure that the master password meets the requirements of your operating system.

- ABAP users: `SAP*`, `DDIC`, and `EARLYWATCH`.
- Secure Store key phrase
  For more information, see line *Key Phrase for Secure Store Settings* and line *Individual Encryption Key for the Secure Storage* in this table.

Basic Password policy

The master password must meet the following requirements:

- It must be 10 to 14 characters long
- It must contain at least one letter (a-z, A-Z)
- It must contain at least one digit (0-9)
- It must not contain \ (backslash) or " (double quote).

Additional restrictions depending on SAP HANA database:

- It must consist of at least one number, one lowercase letter, and one uppercase letter.
- It can only contain the following characters: `_`, `a-z`, `A-Z`, `0-9`, `#`, `@`, `$`, `!` and must not start with a number or an underscore (`_`).

Depending on the installation option, additional restrictions may apply.

Message Server Access Control List	You can specify if you want to have a message server Access Control List (ACL) created.

You can specify if you want to have a message server Access Control List (ACL) created.

The ACL is created as a file in the `/<sapmnt>/<SAPSID>/global` directory. If it exists, it defines the hosts from which the message server accepts requests.

> ⚠ Caution
>
> Only trigger the creation of this file if you do not plan to install any additional instances for this system. With the creation of this ACL, you overwrite existing settings and prevent instances from being installed on additional hosts. If you decide to install an additional instance later, you need to remove this file manually before the installation and create it again after the installation of the additional instance.

For more information, see the information about `ms/acl_info` in SAP Notes 1495075 and 826779 .

Parameter	Description

Individual Encryption Key for the Secure Storage	You can set a randomly generated individual encryption key for the secure storage in the file system and the secure storage in the database. If you skip this step, the system is installed with a default key which provides obfuscation only, but it can be changed later.
	
	• For more information on the secure storage in the file system, see the SAP Online Documentation [page 14] at:
	
	  ▶ *Security* ❯ *System Security* ❯ *System Security for SAP NetWeaver AS ABAP Only* ❯ *Secure Storage in the File System (AS ABAP)* ◀
	
	• For more information on the secure storage in the database, see the SAP Online Documentation [page 14] at:
	
	  ▶ *Security* ❯ *System Security* ❯ *System Security for SAP NetWeaver AS ABAP Only* ❯ *Secure Storage (ABAP)* ❯ *Key Management* ❯ *Using Individual Encryption Keys* ❯ *Generating Encryption Keys* ◀

DNS Domain Name for SAP System	If you want to use HTTP-based URL frameworks such as Web Dynpro applications, you have to specify the DNS domain name for the SAP system. The DNS Domain Name is used to calculate the Fully Qualified Domain Name (FQDN), which is configured in profile parameter `SAPLOCALHOSTFULL`. FQDN is the fully qualified domain name for an IP address. It consists of the host name and the domain name: `<Host_Name>.<Domain_Name>` The DNS Domain Name is needed to define the URLs for the ABAP application servers. It is appended to the server name to calculate the FQDN. ⚙ Example If your application server host is called `kirk.wdf.sap.com`, the DNS Domain Name is `wdf.sap.com`.
SAP Host Agent Upgrade (Optional)	If there already exists an SAP Host Agent on the installation host, the installer asks you if you want to upgrade it to a newer patch level version. If you want the existing version to be upgraded, you must provide the new target version of the `SAPHOSTAGENT<Version>.SAR` archive. For more information, see Downloading the SAP Kernel [page 95]

Parameter	Description
Configuration of Work Processes	**i Note** You must use custom mode to be able to specify this parameter. A correct configuration of work processes in the Application Server ABAP (AS ABAP) is essential to ensure optimum operation of your ABAP system. For example, it has impact on the performance during the installation of additional languages. • *Dialog Work Processes* deal with requests triggered by active users, such as persons and programs. • *Batch Work Processes* processes are programs that can be executed without user interaction, such as background jobs. You can still modify and adjust workprocesses manually after the installation has completed. For more information, see Performing Post-Installation Steps for the ABAP Application Server [page 151]

Ports

Parameter	Description
ABAP Message Server Port	**⚠ Caution** The message server port number must be unique on the host where the message server for the SAP system is running. If there are several message servers running on one host, the message server ports must all be unique. If you do not specify a value, the default port number is used. **ABAP Message Server Port** There is an external messagev server port and an internal message server port. The ABAP message server uses both the internal and the external message server ports. The default profile contains the configuration for both message server ports. The **external** message server port uses the parameter `rdisp/msserv` with default value `36<ABAP_Message_Server_Instance_Number>`. The **internal** message server port uses the parameter `rdisp/msserv_internal` with default value `39<ABAP_Message_Server_Instance_Number>`. During the installation of an SAP system from scratch or an additional application server instance to an existing SAP system , the message server is configured to only accept secure connections. The DEFAULT.PFL profile parameter `system/secure_communication` is set to `ON` (**system/secure_communication = ON**) if the kernel supports secure connections to the message server. For more information, see SAP Note 2040644 .

Operating System Users

Parameter	Definition
Operating System Users and Groups	The installer processes the operating system users as follows:

The installer processes the operating system users as follows:

- If the operating system users do not exist, the installer creates the following users:
  - The SAP system administrator user `<sapsid>adm`
  - Database administrator users

  The installer sets the master password for these users by default. You can overwrite and change the passwords either by using the parameter mode Custom or by changing them on the parameter summary screen.
- If the operating system users already exist, the installer prompts you for the existing password, except if the password of these users is the same as the master password.
- Make sure that the user ID and group ID of these operating system users are unique and the same on each relevant application server instance host.

The `sapinst_instdir` directory belongs to a group named `sapinst`. If this group is not available, it is created automatically as a local group. For security reasons, we recommend removing the operating system users from the group `sapinst` after the execution of the installer has completed.

During the *Define Parameters* phase of the installer, you can specify that the operating system users are to be removed **automatically** from the group `sapinst` **after** the execution of the installer has completed.

For more information about the group `sapinst`, see Creating Operating System Users and Groups [page 74].

For more information about the `sapinst_instdir` directory, see Useful Information about the Installer [page 124].

User Management Engine Parameters

Parameter	Definition
Java Administrator User	The installer creates this user in the ABAP system.

i Note

This user is only created during the installation of the application server ABAP for an SAP NetWeaver 7.5 Process Integration (PI) system or for an SAP Solution Manager 7.2 system.

After the installation, this user is available both in the ABAP and in the Java system.

The installer sets the user name `J2EE_ADMIN` and the master password by default.

If required, you can choose another user name and password according to your requirements.

Parameter	Definition
Java Guest User **i Note** This user is only created during the installation of the application server ABAP for an SAP NetWeaver 7.5 Process Integration (PI) system or for an SAP Solution Manager 7.2 system.	This user is for employees who do not belong to a company or who have registered as company users and who are waiting for approval. Guest users belong to the default group `Authenticated Users`. The installer creates this user in the ABAP system. After the installation, it is available both in the ABAP and in the Java system. The installer sets the user name `J2EE_GUEST` and the master password by default. If required, you can choose another user name and password according to your requirements. For more information about supported UME data sources and change options, see SAP Note 718383 .
Communication User **i Note** This user is only created during the installation of the application server ABAP for an SAP NetWeaver 7.5 Process Integration (PI) system or for an SAP Solution Manager 7.2 system.	The installer creates this user in the ABAP system. After the installation, it is available both in the ABAP and in the Java system This user is used for the communication between the ABAP system and the Java system. The installer sets the user name `SAPJSF` and the master password by default. If required, you can choose another user name and password according to your requirements. For more information about supported UME data sources and change options, see SAP Note 718383 .

System Landscape Directory

Parameter	Definition
SLD Destination for the System	The System Landscape Directory (SLD) registers the systems and the installed software of your entire system landscape. You can choose between the following options: • *Register in existing SLD* Choose this option to register the SAP system you are installing in an existing SAP System Landscape Directory (SLD) by specifying the SLD connection parameters listed below in this table. • *No SLD destination* Choose this option if you do **not** want to register the SAP system you are installing in an existing SAP System Landscape Directory (SLD). You then have to configure the SLD destination manually after the installation has finished. For more information, see Performing Post-Installation Steps for the ABAP Application Server [page 151]
SLD Host	The host name of the existing SLD.
SLD HTTP(S) Port	HTTP port of the SAP system based on AS Java on which the System Landscape Directory (SLD) resides. The following naming convention applies: `5<Primary_Application_Server_Instance_Number>00`. > ❖ Example > > If the primary application server instance number of the AS Java on which the System Landscape Directory (SLD) resides is 01, the SLD HTTP Port is 50100.
SLD Data Supplier User and password	The existing SLD Data Supplier user and password of the existing SLD

3.5.2 SAP System Database Parameters

Parameters	Description
`SYSTEM_ID`	The `SYSTEM_ID` identifies the tenant database instance. This is the result of the following query: **`select SYSTEM_ID from M_DATABASE`** If your SAP HANA `SYSTEM_ID` is the same as the chosen SAP System ID `<SAPSID>`, there are following restrictions: • The ABAP system and SAP HANA database have to be installed on different hosts • Database installation has to done on the ABAP host. Otherwise Database installation procedure with Software Provisioning Manager (the" installer") could overwrite the environment files (`sapenv.*`) of the SAP HANA database and the database will not start any more after reboot. ⚠ **Caution** If you are installing a standard system **on one Linux host**, you can install your SAP system on the **same host** as the SAP HANA database. In this case, you must use a **different** SAP system ID (SID) for the SAP HANA database than the one you later specify for the installation of the AS ABAP system. .
`DATABASE_NAME, Database ID, <DBSID>`	The `<DBSID>` identifies the tenant database. This is the result of the following query: **`select DATABASE_NAME from M_DATABASE`**
Database schema	The ABAP database schema is named `SAPHANADB`. This name cannot be changed. The database schema already exists in the database export. You need to specify a password of your choice.

Parameters	Description
Virtual Host Name	Virtual host name (network name) of the `SAP<SAPSID>` cluster group
	You can assign virtual host names to the SAP HANA database instance by starting the installer with the **SAPINST_USE_HOSTNAME** property. For more information, see Running the Installer [page 119].
	After the installation has completed, all application servers can use this virtual host name to connect to the SAP HANA database instance. The virtual host name is also a global host name. If you do not provide the virtual host name, the instance is installed automatically using the physical host name of the host where you run the installer.
	You must have already reserved the virtual host name (network name) and its IP address on a DNS server before you run the installer. For more information, see Using Virtual Host Names [page 88].
	i Note Fully qualified host names, `IPv4`, `IPv6` are not accepted as virtual host names.
Configuration of SAP liveCache withSAP HANA	Select *Install SAP liveCache for SAP System* if you want to configure SAP liveCache for your SAP System. You need the SAP liveCache installation only when at least one of your applications uses it.
	• Select *Use SAP liveCache integrated in SAP HANA* if you want your SAP liveCache in the SAP HANA database instance. To configure it, SAP liveCache integrated in SAP HANA (also called LCAPPS- or liveCache Applications plugin) must be pre-installed in an existing HANA database. For more information about how to install LCAPPS, see SAP Note 2979266 .For more information about SAP liveCache on SAP HANA requirements, see the *SAP HANA Master Guide* at: http:// help.sap.com/hana_platform ▌ *Implement* ❯ *Installation and Upgrade* ❯ • Select *Use external SAP liveCache based on SAP MaxDB technology* if you want to run SAP liveCache as a separate SAP MaxDB database instance. This is not supported with S/4 HANA installations. For more information about SAP MaxDB liveCache Technology requirements, see the *SAP MaxDB liveCache Technology* installation guide at: https://help.sap.com/viewer/swpm10guides ▌ *Installation Option of Software Provisioning Manager 1.0* ❯ *Installation Guides* ❯ *Standalone Engines and Clients* ❯ *Software Provisioning Manager 1.0* ❯ *SAP MaxDB liveCache Technology* ❯

3.5.3 Additional Parameters When Using a Stack Configuration File

The parameters in this section are only required if you use a stack configuration file generated from the Maintenance Planner.

Parameter	Description
Transport Domain	The ABAP Transport Management System (TMS) must be configured before ABAP correction packages can be applied. You can also run the configuration or even reconfigure the TMS after the installation has finished. To be able to transport changes between the SAP systems in your system landscape, you need to configure the Transport Management System (TMS) for all SAP systems in your system landscape and configure one transport domain controller. To start the TMS in your ABAP system for later reconfiguration, call transaction STMS. At least one transport landscape with this system as transport domain controller is required before you can apply corrections, support packages, or upgrades to the SAP system. The name of the Transport Domain must not contain blank characters. You cannot change the name afterwards without reconfiguring the transport domain controller and thereby the entire Transport Domain. By default use `DOMAIN_<SAPSID>` for the Transport Domain of a single transport landscape with this system as transport domain controller.
Directory with Transport Files	Location of the ABAP transport files that are to be included after the ABAP load during the installation. All transport files in this directory are imported with the transport control program (`tp`).
Location of SPAM/SAINT Update Archive	A SPAM/SAINT update contains updates and improvements to the Support Package Manager (SPAM) and the Add-On Installation Tool (SAINT). Provide the full path to the SPAM/SAINT update archive. SPAM/SAINT is delivered with the ABAP load. SAP recommends that you always use the latest version of SPAM/SAINT before applying Support Packages.
Decide whether you want to prepare for the Software Update Manager run at the end of the installation	With the Software Update Manager (SUM), you can apply support packages stacks at the end of the installation. • Do not start SUM automatically • Start SUM automatically at the end of the installation Choose to start SUM automatically, if you want to have the SUM STARTUP script called in the default `<Update Directory>/SUM/` directory at the end of the installation.

Parameter	Description
Extract the `SUM*.SAR` Archive	If you choose to extract the `SUM*.SAR` archive, the provided archive is validated and extracted to the default update directory: **UNIX and IBM i:** `/usr/sap/<SAPSID>/`
SUM HTTP port	If you are running several SAP system updates on the same host, you have to use different port numbers for each update. You can adjust the default SUM HTTP port by entering the required port number in the SUM HTTP Port field. When doing so you set the SUM GUI Port number to (**=<HTTP port number+2>**). Dependencies See also the Software Update Manager documentation at: https://support.sap.com/en/tools/software-logistics-tools/software-update-manager.html
SUM Batch Input File	You can specify a batch file with some default values for the update. SUM then starts with parameter `batchfile=<XML file with input parameters>`. Enter the full path to the existing batch file. Placeholders like `@PARAMETER_VALUE@` inside the file are replaced by values known from the installation.
Install Additional SAP System Languages	A set of default languages is delivered with the installation export. From the language archives or - if you want to install SAP BW/4HANA 1.0 SR1 - language media delivered with your product version, you can select additional languages that you want to have installed during SAP system installation. If you want to install additional languages, you must provide the directory with the additional language packages for the ABAP installation load, for example with subdirectories like `DATA_UNITS/ES`.

For more information, see Installation Using a Stack Configuration File (Optional) [page 30].

Related Information

Installation Using a Stack Configuration File [page 30]

3.5.4 Parameters for Additional Components to be Included in the ASCS Instance

You only need to specify the following parameters during the ASCS instance installation if you perform an integrated installation of additional components.

> **i Note**
>
> You must choose *Custom* parameter mode. Otherwise you are not prompted for the parameters related to these additional components during the *Define Parameters* phase.

Parameters	Description
Install a gateway integrated in the ASCS instance	When processing the screens for the ASCS instance installation, you are prompted to mark this checkbox on the screen *Additional Components to be Included in the ASCS Instance*.
Install an SAP Web Dispatcher integrated in the ASCS instance	When processing the screens for the ASCS instance installation, you are prompted to mark this checkbox on the screen *Additional Components to be Included in the A*SCS Instance*.* If you mark the checkbox for SAP Web Dispatcher, you are prompted for the additional parameters required for the SAP Web Dispatcher installation on the subsequent screens:
	Message Server Host The name of the host on which the message server is located (profile parameter `rdisp/mshost`)
	Message Server HTTP Port HTTP port of the message server (profile parameter `ms/server_port_<xx>`)
	Password for the Internet Communication Management (ICM) user In order to use the web administration interface for the Internet Communication Manager (ICM) and SAP Web Dispatcher, an administration user `webadm` is created by the installer. You have to assign a password for this user.

Related Information

3.6 SAP System Transport Host

The transport host contains the transport directory used by the SAP transport system to store transport data and change SAP system information, such as software programs, write dictionary data, or customizing data. If you have several SAP systems it depends on your security requirements whether you want them to share a transport directory or whether you use separate directories.

When you install an SAP system, you have to decide which transport host and directory you want to use for your SAP system:

- Use the transport directory that the installer creates during the installation of the SAP system by default on the global host.
  The installer by default creates the transport directory on the global host in `/usr/sap/trans`.
- Use a transport directory located on a host other than the default host:
  - You can use an **existing** transport directory and host in your SAP system landscape.
  - You can set up a **new** transport directory on a different host.
  In either case, you must prepare this host for use by the new SAP system. For more information, see Exporting and Mounting the Global Transport Directory [page 111].

More Information

- Required File Systems and Directories [page 79]
- See the SAP Online Documentation [page 14] at:

Release	SAP Library Path (Continued)
SAP systems based on foundation on ABAP Platform 1809, version for SAP HANA ("ABAP Platform 1809" for short) **and higher**	▶ *Administrating the ABAP Platform* ❯ *Administration Concepts and Tools* ❯ *Solution Life Cycle Management* ❯ *Software Logistics* ❯ *Change and Transport System* ❯ *Change and Transport System – Overview* ❯ *Basics of the Change and Transport System* ❯ *Transport Management System – Concept* ❯
SAP systems based on SAP BW/4HANA 2.0	▶ *Administrating the ABAP Platform* ❯ *Administration Concepts and Tools* ❯ *Solution Life Cycle Management* ❯ *Software Logistics* ❯ *Change and Transport System* ❯ *Change and Transport System – Overview* ❯ *Basics of the Change and Transport System* ❯ *Transport Management System – Concept* ❯

Release	SAP Library Path (Continued)
SAP systems based on SAP BW/4HANA 1.0 SR1 (`<SP08 or higher>`)	▶ *Solution Life Cycle Management* ▶ *Software Logistics* ▶ *Change and Transport System* ▶ *Change and Transport System – Overview* ▶ *Basics of the Change and Transport System* ▶ *Transport Management System – Concept* ▶

3.7 Planning the Switchover Cluster for High Availability

This section describes basic aspects of planning the switchover cluster for a high-availability system.

You can reduce unplanned downtime for your SAP system by setting up a switchover cluster. This setup installs critical software units – known as "single points of failure" (SPOFs) – across multiple host machines in the cluster. In the event of a failure on the primary node, proprietary switchover software automatically switches the failed software unit to another hardware node in the cluster. Manual intervention is not required. Applications trying to access the failed software unit might experience a short delay but can then resume processing as normal.

Switchover clusters also have the advantage that you can deliberately initiate switchover to release a particular node for planned system maintenance. Switchover solutions can protect against hardware failure and operating system failure but **not** against human error, such as operator errors or faulty application software. Additional downtime might be caused by upgrading your SAP system or applying patches to it.

Without a switchover cluster, the SAP system SPOFs – central services instance, the database instance, and the central file share – are vulnerable to failure because they cannot be replicated. All of these can only exist **once** in a normal SAP system.

You can protect software units that are **not** SPOFs against failure by making them redundant, which means simply installing multiple instances. For example, you can add additional application server instances. This complements the switchover solution and is an essential part of building high availability (HA) into your SAP system.

> → Recommendation
>
> We recommend switchover clusters to improve the availability of your SAP system.

A switchover cluster consists of:

- A hardware cluster of two or more physically separate host machines to run multiple copies of the critical software units, in an SAP system the SPOFs referred to above
- Switchover software to detect failure in a node and switch the affected software unit to the standby node, where it can continue operating
- A mechanism to enable application software to seamlessly continue working with the switched software unit – normally this is achieved by virtual addressing (although identity switchover is also possible)

Prerequisites

You must first discuss switchover clusters with your hardware partner because this is a complex technical area. In particular, you need to choose a proprietary switchover product that works with your operating system.

We recommend that you read the following documentation before you start:

- Check the *SAP High Availability* pages at https://wiki.scn.sap.com/wiki/display/SI/SAP+High+Availability ⬥. They contain crucial information about high-availability cluster certification and certified high-availability partners.
- The ERS instance is essential for a high-availability system and should be controlled by the cluster software. You need one ERS instance for the ASCS instance installed in your system.

Features

> **i Note**
>
> The diagrams in this section are only **examples**. Only the instances relevant to the switchover are shown.
>
> These diagrams summarize the overall setup and do not show the exact constellation for an installation based on one of the available technologies.
>
> You need to discuss your individual HA setup with your HA partner.

Switchover Setup for Systems based on ABAP Platform 1809 or higher

The following diagrams show the essential features of a switchover setup for systems based on ABAP Platform 1809 or higher, that is with the new Standalone Enqueue Server 2 in the ASCS instance and Enqueue Replicator 2 in the ERS instance:

- ASCS instance and ERS instance must reside in **different** failover groups.
- The failover groups of the ASCS instance und ERS instance can reside on the same or on different nodes.

There can be more than two nodes for the ERS instance and for the ASCS instance.

> **i Note**
>
> The example in this diagram describes a setup where the ERS instance and the ASCS instance reside on **different** nodes, and where the failover groups of the ASCS instance und ERS instance reside on **different** nodes.
>
> However, the ERS instance and the ASCS instance can also reside on the **same** node, and the failover groups of the ASCS instance und ERS instance can also reside on the **same** nodes. These setups are **not** shown in this example.
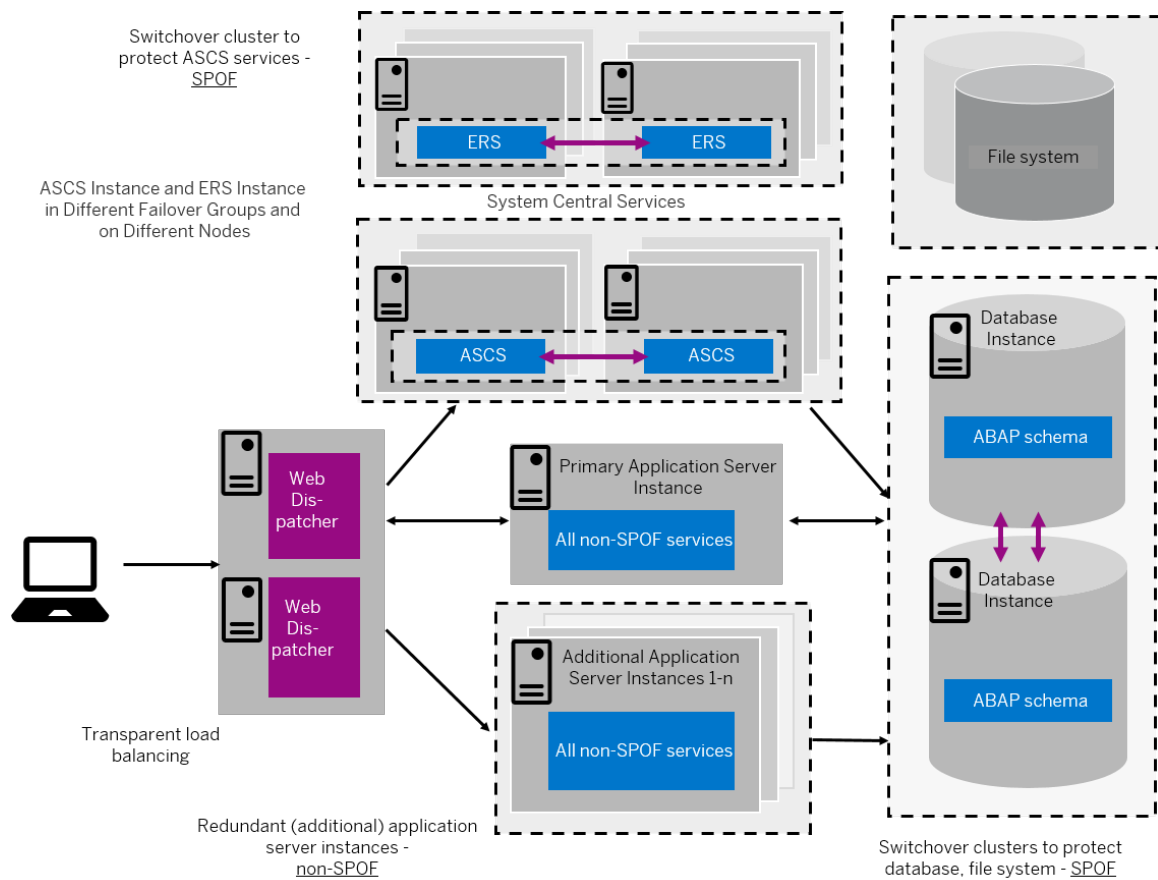
Switchover Setup with ERS Instance and ASCS Instance in Different Failover Groups and on Different Nodes (Overview)

The following diagram shows an example of a switchover cluster for systems based on ABAP Platform 1809 or higher in more detail:

> **i Note**
>
> The failover groups of the ERS instance and ASCS instance can also reside on the same node. This is **not** shown in this example.
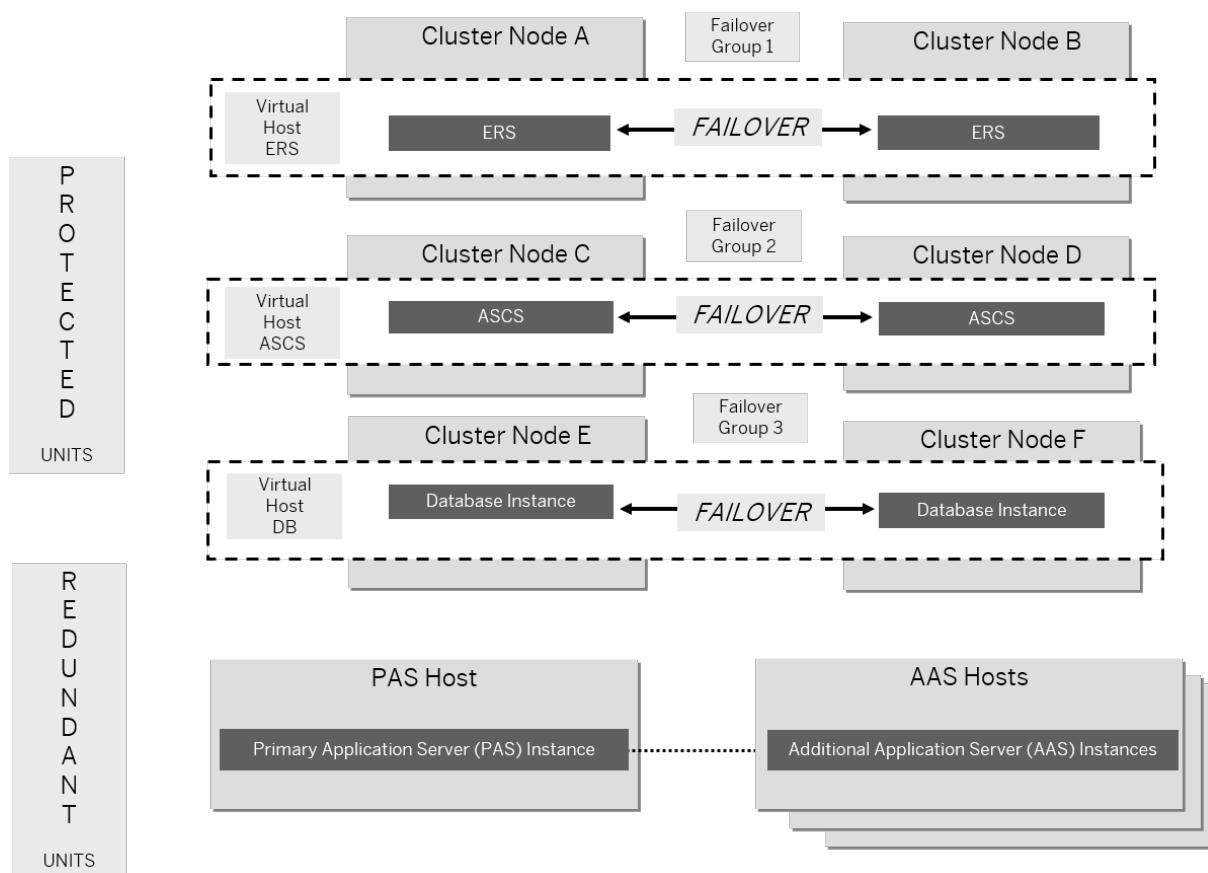
Switchover Setup with ERS Instance and ASCS Instance in Different Failover Groups and on Different Nodes (Schematic View)

For more information, see the SAP Online Documentation [page 14] at: ❯ *Application Server ABAP* *Infrastructure* ❯ *Components of the Application Server for ABAP* ❯ *SAP Lock Concept* ❯ *Standalone Enqueue* *Server 2* ❯ *High Availability with Standalone Enqueue Server 2* ❯

Switchover Setup for Systems based on SAP BW/4HANA 1.0 SR1

The following diagrams show the essential features of a switchover setup for systems based on **SAP BW/ 4HANA 1.0 SR1**, that is with the classic Standalone Enqueue Server in the ASCS instance and the Enqueue Replication Server in the ERS instance:

The failover groups of the ASCS instance und ERS instance must reside in different failover groups but on the same nodes.

Switchover cluster to protect SCS services - SPOF

ASCS Instance and ERS Instance in Different Failover Groups

ERS — ERS

ASCS — ASCS

File system

Web Dis-patcher

Web Dis-patcher

Transparent load balancing

Primary Application Server Instance

All non-SPOF services

Additional Application Server Instances 1-n

All non-SPOF services

Redundant (additional) application server instances - non-SPOF

Database Instance

ABAP schema

Database Instance

ABAP schema

Switchover clusters to protect database, file system - SPOF

Switchover Setup with ERS Instance and ASCS Instance in Different Failover Groups (Overview)

The following diagram shows an example of a switchover setup for systems based on **SAP BW/4HANA 1.0 SR1** in more detail:
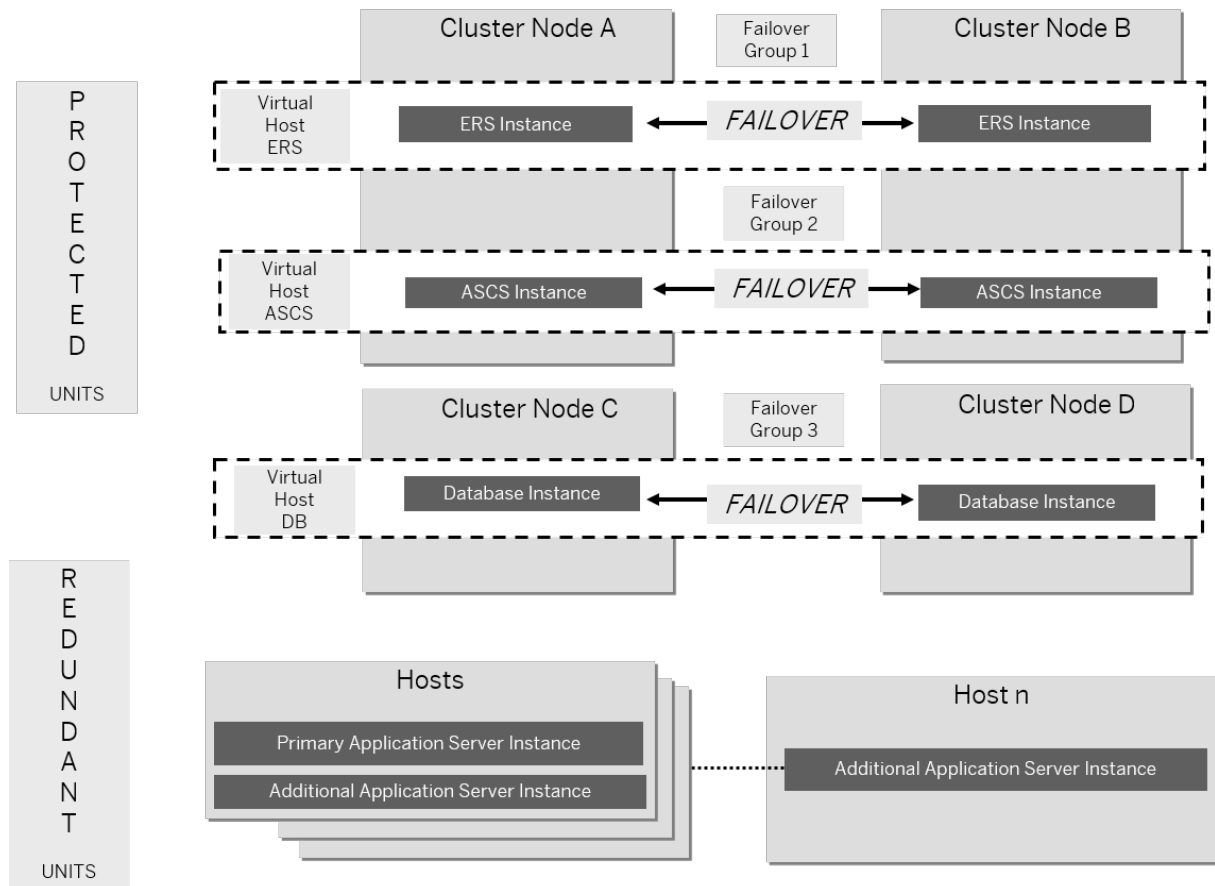
Switchover Setup with ERS Instance and ASCS Instance in Different Failover Groups (Schematic View)

For more information, see the SAP Online Documentation [page 14] at ▶ *Application Server ABAP Infrastructure* ▶ *Components of the Application Server for ABAP* ▶ *Standalone Enqueue Server 2* ◀ and ▶ *Application Server ABAP Infrastructure* ▶ *Components of the Application Server for ABAP* ▶ *Standalone Enqueue Server* ▶ *High Availability with Standalone Enqueue Server* ◀ .

Constraints

This documentation concentrates on the switchover solution for the central services instance. For more information about how to protect the Network File System (NFS) software and the database instance by using switchover software or (for the database) replicated database servers, contact your HA partner.

This documentation concentrates on the switchover solution for the central services instance. For more information about how to protect the central file share and the database instance by using switchover software or (for of the database) replicated database servers, contact your HA partner.

Make sure that your hardware is powerful enough and your configuration is robust enough to handle the increased workload after a switchover. Some reduction in performance might be acceptable after an

emergency. However, it is not acceptable if the system comes to a standstill because it is overloaded after switchover.

4   Preparation

4.1   Preparation Checklist

This section includes the preparation steps that you have to perform for the following installation options:

- Standard, distributed, or high-availability system
- Additional application server instance

Detailed information about the steps are available in the linked sections.

Standard, Distributed, or High-Availability System

> **i Note**
>
> In a standard system [page 15], all mandatory instances except the database instance are normally installed on one host. Therefore, if you are installing a standard system, you can ignore references to other hosts.
>
> The SAP HANA database is normally pre-installed by SAP partners before you start the installation. For more information about how to install the SAP HANA database, see the SAP HANA Server Installation and Update Guide at https://help.sap.com/hana_platform ▶ ▶ *Implement* ▶ *Installation and Upgrade* ▶. The database instance is remotely installed by SoftwareProvisioning Manager (the "installer") from the primary application server host.
>
> However, if you are installing a standard system **on Linux**, you can install SAP systems on the **same host** as the SAP HANA database, without applying additional environment settings. For more information, see SAP Systems Based on Application Server ABAP on One Host with SAP HANA Database - High-Availability Setup Based on SAP HANA System [page 181] and SAP Note 1953429 .

1. You make sure that the SAP HANA database is installed on the SAP HANA host [page 71].
2. You decide how to set connectivity data for your SAP HANA database [page 73].
3. You check that the required Creating Operating System Users and Groups [page 74] are created.
4. You operating systemset up file systems [page 79] and make sure that the required disk space is available for the directories to be created during the installation.
5. If you want to use virtual host names, you have to specify a virtual host name in the `<Instance_Name>` *Host Name* field of the `<Instance_Name>` *Instance* . For more information, see *Virtual Host Name* in Basic Installation Parameters [page 46]).
6. If you want to install a high-availability system, you perform switchover preparations [page 89].
7. If you want to share the transport directory `trans` from another system, export [page 111] this directory to your installation hosts.
8. You install the SAP front-end software [page 89] on the desktop of the user.
9. If required, you configure host names for the SAP HANA database [page 90].

10. To establish a secure connection to your SAP HANA, follow the instructions in Establishing Secure Connection to the SAP HANA Database [page 90].

11. You check that the required installation software [page 93] is available for each installation host.

12. If you decided to use a generic LDAP directory, you have to create a user for LDAP directory access [page 174].

13. You continue with Installation [page 106].

Additional Application Server Instance

You have to perform the following preparations on the host where you install the additional application server instances:

1. You check that the required operating system users and groups [page 74] are created.

2. You set up file systems [page 79] and make sure that the required disk space is available for the directories to be created during the installation.

3. If you want to use virtual host names, you have to specify a virtual host name in the `<Instance_Name>` *Host Name* field of the `<Instance_Name>` *Instance* . For more information, see *Virtual Host Name* in Basic Installation Parameters [page 46]).

4. If you want to share the transport directory `trans` from another system, export [page 111] this directory to your installation hosts.

5. You install the SAP front-end software [page 89] on the desktop of the user.

6. You check the time zones of the ABAP application server and the SAP HANA system [page 92].

7. You check that the required installation software [page 93] is available on each installation host.

8. You continue with Installation [page 106].

4.2   Installing the SAP HANA Database

Make sure that the SAP HANA database has been installed before you start the SAP system installation.

For more information about how to install the SAP HANA database, see the SAP HANA Server Installation and Update Guide at https://help.sap.com/hana_platform ▶ ▶ *Implement* ▶ *Installation and Upgrade* ▶.

To make sure that the installed SAP HANA database has the required minimum version for Software Provisioning Manager 2.0, see SAP Note 2610954 .

The SAP HANA database is normally part of the SAP HANA appliance. It is normally pre-installed by SAP partners before you start the installation using Software Provisioning Manager (the "installer"). The installer accesses the SAP HANA database remotely to perform the necessary database-specific installation steps.

Optional, Standard Systems on Linux only: Installing a Standard System on One Linux Host

If you are installing a standard system **on one Linux host**, you can install your SAP system on the **same host** as the SAP HANA database. In this case, you must make sure that you include the RAM requirements for the SAP HANA database instance. For more information, see Requirements for the SAP System Hosts [page 34].

By default, Software Provisioning Manager is able to install the SAP HANA database and the instances of the SAP system in one run under certain circumstances:

- If you only want to install a Standard System [page 15], you do **not** need to install the SAP HANA database beforehand, because it is installed automatically during the installation with Software Provisioning Manager. However, you must configure the SAP HANA maximum memory settings after the installation has completed.
  Optionally, you **can** install the SAP HANA database using the SAP HANA installer (hdblcm) tool beforehand. For more information, see the SAP HANA Server Installation and Update Guide. You also need to configure the SAP HANA maximum memory settings.
- If you want to perform a High-Availability System [page 19] , you **must** install the SAP HANA database using the SAP HANA installer (hdblcm) tool beforehand. For more information, see the SAP HANA Server Installation and Update Guide. You also need to configure the SAP HANA maximum memory settings.

Only software installed by certified hardware partners, or any person holding certification, is recommended for use on the SAP HANA system. Do not install any other software on the SAP HANA system. The components of SAP HANA can only be installed by certified hardware partners, or any person holding certification. Furthermore, it must be installed on validated hardware running an approved operating system.

For more information, see the blogs *SAP Certified Technology Associate: C_HANATEC_13 – by the SAP HANA Academy* and *Recent changes in the SAP HANA Technology certification program 2016* in the *Related Information* section.

> ⚠ Caution
>
> If you are installing a standard system **on one Linux host**, you can install your SAP system on the **same host** as the SAP HANA database.
>
> In this case, you must use a **different** SAP system ID (SID) for the SAP HANA database than the one you later specify for the installation of the AS ABAP system.
>
> .

To install the SAP HANA database beforehand, proceed as follows:

Prerequisites

- You use the tool `hdblcm` or the GUI version `hdblcmgui` to install SAP HANA. In this documentation we use `hdblcm`.
- You must run the installer (`hdblcm` or `hdblcmgui`) as `root` user from the following directory where you downloaded and extracted the installation medium or software packages, such as from one of the following:
  - `<Media root directory>/DATA_UNITS/HDB_LCM_LINUX_X86_64`
  - `<Media root directory>/DATA_UNITS/HDB_LCM_LINUX_PPC64LE`
  - `<Media root directory>/DATA_UNITS/HDB_LCM_LINUX_PPC64`

Procedure

1. Change to the directory containing hdblcm and enter the command `hdblcm` to start the installation.

2. Choose *Install new system* and select the additional components required:

SAP HANA Studio	Installs the components of the SAP HANA Studio
SAP HANA Lifecycle Manager	Installs the components of the SAP HANA Studio
SAP HANA Database Client	Installs the components of the SAP Database Client

3. Specify the required installation parameters.
   In most cases you can accept the default values unless you have specific requirements, such as for the SAP system ID.

Result

You installed an SAP HANA database and now you are ready to install AS ABAP.

Next Steps

If required, you can check that the SAP Host Agent is running although it should normally be running automatically. For more information about the SAP Host Agent, see SAP Note 1031096 .

4.3   Setting Connectivity Data for the SAP HANA Database

An SAP ABAP system needs connectivity data to log on to the SAP HANA database. This section describes methods for setting up connectivity data.

For SAP HANA database, you can set up the connectivity data using the following methods:

* Local hdbuserstore container (default method)
  The local hdbuserstore container has always been available with SAP HANA. It is used in all versions of software provisioning manager. It is the default when you are doing an installation of SAP HANA or a migration to SAP HANA. One hdbuserstore is created for each host for which you installing an ABAP instance.
  The hdbuserstore is stored in the home directory of the user in the sub-folder `.hdb/<hostname>`.
  Therefore, even if the `<SID>adm` user has a shared home directory, every host has its own hdbuserstore.
  You can trace the connect method of R3trans by checking the log file `trans.log`.
  The disadvantage of this method is that there is one hdbuserstore container on each SAP application server. This means that, if you want to change the connectivity data, you have to log on to each server of the system and change the data separately on each server.
  To use this method, you need take no further action since it is the default.
* Global hdbuserstore container
  As of SAP HANA Database Revision 93 for clients, you can now store hdbuserstore in a central location. The storage location for this method is defined by the value of the environment variable `HDB_USE_IDENT` (that is, hostname is not used in this method). hdbuserstore is stored in the user's home directory at the following location:
  `/home/<sid>adm/.hdb/<HDB_USE_IDENT>`
  `HDB_USE_IDENT` is the successor to the method that uses a file called `installation.ini` to set a folder name by using a virtual hostname.

> **⋮⋮ Example**
>
> Check the value of the environment variable `HDB_USE_IDENT`:
>
> `plx101:cooadm 14>` **`echo $HDB_USE_IDENT`**
>
> `SYSTEM_GTI`
>
> Now you can see that hdbuserstore is stored in a directory called `SYSTEM_GTI`:
>
> `plx101:cooadm 15>` **`hdbuserstore list`**
>
> `DATA FILE : /home/cooadm/.hdb/SYSTEM_GTI/SSFS_HDB.DAT`

By using this method, a global identifier stored in `DEFAULT.PFL` supports a single unified hdbuserstore in a shared home directory of user `<sid>adm`.

To use this method, you start the installation with the parameter `HDB_USE_IDENT`. For more information, see Running the Installer [page 119].

- If you want to use virtual host names, you must start the installer with the `SAPINST_USE_HOSTNAME` parameter.
  For more information, see Running the Installer [page 119].
- ABAP secure storage in the file system (SSFS)
  ABAP SSFS is a database-independent method of storing data located inside the SAP system. For more information, see SAP Note 1639578 .
  To use this method, you start the installation with the parameter `HDB_ABAP_SSFS=YES`. For more information, see Running the Installer [page 119].
  Note that only SAP kernel tools can read from ABAP SSFS. This means that SAP HANA client tools such as hdbsql cannot use ABAP SSFS. Therefore, you might want to choose one application server where you still maintain one hdbuserstore container.

4.4 Creating Operating System Users and Groups

During the installation, the installer checks all required accounts (users, groups) and services on the local machine. The installer checks whether the required users and groups already exist. If not, it creates new users and groups as necessary.

The `sapinst_instdir` directory belongs to a group named `sapinst`. If this group is not available, it is created automatically as a local group.

If you do not want the installer to create operating system users, groups, and services automatically, you can optionally create them **before** the installation is started. This might be the case if you use central user management such as Network Information System (NIS).

For distributed installations, unless you are using global accounts or NIS, you must create the target users automatically using the installer or manually on the operating system, before starting the installation :

> **⚠ Caution**
>
> The user ID (UID) and group ID (GID) of SAP users and groups must be identical for all servers belonging to an SAP system.

> This does not mean that all users and groups have to be installed on all SAP servers.

The installer checks if the required services are available on the host and creates them if necessary. See the log messages about the service entries and adapt the network-wide (NIS) entries accordingly.

The installer checks the NIS users, groups, and services using NIS commands. However, the installer does **not** change NIS configurations.

> → Recommendation
>
> For a distributed or a high-availability system, we recommend that you distribute account information (operating system users and groups) over the network, for example by using Network Information Service (NIS).

If you want to use global accounts that are configured on a separate host, you can do this in one of the following ways:

- You start the installer and choose ▐▶ *Generic Installation Options* ❯ `<Database>` ❯ *Preparation* ❯ *Operating System Users and Groups* ❯ .
  For more information, see Running the Installer [page 119].
- You create operating system users and groups manually. Check the settings for these operating system users.

User Settings

- Only valid for 'Platform': Oracle Solaris
  Oracle Solaris: If your operating system is Oracle Solaris 10 or higher, follow the parameter recommendations for SAP applications in SAP Note 724713 .
  End of 'Platform': Oracle Solaris

- Only valid for 'Platform': AIX
  AIX: Make sure that you have set the limits for operating system users as described in SAP Note 323816 .
  End of 'Platform': AIX

- Only valid for 'Platform': HP-UX, Linux, Oracle Solaris
  HP-UX, Linux, Oracle Solaris: Make sure that you have set the limits for operating system users root, `<sapsid>`adm, and your database-specific operating system users .

  > ⚠ Caution
  >
  > Caution: the `limit` mechanism supports hard and soft limits. The soft limit cannot be bigger than the hard limit. The hard limit can be set/increased by the root user like: **`limit -h <limit> <new_value>`**, for example **`limit -h datasize unlimited`** .

  - Using `csh` shell, the output of command `limit` needs to be at least as follows:

    > ⁙ Example
    >
    > The following table lists example output taken from SUSE Linux Enterprise Server 11 (x86_64).

Output	Properties
cputime	unlimited
filesize	unlimited
datasize	unlimited
stacksize	8192 KB
coredumpsize	unlimited
descriptors	8192
memoryuse	unlimited

○ Using `sh` or `ksh` shell, the output of command `ulimit -a` needs to be at least as follows:

⁂ Example

The following table lists example output taken from SUSE Linux Enterprise Server 11 (x86_64).

Output sh	Output ksh	Properties
cpu time (seconds)	cpu time (seconds)	unlimited
file size (blocks)	file size (blocks)	unlimited
data seg size (kbytes)	data size (Kibytes)	unlimited
stack size (kbytes)	stack size (Kibytes)	8192 KB
core file size (blocks)	core file size (blocks)	unlimited
open files	nofile	8192
max memory size (kbytes)	max memory size (Kibytes)	unlimited

End of 'Platform': HP-UX, Linux, Oracle Solaris

- All users **must** have identical environment settings. Any change to the environment – such as variables, or paths – is at your own responsibility.
- If you have multiple operating system users with user ID (`UID`) 0, you must assign the `sapinst` group to all of them.
- Do **not** delete any shell initialization scripts in the home directory of the operating system users. This applies even if you do not intend to use the shells that these scripts are for.
- If you install an SAP system with instances distributed over several hosts, make sure that the following requirements are met:
  ○ The user ID (UID) and group ID (GID) of each operating system user must be unique and the same on each instance host that belongs to the same SAP system.

- Make sure that the group ID of group `sapinst` is always different from the group ID of any other group (for example, of group `sapsys`) used during the installation.
  For example, if you want to install an additional application server instance for an existing SAP system, you must make sure that the group ID of group `sapinst` created on the host of the additional application server instance is different from the group ID of any other group on the primary application server instance host of the existing SAP system.
  - If you use local operating system user accounts instead of central user management (for example, NIS), users `<sapsid>adm`, `sapadm`, and the database operating system user must have the same password on all hosts.
- If you create operating system users manually or use already existing operating system users, make sure that the home directory for each of these users is **not** the root directory (`/`).
- Make sure that the home directory of user `<sapsid>adm` is not critical for recursive changes on permissions.
  When operating system users are created by the installer, the permissions on the home directories of these users are changed recursively. This can cause unpredictable errors if you define a critical home directory. For example, the home directory must **not** be `/` or `/usr/sap`.
- Only valid for 'Platform': HP-UX

  HP-UX: To prevent terminal query errors in the `<sapsid>adm` environment, comment out the line `eval 'tset -s -Q -m ':?hp'` in the `/etc/skel/.login` script. For more information, see SAP Note 1038842 .

  End of 'Platform': HP-UX

Operating System Users and Groups

The installer chooses available operating system user IDs and group IDs unless you are installing an additional application server instance. On an additional application server instance you have to enter the same IDs as on the host of the primary application server instance.

If you have multiple operating system users with user ID (`UID`) 0, you must assign the `sapinst` group to all of them.

> → Recommendation
>
> For security reasons, we recommend that you remove the operating system users from the group `sapinst` **after** the installer has completed. For more information, see Ensuring User Security [page 157].
>
> We recommend that you specify this "cleanup" already during the *Define Parameters* phase on the *Cleanup Operating System Users* screen. Then, the removal of the operating system users from the group `sapinst` is done automatically. For more information, see *Cleanup of Operating System Users* in SAP System Parameters [page 48].

Users and Groups

User	Primary Group	Additional Group	Description
root	None	sapinst	Superuser of the UNIX operating system

User	Primary Group	Additional Group	Description
`<sapsid>adm`	`sapsys`	`sapinst`	SAP system administrator

Groups and Members

Groups	Members
`sapsys`	`<sapsid>adm`
`sapinst`	`root,<sapsid>adm`

SAP Host Agent:

User and Groups of the SAP Host Agent

User	Primary Group	Additional Group	Comment
`sapadm`	`sapsys`	–	SAP Host Agent administrator
			i Note
			If `sapadm` does not exist, it is created during the SAP Host Agent installation using `/bin/false` shell.
			Make sure that `/bin/false` can be used as a login shell.
			Only valid for 'Platform': AIX
			AIX: Add `/bin/false` to the list of valid login shells (attribute `shells`) in `/etc/security/login.cfg`.
			End of 'Platform': AIX

Groups and Members of the SAP Host Agent User

Groups	Members
`sapsys`	`sapadm`
`sapinst`	`sapadm`

4.5   Required File Systems and Directories

> **i Note**
>
> The installation of any SAP system does not require a special file system setup or separate partitions.

Related Information

4.5.1 SAP Directories

Depending on the installation option you have chosen, the installer automatically creates the directories listed in the following figures and tables. Before running the installation, you have to set up the required file systems manually. In addition, you have to make sure that the required disk space for the directories to be installed is available on the relevant hard disks.

The installer creates the following types of directories:

- Physically shared directories
- Logically shared directories
- Local directories

Only valid for 'Platform': HP-UX

HP-UX only: For recommendations about block size and mount option configuration, see SAP Note 1077887 ⤤ .

End of 'Platform': HP-UX

Directories of the SAP System

The figure below assumes that you have set up one file system for the SAP system mount directory `<sapmnt>` and one file system for the `/usr/sap` directory. However, you have to decide for which directories you want to set up separate file systems. If you do not set up any file system on your installation host, the installer creates all directories in the root directory (`/`). A high-availability setup might influence the file system structure. Contact your HA partner for their recommendation. For more information, see Setting Up File Systems for a High-Availability System [page 84] .

The installer prompts you only for the `<sapmnt>` directory during the installation.

The following figures show the directory structure of SAP ABAP system:

All application server instances, including the primary application server instance, are named
`D<Instance_Number>`.
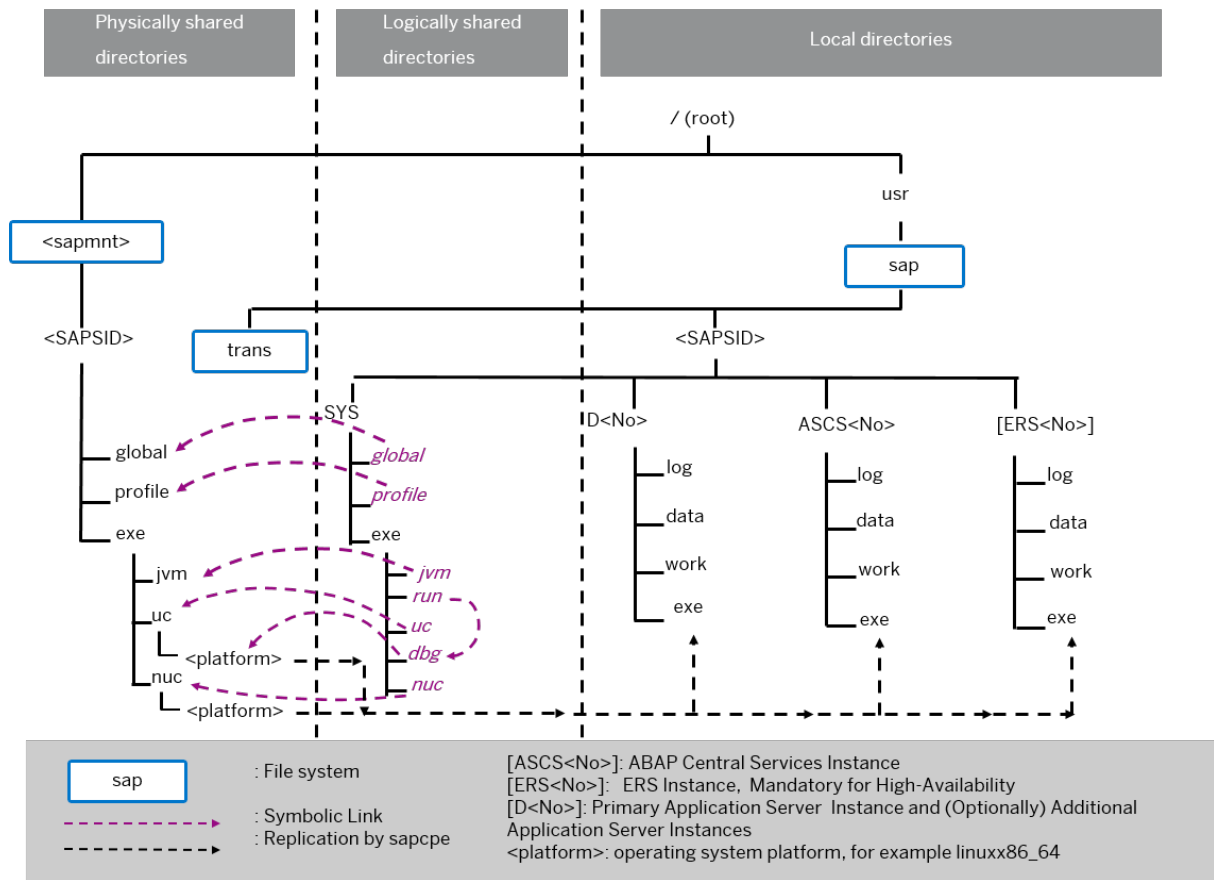
Directory Structure for an SAP ABAP System

Physically Shared Directories (SAP System)

Physically shared directories reside on the global host and are shared by Network File System (NFS). The installer creates the following directories:

- The directory `/<sapmnt>/<SAPSID>`, which contains SAP kernel and related files, is created on the first installation host. Normally, the first installation host is the host on which the central services instance is to run, but you can also choose another host for , which is the global transport directory. `/<sapmnt>/<SAPSID>`.
  You need to manually share this directory with Network File System (NFS) and – for a distributed system such as a high-availability system or a system with additional application server instances – mount it from the other installation hosts.
  The installer creates the following shared subdirectories in `/<sapmnt>/<SAPSID>`, which is the during the SAP system installation. If you install an SAP system with instances distributed over several hosts, you have to share these directories for all hosts with the same operating system (see Exporting and Mounting Global Directories [page 113]):
  - `global`
  - `profile`
    Contains the profiles of all instances
  - `exe`

○ Contains a folder `uc` and a folder `nuc`, each with a platform-specific subfolder:

○ `<sapmnt>/<SAPSID>/exe/uc/<platform>` is used in Unicode systems.
Executable kernel programs are replicated from this directory to the `exe` directories of each Unicode system instance.

○ `<sapmnt>/<SAPSID>/exe/nuc/<platform>` is used in non-Unicode systems (see below).
Executable kernel programs are replicated from this directory to the `exe` directories of each non-Unicode system instance (see below).

○ Contains a folder `jvm` with the SAP JVM files

- The directory `/usr/sap/trans`
If you want to use an existing transport directory, you have to mount it before you install the relevant application server instance. Otherwise, the installer creates `/usr/sap/trans` locally.

> → Recommendation
>
> We recommend that you set up your global transport directory as a shared file system.

For more information about the global transport directory, see Exporting and Mounting the Global Transport Directory [page 111].

Physically Shared SAP Directories

Directory	Required Minimum Disk Space
`/<sapmnt>/` `<SAPSID>`	Minimum 2.5 GB
`/usr/sap/trans`	This value heavily depends on the use of your SAP system. For production systems, we recommend to use as much free space as available (at least 2 GB), because the space requirement normally grows dynamically. For the installation, it is sufficient to use 2 GB for each SAP system instance. You can enlarge the file system afterwards.

Logically Shared Directories (SAP System)

Logically shared directories reside on the local hosts with symbolic links to the global host. The installer creates the directory `/usr/sap/<SAPSID>/SYS` on each host.

This directory contains the following symbolic links to physically shared directories:

- Symbolic link `profile` points to `/<sapmnt>/<SAPSID>/profile`
- Symbolic link `global` points to `/<sapmnt>/<SAPSID>/global`

This directory contains the `exe` subdirectory with symbolic links pointing to the corresponding subdirectories of `/<sapmnt>/<SAPSID>/exe` on the SAP global host:

- Symbolic link `uc` (for Unicode) points to `/<sapmnt>/<SAPSID>/exe/uc`
- Symbolic link `nuc` (for non-Unicode) points to `/<sapmnt>/<SAPSID>/exe/nuc`
- Symbolic link `run` points to another symbolic link `/usr/sap/<SAPSID>/SYS/exe/dbg` in the same directory, and symbolic link `dbg` finally points to `/<sapmnt>/<SAPSID>/exe/uc/<platform>`

Whenever a local instance is started, the `sapcpe` program checks the executables against those in the logically shared directories and, if necessary, replicates them to the local instance.

The installer uses `sapcpe` to replicate the kernel automatically from `/usr/sap/<SAPSID>/SYS/exe/run/DIR_CT_RUN` to `/usr/sap/<SAPSID>/<INSTANCE>/exe/DIR_EXECUTABLE` for each SAP system instance.

Local Directories (SAP System)

The installer also creates local directories that reside on the local hosts. The directory `/usr/sap/<SAPSID>` contains files for the operation of a local instance as well as symbolic links to the data for one system. This directory is physically located on each host in the SAP system and contains the following subdirectories:

- `SYS`

  > **i** Note
  >
  > The subdirectories of `/usr/sap/<SAPSID>/SYS` have symbolic links to the corresponding subdirectories of `/<sapmnt>/<SAPSID>`, as shown in the figure above.

- Instance-specific directories with the following names:
  - **SAP systems based on SAP NetWeaver 7.5 and higher:** The directory of an application server instance (primary application server instance and additional application server instances) is called `D<Instance_Number>`.
- The directory of the ABAP central services instance (ASCS) instance is called `ASCS<Instance_Number>`.
- The directory of an ERS instance is called `ERS<Instance_Number>`.
  If you install a high-availability system, you must install an ERS instance for the ASCS instance.

Local SAP Directories

Directory	Description	Required Minimum Disk Space
`/usr/sap/<SAPSID>/D<Instance Number>`	Primary application server instance directory	- SAP Business Warehouse server only: minimum 25 GB - Other installations: minimum 4 GB
`/usr/sap/<SAPSID>/D<Instance Number>`	Additional application server instance directory	- SAP Business Warehouse server only: minimum 25 GB - Other installations: minimum 4 GB
`/usr/sap/<SAPSID>/ASCS<Instance Number>`	ABAP central services instance (ASCS instance) directory	Minimum 2 GB
`/usr/sap/<SAPSID>/ERS<Instance Number>`	ERS instance directory for the ASCS instance (high availability only)	Minimum 2 GB

Directories of the SAP Host Agent

The SAP Host Agent has only local directories as shown in the following figure:
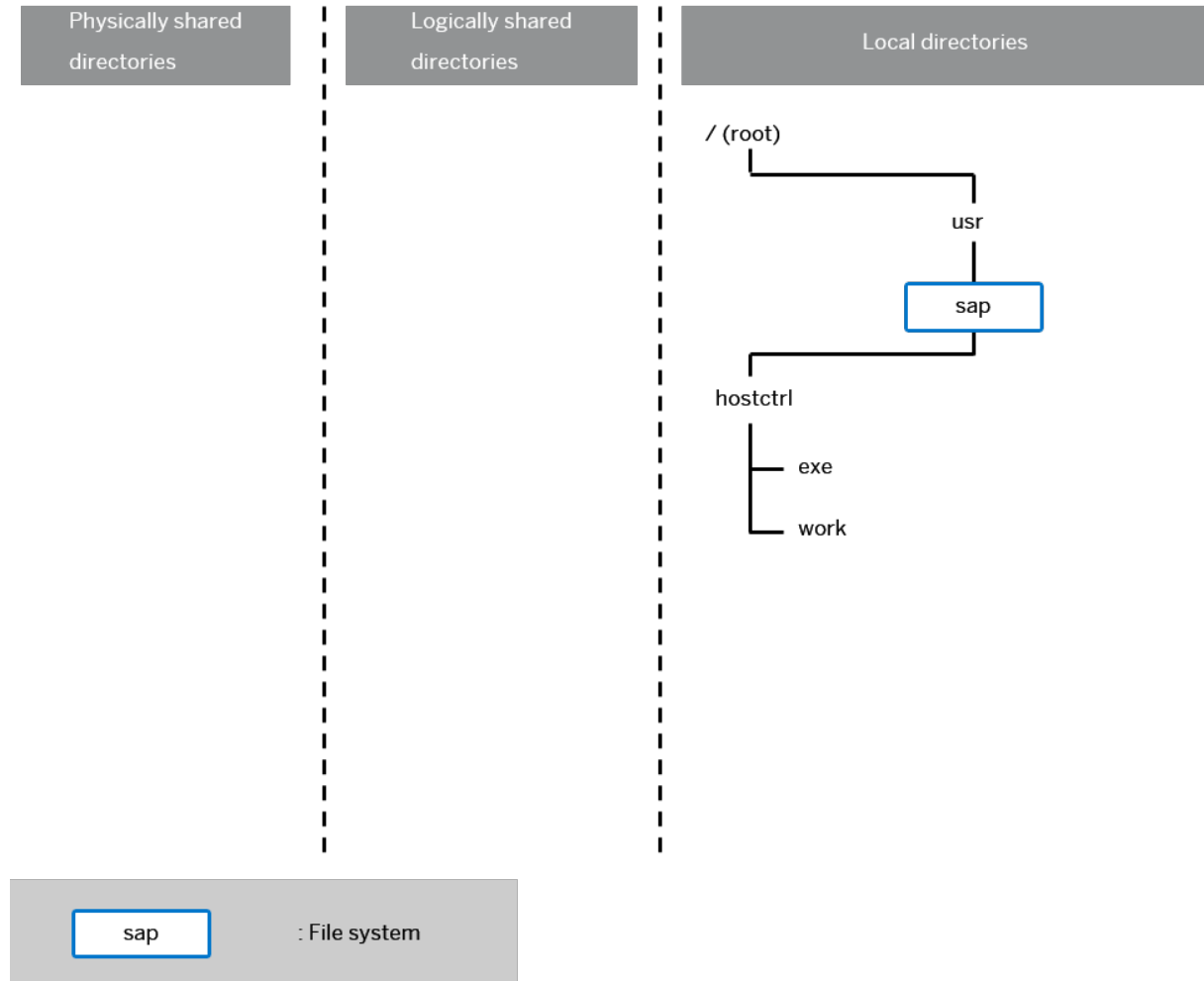
Directory Structure for the SAP Host Agent

Local Directories (SAP Host Agent)

The SAP Host Agent directory `/usr/sap/hostctrl` requires 100 MB of disk space. It contains the following subdirectories:

- `exe`
  Contains the profile `host_profile`
- `work`
  Working directory of the SAP Host Agent

4.5.2 SAP HANA Database Client Directories

The SAP HANA database client can be installed in one of the following ways:

- As a Local Client Directory:
  Then the filepath is `/usr/sap/<SAPSID>/hdbclient`
- As a Central Client Directory:
  Then the filepath is `$DIR_CT_RUN/hdbclient`. In this case, `sapcpe` is enabled for the client software. When the instance is restarted, the client is updated automatically.

For the space required, see the table *Hardware Requirements* in Hardware and Software Requirements Tables [page 34].

> **i Note**
>
> If you are installing a standard system **on Linux**, you can install SAP systems on the **same host** as the SAP HANA database.
>
> The required file systems are created during installation of the SAP HANA database and AS ABAP . However, if required you can set them up before the installation and specify them during the installation procedure.
>
> For more information, see section *Recommended File System Layout* in the *SAP HANA Server Installation and Update Guide* at https://help.sap.com/hana ▶ ❯ `<Version>` ❯ *Installation and Upgrade* ❯ .

4.5.3 Setting Up File Systems for a High-Availability System

Third-party technology is used to make the SAP directories available to the SAP system. The technologies of choice are NFS, shared disks, and cluster file system. If you have decided to use a high-availability (HA) solution for your SAP system, make sure that you properly address the HA requirements of the SAP file systems in your SAP environment with the HA partner of your choice.

Prerequisites

You have already installed the hardware – that is, hosts, disks, and network – and decided how to distribute the database, SAP instances, and – if required – Network File System (NFS) server over the cluster nodes (that is, over the host machines). For more information, see Planning the Switchover Cluster [page 63] and contact your HA partner.

Context

From the perspective of an SAP application, there are the following types of SAP Directories [page 79]:

- Physically shared directories: `/<sapmnt>/<SAPSID>` and `/usr/sap/trans`

In an HA setup, `/<sapmnt>` should be a highly available file system, and `/usr/sap/trans` should be a shared file system.

- Logically shared directories that are bound to a node such as `/usr/sap` with the following local directories:
  - `/usr/sap/<SAPSID>`
  - `/usr/sap/<SAPSID>/SYS`
  - `/usr/sap/hostctrl`

  In an HA Setup, no special actions are required for these local directories.
- Local directories that contain the SAP instances such as `/usr/sap/<SAPSID>/ASCS<Instance Number>`.

  In an HA setup, the directories of the clustered instances (`/usr/sap/<SAPSID>/<Instance Type><Instance Number>`) should be mounted as cluster-controlled file systems and reside on highly available file systems.

HP-UX only: For recommendations about block size and mount option configuration, see SAP Note 1077887 .

Procedure

1. Create the file systems or raw partitions for the SAP instances you can switch over in such a way that the content can be made available to all nodes that can run the service. .

   At least the ABAP central services (ASCS) instance and the ERS instance must be part of the switchover cluster

   The SAP directories `/<sapmnt>/<SAPSID>` and `/usr/sap/trans` are usually mounted from a Network File System (NFS). Especially for `/<sapmnt>/<SAPSID>` you should think of using a highly available file system. However, an SAP instance directory `/usr/sap/<SAPSID>/<Instance Type><Instance Number>` that you want to prepare for HA must always be mounted on the cluster node that is currently running the instance.

   > ⚠ Caution
   >
   > To start or stop an SAP instance, you have to do one of the following:
   >
   > - Make the physically shared SAP directories under `/<sapmnt>/<SAPSID>/` available to the server beforehand.
   > - Consult your HA partner to clarify the best solution for the cluster software.

2. Use the following approach for the file system for the `/usr/sap/<SAPSID>` directory:

   The `/usr/sap/<SAPSID>` directory contains at least two subdirectories (see also SAP Directories [page 79]):

   - `SYS/sapmnt/<SAPSID>`
   - `<Instance Type> <Instance Number>` – where the name is defined by the type of services and the application server number:
     - `D<Instance Number>` – which contains the data for the primary application server instance or an additional application server instance

- `ASCS<Instance Number>` – which contains data for the ABAP central services instance (ASCS instance)
- `ERS<Instance Number>` – which contains the replication table, which is a copy of the lock table

Only `<Instance Type><Instance Number>` directories of clustered instances need to be migrated with the SAP instances during the switchover.

Create cluster-controlled file systems for `/usr/sap/<SAPSID>/<Instance Type><Instance Number>` of clustered instances.

The instance-specific directory name for the ABAP central services instance is normally `ASCS<Instance Number>`. Migrating only these directories avoids mount conflicts when switching over to a node on which another application server instance is already running. The `ASCS<Instance Number>` directory can join the `/usr/sap/<SAPSID>` tree instead of mounting on top of it. The same is true for all other clustered instances.

> ℹ **Note**
>
> This approach becomes increasingly important when you want to cluster the central services instances with other local instances running on the cluster hosts outside the control of the switchover software. This applies to the ERS instance and additional ABAP application server instances. The result is a more efficient use of resources. Use this approach for integrated installations of the application server with ABAP stacks.

3. You assign the **local** (not switching) file systems to **permanent** mount points.
4. You assign the **shared** file systems as documented by your HA partner.

Example

The graphic below shows a scenario of the file systems and disks in an HA setup with an integrated NFS server. Such a setup is not mandatory. For more information about a setup that meets your needs, consult your HA partner.

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Installation of SAP ABAP Systems on UNIX : SAP HANA 2.0 Database - Using Software
Provisioning Manager 2.0
Preparation

Local Disks – Node A

- usr
  - sap
    - <SAPSID>
      - SYS
        - global
        - profile
        - exe
- export
  - sapmnt
    - S
    - Node B fails
- sapmnt
  - <SAPSID>

Optional

Shared Disks

<SAPSID>
- global
- profile
- exe

ERS
- log
- data
- exe

ASCS
- work
- log
- data
- exe

Local Disks – Node B

- sapmnt
  - <SAPSID>
- export
  - sapmnt
    - S
    - Node A fails
- usr
  - sap
    - <SAPSID>
      - SYS
        - global
        - profile
        - exe

Optional

PAS
- log
- exe
- work

AAS
- log
- exe
- work

Key

→ Mount point *before* switchover

S → Mount point *after* switchover

---→ NFS mount point

File Systems and Disks in an HA Setup

4.6　Using Virtual Host Names

You can use one or more virtual `TCP/IP` host names for SAP servers within an SAP server landscape to hide their physical network identities from each other. This can be useful when quickly moving SAP servers or complete server landscapes to alternative hardware since you do not need to reinstall or reconfigure.

Prerequisites

Make sure that the virtual host name can be correctly resolved in your Domain Name System (DNS) setup.

Context

If you want to install a high-availability (HA) system [page 19], you need the virtual host name when you install the ASCS instance in a cluster.

Procedure

Assign the required virtual host names to the instance to be installed by specifying them in one of the following ways:

○ By starting the installer with the `SAPINST_USE_HOSTNAME` property. For more information, see Running the Installer [page 119].
○ Alternatively by specifying vitual host names in the `<Instance Name>` *Host Name* field of the `<Instance Name>` *Instance* screen.

For more information, see the *Virtual Host Name* parameter description in SAP System Parameters [page 48] and SAP Note 962955 .

4.7 Performing Switchover Preparations for High Availability

You have to assign virtual host names to prepare the switchover for high-availability.

Context

To be able to use the required virtual host names [page 88], you must set the installer property `SAPINST_USE_HOSTNAME` to specify the required virtual host name. You can do this in one of the following ways:

- By starting the installer with the `SAPINST_USE_HOSTNAME` property. For more information, see Running the Installer [page 119].
- Alternatively by specifying vitual host names in the `<Instance Name>` *Host Name* field of the `<Instance Name>` *Instance* screen.

For more information, see *Virtual Host Name* in SAP System Parameters [page 48].

Procedure

Assign the virtual IP addresses and host names for the ASCS instance, and (if required) NFS to appropriate failover groups.

> **i Note**
>
> For more information on virtual addresses and virtual host names and how to assign resources to failover groups, ask your HA partner.

4.8 Installing the SAP Front-End Software

Before you start the installation, make sure that the SAP front-end software is installed on at least **one** computer in your system environment to be able to log on to the SAP system after the installation has finished.

Procedure

1. Check SAP Note 147519 for the recommended SAP front-end release.

2. Install the SAP front-end software required for your SAP system release as described in the documentation *SAP Frontend Installation Guide - <Release>* at: https://wiki.scn.sap.com/wiki/display/ATopics/SAP+GUI +Family

4.9 Configuring Host Names for the SAP HANA Database

You need to perform this procedure if you want to use virtual host names or if your SAP HANA database is located in a separate network.

Context

During the *Define Parameters* phase, the installer prompts you for the parameters to connect to your SAP HANA database. However, the database host name that you enter is not used for the user store. Instead, the external host name of the database is determined and subsequently used. If the SAP HANA database was installed using a virtual host name and you want this host to be used in the user store connection environment, make sure the host can be resolved from the installation host as well.

Procedure

Make sure that the external host name of the database is correctly maintained.

For more information on how to do this, see SAP Note 1930853 or section *Mapping Host Names for Database Client Access* in the *SAP HANA Administration Guide*, available here:

https://help.sap.com/viewer/p/SAP_HANA_PLATFORM ▸ *Administration*

4.10 Establishing Secure Connection to the SAP HANA Database

You can establish a secure connection to the SAP HANA database.

You can accomplish this in one of the following ways:

- Use the installer to configure the SAP system instances to use the Transport Layer Secure (TLS)/Secure Sockets Layer (SSL) protocol to secure connections of to the SAP HANA database.
- Configuring your SAP HANA database to force all clients to use a secured connection and to validate all client connection.

Prerequisites

For enabling SAP HANA SSL, at least SAP HANA Client 2.0 SPS04 is required. For more information, see SAP Note 2784500 .

4.10.1 Applying Self-signed Certificates while Running the Installer

The installer can configure the SAP system instances to use the Transport Layer Secure (TLS)/Secure Sockets Layer (SSL) protocol to secure connections of to the SAP HANA database. Self-signed certificates are generated to setup the secure environment for your system using the SAP Cryptographic Library `CommonCryptoLib`.

Context

If you want to secure your SAP system database connection to the SAP HANA database, TLS/SSL must be configured on both server and client side.

For more information, see section *Configuring Clients for Secure Connections* in the documentation SAP HANA Client Interface Programming Reference.

Procedure

On the *Database for SAP System* screen, select checkbox *Connect using SSL* and enter the required encryption parameters when requested by the installer. For more information, see SAP Note 2891130 .

4.10.2 Configuring SAP HANA Encryption Parameters

Depending on how you have specified parameter `sslEnforce`, the installer will configure the connection of the SAP system instances to the SAP HANA database.

Context

Due to enhanced security standards, you can set up your SAP HANA database using parameter `sslEnforce` in a way that SAP system instances are only allowed to access it using secured and encrypted connections.

For more information, see the information about parameter `sslEnforce` in section *Enforced TLS/SSL for Client Connections* in the SAP HANA Security Guide at: https://help.sap.com/viewer/p/ SAP_HANA_PLATFORM ▌❯ *Security* ❯

Procedure

1. Start the SAP HANA Database Studio as described in the SAP HANA Administration Guide at: https:// help.sap.com/viewer/p/SAP_HANA_PLATFORM ▌❯ *Administration* ❯
2. If not yet done, add your SAP HANA database system .
3. Log on as user `SYSTEM`.
4. Choose *Configuration*
5. Filter for the **sslenforce** parameter and change the value according to your requirements.

   Default is `false`.

4.11 Checking Time Zones

Before you start the installer, you need to check time zone settings.

Context

Before you start the installer, compare the following time zone settings:

- The time zone of the target host for the ABAP application server
- The time zone of the `<sid>adm` user of the SAP HANA system
  Check the relevant SAP HANA time zone by logging on to the system at the command line with your user `<sid>adm` and then using command **date**.

Procedure

If the systems have different time zones, proceed as follows:

○ Change the time zone of the ABAP system (recommended solution)
○ If the time zone of the ABAP system cannot be changed, change the time zone of the SAP HANA system. For more information, see https://help.sap.com/viewer/p/SAP_HANA_PLATFORM 🔗 *Installation and Upgrade* ❯ *SAP HANA Server Installation and Update Guide* ❯

4.12 Getting the Installation Software

This section provides information about how to get the required installation archives and software.

> **i Note**
>
> The signature of **installation archives and installation media** is checked **automatically** by the installer during the *Define Parameters* phase while the *Software Package Browser* or *Media Browser* screens are processed (see also Running the Installer [page 119]). The installer only accepts archives and media whose signature has been checked. For more information, see SAP Note 2393060 🔗.

1. Download and extract the Software Provisioning Manager 2.0 archive. [page 94]
   The Software Provisioning Manager 2.0 archive is required on each installation host. Make sure that you always download the latest version.
2. Download the SAP Kernel [page 95].
   SAP BW/4HANA 1.0 SR1 only: You can either download the SAP Kernel archives separately or download the complete SAP Kernel medium. We recommend downloading the SAP Kernel archives instead of using the complete SAP Kernel medium because the installer verifies each archive separately.
   ○ Downloading the SAP Kernel Archives (Archive-Based Installation) [page 96]
   ○ Downloading the Complete SAP Kernel Medium (Only Valid for SAP BW/4HANA 1.0 SR1) [page 97]
   The SAP Kernel archives are required for the installation of the ASCS instance and of each application server instance.
   If you perform the installation using a stack configuration file, you can use the installer to download the SAP Kernel archives from a Maintenance Planner transaction. For more information, see Downloading Software Packages for a Maintenance Planner Transaction [page 99].
3. Download the SAP HANA database client software [page 101].
   The RDBMS media and archives are required for the installation of the SAP HANA database on the SAP HANA host. For more information, see Installing the SAP HANA Database [page 71].

> **i Note**
>
> If you are installing a standard system **on one Linux host**, you can install your SAP system on the **same host** as the SAP HANA database. For more information, see SAP Note 1953429 🔗. In this case, you must make sure that the SAP HANA database RDBMS media are also available on the installation host.

The SAP HANA database client software is required for the installation of each application server instance.

4. Downloading the Database Installation Export and Languages Software [page 104]. The installation export media are required for the installation of the primary application server instance on the primary application server instance host, and for the SAP HANA database on the SAP HANA host.

4.12.1 Downloading and Extracting the Software Provisioning Manager 2.0 Archive

You must always download and extract the Software Provisioning Manager 2.0 archive from the SAP Software Download Center because you must use the latest version.

Context

You require the `SAPCAR` tool to be able to unpack and verify software component archives (*.SAR files). *.SAR is the format of software lifecycle media and tools that you can download from the SAP Software Download Center. For more information about how to get this tool, see the *Procedure* section below.

Procedure

1. Download the latest version of the Software Provisioning Manager 2.0 archive `SWPM20SP<Support Package Number>_<Version Number>.SAR` from:

   https://support.sap.com/sltoolset ➔ *System Provisioning* ➔ *Download Software Provisioning Manager*

2. Make sure that you use the **latest** version of the `SAPCAR` tool when manually extracting the Software Provisioning Manager archive.

   > **i Note**
   >
   > An older `SAPCAR` version might extract archive files in a wrong way and this could prevent the installer from working consistently.

   Proceed as follows to get the latest version of `SAPCAR`:

   a. Go to https://launchpad.support.sap.com/#/softwarecenter ➔ *SUPPORT PACKAGES & PATCHES* ➔ *By Category* ➔ *SAP TECHNOLOGY COMPONENTS* ➔ *SAPCAR*.
   b. Select the archive file for your operating system and download it to an empty directory.
   c. Rename the executable to **sapcar.exe**.

   For more information about `SAPCAR`, see SAP Note 212876.

3. Using the latest version of SAPCAR, you can verify the signature of the downloaded `SWPM20SP<Support Package Number>_<Version Number>.SAR` archive as follows:

   a. Get the latest version of the `SAPCRYPTOLIB` archive to your installation host as follows:

1. Go to https://launchpad.support.sap.com/#/softwarecenter ⬌ ▶ *SUPPORT PACKAGES & PATCHES* ❭ and search for "**sapcryptolib**".

2. Select the archive file for your operating system and download it to the same directory where you have put the `SAPCAR` executable.

3. Go to the `SAPCAR` directory and use the following command to extract the `SAPCRYPTOLIB` archive to the same directory where you have put the `SAPCAR` executable:

   ./sapcar -xvf sapcryptolibp_84…sar

4. Download the `Certificate Revocation List` from **https://tcs.mysap.com/crl/ crlbag.p7s** and move it to the `SAPCAR` directory.

b. Verify the signature of the downloaded `SWPM20SP<Support Package Number>_<Version Number>.SAR` archive by executing the following command:

> **i Note**
>
> Check SAP Notes 2178665 ⬌ and 2568783 ⬌ whether additional information is available.

/<Path to SAPCAR>/sapcar -tvVf <Path to Download Directory>/SWPM20SP<Support Package Number>_<Version Number>.SAR -crl<File Name of Revocation List>

4. Unpack the Software Provisioning Manager 2.0 archive to a local directory using the following command:

/<Path to SAPCAR>/sapcar -xvf <Path to Download Directory>/SWPM20SP<Support Package Number>_<Version Number>.SAR -R <Path to Unpack Directory>

> **i Note**
>
> Make sure that all users have read permissions for the directory where you want to unpack the installer.

> **⚠ Caution**
>
> Make sure that you unpack the Software Provisioning Manager archive to a dedicated folder. Do not unpack it to the same folder as other installation media or archives.

4.12.2 Downloading the SAP Kernel

This section describes how to download the SAP Kernel.

You can either download the separate *.SAR archives of the SAP Kernel or the complete SAP Kernel medium.

Related Information

Downloading the SAP Kernel Archives (Archive-Based Installation) [page 96]
Downloading the Complete SAP Kernel Medium (Only Valid for SAP BW/4HANA 1.0 SR1) [page 97]

4.12.2.1 Downloading the SAP Kernel Archives (Archive-Based Installation)

This section describes how to download the SAP kernel *.SAR archives required for an archive-based installation.

Context

The signature of **installation archives** is checked **automatically** by the installer [page 119] during the *Define Parameters* phase while processing the *Software Package Browser* screens. The installer only accepts archives whose signature has been checked. After scanning the archives and verifying the signature, an info file is written where you can find detailed information about matching and non-matching archive files. You can access this info file by choosing the *info file* link in the Archive Scanning Result section of the *Software Package Browser* screen. The info file contains only the results of the latest archive scan. For more information, see SAP Note 2393060 .

Procedure

1. Go to https://launchpad.support.sap.com/#/softwarecenter ▶ ▶ *SUPPORT PACKAGES & PATCHES* ▶ *By Category* ▶

2. Choose the required software component and release:

   ○ If you want to install SAP S/4HANA Server `<Release>`, choose ▶ *SAP APPLICATION COMPONENTS* ▶ *SAP S/4HANA* ▶ *SAP S/4HANA* `<Release>` ▶ *SAP S/4HANA SERVER* ▶

   ○ If you want to install SAP S/4HANA Foundation 1909 or higher, choose ▶ *SAP APPLICATION COMPONENTS* ▶ *SAP S/4HANA* ▶ *SAP S/4HANA* `<Release>` ▶ *SAP S/4HANA FOUNDATION* ▶ *SAP S/4HANA FOUNDATION* `<Release>` ▶

   ○ If you want to install foundation on ABAP Platform 1809, version for SAP HANA , choose ▶ *SAP APPLICATION COMPONENTS* ▶ *ABAP FND ON HANA* ▶ *ABAP FND 1809 ON HANA* ▶

   ○ If you want to install an SAP BW/4HANA 2.0 server, choose ▶ *SAP NetWeaver and complementary products* ▶ *SAP BW/4HANA* ▶ *SAP BW/4HANA 2.0* ▶ *BW/4HANA SERVER* ▶

   ○ If you want to install an SAP BW/4HANA 1.0 server, choose ▶ *SAP NetWeaver and complementary products* ▶ *SAP BW/4HANA* ▶ *SAP BW/4HANA 2.0* ▶ *BW/4HANA SERVER* ▶

3. Choose the required package:

   > **i** Note
   >
   > If you perform an additional application server installation, kernel archives - such as `SAPEXE<Version>.SAR`, `SAPEXEDB<Version>.SAR`, `IGSEXE<Version>.SAR`, `igshelper<version>.sar` - are only prompted if they cannot be retrieved from the primary application server instance or the ASCS instance of the existing SAP system.

> ⚠ **Caution**
>
> - Make sure that you always use the highest available patch level unless special patch levels are specified for the relevant package in SAP Note 2568783🔗.
> - Make sure that you always choose `SAPEXE<Version>.SAR`, `SAPEXEDB<Version>.SAR` of the **same** SAP kernel release and extension.
>
> > ❖ **Example**
> >
> > If `SAPEXE<Version>.SAR` is of version **7.81 64-BIT UNICODE**, then `SAPEXEDB<Version>.SAR` must also be of version **7.81 64-BIT UNICODE**.

- `SAPEXE<Version>.SAR`

  ▷ *SAP KERNEL* `<Version> <UC>` ▷ `<Operating System>` ▷ *#DATABASE INDEPENDENT* ▷

- `SAPEXEDB<Version>.SAR`

  Choose the version corresponding to the `SAPEXE<Version>.SAR` from ▷ *SAP KERNEL* `<Version>` `<UC>` ▷ `<Operating System>` ▷ `<DATABASE>` ▷

- `igsexe<version>.sar`

  ▷ *SAP IGS* `<Version>` ▷ `<Operating System>` ▷

- `igshelper<version>.sar`

  ▷ *SAP IGS HELPER* ▷ *# OS independent* ▷

- `SAPHOSTAGENT<Version>.SAR`

  ▷ *SAP HOST AGENT 7.21* ▷ `<Operating System>` ▷

> ℹ **Note**
>
> The `SAPHOSTAGENT<Version>.SAR` archive is only prompted if there is either no SAP Host Agent available on the installation host or you specified during the Define Parameters phase that you want to upgrade an existing version of the SAP Host Agent already available on the installation host. In the latter case, you must specify a higher version of the `SAPHOSTAGENT<Version>.SAR` .Otherwise, the existing SAP Host Agent is not upgraded.

4.12.2.2 Downloading the Complete SAP Kernel Medium (Only Valid for SAP BW/4HANA 1.0 SR1)

This section describes how to download the complete kernel medium required for the installation.

> ℹ **Note**
>
> A complete SAP kernel medium is only available for SAP systems based on SAP BW/4HANA 1.0 SR1 . For SAP systems based on ABAP Platform 1809 or higher, you can only download the SAP kernel archives [page 96].

Context

The signature of **installation media** is checked **automatically** by the installer during the *Define Parameters* phase while the *Media Browser* screens are processed (see also Running the Installer [page 119]). The installer only accepts media whose signature has been checked. For more information, see SAP Note 2393060.

Procedure

1. Create a download directory on the host where you want to run the installer.
2. You can download the complete kernel medium for your operating system as a `*.zip` file from the following path: https://launchpad.support.sap.com/#/softwarecenter ▶ ▶ *INSTALLATION & UPGRADE* ▶ *By Category* ▶ *SAP NetWeaver and complementary products* ▶ *SAP BW/4HANA* ▶ *SAP BW/4HANA 1.0* ▶ *INSTALLATION* ▶

   > **i Note**
   >
   > All download objects that are part of an installation medium have the same material number and an individual sequence number:
   >
   > `<Material_Number>_<Sequence_Number>`
   >
   > > **⁙ Example**
   > >
   > > `51031387_1`
   > >
   > > `51031387_2`
   > >
   > > `...`

3. Download the objects to the download directory.
4. To correctly re-combine the media that are split into small parts, unpack all parts into the same directory.

   In the unpacking directory, the system creates a subdirectory with a short text describing the medium and copies the data into it. The data is now all in the correct directory, the same as on the medium that was physically produced. For more information, see SAP Note 1258173.

   > **⚠ Caution**
   >
   > Make sure that you unpack each installation media to a separate folder. Do not unpack installation media to the same folder where you unpack the Software Provisioning Manager archive.
   >
   > Do not unpack installation media to the same folder where you unpack the SAP kernel archives for archive-based installation.

4.12.3 Downloading Software Packages for a Maintenance Planner Transaction

Software Provisioning Manager (the installer) is now enabled to download all software packages that have been defined in a Maintenance Planner Transaction.

> **i Note**
>
> This feature is only available if you perform an installation using a stack configuration file.

Prerequisites

Plan your new SAP system including the required Support Package level (applicable for SAP S/4 HANA, SAP NetWeaver, SAP Business Suite, and SAP Financials) as available in the Maintenance Planner and run `sapinst SAPINST_STACK_XML=<stack configuration file>` in order to benefit from an automated installation process.

Procedure

1. Specify a download directory for the artifacts (SAP archives) to be downloaded.
2. Start the installer as described in .
3. On the *Welcome* screen, choose ▌▶ *Generic Options* ❯ *Download Software Packages for Maintenance Planner Transaction* ❯
4. Follow the instructions on the installer screens.

   The installer prompts you for the following input parameters:

   ○ Maintenance Planner Transaction ID
     You can find the Maintenance Planner Transaction ID by one of the following ways:
     ○ In the `MP_Plan_<Transaction ID>_<Generation Date>_.pdf` file which you can download during the *Completed* step in the Maintenance Planner by choosing the *Download PDF* button.
     ○ From the *Transaction ID* column in the list of transactions displayed in the *Transactions* panel in the maintenance planner.
     ○ From the parameter `mopz-transaction-id` in the stack configuration file `MP_Stack_<Transaction ID>_<Generation Date>.xml` which you can download during the *Download Files* step in the Maintenance Planner by choosing the *Download Stack XML* button.

     > **i Note**
     >
     > If you started the installer using a stack configuration file, the Maintenance Planner Transaction ID is only displayed.

   ○ Your S-UserID and password

You call *Software Provisioning Manager* with command line parameter
`SAPINST_STACK_XML=<Absolute_Path_To_Stack_XML_File>` to get the *Maintenance Planner Transaction ID* extracted from the stack configuration file.
You must perform this option directly after creating the Maintenance Planner Transaction, because the contained download links usually expire soon.
Ensure the following for your *S-User*:

1. You have download permissions for all artifacts on https://launchpad.support.sap.com/#/softwarecenter to be able to download them.
2. Consider the SAP Support Portal and the SAP ONE Support Launchpad password policies : Your **password must be the same** for both of them. If the passwords are not the same, you will lock the S-User in the SAP Support Portal. The **password must meet all of the following requirements**:
   - Must be **exactly** eight characters long
   - Contains at least one upper-case letter (A-Z)
   - Contains at least one lower-case letter (a-z)
   - Contains at least one decimal digit (0-9)
   - Contains at least one of the following special characters: ! \ @ $ % / ({ [ ] }) + - * = ? ' ~ # _ . , ; : <>
   - Must not start with ? or !
   - Must not contain any blanks
   - Must not begin with three identical characters
   - Must be different from the last five passwords you have already used
   - Only one password change is allowed per day

   If required, request a change of your SAP Support Portal Password **and** of your SAP ONE Support Password at https://support.sap.com/en/my-support/users.html.

   - Location of download folder for the installation software packages to be downloaded
   - If you have a proxy configured in your network, provide the proxy host and port.
5. You get a list of all downloadable artifacts (SAP archives) as specified in the stack configuration file along with their file size.

   You can still deselect downloadable artifacts (SAP archives) that you do not need to be downloaded.
6. Choose *Next* to start the download.

   If you get a download error, this is the result of an unsuccessful network connection. Check your network connection and proxy configuration. If the download of some artifacts finishes without any error, but still with a status other than *OK*, you must do one of the following:

   - Create an up-to-date Maintenance Plan and perform again the download of the files which were not downloaded successfully. In case of an error, the installer skips the download of the artifact (SAR archive) in question and continue with the next one in the list.
   - Download the still missing files directly from the SAP Software Center at https://launchpad.support.sap.com/#/softwarecenter.

Results

You have downloaded the artifacts (SAP archives) required for your SAP system installation with Software Provisioning Manager (the installer) - corresponding to the archives listed in section Downloading the SAP

Kernel [page 95] - and for applying the required kernel and support packages using Software Update Manager (SUM) after the installation has completed.

4.12.4 Downloading the SAP HANA Database Software

This section describes how to download the SAP HANA 2.0 database client and - if you want to install your SAP system on the same host as the SAP HANA database - the SAP HANA database server software required for the installation.

Prerequisites

For enabling SAP HANA SSL, at least SAP HANA Client 2.0 SPS04 is required. For more information, see SAP Note 2784500 .

Context

For SAP systems based on ABAP Platform 1809 or higher, the SAP HANA 2.0 database RDBMS and client software is available as installation **archives**.

For SAP systems based on SAP BW/4HANA 1.0 SR1, the SAP HANA 2.0 database RDBMS and client software is available as physical installation **media**.

> **i Note**
>
> The SAP HANA database server software is only required if you are installing a standard system **on one Linux host**, you can install your SAP system on the **same host** as the SAP HANA database. For more information, see SAP Note 1953429 .

The signature of **installation archives** is checked **automatically** by the installer [page 119] during the *Define Parameters* phase while processing the *Software Package Browser* screens. The installer only accepts archives whose signature has been checked. After scanning the archives and verifying the signature, an info file is written where you can find detailed information about matching and non-matching archive files. You can access this info file by choosing the *info file* link in the Archive Scanning Result section of the *Software Package Browser* screen. The info file contains only the results of the latest archive scan. For more information, see SAP Note 2393060 .

The signature of **installation media** is checked **automatically** by the installer during the *Define Parameters* phase while the *Media Browser* screens are processed (see also Running the Installer [page 119]). The installer only accepts media whose signature has been checked. For more information, see SAP Note 2393060 .

Procedure

1. Create a download directory on the host where you want to run the installer.
2. To download SAP HANA database client software, choose the download path for your product:
   - If you want to install an SAP system based on ABAP Platform 1809 or higher, go to:
     https://launchpad.support.sap.com/#/softwarecenter ▶ *Installations & Upgrades* ▶ *By Category*
     ▶ *SAP APPLICATION COMPONENTS* ▶ *SAP S/4HANA* ▶ `<Release>` ▶ *INSTALLATION*
     Make the database client archive available on the installation host. Do **not** unpack it but just provide it
     when you are prompted during the installation process.
   - If you want to install SAP BW/4HANA 1.0 SR1, go to:
     https://launchpad.support.sap.com/#/softwarecenter ▶ *Installations & Upgrades* ▶ *By Category*
     ▶ *SAP NETWEAVER AND COMPLEMENTARY PRODUCTS* ▶ *SAP BW/4HANA* ▶ *SAP BW/4HANA 1.0* ▶
     INSTALLATION
     Unpack the ZIP archive and make it available on the installation host.

   > **i Note**
   >
   > All download objects that are part of an installation medium have the same material number and
   > an individual sequence number:
   >
   > `<Material_Number>_<Sequence_Number>`
   >
   > > **⁙ Example**
   > >
   > > 51031387_1
   > >
   > > 51031387_2
   > >
   > > . . .

   1. Download the objects to the download directory.
   2. To correctly re-combine the media that are split into small parts, unpack all parts into the same
      directory.
      In the unpacking directory, the system creates a subdirectory with a short text describing the
      medium and copies the data into it. The data is now all in the correct directory, the same as on the
      medium that was physically produced. For more information, see SAP Note 1258173 .

      > **⚠ Caution**
      >
      > Make sure that you unpack each installation media to a separate folder. Do not unpack
      > installation media to the same folder where you unpack the Software Provisioning Manager
      > archive.
      >
      > Do not unpack installation media to the same folder where you unpack the SAP kernel archives
      > for archive-based installation.

3. To download the SAP HANA 2.0 database RDBMS media, go to https://launchpad.support.sap.com/#/
   softwarecenter ▶ *Installations & Upgrades* ▶ *By Category* ▶ *SAP IN-MEMORY (SAP HANA)* ▶ *SAP
   HANA PLATFORM EDITION 2.0* ▶ *INSTALLATION* .

> **i Note**
>
> This step is only required if you are installing a standard system **on one Linux host**, you can install your SAP system on the **same host** as the SAP HANA database. For more information, see SAP Note 1953429 . Only in this case, you must make sure that the SAP HANA database RDBMS media are also available on the installation host.

- If you want to install an SAP system based on ABAP Platform 1809 or higher, download the database RDBMS archives and make them available on the installation host. Do **not** unpack it but just provide it when you are prompted during the installation process.
  Make the database client archive available on the installation host. Do **not** unpack it but just provide it when you are prompted during the installation process.
- If you want to install SAP BW/4HANA 1.0 SR1, download the database RDBMS media and make them available on the installation host.

> **i Note**
>
> All download objects that are part of an installation medium have the same material number and an individual sequence number:
>
> `<Material_Number>_<Sequence_Number>`
>
> > **Example**
> >
> > `51031387_1`
> >
> > `51031387_2`
> >
> > `...`

1. Download the objects to the download directory.
2. To correctly re-combine the media that are split into small parts, unpack all parts into the same directory.
   In the unpacking directory, the system creates a subdirectory with a short text describing the medium and copies the data into this subdirectory. The data is now all in the correct directory, the same as on the medium that was physically produced. For more information, see SAP Note 1258173 .

> **⚠ Caution**
>
> Make sure that you unpack each installation media to a separate folder. Do not unpack installation media to the same folder where you unpack the Software Provisioning Manager archive.
>
> Do not unpack installation media to the same folder where you unpack the SAP kernel archives for archive-based installation.

4. If you want to use SAP liveCache on SAP HANA, you must install the `LCAPPS` package on the database server.

   For more information, see the *SAP MaxDB Administration Guide* at https://help.sap.com/maxdb *Application Help* and SAP Note 2979266 .

4.12.5 Downloading the Database Installation Export and Languages Software

This section describes how to download the database installation export and languages required for the installation of the SAP HANA 2.0 database instance. Alternatively, you can also mount the download directory of the database installation export.

Context

Physical database installation export **media** are only available for SAP systems based on SAP BW/4HANA 1.0 SR1.

For SAP systems based on ABAP Platform 1809 or higher, the database installation export is only available as installation **archives**.

The signature of **installation archives** is checked **automatically** by the installer [page 119] during the *Define Parameters* phase while processing the *Software Package Browser* screens. The installer only accepts archives whose signature has been checked. After scanning the archives and verifying the signature, an info file is written where you can find detailed information about matching and non-matching archive files. You can access this info file by choosing the *info file* link in the Archive Scanning Result section of the *Software Package Browser* screen. The info file contains only the results of the latest archive scan. For more information, see SAP Note 2393060 .

The signature of **installation media** is checked **automatically** by the installer during the *Define Parameters* phase while the *Media Browser* screens are processed (see also Running the Installer [page 119]). The installer only accepts media whose signature has been checked. For more information, see SAP Note 2393060 .

Ensure that you make the SAP HANA database installation export available both on the SAP HANA host and on the primary application server instance host.

Procedure

1. Create a download directory.
2. Go to https://launchpad.support.sap.com/#/softwarecenter ⟩ ⟩ *INSTALLATION & UPGRADE* ⟩ *By Category* ⟩
3. Download the database installation export for the product you want to install.

   ○ For an SAP system based on ABAP Platform 1809 or higher, download the database installation export **archives** and language installation **archives** from the following path:
   ⟩ *SAP APPLICATION COMPONENTS* ⟩ *SAP S/4HANA* ⟩ *SAP S/4HANA* <Release> ⟩ *SAP S/4HANA SERVER* ⟩
   Make the database installation export archives available on the installation host. Do **not** unpack them but just provide them when you are prompted during the installation process.

   ○ For an SAP system based on SAP BW/4HANA 1.0 SR1, download the database installation export **media** and language installation **media** from the following path:
   ⟩ *SAP NetWeaver and complementary products* ⟩ *SAP BW/4HANA* ⟩ *SAP BW/4HANA 1.0* ⟩

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Preparation

> **i Note**
>
> All download objects that are part of an installation medium have the same material number and an individual sequence number:
>
> `<Material_Number>_<Sequence_Number>`
>
> > **⁂ Example**
> >
> > `51031387_1`
> >
> > `51031387_2`
> >
> > `...`

1. Download the objects to the download directory.
2. To correctly re-combine the media that are split into small parts, unpack all parts into the same directory.
   In the unpacking directory, the system creates a subdirectory with a short text describing the medium and copies the data into it. The data is now all in the correct directory, the same as on the medium that was physically produced. For more information, see SAP Note 1258173.

   > **⚠ Caution**
   >
   > Make sure that you unpack each installation media to a separate folder. Do not unpack installation media to the same folder where you unpack the Software Provisioning Manager archive.
   >
   > Do not unpack installation media to the same folder where you unpack the SAP kernel archives for archive-based installation.

5 Installation

5.1 Installation Checklist

This section includes the installation steps for the following:

- Standard system
- Distributed system
- High-availability system
- Additional application server instance

Detailed information about the steps are available in the linked sections.

> **i Note**
>
> The SAP HANA database is normally pre-installed by SAP partners before you start the installation. For more information about how to install the SAP HANA database, see the SAP HANA Server Installation and Update Guide at https://help.sap.com/hana_platform ▶ ▶ *Implement* ▶ *Installation and Upgrade* ▶. The contents of the database instance are remotely installed by SoftwareProvisioning Manager (the "installer") from the primary application server host.
>
> However, if you are installing a standard system **on Linux**, you can install SAP systems on the **same host** as the SAP HANA database, without applying additional environment settings. For more information, see SAP Systems Based on Application Server ABAP on One Host with SAP HANA Database - High-Availability Setup Based on SAP HANA System [page 181] and SAP Note 1953429 .
>
> On the *Database for SAP System* screen, enter the *Database Host* and the *Instance Number* for your SAP HANA database host. If the instance does not exist, a **new SAP HANA database instance will be installed on the same host as the SAP system.**.

Standard System

1. You check the prerequisites [page 115] and run the installer [page 119] to install the SAP system.

   > **i Note**
   >
   > In a standard system, all mandatory instances except the database instance are installed on one host.

2. You continue with Post-Installation [page 136].

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Distributed System

1. If you want to share the transport directory `trans` from another system, you have to mount [page 111] it from this system. Otherwise, we recommend that you share the `trans` directory that is created during the installation of the primary application server instance.
2. On the **ASCS instance host**, you do the following:
   1. You check the prerequisites [page 115] and run the installer [page 119] to install the ABAP central services instance (ASCS instance).

   > **i Note**
   >
   > If you want to install an ASCS instance with integrated SAP Web Dispatcher [page 25] or with integrated SAP Gateway [page 27] or both, you must choose the *Custom* parameter mode.
   >
   > When processing the screens for the ASCS instance installation, you are prompted to mark the corresponding checkbox on the screen *Additional Components to be Included in the ASCS Instance*.
   >
   > If you mark the checkbox for SAP Web Dispatcher, you are prompted for the additional parameters required for the SAP Web Dispatcher installation on the subsequent screens.

   2. You export global directories [page 113] in `<sapmnt>/<SAPSID>` to the database and primary application server instance host.
3. On the **primary application server instance host**, you do the following:
   1. You mount the global directories [page 113] in `<sapmnt>/<SAPSID>` that you exported from the SAP global host.
   2. You check the prerequisites [page 115] and run the installer [page 119] to install the contents of the database instance and then the primary application server instance.
   3. If you want to use the shared transport directory `trans` from another system, you also mount [page 111] this directory.
4. You continue with Post-Installation [page 136].

Graphical Overview

The following figure shows how you install the various instances in a distributed system:
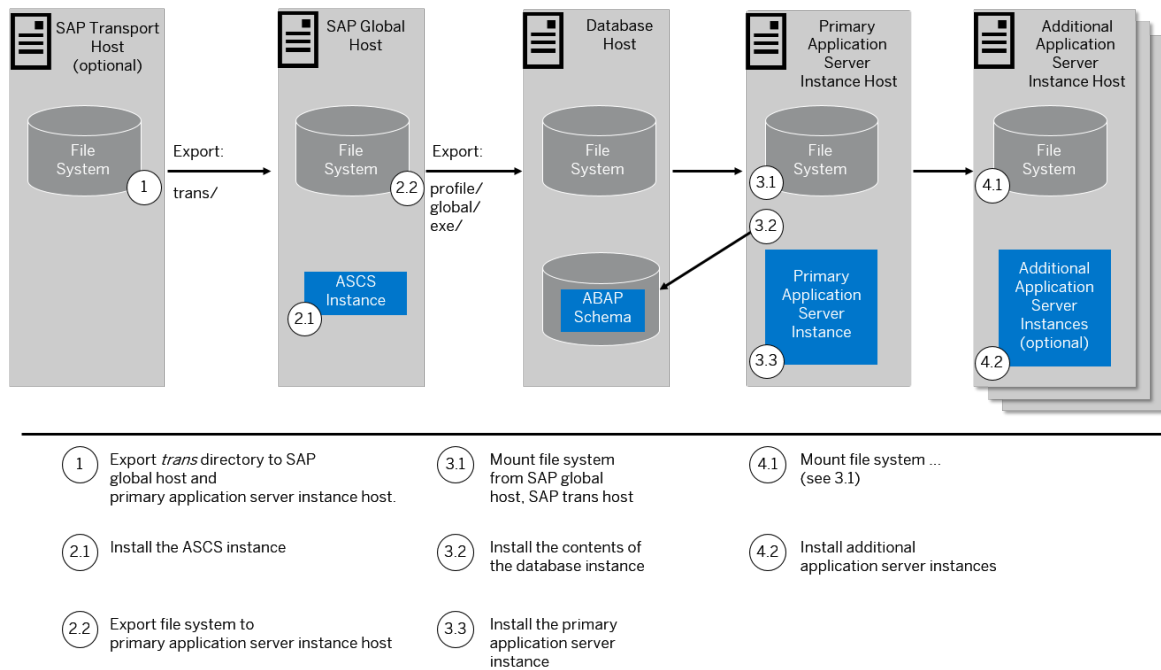
Distribution of Instances in an ABAP System

High-Availability System

You make sure that you have already prepared the switchover cluster both for the ASCS and the ERS failover groups. You ought to have already made sure that it meets the hardware and software requirements and that it has all the necessary file systems, mount points, and (if required) Network File System (NFS).

This is described in Performing Switchover Preparations for High Availability [page 89] and Setting Up File Systems for a High Availability System [page 84].

1. Export the trans directory to the switchover cluster, database, primary application server, and additional application server instance hosts.
   If you want to share the transport directory `trans` from another system, you have to mount [page 111] it from this system. Otherwise, we recommend that you share the `trans` directory that is created during the installation of the primary application server instance (see below).
2. You check the prerequisites [page 115] and run the installer [page 119] to install the ASCS instance on Node 1 of the switchover cluster, using Virtual Host (VH) for ASCS instance ("VH ASCS").
   For more information about virtual hosts, see Using Virtual Host Names [page 88].

> **i Note**
>
> If you want to install an ASCS instance with integrated SAP Web Dispatcher [page 25] or with integrated SAP Gateway [page 27] or both, you must choose the *Custom* parameter mode.
>
> When processing the screens for the ASCS instance installation, you are prompted to mark the corresponding checkbox on the screen *Additional Components to be Included in the A*SCS Instance.
>
> If you mark the checkbox for SAP Web Dispatcher, you are prompted for the additional parameters required for the SAP Web Dispatcher installation on the subsequent screens.

3. You check the prerequisites [page 115] and run the installer [page 119] to install the ERS instance on Node 2 of the switchover cluster, using Virtual Host (VH) for ERS instance ("VH ERS").
   For more information about virtual hosts, see Using Virtual Host Names [page 88].

4. **Optional, only valid for SAP systems based on ABAP Platform 1809 or higher:** Copy users, groups, and filesystems from Node 1 to Node … , Node N.
   You can do this in one of the following ways:

   ○ Using the installer to prepare 1 to n additional cluster nodes:
     You check the prerequisites [page 115] and run the installer [page 119] on the host which is to be prepared as additional cluster, and execute option *Prepare Additional Cluster Node*.
     This prepares an additional cluster node by creating the following:

     ○ The operating system users with the required IDs - unless they exist already
     ○ The basic file system structure with the required permissions
     ○ The instance directories for all instances that are to be installed in the cluster - that is the ASCS instance and the ERS instance
     ○ The entries in the `/etc/services` file for the SAP system instances

     > **i Note**
     >
     > The option *Prepare Additional Cluster Node* does **not** adapt the entries in the `/usr/sap/sapservices` file, and does not perform any follow-up activities for the additional cluster node . To perform these activities, follow the documentation from your HA-partner.

   ○ Copy users, groups, and filesystems manually:
     You prepare Node … , Node N, making sure that they meet the hardware and software requirements [page 32] and have all the necessary file systems [page 84], mount points, and (if required) Network File System (NFS).
     You set up the user environment on Node … , Node N:

     ○ You use the same user and group IDs as on the primary node.
     ○ You create the home directories of users and copy all files from the home directory of the primary node.
     ○ You copy the files from the following directories:

       ○ `/etc/services` (SAP service port definitions)
       ○ `/etc/rc.d/sapinit` (generic start script)
       ○ `/usr/sap/sapservices` (for **sapcontrol -nr NN -function ListInstances**)

     For more information about the required operating system users and groups, see Creating Operating System Users [page 74]

5. You export global directories [page 113] in `<sapmnt>/<SAPSID>` to the database host, to the primary application server instance host, and to the additional application server instance hosts.

6. Prepare mount points, file systems on the primary application server instance host.
   For more information, see Exporting and Mounting Global Directories [page 113].

7. Mount global directories on the primary application server instance host. For more information, see Exporting and Mounting Global Directories [page 113].

8. You check the prerequisites [page 115] and run the installer [page 119] to install the contents of the database instance.

9. You check the prerequisites [page 115] and run the installer [page 119] to install the primary application server instance.

10. You mount global directories on the additional application server instance hosts. For more information, see Exporting and Mounting Global Directories [page 113].

11. You check the prerequisites [page 115] and run the installer [page 119] to install additional application server to create redundancy.

   The AS instances are not a SPOF. Therefore, do **not** include these instances in the cluster.

12. You continue with Post-Installation [page 136].

Graphical Overview

The following figure provides an overview of how you install the various instances in a high-availability installation:

The ASCS and ERS instances behave similar regarding to installation and failover groups. The ASCS instance has an own failover group and the ERS instance has another failover group. If shared discs are used for installation of ASCS, the installation for ERS should also use a shared disk.
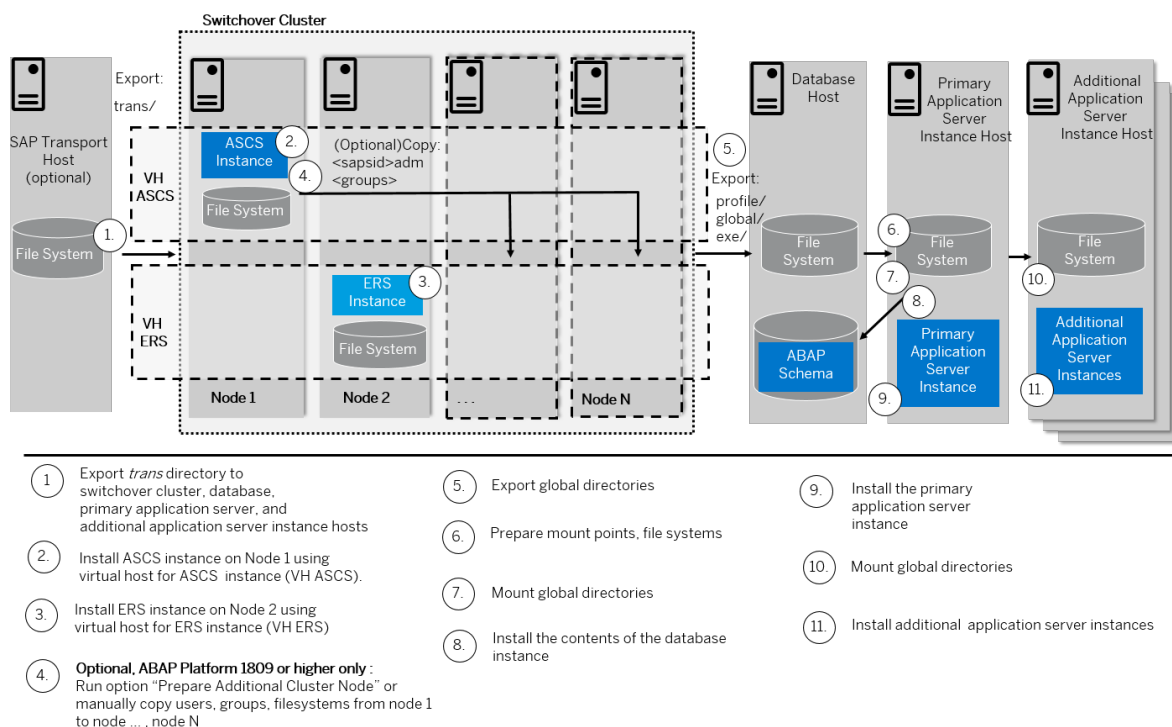
Distribution of Instances in a High-Availability ABAP System

Additional Application Server Instance

1. If you want to install additional application server instances on a host different from the SAP system host, you export global directories in `<sapmnt>/<SAPSID>` to the hosts on which you want to install additional application server instances.

2. On every **additional application server instance host**, you do the following:

   1. If you want to install additional application server instances on a host different from the SAP system host, you mount the global directories [page 113] in `<sapmnt>/<SAPSID>` that you exported from the SAP system host.

   2. You check the prerequisites [page 115] and run the installer [page 119] to install the additional application server instance.

3. You continue with Post-Installation [page 136].

Installation Steps for an Application Server Instance for a Distributed System

1. If you want to share the transport directory `trans` from another system, you have to mount [page 111] it from this system. Otherwise, we recommend that you share the `trans` directory that is created during the installation of the primary application server instance.
2. On the **SAP global host**, you export global directories in `<sapmnt>/<SAPSID>` to the hosts on which you want to install additional application server instances.
3. On every **additional application server instance host**, you do the following:
   1. You mount the global directories [page 113] in `<sapmnt>/<SAPSID>` that you exported from the SAP global host.
   2. You check the prerequisites [page 115] and run the installer [page 119] to install the additional application server instance.
   3. If you want to use the shared transport directory `trans` from another system, also mount [page 111] this directory.
4. You continue with Post-Installation [page 136].

Installation Steps for an Additional Application Server Instance for a High-Availability System

1. If you want to share the transport directory `trans` from another system, you have to mount [page 111] it from this system. Otherwise, we recommend that you share the `trans` directory that is created during the installation of the primary application server instance.
2. On the **primary node, host A**, of the **switchover cluster infrastructure**, you export global directories in `<sapmnt>/<SAPSID>` to the hosts on which you want to install additional application server instances.
3. On each **additional application server instance host**, do the following:
   1. You mount the global directories [page 113] in `<sapmnt>/<SAPSID>` that you exported from the SAP global host.
   2. You check the prerequisites [page 115] and run the installer [page 119] to install the additional application server instance.
   3. If you want to use the shared transport directory `trans` from another system, you also mount [page 111] this directory.
4. You continue with Post-Installation [page 136].

5.2 Exporting and Mounting the Transport Directory

Every SAP system must be assigned to a transport directory. All application server instances of an SAP system must point to the same transport directory.

Context

Multiple SAP system can use the same transport directory. However, it is not required to have one global transport directory in your SAP system landscape. Depending on your security requirements, you must decide how you want to set up the transport directories in your landscape. Systems with lower security requirements can share a transport directory (DEV, QA, for example). For systems with higher security requirements (PROD, for example), you might want to have a separate transport directory.

The transport directory is used by the Change and Transport System (CTS). The CTS helps you to organize development projects, and then transport the changes between the SAP systems in your system landscape.

For more information, see the SAP Online Documentation [page 14] at:

Release	SAP Library Path (Continued)
SAP systems based on foundation on ABAP Platform 1809, version for SAP HANA ("ABAP Platform 1809" for short) **and higher**	▶ *Administrating the ABAP Platform* ❯ *Administration Concepts and Tools* ❯ *Solution Life Cycle Management* ❯ *Software Logistics* ❯ *Change and Transport System* ❯
SAP systems based on SAP BW/4HANA 2.0	▶ *Administrating the ABAP Platform* ❯ *Administration Concepts and Tools* ❯ *Solution Life Cycle Management* ❯ *Software Logistics* ❯ *Change and Transport System* ❯
SAP systems based on SAP BW/4HANA 1.0 SR1 (`<SP08 or higher>`)	▶ *Application Help* ❯ *Function-Oriented View: English* ❯ *Application Server* ❯ *Application Server ABAP* ❯ *Administration of Application Server ABAP* ❯ *Change and Transport System* ❯

Consider the following:

- If the transport directory already exists, make sure that it is exported on the transport directory host and mount it on the SAP instance installation host.
- If the transport directory does not exist, proceed as follows:
  - Create the transport directory (either on the host where the primary application server instance is running or on a file server).
  - Export it on the transport directory host.
  - If you did not create the transport directory on your SAP instance installation host, mount it there.

Procedure

1. **Exporting the Transport Directory**
   a. Log on as user `root` to the host where the transport directory `/usr/sap/trans` resides.
   b. Make sure that `/usr/sap/trans` belongs to the group `sapsys` and to the user `root`.
   c. If not already done, export the directory using Network File System (NFS).
2. **Mounting the Transport Directory**

   > **i Note**
   >
   > If the transport directory resides on your local SAP instance installation host, you do not need to mount it.

   a. Create the mount point `/usr/sap/trans`.
   b. Mount `/usr/sap/trans` using Network File System (NFS) from the exporting host.

Related Information

5.3 Exporting and Mounting Global Directories

If you install an additional application server instance on a host other than the SAP global host, mount global directories from the SAP global host.

Prerequisites

If you want to install the executables locally instead of sharing them, do **not** mount the `exe` directory with Network File System (NFS). Instead, create `<sapmnt>/<SAPSID>/exe` as a local directory (not a link) with a minimum of 1.5 GB free space.

Context

There is no need to create the directories before the installation when you install a primary application server instance. The global directories must be exported only if you install additional application server instances.

Choose one of the following ways to proceed, depending on whether you are performing a homogeneous or heterogeneous installation:

Procedure

- **Exporting and Mounting Global Directories for a Homogeneous Installation**
    a. Log on to the SAP global host as user `root` and export the following directories with read/write access for the `root` user to the host where you want to install the new instance:

    `<sapmnt>/<SAPSID>/exe`

    `<sapmnt>/<SAPSID>/profile`

    `<sapmnt>/<SAPSID>/global`

    b. Log on to the host of the new instance that you want to install as user `root`.
    c. Create the following mount points and mount them from the SAP global host:

```
<sapmnt>/<SAPSID>/exe
```

```
<sapmnt>/<SAPSID>/profile
```

```
<sapmnt>/<SAPSID>/global
```

> ⚠ Caution
>
> Make sure that the mount points under /`<sapmnt>`/`<SAPSID>`/ are permanent. Otherwise,
> automatic start of the instance services does not work when you reboot the system.

- **Exporting and Mounting Global Directories for a Heterogeneous Installation**

  With a heterogeneous installation, the instances of an SAP system are installed on hosts with **different UNIX operating systems**. If you need information about the installation of application servers on Windows in a UNIX environment, see Heterogeneous SAP System Installations [page 180].

  > i Note
  >
  > Mounting the directories between different system types, for example mounting a Windows file system on a Linux host, requires a 3rd party product such as Samba. The installation and configuration of Samba is **not** covered by in this guide.

  Proceed as follows for a heterogeneous installation with different UNIX operating systems:

  a. Log on to the SAP global host as user `root` and export the following directories with `root` access to the host on which you want to install the new instance:

  ```
  <sapmnt>/<SAPSID>/exe
  ```

  ```
  <sapmnt>/<SAPSID>/profile
  ```

  ```
  <sapmnt>/<SAPSID>/global
  ```

  b. Log on to the host of the new instance as user `root`.
  c. Create the following mount points and mount them from the SAP global host:

  ```
  <sapmnt>/<SAPSID>/exe
  ```

  ```
  <sapmnt>/<SAPSID>/profile
  ```

  ```
  <sapmnt>/<SAPSID>/global
  ```

  > ⚠ Caution
  >
  > Make sure that these mount points are permanent. Otherwise automatic start of the instance services does not work when you reboot the system.

Related Information

5.4 Specifying the Initial Data Source of the User Management Engine

During the installation of your SAP system, you have to specify the initial data source of the User Management Engine (UME).

Prerequisites

You have planned how you want to configure user and access management for your SAP system to be installed as described in Planning User and Access Management [page 45].

Procedure

Using Central User Management

1. You install your SAP system as described in this installation guide.
2. Add the system to Central User Administration (CUA). For more information, see Configuring User Management [page 156].

Using an LDAP directory as Source for User Data

1. You install your SAP system as described in this installation guide.
2. Configure the user management of the newly installed SAP system to use an LDAP directory.
   For more information, see Configuring User Management [page 156].

5.5 Prerequisites for Running the Installer

Make sure you fulfil the following prerequisites before running the installer.

- For the SL Common GUI, make sure that the following web browser requirements are met:
  - You have one of the following supported browsers on the device where you want to run the SL Common GUI:
    - Google Chrome (recommended)
    - Mozilla Firefox
    - Microsoft Edge
    - Microsoft Internet Explorer 11 or higher.

    Always use the latest version of these web browsers.
  - If you copy the SL Common GUI URL manually in the browser window, make sure that you open a new Web browser window in private browsing mode (Internet Explorer), incognito mode (Chrome) or private browsing mode (Firefox). This is to prevent Web browser plugins and settings from interfering with the SL Common GUI.

> ⚠ Caution
>
> The installer uses a self-signed certificate, which is used temporarily only while the installer is running. This certificate is not trusted by the browser unless it is imported manually by the user running the installer. This behavior is intentionally designed in this way because - unlike ordinary public web servers - the installer has different usage patterns. You must configure your browser do trust the self-issued certificate of the installer after carefully performing the "thumbprint" verification described in Running the Installer [page 119] . For more information about adding trusted certificates, see the documentation of your browser.

For more information about the SL Common GUI, see Useful Information about the Installer [page 124].

- If you want to enable Internet Protocol Version 6 (IPv6), make sure that you set **SAP_IPv6_ACTIVE=1** in the environment of the user with `root` authorization which you use to start the installer. While running the installer, this setting is then also added to the environment of the `<sapsid>adm` user.

  > i Note
  >
  > By applying this setting the SAP system administrator is responsible for configuring the IP version on each host of the system landscape, before installing any additional instance to it.

- The installer uses shell scripts to obtain the environment for user `<sapsid>adm`.
  - If user `<sapsid>adm` does not yet exist, a working `/bin/csh` must be available on the host where you run the installer. For more information about recommended login shells, see SAP Note 202227 .
  - If `<sapsid>` already exists and uses `csh`, before you start the installer, execute the following command as user `<sapsid>` to make sure that the `csh` scripts are up-to-date, depending on your UNIX OS platform:
    /bin/csh -c "source /home/<sapsid>adm/.cshrc;env" or **/bin/csh -c "source /home/<sapsid>adm/.login;env"**

- Make sure that your operating system does not delete the contents of the temporary directory `/tmp` or the contents of the directories to which the variables `TEMP`, `TMP`, or `TMPDIR` point, for example by using a `crontab` entry.
  Make sure that the temporary directory has the permissions `755`.

- Make sure that you have at least 300 MB of free space in the installation directory for each installation option. In addition, you need 300 MB free space for the installer executables. If you cannot provide 300 MB free space in the temporary directory, you can set one of the environment variables `TEMP`, `TMP`, or `TMPDIR` to another directory with 300 MB free space for the installer executables.
  You can set values for the `TEMP`, `TMP`, or `TMPDIR` environment variable to an alternative installation directory as described in section Useful Information About the Installer [page 124].

  > i Note
  >
  > Some tools such as `jsplitter` may create files while the installer is running. The required free space in the `/tmp` directory depends on the amount of databases which you intend to unload.

- Make sure that `umask` is set to **022** for the user with `root` permissions that you want to use for running the installer.
  As the user with `root` permissions that you want to use for running the installer, enter the following command: **umask 022**

-

  AIX: Make sure that you have set the limits for operating system users as described in SAP Note 323816 🐾.

-

  HP-UX, Linux, Oracle-Solaris: Make sure that you have set the limits for operating system users root, `<sapsid>`adm, and your database-specific operating system users (see also sections *Creating Operating System Users and Groups* and *Running the Installer* in the installation guide).

  > ⚠ Caution
  >
  > Caution: the `limit` mechanism supports hard- and soft-limits. The soft-limit cannot be bigger than the hard-limit. The hard-limit can be set/increased by the root user like: **`limit -h <limit> <new_value>`**, for example **`limit -h datasize unlimited`**.

  - Using `csh` shell, the output of command `limit` needs to be at least as follows:

    > ✤ Example
    >
    > The following table lists example output taken from SUSE Linux Enterprise Server 11 (x86_64).
    >
    > | Output | Properties |
    > | --- | --- |
    > | cputime | unlimited |
    > | filesize | unlimited |
    > | datasize | unlimited |
    > | stacksize | 8192 KB |
    > | coredumpsize | unlimited |
    > | descriptors | 8192 |
    > | memoryuse | unlimited |

  - Using `sh` or `ksh` shell, the output of command `ulimit -a` needs to be at least as follows:

    > ✤ Example
    >
    > The following table lists example output taken from SUSE Linux Enterprise Server 11 (x86_64).
    >
    > | Output sh | Output ksh | Properties |
    > | --- | --- | --- |
    > | cpu time (seconds) | cpu time (seconds) | unlimited |
    > | file size (blocks) | file size (blocks) | unlimited |
    > | data seg size (kbytes) | data size (Kibytes) | unlimited |

Output sh	Output ksh	Properties
stack size (kbytes)	stack size (Kibytes)	8192 KB
core file size (blocks)	core file size (blocks)	unlimited
open files	nofile	8192
max memory size (kbytes)	max memory size (Kibytes)	unlimited

End of 'Platform': HP-UX, Linux, Oracle Solaris

- Make sure that you have defined the most important SAP system parameters as described in Basic Installation Parameters [page 46] **before** you start the installation.
- Check that your installation host meets the requirements for the installation options that you want to install.
  For more information, see Running the Prerequisite Checker [page 33].
- Make sure that the database is **up and running** before starting the installation.
- If you want to install an additional application server instance in an existing SAP system, make sure that:
  - There is exactly one entry in the `/usr/sap/sapservices` file for each SAP instance installed on this host. Be sure to check that the entry refers to the correct profile.
  - There are no profile backup files with an underscore "_" in their profile name. If so, replace the "_" with a ".".

    > ❖ Example
    >
    > Rename `/usr/sap/S14/SYS/profile/S14_D20_zsi-aix693p2_D20081204`
    > to **`/usr/sap/S14/SYS/profile/S14_DVEBMGS20_zsi-aix693p2.D20081204`**.

- Make sure that the following ports are not used by other processes:
  - Port 4237 is used by default as HTTPS port for communication between the installer and the SL Common GUI.
    If this port cannot be used, you can assign a free port number by executing `sapinst` with the following command line parameter:
    `SAPINST_HTTPS_PORT=<Free Port Number>`
  - Port 4239 is used by default for displaying the feedback evaluation form at the end of the installer processing.
    The filled-out evaluation form is then sent to SAP using HTTPS.
    If this port cannot be used, you can assign a free port number by executing `sapinst` with the following command line parameter:
    `SAPINST_HTTP_PORT=<Free Port Number>`
- If you want to perform the installation in unattended mode, see System Provisioning Using a Parameter Input File [page 125] which describes an improved procedure using `inifile.params`.

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Installation of SAP ABAP Systems on UNIX : SAP HANA 2.0 Database - Using Software
Provisioning Manager 2.0
Installation

5.6   Running the Installer

This section describes how to run the installer.

Prerequisites

For more information, see Prerequisites for Running the Installer [page 115].

Context

The installer has a web browser-based GUI named "SL Common GUI of the Software Provisioning Manager" - "SL Common GUI" for short.

This procedure describes an installation where you run the installer and use the SL Common GUI, that is you can control the processing of the installer from a browser running on any device.

For more information about the SL Common GUI, see Useful Information About the Installer [page 124].

Procedure

1. Log on to the installation host as a user with `root` permissions.

   > ⚠ Caution
   >
   > Make sure that the user with `root` permissions that you want to use for running the installer has not set any environment variables for a different SAP system or database.

   If your security policy requires that the person running the installer is not allowed to know the credentials of a user with `root` permissions on the installation host, you can specify another operating system user for authentication purposes. You do this using the `SAPINST_REMOTE_ACCESS_USER` parameter when starting the `sapinst` executable from the command line. You must confirm that the user is a trusted one. For more information, see SAP Note 1745524🖈.

2. Make the installation software available.

   executable from the command line. You must confirm that the user is a trusted one. For more information, see SAP Note

   For more information, see Getting the Installation Software [page 93].

   > i Note
   >
   > **SAP BW/4HANA 1.0 SR1 only:** Even if you use the complete SAP kernel media, the installer might prompt you during the provisioning process for additional archives (*.SAR files) due to special Patch

Level (PL) requirements depending on categories such as the product, operating system, and database platform.

For example: The installer might require a certain PL of `<X>` of the `SAPEXEDB.SAR` (for DBTYPE `<Y>`), but this PL of the `SAPEXEDB.SAR` is not contained in the SAP kernel media . In this case you must download the required PL from https://launchpad.support.sap.com/#/softwarecenter🔗 following the instructions given in Downloading the SAP Kernel Archives (Archive-Based Installation) [page 96].

→ Recommendation

Make the installation software available **locally** . For example, if you use Network File System (NFS), reading from software mounted with NFS might fail.

Only valid for 'Platform': Oracle Solaris

i Note

Oracle Solaris: If you mount installation media, make sure that you do this with option **`nomaplcase`**.

End of 'Platform': Oracle Solaris

3. Start the installer from the directory to which you unpacked the Software Provisioning Manager archive by entering the following command:

`<Path_To_Unpack_Directory>/sapinst`

i Note

If you are using a stack configuration file (see Installation Using a Stack Configuration File (Optional) [page 30]), you must call the `sapinst` executable with command line parameter `SAPINST_STACK_XML=<Absolute_Path_To_Stack_XML_File>`:

`/<Path_To_Unpack Directory>/sapinst`
`SAPINST_STACK_XML=<Absolute_Path_To_Stack_XML_File>`

i Note

If you want to set the connectivity data for your SAP HANA database, you can add parameters when calling `sapinst` as follows:

○ Global hdbuserstore container
   `/<Path_To_Unpack Directory>/sapinst HDB_USE_IDENT=SYSTEM_<SID>`
   You need not set `HDB_USER_IDENT` to the suggested value `SYSTEM_<SID>`. If you prefer, you can use the characters `A-z`, `0-9`, or `_`.
○ If you want to assign virtual host names, you must start the installer with the `SAPINST_USE_HOSTNAME` command line parameter:
   `<Path_To_Unpack_Directory>/sapinst`
   `SAPINST_USE_HOSTNAME=<Virtual_Host_Name>`
○ ABAP secure storage in the file system (SSFS) :
   `/<Path_To_Unpack Directory>/sapinst HDB_ABAP_SSFS=YES`

For more information, see Setting Connectivity Data for the SAP HANA Database [page 73].

4. The installer is starting up.

   The installer now starts and waits for the connection with the SL Common GUI.

You can find the URL you require to access the SL Common GUI at the bottom of the shell from which you are running the installer.

```
...
*********************************************************************
Open your browser and paste the following URL address to access the GUI
https://[<hostname>]:4237/sapinst/docs/index.html
Logon users: [<users>]
*********************************************************************
...
```

i Note

If the host specified by `<hostname>` cannot be reached due to a special network configuration, proceed as follows:

1. Terminate the installer as described in Useful Information about the Installer [page 124].
2. Restart the installer from the command line with the **SAPINST_GUI_HOSTNAME=<hostname>** property.
   You can use a fully-qualified host name.

If you have a supported web browser (see Prerequisites for Running the Installer [page 115]) installed on the host where you run the installer, you can open this URL directly in the shell. Otherwise, open the URL in a supported web browser that runs on another device.

⚠ Caution

After opening the browser URL, make sure that the URL in the browser starts with "https://" to avoid security risks such as SSL stripping .

Before you reach the *Welcome* screen, your browser warns you that the certificate of the `sapinst` process on this computer could not be verified.

Proceed as follows to avoid security risks such as a man-in-the-middle attack:

1. Click on the certificate area on the left hand side in the address bar of your browser, and view the certificate.
2. Open the certificate fingerprint or thumbprint, and compare all hexadecimal numbers to the ones displayed in the console output of the installer.
   Proceed as follows to get the certificate fingerprint or thumbprint from the server certificate printed in the installer console:

   1. Go to the `sapinst_exe.xxxxxx.xxxx` directory in the temporary directory to which the installer has extracted itself:
      `<User_Home>/.sapinst/`
   2. In the `sapinst_exe.xxxxxx.xxxx` directory, execute the `sapgenpse` tool with the command line option **get_my_name -p**.

   As a result, you get the server fingerprint or thumbprint from the server certificate.
3. Accept the warning to inform your browser that it can trust this site, even if the certificate could not be verified.

The SL Common GUI opens in the browser by displaying the *Welcome* screen.

5. On the *Welcome* screen, choose the required option:

- To install a complete SAP system, choose ▶ `<Product>` ❭ `<Database>` ❭ *Installation* ❭ *Application Server ABAP* ❭ `<System_Variant>` ❭.

- To install an additional SAP system instance, choose ▶ `<Product>` ❭ `<Database>` ❭ *Installation* ❭ *Additional SAP System Instances* ❭.

- To perform other tasks or install additional components, choose ▶ *Generic Options* ❭ and select the required task.

6. Choose *Next*.

> **i Note**
>
> If there are errors during the self-extraction process of the installer, you can find the log file `dev_selfex.out` in the temporary directory.

7. Follow the instructions on the installer screens and enter the required parameters.

   If you are installing a **standard system on Linux**, and want to install your SAP system on the **same host** as the SAP HANA database, note the following:

   On the *Database for SAP System* screen, enter the *Database Host* and the *Instance Number* for your SAP HANA database host. If the instance does not exist, a **new SAP HANA database instance will be installed on the same host as the SAP system.**.

   The parameter *Database ID (DBSID)* is the name of the database tenant and the *Password* is for its SYSTEM user. If an SAP HANA database is found but the DBSID does not exist, a **new database tenant will be created**.

   > **⚠ Caution**
   >
   > If no active SAP HANA instance is found, a new one will be created. The system id and tenant database will have the name given in the database. The DBSID used for this case must not match the SAPSID used for the SAP system installed or to be installed on the current host.

   > **⚠ Caution**
   >
   > You must use a **different** SAP system ID (SID) for the AS ABAP system than that already specified for the installation of the SAP HANA database.

8. To start the installation, choose *Next*.

   The installer starts the installation and displays the progress of the installation. When the installation has finished, the installer shows the message: `Execution of <Option_Name> has completed.`

   Only valid for 'Platform': HP-UX

   > **⚠ Caution**
   >
   > **HP-UX only:** If you decided to use 02 as the instance number, the instance fails to start during the installation process. For more information about the cause, see SAP System Parameters [page 48] . You must manually change the port number for report `RSLGCOLL` to continue with the installation.
   >
   > Proceed as follows:
   >
   > 1. Go to directory `/<sapmnt>/<SAPSID>/profile`.
   > 2. Edit `DEFAULT.PFL`.

> 3. Set the parameter `rslg/collect_daemon/listen_port` to a free port number.

End of 'Platform': HP-UX

9. If required, delete directories with the name `sapinst_exe.xxxxxx.xxxx` after the installer has finished. Sometimes these directories remain in the temporary directory.

> **→ Recommendation**
>
> Keep all installation directories until you are sure that the system, including all instances, is completely and correctly installed. Once the system is completely and correctly installed, make a copy of the installation directories with all their contents and save it to a physically separate medium, such as an optical medium or a USB drive separate from your installation hosts. This might be useful for analyzing issues occurring later when you use the system. For security reasons, do **not** keep installation directories on installation hosts, but make sure that you delete them after saving them separately.

10. If you copied the installer software to your hard disk, you can delete these files when the installation has successfully completed.

11. For security reasons, we recommend that you remove the operating system users from the group `sapinst` **after** you have completed the installation.

> **i Note**
>
> This step is only required, if you did **not** specify during the *Define Parameters* phase that the operating system users are to be removed from the group `sapinst` **after** the execution of the installer has completed.

12. For security reasons, we recommend that you delete the `.sapinst` directory within the home directory of the user with which you ran the installer:

`<User_Home>/.sapinst/`

13. The installer log files contain IP addresses and User IDs such as the ID of your S-User. For security, data protection, and privacy-related reasons we strongly recommend that you delete these log files once you do not need them any longer.

You find the installer log files in the `sapinst_instdir` directory. For more information, see Useful Information about the Installer [page 124].

5.7   Additional Information about the Installer

The following sections provide additional information about the installer.

5.7.1 Useful Information about the Installer

This section contains some useful technical background information about the installer and the installer GUI.

- Software Provisioning Manager (the "installer" for short) has the web browser-based "SL Common GUI of the Software Provisioning Manager" - "SL Common GUI" for short.
  The SL Common GUI uses the SAP UI Development Toolkit for HTML5 - also known as SAPUI5 - a client-side HTML5 rendering library based on JavaScript. The benefits of this new user interface technology for the user are:
  - Zero foot print, since only a web browser is required on the client
  - New controls and functionality, for example, view logs in web browser.

  As of version 2.0 SP01 Patch Level (PL) 5, Software Provisioning Manager comes with a new look and feel of the SL Common GUI. For more information, see https://blogs.sap.com/2018/11/10/new-look-for-software-provisioning-manager/.
  The SL Common GUI connects the web browser on a client with the `sapinst` executable - which is part of Software Provisioning Manager - running on the installation host using the standard protocol HTTPS.
  For the SL Common GUI the installer provides a pre-generated URL at the bottom of the shell from which you are running the installer . If you have a supported web browser installed on the host where you run the installer, you can start the SL Common GUI directly from this URL. Otherwise, open a web browser supported by the SL Common GUI on any device and run the URL from there.
  For more information about supported web browsers see Prerequisites for Running the Installer [page 115].
  If you need to run the **SL Common GUI** in **accessibility mode**, apply the standard accessibility functions of your web browser.

- As soon as you have started the `sapinst` executable, the installer creates a `.sapinst` directory underneath the `/home/<User>` directory where it keeps its log files. `<User>` is the user with which you have started the installer.
  After you have reached the *Welcome* screen and selected the relevant installer option for the SAP system or instance to be installed , the installer creates a directory `sapinst_instdir` where it keeps its log files, and which is located directly below the temporary directory. The installer finds the temporary directory by checking the value of the `TEMP`, `TMP`, or `TMPDIR` environment variable. If no value is set for these variables, the installer uses `/tmp` by **default**.
  All log files which have been stored so far in the `.sapinst` folder are moved to the `sapinst_instdir` directory as soon as the latter has been created.
  If you want the `sapinst_instdir` directory to be created in another directory than `/tmp`, set the environment variable `TEMP`, `TMP`, or `TMPDIR` to this directory before you start the installer.

Shell Used	Command

Bourne shell (sh)	`TEMP=<Directory>`
	
	`export TEMP`

C shell (csh)	`setenv TEMP <Directory>`
Korn shell (ksh)	`export TEMP=<Directory>`

> **⚠ Caution**
>
> Make sure that the installation directory is not mounted with NFS, or there might be problems when the Java Virtual Machine is started.

The installer records its progress in the `keydb.xml` file located in the `sapinst_instdir` directory. Therefore, if required, you can continue with the installer from any point of failure, without having to repeat the already completed steps and without having to reenter the already processed input parameters. For security reasons, a variable encryption key is generated as soon as the `sapinst_instdir` directory is created by the installer. This key is used to encrypt the values written to the `keydb.xml` file.

> **→ Recommendation**
>
> We recommend that you keep all installation directories until the system is completely and correctly installed.

- The installer extracts itself to the temporary directory. These executables are deleted again after the installer has stopped running.
  Directories called `sapinst_exe.xxxxxx.xxxx` sometimes remain in the temporary directory after the installer has finished. You can safely delete them.
  The temporary directory also contains the log file `dev_selfex.out` from the self-extraction process of the installer, which might be useful if an error occurs.

> **⚠ Caution**
>
> If the installer cannot find a temporary directory, the installation terminates with the error `FCO-00058`.

- To see a list of all available installer properties, start the installer as described above with the option **-p**:
  ./sapinst -p
- If you want to perform the installation in unattended mode, see System Provisioning Using a Parameter Input File [page 125] which describes an improved procedure using `inifile.params`.
- If required, stop the installer by choosing the *Cancel* button.

> **i Note**
>
> If you need to terminate the installer, press `Ctrl` + `C`.

5.7.2 System Provisioning Using a Parameter Input File

Provisioning with Software Provisioning Manager ("the installer"), for example installation, of SAP systems in unattended mode with a parameter input file.

Prerequisites

Provisioning of SAP systems can also be done in unattended mode without the user interface of the installer. This means that, after inserting the required parameters into a parameter-file and running the sapinst

executable by providing the path to this parameter-file , the installation will run in the background and no further user interaction is required.

Context

This section describes the steps that you need to execute in addition to the procedure described in this guide, when running the installer in unattended mode using a parameter input file.

Since the new Web-based SL Common GUI (see Useful Information about the Installer [page 124]) was introduced in 2017 there are two ways to run the unattended mode: "observer mode" and "non-observer mode".

Observer Mode

If you are running an installation in unattended mode but you are sitting in front of the screen, you might want to check the progress from time to time. In this case the "observer mode" makes sense.

Start the installation as described below in the Solution section, using the following parameters:

```
SAPINST_INPUT_PARAMETERS_URL=<path_to_your_parameterfile>
SAPINST_EXECUTE_PRODUCT_ID=<product-id for the installation>
SAPINST_SKIP_DIALOGS=true
```

The Software Provisioning Manager will start the installation in the background AND start a Web Dispatcher and provide an URL to access the SL Common GUI. The user who has started the installation can now connect to the URL and observe the progress of the installation, for example to look at the logfiles in the Web browser. However, all parameters will be taken from the parameter input file and can not be changed in the Web browser.

Non-Observer Mode

Choose that mode if you want to run a "scripted" or by other means automated scenario, for example overnight. In that case it is crucial that the process is started without a Web Dispatcher and therefore without a GUI. Otherwise, the automation could be stuck if the installer encounters a situation that requires user interaction.

Start the installation as described below in the Solution section, using the following parameters (use the same parameters like for Observer Mode, but provide **SAPINST_START_GUISERVER=false** in addition):

```
SAPINST_INPUT_PARAMETERS_URL=<path_to_your_parameterfile>
SAPINST_EXECUTE_PRODUCT_ID=<product-id for the installation>
SAPINST_SKIP_DIALOGS=true
SAPINST_START_GUISERVER=false
```

This will start the installation but this time **NO** Web Dispatcher will be started and no URL to access the SL Common GUI will be provided either. So the user can not follow the processing of the installation in a Web browser and the installation will run completely in the background.

If the process runs into an error, SAPinst will abort and you have to check for the reason in the log files.

Restrictions

In exceptional cases, parameters prompted or displayed in the Software Provisioning Manager UI are not maintainable in the parameter input file. If one of those parameters, that are only available in the GUI mode of

the Software Provisioning Manager, is needed for your unattended installations, you should create a ticket in the best fitting component below BC-INS to get the issue analyzed.

Must Know about the Input Parameter File

- The parameter input file only contains values that you entered in the Software Provisioning Manager GUI.
- With the `SAPinst 749.0.69` or by other means patch we provide a better encryption of passwords in Software Provisioning Manager files:
  If the parameter input file has parameters which are encrypted with Des25 encryption, the `instkey.pkey` file available in the installation directory contains the key for the encryption. The `instkey.pkey` file must be always located in the same directory as the parameter input file and is used to decrypt the values of the encrypted parameters. If you need to copy a parameter input file to another directory, you must also copy the `instkey.pkey` file to this directory.
- Not explicitly set parameters are documented as comments in the generated parameter input file.
- Each parameter has got a documentation assigned as a comment on top.

> ❖ Example
>
> Example for a parameter that is not used and therefore commented out:
>
> ```
> # Specify whether Software Provisioning Manager is to drop the schema if
> it exists. <= Documentation
> # HDB_Schema_Check_Dialogs.dropSchema = false
> ```

> ❖ Example
>
> Example for a parameter that is used:
>
> ```
> # The name of the database schema. <= Documentation
> HDB_Schema_Check_Dialogs.schemaName = SAPABAP2
> ```

- The media information is provided using the following convention:

  ```
  SAPINST.CD.PACKAGE.<media_name>=<location>
  ```

  For each media location a line.
- **Restriction:** Currently you can only specify complete media, not paths to single files like `*.SAR` archives. Make sure that you enter the full paths to all required media, relative paths are not sufficient:

> ❖ Example
>
> Example on UNIX:
>
> ```
> SAPINST.CD.PACKAGE.KERNEL = /mnt/KERNEL
> SAPINST.CD.PACKAGE.LOAD = /mnt/LOAD
> SAPINST.CD.PACKAGE.RDBMS = /mnt/RDBMS
> ```

> ❖ Example
>
> Example on Windows:
>
> ```
> SAPINST.CD.PACKAGE.KERNEL = C:\sapdvds\KERNEL
> SAPINST.CD.PACKAGE.LOAD = C:\sapdvds\LOAD
> SAPINST.CD.PACKAGE.RDBMS =C:\sapdvds\RDBMS
> ```

When performing a system copy, you need to add one additional media path:

```
SAPINST.CD.PACKAGE.MIGRATION1 = <full path to HANA backup>
```

- **Caution:**
  If you want to use archives for your installation, you must copy all files that are to be used to a single directory. In the parameter input file you must specify this directory as a download basket, using the `archives.downloadBasket` parameter.
  Make sure that there is only one version of the same archive in the directory, for example `SAPEXE_<Version>.SAR`

Procedure

1. You plan and prepare the run as described in Planning [page 29] and Preparation [page 70].
2. Create a text file that has ".`params`" as a suffix as follows:
   1. Start the installer as described in Running the Installer [page 119].
   2. Choose the option you want to run, and follow the instructions on the screens by entering all parameter values
   3. Stop after the *Parameter Summary* screen has been displayed
   4. Find the parameter input file named "`inifile.params`" in the installation directory
   5. Rename the "`inifile.params`" file. For example, you can rename it to "`my_inifile.params`".
3. Adjust the values of the parameter input file as follows:
   1. Edit the parameter input file ("`my_inifile.params`") file and modify the parameters according to your needs.
   2. Add required media or archives information line by line.
4. Identify the Product-ID:
   - To start in unattended mode, you need to know the component ID for the option that are required for your provisioning scenario.
     Proceed as follows:
     1. Open the `sapinst_dev.log` in the installation directory.
     2. Check for the "product-id"

     > **⁂ Example**
     >
     > ```
     > product-id=NW_ABAP_ASCS:NW750.ADA.ABAP
     > ```

   - Alternatively, you can check the header of the generated "`my_inifile.params`" file.

     > **⁂ Example**
     >
     > ```
     > product id 'NW_ABAP_ASCS:NW750.ADA.ABAP'
     > ```

5. Run the installer [page 119] with the parameters required for unattended mode:
   - **In observer mode:** Start the sapinst executable from an empty directory with the following parameters:

     ```
     SAPINST_INPUT_PARAMETERS_URL=<path_to_your_parameterfile>
     SAPINST_EXECUTE_PRODUCT_ID=<product-id for the installation>
     ```

```
SAPINST_SKIP_DIALOGS=true
```

- ○ **In non-observer mode**: Start the sapinst executable from an empty directory with the following parameters:

```
SAPINST_INPUT_PARAMETERS_URL=<path_to_your_parameterfile>
SAPINST_EXECUTE_PRODUCT_ID=<product-id for the installation>
SAPINST_SKIP_DIALOGS=true
SAPINST_START_GUISERVER=false
```

6. After the installer has completed, perform follow-up activities as described in Post-Installation [page 136].

Related Information

SAP Note 2849054
SAP Note 2742212
SAP Note 2626837
SAP Note 2669183
SAP Note 2482103
SAP Note 2974889 Installation with SWPM in unattended mode fails in step getDBInfo due to missing paramerters

5.7.3 Interrupted Processing of the Installer

Here you find information about how to restart the installer if its processing has been interrupted.

Context

The processing of the installer might be interrupted for one of the following reasons:

- An error occurred during the *Define Parameters* or *Execute* phase:
  The installer does not abort the installation in error situations. If an error occurs, the installation pauses and a dialog box appears. The dialog box contains a short description of the choices listed in the table below as well as a path to a log file that contains detailed information about the error.

- You interrupted the processing of the installer by choosing *Cancel* in the SL Common GUI.

> ⚠ Caution
>
> If you stop an option in the *Execute* phase, any system or component **installed** by this option is incomplete and not ready to be used. Any system or component **uninstalled** by this option is not completely uninstalled.

The following table describes the options in the dialog box:

Option	Definition
Retry	The installer retries the installation from the point of failure without repeating any of the previous steps.
	This is possible because the installer records its progress in the `keydb.xml` file.
	We recommend that you view the entries in the log files, try to solve the problem, and then choose *Retry*.
	If the same or a different error occurs, the installer displays the same dialog box again.
Stop	The installer stops the installation, closing the dialog box, the installer GUI, and the GUI server.
	The installer records its progress in the `keydb.xml` file. Therefore, you can continue with the installer from the point of failure without repeating any of the previous steps. See the procedure below.
Continue	The installer continues the installation from the current point.
View Log	Access installation log files.

> i Note
>
> You can also terminate the installer by choosing `Ctrl` + `C` but we do **not** recommend this because it kills the process immediately.

The following procedure describes the steps to restart an installation, which you stopped by choosing *Stop*, or to continue an interrupted installation after an error situation.

Procedure

1. Log on to the installation host as a user with the required permissions as described in Running the Installer [page 119] .
2. Make sure that the installation software is still available.

   For more information, see Getting the Installation Software [page 93].

   > → Recommendation
   >
   > Make the installation software available **locally**. For example, if you use remote file shares on other Windows hosts, CIFS shares on third-party SMB-servers, or Network File System (NFS), reading from software mounted with NFS might fail.

i Note

Oracle Solaris: If you mount installation media, make sure that you do this with option `nomaplcase`.

3. Make sure that the installation software are still available.

   For more information, see Getting the Installation Software [page 93].

   → Recommendation

   Make the installation software available **locally**. For example, if you use remote file shares on other Windows hosts, CIFS shares on third-party SMB-servers, or Network File System (NFS), reading from software mounted with NFS might fail.

Only valid for 'Platform': Oracle Solaris

i Note

Oracle Solaris: If you mount installation media, make sure that you do this with option `nomaplcase`.

End of 'Platform': Oracle Solaris

4. Restart the installer from the directory to which you unpacked the Software Provisioning Manager archive by executing the following command:

   `<Path_To_Unpack_Directory>/sapinst`

5. The installer is restarting.

   The installer now starts and waits for the connection with the SL Common GUI.

   You can find the URL you require to access the SL Common GUI at the bottom of the shell from which you are running the installer.

   ```
   ...
   **********************************************************************
   Open your browser and paste the following URL address to access the GUI
   https://[<hostname>]:4237/sapinst/docs/index.html
   Logon users: [<users>]
   **********************************************************************
   ...
   ```

   i Note

   If the host specified by `<hostname>` cannot be reached due to a special network configuration, proceed as follows:

   1. Terminate the installer as described in Useful Information about the Installer [page 124].
   2. Restart the installer from the command line with the `SAPINST_GUI_HOSTNAME=<hostname>` property.
      You can use a fully-qualified host name.

   If you have a supported web browser (see Prerequisites for Running the Installer [page 115]) installed on the host where you run the installer, you can open this URL directly in the shell. Otherwise, open the URL in a supported web browser that runs on another device.

> ⚠ Caution
>
> After opening the browser URL, make sure that the URL in the browser starts with "https://" to avoid security risks such as SSL stripping .
>
> Before you reach the *Welcome* screen, your browser warns you that the certificate of the `sapinst` process on this computer could not be verified.
>
> Proceed as follows to avoid security risks such as a man-in-the-middle attack:
>
> 1. Click on the certificate area on the left hand side in the address bar of your browser, and view the certificate.
> 2. Open the certificate fingerprint or thumbprint, and compare all hexadecimal numbers to the ones displayed in the console output of the installer.
>   Proceed as follows to get the certificate fingerprint or thumbprint from the server certificate printed in the installer console:
>   1. Go to the `sapinst_exe.xxxxxx.xxxx` directory in the temporary directory to which the installer has extracted itself:
>   `<User_Home>/.sapinst/`
>   2. In the `sapinst_exe.xxxxxx.xxxx` directory, execute the `sapgenpse` tool with the command line option **`get_my_name -p`**.
>   As a result, you get the server fingerprint or thumbprint from the server certificate.
> 3. Accept the warning to inform your browser that it can trust this site, even if the certificate could not be verified.

The SL Common GUI opens in the browser by displaying the *Welcome* screen.

6. From the tree structure on the *Welcome* screen, select the installation option that you want to continue and choose *Next*.

   The *What do you want to do?* screen appears.

7. On the *What do you want to do?* screen, decide between the following alternatives and continue with *Next*:

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Alternative	Behavior

Perform a new run	The installer does not continue the interrupted installation option. Instead, it moves the content of the old installer directory and all installer-specific files to a backup directory. Afterwards, you can no longer continue the old option.
	
	The following naming convention is used for the backup directory:
	
	`log_<Day>_<Month>_<Year>_<Hours>_<Minutes>_<Seconds>`
	
	⚙ Example
	
	`log_01_Oct_2016_13_47_56`
	
	ⓘ Note
	
	All actions taken by the installation before you stopped it (such as creating directories or users) are not revoked.
	
	⚠ Caution
	
	The installer moves all the files and folders to a new log directory, even if these files and folders are owned by other users. If there are any processes currently running on these files and folders, they might no longer function properly.

Continue with the existing one	The installer continues the interrupted installation from the point of failure.

5.7.4 Entries in the Services File Created by the Installer

After the installation has finished successfully, the installer has created the following entries in `/etc/services`:

`sapdp<Instance_Number>` = `32<Instance_Number>/tcp`

`sapdp<Instance_Number>s` = `47<Instance_Number>/tcp`

`sapgw<Instance_Number>` = `33<Instance_Number>/tcp`

`sapgw<Instance_Number>s` = `48<Instance_Number>/tcp`

`sapms<SAPSID>` = `36<Instance_Number>/tcp` (unless you specified another value during the installation)

ⓘ Note
- There is a port created for every possible instance number, regardless of which instance number you specified during the installation. For example, for `sapgw<Instance_Number>` = `33<Instance_Number>/tcp` the following range of entries is created:
  `sapgw00 = 3300/tcp`
  `sapgw01 = 3301/tcp`
  `sapgw02 = 3302/tcp`

```
    [...]
    sapgw98 = 3398/tcp
    sapgw99 = 3399/tcp
```
- If there is more than one entry for the same port number, this is **not** an error.

5.7.5 Troubleshooting with the Installer

This section tells you how to proceed when errors occur while the installer is running.

Context

If an error occurs, the installer:

- Stops processing
- Displays a dialog informing you about the error

Procedure

1. Check SAP Note 2393060 for known installer issues.
2. If an error occurs during the *Define Parameters* or the *Execute Service* phase, do one of the following:
   - Try to solve the problem:
     - To check the installer log files (`sapinst.log` and `sapinst_dev.log`) for errors, choose the *LOG FILES* tab.

       > **i** Note
       >
       > The *LOG FILES* tab is only available if you have selected on the *Welcome* screen the relevant installer option for the SAP product to be installed .
       >
       > If you need to access the log files before you have done this selection, you can find them in the `.sapinst` directory underneath the `/home/<User>` directory, where `<User>` is the user that you used to start the installer.
       >
       > For more information, see Useful Information about the Installer [page 124].

     - To check the log and trace files of the installer GUI for errors, go to the directory `<User_Home>/.sapinst/`
     - Then continue by choosing *Retry*.
   - If required, abort the installer by choosing *Cancel* in the tool menu and restart the installer. For more information, see Interrupted Processing of the Installer [page 129].
3. If you cannot resolve the problem, report an incident using the appropriate subcomponent of BC-INS*.

   For more information about using subcomponents of BC-INS*, see SAP Note 1669327 .

5.7.6 Using the Step State Editor (SAP Support Experts Only)

This section describes how to use the `Step State Editor` available in the installer.

> **i Note**
>
> Only use the `Step State Editor` if the SAP Support requests you to do so, for example to resolve a customer incident.

Prerequisites

- SAP Support requests you to use the `Step State Editor`.
- Make sure that the host where you run the installer meets the requirements listed in Prerequisites for Running the Installer [page 115].

Procedure

1. Start the installer from the command line as described in Running the Installer [page 119] with the additional command line parameter **`SAPINST_SET_STEPSTATE=true`**

2. Follow the instructions on the installer screens and fill in the parameters prompted during the *Define Parameters* phase until you reach the *Parameter Summary* screen.

3. Choose *Next*.

   The `Step State Editor` opens as an additional dialog. Within this dialog you see a list of all steps to be executed by the installer during the *Execute Service* phase. By default all steps are in an initial state. Underneath each step, you see the assigned installer component. For each step you have a *Skip* and a *Break* option.

   ○ Mark the checkbox in front of the *Break* option of the steps where you want the installer to pause.
   ○ Mark the checkbox in front of the *Skip* option of the steps which you want the installer to skip.

4. After you have marked all required steps with either the *Break* or the *Skip* option, choose *OK* on the *Step State Editor* dialog.

   The installer starts processing the *Execute Service* phase and pauses one after another when reaching each step whose *Break* option you have marked. You can now choose one of the following:

   ○ Choose *OK* to continue with this step.
   ○ Choose *Step State Editor* to return to the `Step State Editor` and make changes, for example you can repeat the step by marking the checkbox in front of the *Repeat* option.
   ○ Choose *Cancel* to abort the installer.

5. Continue until you have run through all the steps of the *Execute Service* phase of the installer.

6 Post-Installation

6.1 Post-Installation Checklist

This section includes the post-installation steps that you have to perform for the following:

> **i Note**
>
> You can automate some of these post-installation steps by running task list
> `SAP_BASIS_SETUP_INITIAL_CONFIG` in the ABAP task manager for lifecycle management automation
> (transaction `STC01`). For more information, see Performing Automated Initial Setup (Optional) [page 139].
>
> The sections describing these steps are marked with a corresponding note at the beginning.

- Standard, distributed, or high-availability system
- Additional application server instance

More detailed information about the steps are available in the linked sections.

> **i Note**
>
> We highly recommend that you apply the latest Support Package as described in Applying the Latest
> Kernel [page 150]. The minimum requirement for running SAP BW on the SAP HANA database is SP4.

Standard, Distributed, or High-Availability System

> **i Note**
>
> In a standard system, all mandatory instances except the database instance are installed on one host.
> Therefore, if you are installing a standard system, you can ignore references to other hosts.
>
> The SAP HANA database is normally pre-installed by SAP partners before you start the installation. During
> the SAP system installation, the database instance was remotely installed by Software Provisioning
> Manager (the "installer") from the primary application server host.
>
> However, **and higher on Linux** you can install SAP systems on the **same host** as the SAP HANA database -
> that is as a standard system [page 15] - without applying additional environment settings. For more
> information, see SAP Note 1953429 .

1. You check and if necessary modify the settings for the operating system users for your SAP system if they
   were created by the installer.
   For more information, see Creating Operating System Users and Groups [page 74].
2. You check whether you can log on to the Application Server ABAP [page 138].
3. You perform the automated initial setup [page 139].

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> **i Note**
>
> This step is optional.

4. If you have not enabled SAP EarlyWatch Alert in your SAP Solution Manager, you enable SAP EarlyWatch Alert for ABAP Systems on SAP HANA [page 140].
5. If you have installed a high-availability system, you set up the licenses for high availability [page 142].
6. You configure the remote connection to SAP support [page 144].
7. You enable the Note Assistant to apply note corrections [page 144].
8. You perform the consistency check [page 145].
9. You configure the Transport Management System [page 146].
10. For production systems it is highly recommended that you connect the system to SAP Solution Manager [page 148].
11. Run installer option *Check and Adjust ABAP System* to apply necessary configuration steps.
12. You apply the latest kernel and Support Packages [page 150].
13. If required, you install additional languages and perform language transport [page 154].
14. You perform IP Multicast Configuration [page 156].
15. You configure the user management [page 156].
16. You ensure user security [page 157].
17. You perform the client copy [page 159].
18. You install or upgrade SAP HANA studio [page 160].
19. You back up the SAP HANA database [page 161].
20. If required, you change the keys for the secure storage [page 161].
21. You have to make sure that the systems – that is, AS ABAP and SAP HANA database – on each host do not compete for memory resources [page 162].
22. You perform a full installation backup [page 163].
23. If you chose to install an integrated SAP Web Dispatcher within the ASCS instance, you log on to the SAP Web Dispatcher Management Console [page 165]
24. If you chose to install an integrated SAP Web Dispatcher within the ASCS instance, you configure the SAP Web Dispatcher [page 166]
25. If you chose to install an integrated Gateway within the ASCS instance, you configure the SAP Gateway [page 167].
26. You check section *Installation Follow-Up Activities* in the release-specific "Installation Guide" - also called "Master Guide" for SAP BW/4HANA - [page 11] for additional implementation and configuration steps.

Additional Application Server Instance

1. You check and if necessary modify the settings for the operating system users for your SAP system if they were created by the installer.
   For more information, see Creating Operating System Users and Groups [page 74].
2. You check whether you can log on to the Application Server ABAP [page 138].
3. You ensure user security [page 157].
4. You perform a full installation backup [page 163].

6.2 Logging On to the Application Server ABAP

You need to check that you can log on to the Application Server ABAP with the standard users, given in the table below.

Prerequisites

- The SAP system is up and running.
- You have installed the SAP front-end software.

Context

> **i Note**
>
> Client 066 is no longer available in newly installed SAP systems based on SAP NetWeaver 7.5 or higher. For more information, see SAP Note 1749142 .

> **i Note**
>
> Client 001 is no longer available in newly installed SAP systems based on SAP S/4HANA and SAP BW/4HANA.

User	User Name	Client
SAP system user	SAP*	000, 001, 066
	DDIC	000, 001

You access the application server ABAP using *SAP Logon*.

Procedure

1. Start *SAP Logon* on the host where you have installed the SAP front-end software as follows:
   - SAP GUI for Windows:
     On the host where you have installed the front end, choose:
     ▶ *Start* ❭ *Programs* ❭ *SAP Front End*<Release> ❭ *SAPlogon* ❭
   - SAP GUI for Java:
     Enter the following command from the GUI installation directory:
     guilogon

2. Create a logon entry for the newly installed system in the *SAP Logon*.

   For more information about creating new logon entries, press `F1`.

3. When you have created the entry, log on as user `SAP*` or `DDIC`.

6.3 Performing Automated Initial Setup (Optional)

After the installation of a new SAP system you have to configure the system to enable its usage. For example, you have to install an SAP license, create logon groups, and configure the Transport Management System (TMS) and security settings. You can profit from an automated initial setup which executes these steps automatically.

Prerequisites

Note that the best point in time when you perform automated initial setup depends on the following:

- If you have run the installation using a stack configuration file (also called "up-to-date installation"), we recommend that you proceed as follows:
  1. Perform the **complete** installation and update process - that is the installation with Software Provisioning Manager **and** the update with Software Update Manager.
  2. Perform the automated initial setup.

  By running first the update and then the automated initial setup, you can profit from latest features and fixes in the initial setup configuration content.

  Background: As of Software Logistics Toolset 1.0 SPS12, the installation procedure with Software Provisioning Manager 1.0 SP07 and higher also includes basic configuration activities, such as initial basic configuration of transport management, which are a prerequisite for the subsequent maintenance process. In previous SP versions of Software Logistics Toolset 1.0, this prerequisite had to be fulfilled by running automated initial setup before the update process.

- If you have **not** run the installation using a stack configuration file (also called "up-to-date installation"), we recommend that you proceed as follows:
  1. Run automated initial setup directly after the installation, using the automation content provided with the system load.
  2. Apply the Support Packages to benefit from the already performed initial configuration – for example, using the already configured Transport Management System.
  3. Consider running the automated initial setup a second time, especially if you want to benefit from the latest improvements and fixes offered by the updated automation content provided by the applied Support Package.

For more information about automated initial setup, see the SAP Community Network at https:// wiki.scn.sap.com/wiki/display/SL/Automated+Initial+Setup+of+ABAP-Based+Systems .

Procedure

1. Start the ABAP Task Manager by calling transaction STC01.
2. Choose task list SAP_BASIS_SETUP_INITIAL_CONFIG.
3. Select the tasks you want to get executed.

    For this, the task list offers sophisticated online documentation of the comprised activities.
4. Choose *Execute*.

    You are guided through the configuration steps where you can enter the required values.

Related Information

6.4 Enabling SAP EarlyWatch Alert for ABAP Systems on SAP HANA

Context

After the installation of any new SAP ABAP system running on SAP HANA, you have to enable the SAP EarlyWatch Alert (EWA) and send corresponding data to SAP – either by using SAP Solution Manager for SAP EarlyWatch Alert or by performing the automated configuration described below.

The SAP EarlyWatch Alert identifies potential problems early, avoids bottlenecks, and monitors the performance of your ABAP and Java systems and your most important business processes regularly, automatically, and effectively. For more information, see http://support.sap.com/ewa .

If you have not enabled SAP EarlyWatch Alert in your SAP Solution Manager (for more information, see SAP Note 1257308), we provide an automated procedure using our automation framework ABAP Task Manager, which is already part of the ABAP system. The automation task list "Early Watch Alert to SAP Configuration" sets up a periodical EWA data collection and transfers this data to SAP in Service Data Control Center (SDCCN), when executed by the ABAP Task Manager.

The task list comprises the following detailed tasks:

1. Configuration of SAPOSS Connection (OSS1)
   Creates standard RFC SAPOSS if it does not yet exist.
2. SDCC_OSS Connection
   Creates an RFC SDCC_OSS by copying RFC SAPOSS and adds this RFC to the SDCCN RFC list if it does not yet exist. This RFC is used in SDCCN to communicate with the SAP backend.
3. SDCCN Activation
   Activates the SDCCN in the system if not yet activated. An hourly job /BDL/TASK_PROCESSOR is scheduled after the activation.
4. SDCCN Refresh Service Definition
   Gets the newest Service Definitions from SAP. The Service Definitions define the data to be collected for the EWA session.
5. SDCCN Schedule EWA to SAP
   Schedules a weekly EWA session (with session number 000Z*) in SDCCN, if no session exists.

Procedure

1. Download the archive `SAPK-74005INSTPI` or higher at:

   http://support.sap.com/installations ⬈ ▶ *Software Downloads* ❯ *Support Packages and Patches* ❯ *By Alphabetical Index (A-Z)* ❯ *S* ❯ *ST-PI* ❯ *ST-PI 740* ❯ *SUPPORT PACKAGES* ❯ .
2. Apply the downloaded ST-PI archive via SPAM/SAINT.

   For more information, see http://help.sap.com/spmanager ⬈ .
3. Start the ABAP Task Manager by calling transaction STC01.
4. Choose the task list /BDL/SDCCN_EWA_CONFIG.
5. Choose *Execute*.

   You are guided through the configuration steps.

6.5   Installing the SAP License

You must install a **permanent** SAP license. When you install your SAP system, a **temporary** license is automatically installed.

> i Note
>
> You can automate this step by running task list `SAP_BASIS_SETUP_INITIAL_CONFIG` in the ABAP task manager for lifecycle management automation (transaction `STC01`). For more information, see Performing Automated Initial Setup (Optional) [page 139].

Context

> ⚠ **Caution**
>
> **Before** the temporary license expires, you must apply for a permanent license key from SAP.
>
> We recommend that you apply for a permanent license key as soon as possible after installing your system.

For more information about SAP license keys and how to obtain them, see http://support.sap.com/licensekey 📄.

Procedure

Install the SAP license as described in the SAP Online Documentation [page 14] at:

Release	SAP Library Path (Continued)
SAP systems based on foundation on ABAP Platform 1809, version for SAP HANA ("ABAP Platform 1809" for short) **and higher**	▶ *Administrating the ABAP Platform* ▶ *Administration Concepts and Tools* ▶ *Solution Life Cycle Management* ▶ *SAP Licenses* ▶
SAP systems based on SAP BW/4HANA 2.0	▶ *Administrating the ABAP Platform* ▶ *Administration Concepts and Tools* ▶ *Solution Life Cycle Management* ▶ *SAP Licenses* ▶
SAP systems based on SAP BW/4HANA 1.0 SR1 (`<SP08 or higher>`)	▶ *Solution Life Cycle Management* ▶ *SAP Licenses* ▶

6.6 High Availability: Setting Up Licenses

You need to install a **permanent** license, which is determined by the hardware environment of the message server.

Prerequisites

The SAP system is up and running.

Context

SAP has implemented a license mechanism for switchover solutions and clustered environments. Your customer key is calculated on the basis of local information on the message server host. This is the host machine where the ABAP central services instance (ASCS instance) runs.

To be able to perform a switchover, the **temporary** license that is installed automatically with the ASCS instance is not sufficient. You first need to install a **permanent** license, which is determined by the hardware environment of the message server. Since SAP's high-availability (HA) solution stipulates two or more cluster nodes (host machines) where the message server is enabled to run, you have to order as many license keys [page 141] as you have cluster nodes.

When we receive confirmation from your vendor that you are implementing a switchover environment, we provide the required license keys for your system, one key for each machine.

Procedure

1. To find the hardware ID of the primary host, log on to any application server instance of the SAP system and call transaction `SLICENSE`.
2. Perform a switchover of the ABAP central services instance (ASCS) to another node in the cluster and repeat the previous step.

   Repeat this for all remaining nodes in the cluster.
3. To obtain the two license keys, enter the hardware IDs for each cluster node, where message server is enabled to run: http://support.sap.com/licensekey
4. To import the files containing the two licenses, log on to any application server instance of the SAP system and call transaction SLICENSE.
5. Perform a switchover of the ABAP central services instance (ASCS) to another node in the cluster and repeat the previous step.

   Repeat this for all remaining nodes in the cluster.

Results

The license is no longer a problem during switchover. This means you do **not** need to call `saplicense` in your switchover scripts.

6.7 Configuring the Remote Connection to SAP Support

SAP offers its customers access to support and a number of remote services such as the `Early Watch Service` or the `GoingLive Service`. Therefore, you have to set up a remote network connection to SAP.

> **i Note**
>
> You can automate this step by running task list `SAP_BASIS_SETUP_INITIAL_CONFIG` in the ABAP task manager for lifecycle management automation (transaction `STC01`). For more information, see Performing Automated Initial Setup (Optional) [page 139].

For more information, see SAP Support Portal at https://support.sap.com/remote-support.html.

6.8 Enabling Note Assistant to Apply Note Corrections

Use the Note Assistant to implement note corrections in your ABAP system.

Context

The Note Assistant allows you to automatically implement note corrections in your ABAP system. For more information about the Note Assistant, see https://support.sap.com/noteassistant and https://help.sap.com/netweaver ▶ *SAP NetWeaver Platform* ▶ `<Release>` ▶ *Application Help* ▶ *SAP NetWeaver Library: Function-Oriented View* ▶ *Solution Life Cycle Management* ▶ *Software Logistics* ▶ *Note Assistant* ▶.

Procedure

1. Follow the instructions in SAP Note 2836302 for enabling the Note Assistant for TCI and Digitally Signed SAP Notes.
2. Apply important SAP Notes for SAP_BASIS as described in SAP Note 1668882.

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Provisioning Manager 2.0
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6.9 Performing the Consistency Check

We recommend that you check the consistency of the newly installed SAP ABAP system.

> **i Note**
>
> You can automate this step by running task list `SAP_BASIS_SETUP_INITIAL_CONFIG` in the ABAP task manager for lifecycle management automation (transaction `STC01`). For more information, see Performing Automated Initial Setup (Optional) [page 139].

Prerequisites

- If the installation finished successfully, your SAP system should be up and running. Otherwise, start it as described in Starting and Stopping SAP System Instances [page 209].
- You have logged on to the SAP system [page 138].

Context

When logging on to the system for the first time, you need to trigger a consistency check manually. The function is then called automatically whenever you start the system or an application server.

The following checks are performed:

- Completeness of installation
- Version compatibility between the SAP release and the operating system
  The initial consistency check determines whether:
  - The release number in the SAP kernel matches the release number defined in the database system
  - The character set specified in the SAP kernel matches the character set specified in the database system
  - Critical structure definitions that are defined in both the data dictionary and the SAP kernel are identical. The structures checked by this function include `SYST`, `T100`, `TSTC`, `TDCT` and `TFDIR`.
- Accessibility of the message server
- Availability of all work process types
- Information about the standalone enqueue server and the update service

Procedure

1. Perform a system check:

   Call transaction `SICK`.

   You should see the entry `SAP System Check | no errors reported`

2. Perform a database check:

   In the DBA Cockpit (transaction DBACOCKPIT), check for missing tables or indexes by choosing
   ▐▶ *Diagnostics* ❯ *Missing Tables and Indexes* ▐ .

6.10 Configuring the Change and Transport System

You have to perform some steps in the Transport Management System to be able to use the Change and
Transport System (TMS).

> i Note
>
> You can automate this step by running task list SAP_BASIS_SETUP_INITIAL_CONFIG in the ABAP task
> manager for lifecycle management automation (transaction STC01). For more information, see Performing
> Automated Initial Setup (Optional) [page 139].

> i Note
>
> SAP_BASIS_SETUP_INITIAL_CONFIG only covers the configuration of TMS as single system.

> i Note
>
> If you are using a stack configuration file (see Installation Using a Stack Configuration File (Optional) [page
> 30]) and chose *Run TMS Configuration (for Single System)* during the installation, you have already
> completed this step and and skip this section.

Context

Procedure

1. Call transaction STMS in the ABAP system to configure the domain controller in the Transport Management
   System (TMS).

For more information, see the SAP Online Documentation [page 14] at:

Release	SAP Library Path (Continued)
SAP systems based on foundation on ABAP Platform 1809, version for SAP HANA ("ABAP Platform 1809" for short) **and higher**	▶ *Application Server ABAP Infrastructure* ﹥ *Administration of Application Server ABAP* ﹥ *Administration Concepts and Tools* ﹥ *Solution Life Cycle Management* ﹥ *Software Logistics* ﹥ *Change and Transport System* ﹥ *Change and Transport System – Overview* ﹥ *Basics of the Change and Transport System* ﹥ *Transport Management System – Concept* ◢
SAP systems based on SAP BW/4HANA 2.0	▶ *Application Server ABAP Infrastructure* ﹥ *Administration of Application Server ABAP* ﹥ *Administration Concepts and Tools* ﹥ *Solution Life Cycle Management* ﹥ *Software Logistics* ﹥ *Change and Transport System* ﹥ *Change and Transport System – Overview* ﹥ *Basics of the Change and Transport System* ﹥ *Transport Management System – Concept* ◢
SAP systems based on SAP BW/4HANA 1.0 SR1 (`<SP08 or higher>`)	▶ *Application Server* ﹥ *Application Server ABAP* ﹥ *Administration of Application Server ABAP* ﹥ *Change and Transport System* ﹥ *Change and Transport System – Overview* ﹥ *Basics of the Change and Transport System* ﹥ *Transport Management System – Concept* ◢

2. In addition, you must configure the system change options.

For more information, see the SAP Online Documentation [page 14] at:

Release	SAP Library Path (Continued)
SAP systems based on foundation on ABAP Platform 1809, version for SAP HANA ("ABAP Platform 1809" for short) **and higher**	▶ *Application Server ABAP Infrastructure* ﹥ *Administration of Application Server ABAP* ﹥ *Administration Concepts and Tools* ﹥ *Solution Life Cycle Management* ﹥ *Software Logistics* ﹥ *Change and Transport System* ﹥ *Transport Organizer (BC-CTS-ORG)* ﹥ *Requirements for Working with the Transport Organizer* ﹥ *Setting the System Change Option* ◢

Release	SAP Library Path (Continued)
SAP systems based on SAP BW/4HANA 2.0	▶ *Application Server ABAP Infrastructure* ❯ *Administration of Application Server ABAP* ❯ *Administration Concepts and Tools* ❯ *Solution Life Cycle Management* ❯ *Software Logistics* ❯ *Change and Transport System* ❯ *Transport Organizer (BC-CTS-ORG)* ❯ *Requirements for Working with the Transport Organizer* ❯ *Setting the System Change Option* ◢
SAP systems based on SAP BW/4HANA 1.0 SR1 (`<SP08 or higher>`)	▶ *Solution Life Cycle Management* ❯ *Software Logistics* ❯ *Change and Transport System* ❯ *Transport Organizer (BC-CTS-ORG)* ❯ *Requirements for Working with the Transport Organizer* ❯ *Setting the System Change Option* ◢

3. Call transaction `SE38` to schedule a dispatcher job for transport programs by executing report `RDDIMPDP`.

   You schedule the transport dispatcher in the current client. This is equivalent to the execution of job `RDDNEWPP` in transaction `SE38`

6.11   Connecting the System to SAP Solution Manager

Here you find information about how to connect your newly installed SAP system to SAP Solution Manager.

Prerequisites

An SAP Solution Manager system must be available in your system landscape. For more information, see http://help.sap.com/solutionmanager .

Context

SAP Solution Manager gives you central access to tools, methods, and preconfigured content that you can use to evaluate and implement your solutions.

When your implementation is running, you can use SAP Solution Manager to manage, monitor, and update systems and business processes in your solution landscape, and also to set up and operate your own solution support.

Procedure

You connect a technical system to SAP Solution Manager by the following steps:

1. On the technical systems of your landscape, **data suppliers** are implemented, for example, with transaction `RZ70` for Application Server ABAP and with Visual Administrator for Application Server Java.

   For more information, see the SAP Solution Manager Application Help:

   o If your SAP Solution Manager release is 7.1:
     http://help.sap.com/solutionmanager 🌊 |▶ ❯ *Version 7.1 SPS* <No> ❯ *Application Help (English)* ❯ *SAP Solution Manager Operations* ❯ *Managing System Landscape Information* ❯ *Managing Technical System Information* ❯ *Register Technical Systems Automatically by Data Suppliers* ❯

   o If your SAP Solution Manager release is 7.2:
     http://help.sap.com/solutionmanager 🌊 |▶ ❯ *Version 7.2 SPS* <No> ❯ *Application Help (English)* ❯ *Technical Infrastructures* ❯ *Landscape Management Database (LMDB)* ❯ *Managing Technical System Information* ❯ *Registering Technical Systems Automatically by Data Suppliers* ❯

2. The data suppliers send information about the hardware and installed software to a central **System Landscape Directory (SLD)**. Updates are sent to the SLD as well.

   For more information, see the *Planning Guide - System Landscape Directory* in the SAP Community Network at System Landscape Directory (SLD) - Overview🌊

3. From the SLD, this information is regularly synchronized with **SAP Solution Manager** where it is managed in the Landscape Management Database (LMDB).

   For more information, see the SAP Solution Manager Application Help:

   o If your SAP Solution Manager release is 7.1:
     http://help.sap.com/solutionmanager 🌊 |▶ ❯ *Version 7.1 SPS* <No> ❯ *Application Help (English)* ❯ *SAP Solution Manager Operations* ❯ *Managing System Landscape Information* ❯ *Setting Up the Landscape Management Infrastructure* ❯ *Connecting LMDB to System Landscape Directory (SLD)* ❯

   o If your SAP Solution Manager release is 7.2:
     http://help.sap.com/solutionmanager 🌊 |▶ ❯ *Version 7.2 SPS* <No> ❯ *Application Help (English)* ❯ *Technical Infrastructures* ❯ *Landscape Management Database (LMDB)* ❯ *Setting Up the Landscape Management Infrastructure* ❯ *Connecting LMDB to System Landscape Directory (SLD)* ❯

4. In the LMDB, you complete the information from the SLD manually.

   For more information, see the SAP Solution Manager Application Help:

   o If your SAP Solution Manager release is 7.1:
     Managing Technical System Information and *Managing Product System Information* at http://help.sap.com/solutionmanager 🌊 |▶ ❯ *Version 7.1 SPS* <No> ❯ *Application Help (English)* ❯ *SAP Solution Manager Operations* ❯ *Managing System Landscape Information* ❯

   o If your SAP Solution Manager release is 7.2:
     http://help.sap.com/solutionmanager 🌊 |▶ ❯ *Version 7.2 SPS* <No> ❯ *Application Help (English)* ❯ *Technical Infrastructures* ❯ *Landscape Management Database (LMDB)* ❯ *Managing Technical System Information* ❯

Next Steps

For more information, see the following pages in the SAP Community Network:

- System Landscape Directory (SLD) - Overview 🔗
- Documentation for Landscape Management Database - LMDB 🔗

6.12 Running Installer Option "Check and Adjust ABAP System"

Run installer option *Check and Adjust ABAP System* to apply some necessary configuration steps.

Procedure

1. Start the installer as described in Running the Installer [page 119].
2. On the Welcome screen, choose installer option ▎▶ *Generic Options* ❯ *SAP HANA Database* ❯ *Check and Adjust ABAP System* ❯

   Follow the instructions on the installer screens and enter the parameters for the ABAP system to be checked and adjusted.

   On the *Check Adjust SAP System* screen, select the required option:

   - *HDI_CHECK_ENABLE*
     If your SAP system is based on ABAP Platform 1809 or higher, running this option applies some necessary configuration for the HANA Deployment Infrastructure (HDI) content. If you do not run this option, updating the ABAP system using transaction SPAM might fail.
   - *REPAIR_PRIVILEGES*
     With this option you can check and recreate the privileges for the ABAP schema user.

6.13 Applying the Latest Kernel and Support Package Stacks

We strongly recommend that you apply the latest kernel and Support Package stacks before you start configuring your SAP system.

> ⓘ Note
>
> If you are using a stack configuration file (see Installation Using a Stack Configuration File (Optional) [page 30]), you already downloaded the `stack.xml` file and the delta archives. If you then already called the Software Update Manager (SUM) from the installer and applied the Support Package Stacks after the installation had finished, you can skip this section.

Context

For more information about release and roadmap information for the kernel versions, and how this relates to SAP NetWeaver support packages - including important notes on downward compatibility and release dates - see SAP Note 1969546 .

Procedure

- Download and apply the latest Kernel and Support Package stacks using the Software Update Manager (SUM) as described in the Software Update Manager documentation at: https://support.sap.com/en/tools/software-logistics-tools/software-update-manager.html
- If you want to update the kernel manually, proceed as described below:
  a. Log on as user `<sapsid>adm` to the hosts of the SAP system instances to be updated.
  b. Download the latest kernel for your operating system and database platform as described in SAP Note 19466 .
  c. Back up the kernel directory that is specified by the profile parameter `DIR_CT_RUN`.
  d. Extract the `SAR` files of the kernel Support Packages of the target SP level to a temporary directory using the `SAPCAR` tool.
  e. Copy or move the extracted programs from the temporary directory to the local kernel directory.
  f. Adjust the ownership and permissions of the kernel binaries by entering the following command sequence (Execute the `saproot.sh` script that is located in the kernel directory):

  ```
  su - root

  cd <Kernel_Directory>

  ./saproot.sh <SAPSID>

  exit
  ```

6.14 Performing Post-Installation Steps for the ABAP Application Server

This section describes the post-installation steps you have to perform for the ABAP application server.

> **i Note**
>
> You can automate this step by running task list `SAP_BASIS_SETUP_INITIAL_CONFIG` in the ABAP task manager for lifecycle management automation (transaction `STC01`). For more information, see Performing Automated Initial Setup (Optional) [page 139].

Prerequisites

You have logged on to the ABAP application server as described in Logging On to the Application Server [page 138].

Context

You have to perform the following post-installation steps for the ABAP application server:

- Upload and set system profiles using transaction `RZ10`
- Configure the number of work processes
- Create logon and RFC server groups using transactions `SMLG` and `RZ12`
- Create operation modes using transaction `RZ04`
- Schedule standard jobs using transaction `SM36`
- Configuration of SLD data supplier using transaction `RZ70`
- Perform load generation using transaction `SGEN`

For more information, see the appropriate sections below.

Procedure

- **Upload and Set System Profiles using Transaction RZ10**

  You upload system profiles, such as default profile and instance profile, from the file system into the database of the target system using transaction `RZ10`.

  For more information about how to maintain SAP system profiles, see the SAP Online Documentation [page 14] at:

Release	SAP Library Path (Continued)
SAP systems based on foundation on ABAP Platform 1809, version for SAP HANA ("ABAP Platform 1809" for short) **and higher**	*Administrating the ABAP Platform* ▶ *Administration Concepts and Tools* ▶ *Administration of Application Server ABAP* ▶
SAP systems based on SAP BW/4HANA 2.0	*Administrating the ABAP Platform* ▶ *Administration Concepts and Tools* ▶ *Administration of Application Server ABAP* ▶

Release	SAP Library Path (Continued)
SAP systems based on SAP BW/4HANA 1.0 SR1 (`<SP08 or higher>`)	▶ *Application Server* ❯ *Application Server ABAP* ❯ *Administration of Application Server ABAP* ❯ *Monitoring and Administration Tools for Application Server ABAP* ❯ *Configuration in the CCMS* ❯ *Profiles* ❯ *Maintaining Profiles / Profile Maintenance* ▶

- **Configure the number of work processes**

  SAP systems are installed with a minimum number of work processes. This is only an initial configuration to get you started after the installation. It is not detailed enough for a production system because the optimal number of each type of work process depends on the system resources and on the number of users working in each SAP system application. For more information about how many work processes to configure and how to set the number, see SAP Note 39412 .

- **Create Logon and RFC Server Groups using Transactions SMLG and RZ12**

  You create the following:

  - Logon groups using transaction `SMLG`
  - RFC server groups using transaction `RZ12`

  Specify the following:

  - Name of the logon or RFC server group
  - Instance name (application server)
  - Group type attributes are optional

  If required, you create the RFC server group `parallel_generators`.

- **Create Operation Modes using Transaction RZ04**

  You check for existing operation modes and - if required - create a new operation mode using transaction `RZ04`.

  Specify the following:

  - Name of the operation mode
  - Short description
  - Optional: monitoring properties variant

  Select the corresponding checkbox to assign the operation mode to the following:

  - Time table (assignment only from 0-24 h)
  - Current application server instance

- **Schedule Standard Jobs using Transaction SM36**

  You schedule SAP standard jobs using transaction `SM36`.

  If a standard job is already scheduled, it is kept. Only missing jobs are scheduled.

- **Configure the SLD Data Supplier using Transaction RZ70**

  a. Make sure that the SLD and the SLD bridge (the receiving thread of the SLD, which runs on a Java EE engine) are running.
  b. Configure the System Landscape Directory (SLD) data supplier with default settings, using transaction `RZ70`.

SLD configuration is a prerequisite for the connection of an SAP system to SAP Solution Manager.

For more information, see Connecting the System to SAP Solution Manager [page 148]

- **Perform Load Generation using Transaction SGEN**

  You generate the ABAP loads using transaction SGEN. ABAP loads are platform-dependent programs that are generated during runtime and stored in database tables. Using transaction SGEN you can generate ABAP loads of a number of programs, function groups, classes, and so on.

  Choose one of the following generation modes:

  - Generate All Objects
    All existing objects of all software components are generated synchronously. Job RSPARGENER8M starts the generation directly after all ABAP objects have been prepared for generation and have been stored in table GENSETC. Be aware that this is a time-consuming process.

    > **i Note**
    >
    > Make sure that you have sufficient space available on your database. The generation of all existing objects requires around 2 - 9 GB of free space.

  - Prepare All Objects for Generation
    All objects to be generated are prepared for generation and stored in table GENSETM. You can start the generation of these objects later with transaction SGEN. Choose this strategy if object generation is to be done outside the configuration task due to performance issues.

6.15 Installing Additional Languages and Performing Language Transport

This section describes how to install and transport additional languages.

> **i Note**
>
> You do not have to perform these steps or at least some of these steps if you are using a stack configuration file (see Installation Using a Stack Configuration File (Optional) [page 30]) and processed the *Install Additional Languages* screen during the installation.

Context

If you have problems during the language installation, see SAP Note 2456868 .

Procedure

1. Configure the language settings by using transaction `I18N` and choosing ▶ *I18N Customizing* ❯ *I18N System Configuration* ❯ or by executing report `RSCPINST` directly.

   For more information, see SAP Note 42305🔗

   AIX: If you wish to use the Turkish locale with SAP on AIX, you must install the Turkish locale supplied by SAP instead of the one supplied with the operating system. For more information, see SAP Note 39718🔗.

2. Perform the language transport using transaction SMLT:

   > **i Note**
   >
   > German is already available in the system. Do not transport it via SMLT.

   a. Classify the language.
   b. Schedule the language transport.
   c. Schedule the language supplementation.

Next Steps

> **i Note**
>
> You can also install additional languages later, but if you install any Support Packages in the meantime, you have to do one of the following:
>
> - Install the Support Packages again.
> - Use the report `RSTLAN_IMPORT_OCS` to extract the language-relevant information from each Support Package.

For information about the language transport, see the SAP Online Documentation [page 14] at:

Release	SAP Library Path (Continued)
SAP systems based on foundation on ABAP Platform 1809, version for SAP HANA ("ABAP Platform 1809" for short) **and higher**	▶ *Administrating the ABAP Platform* ❯ *Administration Concepts and Tools* ❯ *Solution Life Cycle Management* ❯ *Software Logistics* ❯ *Change and Transport System* ❯ *Language Transport (BC-CTS-LAN)* ❯
SAP systems based on SAP BW/4HANA 2.0	▶ *Administrating the ABAP Platform* ❯ *Administration Concepts and Tools* ❯ *Solution Life Cycle Management* ❯ *Software Logistics* ❯ *Change and Transport System* ❯ *Language Transport (BC-CTS-LAN)* ❯

Release	SAP Library Path (Continued)
SAP systems based on SAP BW/4HANA 1.0 SR1 (`<SP08 or higher>`)	▶ *Solution Life Cycle Management* ▶ *Software Logistics* ▶ *Change and Transport System* ▶ *Language Transport (BC-CTS-LAN)* ▶

6.16 IP Multicast Configuration and Wake-Up Mechanism

The ABAP application server (AS ABAP) uses IP multicast datagrams with host local scope to wake up the internal processes (such as dispatcher, Gateway, internet communication manager, work processes) when dispatching requests.

The dispatcher checks during startup whether local IP multicast communication is working properly. You have to adjust the network configuration of AS ABAP as described in SAP Note 1931675 .

A new event-based wake-up mechanism is available that replaces the multicast mechanism. SAP recommends using this new mechanism in case of problems with multicast. For details on activating the new mechanism see SAP Note 2050408 to ensure that local IP multicast communication works properly.

6.17 Configuring the User Management

After the installation has completed, configure the user management of your SAP system.

Procedure

After the installation of your SAP system has finished, you must decide whether you want to do the following:
○ Add the system to Central User Administration (CUA)
○ Use Lightweight Directory Access Protocol (LDAP) synchronization

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For more information, see the SAP Online Documentation [page 14] at:

Release	SAP Library Path (Continued)
SAP systems based on foundation on ABAP Platform 1809, version for SAP HANA ("ABAP Platform 1809" for short) **and higher**	▷ *Securing the ABAP Platform* ▷ *ABAP Platform Security Guide* ▷ *User Administration and Authentication* ▷ *User Management* ▷ *Identity Management* ▷ *Identity Management for System Landscapes* ▷ *Integration of User Management in Your System Landscape* ▷ *Adding an ABAP System to Your System Landscape* ▷
SAP systems based on SAP BW/4HANA 2.0	▷ *Securing the ABAP Platform* ▷ *ABAP Platform Security Guide* ▷ *User Administration and Authentication* ▷ *User Management* ▷ *Identity Management* ▷ *Identity Management for System Landscapes* ▷ *Integration of User Management in Your System Landscape* ▷ *Adding an ABAP System to Your System Landscape* ▷
SAP systems based on SAP BW/4HANA 1.0 SR1 (`<SP08 or higher>`)	▷ *Security* ▷ *Identity Management* ▷ *Identity Management for System Landscapes* ▷ *Integration of User Management in Your System Landscape* ▷ *Adding an ABAP System to Your System Landscape* ▷

6.18 Ensuring User Security

You need to ensure the security of the users that the installer created during the installation.

The tables below at the end of this section list the following users:

- Operating system users
- SAP system users

During the installation, the installer by default assigned the master password to all users created during the installation unless you specified other passwords.

→ Recommendation

In all cases, the user ID and password are encoded only when transported across the network. Therefore, we recommend using encryption at the network layer, either by using the Secure Sockets Layer (SSL) protocol for HTTP connections, or Secure Network Communications (SNC) for the SAP protocols dialog and RFC.

⚠ Caution

Make sure that you perform this procedure **before** the newly installed SAP system goes into production.

For the users listed below, take the precautions described in the relevant SAP security guide.

You can find the security guide in the *Security* section of the product page for your SAP product at https://help.sap.com/🔗

Operating System and Database Users

After the installation, operating system users for SAP system, database, and SAP Host Agent are available as listed in the following table:

> → Recommendation
>
> For security reasons, we recommend that you remove the operating system users from the group `sapinst` **after** you have completed the installation of your SAP system.
>
> You do not have to do this if you specified this "cleanup" already during the *Define Parameters* phase on the *Cleanup Operating System Users* screen. Then the removal had already been done automatically when the processing of the installer had completed. For more information, see *Operating System Users* in SAP System Parameters [page 48].

Operating System and Database Users

User Type	User	Comment
Operating system user	`<sapsid>adm`	SAP system administrator
SAP HANA database user	`SAP<SAPSID>`	SAP HANA database owner

SAP Host Agent User

User Type	User	Comment
Operating system user	`sapadm`	SAP Host Agent administrator is the user for central monitoring services.
		You do not need to change the password of this user after the installation.
		This user is for administration purposes only.
		You are not able to log on as `sapadm` as this user is locked.

SAP System Users

After the installation, ABAP system users are available. The following table shows these users with the SAP system clients in which they are available, together with recommendations on how you can ensure the security of these users.

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> **i Note**
>
> Client 066 is no longer available in newly installed SAP systems based on SAP NetWeaver 7.5 or higher. For more information, see SAP Note 1749142 ☁️.

> **i Note**
>
> Client 001 is no longer available in newly installed SAP systems based on SAP S/4HANA and SAP BW/4HANA.

SAP System Users

User	User Name	Comment
SAP system user	SAP*	User exists in SAP system client 000.
	DDIC	User exists in SAP system client 000.

6.19 Performing the Client Copy

To get a production client, you have to perform a copy of the SAP reference client.

Context

The installer creates ABAP client 000 during the installation.

Use client 000 as source client for the client copy.

Procedure

1. Maintain the new client with transaction `SCC4`.
2. Activate kernel user `SAP*`:
   a. Set the profile parameter `login/no_automatic_user_sapstar` to `0`.
   b. Restart the application server.
3. Log on to the new client with kernel user **SAP*** and password **PASS**.
4. Copy the client with transaction `SCCL` and profile `SAP_CUST`.
5. Check the log files with transaction `SCC3`.
6. Create the required users. These users must have at least the authorizations required for user administration and system administration. Create a user SAP* with all required authorizations for this user. If you want to have other users for system administration, you can also create user SAP* without authorizations.

7. Deactivate kernel user `SAP*`:

   a. Reset `login/no_automatic_user_sapstar` to `1`.

   b. Restart the application server.

Next Steps

For more information about the client copy and about how to perform it, see the SAP Online Documentation [page 14] at :

Release	SAP Library Path (Continued)
SAP systems based on foundation on ABAP Platform 1809, version for SAP HANA ("ABAP Platform 1809" for short) **and higher**	▶ *Application Server ABAP Infrastructure* ❯ *Administration of Application Server ABAP* ❯ *Administration Concepts and Tools* ❯ *Solution Life Cycle Management* ❯ *Software Logistics* ❯ *Change and Transport System* ❯ *BC - Client Copy and Transport (BC-CTS-CCO)* ❯
SAP systems based on SAP BW/4HANA 2.0	▶ *Application Server ABAP Infrastructure* ❯ *Administration of Application Server ABAP* ❯ *Administration Concepts and Tools* ❯ *Solution Life Cycle Management* ❯ *Software Logistics* ❯ *Change and Transport System* ❯ *BC - Client Copy and Transport (BC-CTS-CCO)* ❯
SAP systems based on SAP BW/4HANA 1.0 SR1 (`<SP08 or higher>`)	▶ *Application Server* ❯ *Application Server ABAP* ❯ *Administration of Application Server ABAP* ❯ *Change and Transport System* ❯ *BC – Client Copy and Transport* ❯

6.20 Installation or Upgrade of SAP HANA Studio

Here you find documentation about how to install or upgrade the SAP HANA Studio.

To install or upgrade SAP HANA studio, see the documentation *SAP HANA Studio Installation and Update Guide* at https://help.sap.com/viewer/p/SAP_HANA_PLATFORM ↝ ▶ *Installation and Upgrade* ❯.

6.21 Backing Up the SAP HANA Database

We recommend that you back up the SAP HANA database after the installation has completed.

Back up the SAP HANA database as described in section *SAP HANA Database Backup and Recovery* of the *SAP HANA Administration Guide*, which you can find here:

https://help.sap.com/viewer/p/SAP_HANA_PLATFORM ▎▶ ❯ *Administration* ❭

Alternatively, as of SAP HANA 2.0, you can use the SAP HANA cockpit to do so. For more information, see section *Backup and Recovery* of the documentation *SAP HANA Administration with SAP HANA Cockpit*, which you can find here:

https://help.sap.com/viewer/product/SAP_HANA_COCKPIT/ ▎▶ ❯ *Administration* ❭

> **i Note**
>
> Make sure that you perform a "Complete Data Backup".

6.22 Changing Keys for the Secure Storage

The secure storage in the file system and the secure storage in the database have been encrypted with a randomly generated individual encryption key or with a default key.

In the first case, you have made a backup of the individual key because you need this value in case of failure to recover the data.

No matter what you chose during installation, you can change the encryption key at any time using the respective maintenance tool.

> **→ Recommendation**
>
> SAP recommends using an individual encryption key.

- For the secure storage in the file system, the key change is described in the SAP Online Documentation [page 14] at:
  ▎▶ *Security* ❯ *System Security* ❯ *System Security for SAP NetWeaver AS ABAP Only* ❯ *Secure Storage in the File System (AS ABAP)* ❭
- For the secure storage in the database, the key change is described in the SAP Online Documentation [page 14] at:
  - **SAP systems based on SAP S/4HANA:** ▎▶ *Securing the ABAP Platform* ❯ *Security Concepts and Tools* ❯ *System Security* ❯ *System Security for AS ABAP Only* ❯ *Secure Storage (ABAP)* ❯ *Key Management* ❯ *Using Individual Encryption Keys* ❯ *Generating Encryption Keys* ❭
  - **SAP systems based on SAP BW/4HANA 2.0:** ▎▶ *Securing the ABAP Platform* ❯ *Security Concepts and Tools* ❯ *System Security* ❯ *System Security for AS ABAP Only* ❯ *Secure Storage (ABAP)* ❯ *Key Management* ❯ *Using Individual Encryption Keys* ❯ *Generating Encryption Keys* ❭

- ○ **SAP systems based on SAP BW/4HANA 1.0:** ▶ *Security* ❯ *System Security* ❯ *System Security for SAP NetWeaver AS ABAP Only* ❯ *Secure Storage (ABAP)* ❯ *Key Management* ❯ *Using Individual Encryption Keys* ❯ *Generating Encryption Keys* ❯

More Information

See also the entry *Individual Encryption Key for the Secure Storage* in table *SAP System Parameters* in SAP System Parameters [page 48].

6.23 Configuring Memory Settings

You have to make sure that the SAP system and the SAP HANA database do not compete for memory resources.

Context

This procedure is necessary so that the systems – that is, AS ABAP and SAP HANA database – on each host do not compete for memory resources. The exact settings depend on the size of your hosts and the sizing required for each system, SAP HANA and SAP Business Suite.

SAP AS ABAP (for the SAP Business Suite) and the SAP HANA database can only run together on one host if the sizing of ABAP plus the sizing of HANA does not exceed the total size of the HANA server in terms of memory. You configure the values resulting from the ABAP sizing (see SAP note 1793345) with `PHYS_MEMSIZE` and you configure the values for the SAP HANA database with `GLOBAL_ALLOCATION_LIMIT` (see SAP note 1872170). If you have extra memory available, allocate it to the SAP HANA database.

Procedure

1. Change the profile for the SAP HANA database either by using the SAP HANA Administration Console of the SAP HANA studio or at the command line as follows:
   Modify the file `global.ini` from `/usr/sap/<DB_SID>/SYS/global/hdb/custom/config` as user `<sapsid>adm` as follows:

   ```
   [memorymanager]
   ```

   ```
   global_allocation_limit = <your HANA sizing result>
   ```

2. Change the profile for AS ABAP:
   a. Log on to the AS ABAP system.

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b. Start transaction RZ10.

c. Edit the profile for the primary application server instance.

d. Select *Extended maintenance*.

e. Set the parameter `PHYS_MEMSIZE` to a value suitable for your host size.

6.24 Performing a Full Installation Backup

You must perform a full offline backup after the configuration of your SAP system. If required, you can also perform a full offline backup after the installation (recommended). In addition, we recommend you to regularly back up your database.

> ⚠ Caution
>
> Make sure that you fully back up your database so that you can recover it later if necessary.

The UNIX commands used in this procedure work on all hardware platforms. For more information about operating system-specific backup tools, see your operating system documentation.

You need to back up the following directories and files:

- All SAP-specific directories:
  - `/usr/sap/<SAPSID>`
  - You have logged on as user as
    `/usr/sap/trans`
  - `<sapmnt>/<SAPSID>`
  - Home directory of the user `<sapsid>adm`
- All database-specific directories
- The root file system
  This saves the structure of the system and all configuration files, such as file system size, logical volume manager configuration, and database configuration data.

> i Note
>
> This list is only valid for a standard installation.

Prerequisites

You have logged on as user `<sapsid>adm` and .

Use the backup tool of your choice and refer to the backup software documentation. You can also use the standard UNIX commands as described below.

Backing Up the Installation

1. Log on as user `root`.
2. Manually create a compressed `tar` archive that contains all installed files:
   - Saving to tape:
     ```
     tar -cf - <file_system> | compress -c > <tape_device>
     ```
   - Saving to the file system:
     ```
     tar -cf - <file_system> | compress -c > ARCHIVENAME.tar.Z
     ```

> **i Note**
>
> **Linux only:** You can also execute the following command to manually create a compressed `GNU tar` archive that contains all installed files and save it to the file system:
>
> ```
> tar -czf <ARCHIVENAME>.tgz <file_system>
> ```

Restoring Your Backup

If required, you can restore the data that you previously backed up.

> **⚠ Caution**
>
> Check for modifications in the existing parameter files before you overwrite them when restoring the backup.

1. Log on as user `root`.
2. Go to the location in your file system where you want to restore the backup image.
3. Restore the data with the following commands:
   - From tape:
     ```
     cat <tape_device> | compress -cd | tar -xf -
     ```
   - From the file system:
     ```
     cat ARCHIVENAME.tar.Z | compress -cd | tar -xf -
     ```

Only valid for 'Platform': Linux

> **i Note**
>
> **Linux only:** If you want to restore the data from a `GNU tar` archive, you have to execute the following command:
>
> ```
> tar -xzf <ARCHIVENAME>.tgz
> ```

End of 'Platform': Linux

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6.25 Logging on to the SAP Web Dispatcher Management Console

This section describes how to log on to the SAP Web Dispatcher.

Context

> **i Note**
>
> This step is only required if you chose to install an integrated SAP Web Dispatcher instance within the ASCS instance.

You must log on to the SAP Web Dispatcher Management Console to do the following:

- Check whether the SAP Web Dispatcher was installed successfully,
- Change the password of the `webadm` user,
- Access monitoring and administration tools.

Procedure

1. Open a web browser.
2. Enter the following URL, depending on whether you use HTTP or HTTPS:

   `http(s)://<Webdispatcher_Host>:<HTTP(S)_PORT>/sap/wdisp/admin/public/default.html`

   > **✦ Example**
   >
   > `https://plx282:44300/sap/wdisp/admin/public/default.html`

3. Log on as user `webadm` with the password that you entered during the input phase of the installation.

   The *SAP Web Dispatcher Monitor* screen appears.
4. We recommend that you change the password of `webadm` immediately after the installation for security reasons.

Release	SAP Library Path (Continued)
SAP systems based on foundation on ABAP Platform 1809, version for SAP HANA ("ABAP Platform 1809" for short) **and higher**	▶ *Application Server ABAP - Infrastructure* ❯ *Components of Application Server ABAP* ❯ *SAP Web Dispatcher* ❯ *Administration of the SAP Web Dispatcher* ❯ *Using the Web Administration Interface* ❯ *Area menu* ❯ *Section "HTTP Handler"* ◢
SAP systems based on SAP BW/4HANA 2.0	▶ *Application Server ABAP - Infrastructure* ❯ *Components of Application Server ABAP* ❯ *SAP Web Dispatcher* ❯ *Administration of the SAP Web Dispatcher* ❯ *Using the Web Administration Interface* ❯ *Area menu* ❯ *Section "HTTP Handler"* ◢
SAP systems based on SAP BW/4HANA 1.0 SR1 (`<SP08 or higher>`)	▶ *Application Help* ❯ *Function-Oriented View* ❯ *Application Server Infrastructure* ❯ *Components of SAP NetWeaver Application Server* ❯ *SAP Web Dispatcher* ❯ *Administration of the SAP Web Dispatcher* ❯ *Using the Web Administration Interface* ❯ *Area menu* ❯ *Section "HTTP Handler"* ◢

Related Information

ASCS Instance with Integrated SAP Web Dispatcher [page 25]

6.26 SAP Web Dispatcher Configuration (Optional)

After installing SAP Web Dispatcher, you must configure it to be able to use it.

> i Note
>
> This step is only required if you chose to install an integrated SAP Web Dispatcher instance within the ASCS instance.

You can find the configuration information in the SAP Online Documentation [page 14] at:

Release	SAP Library Path (Continued)
SAP systems based on foundation on ABAP Platform 1809, version for SAP HANA ("ABAP Platform 1809" for short) **and higher**	▶ *Application Server ABAP - Infrastructure* ❯ *Components of Application Server ABAP* ❯ *SAP Web Dispatcher* ❯ *Administration of the SAP Web Dispatcher* ◢

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Release	SAP Library Path (Continued)
SAP systems based on SAP BW/4HANA 2.0	▐▶ *Application Server ABAP - Infrastructure* ❯ *Components of Application Server ABAP* ❯ *SAP Web Dispatcher* ❯ *Administration of the SAP Web Dispatcher* ◀▌
SAP systems based on SAP BW/4HANA 1.0 SR1 (`<SP08 or higher>`)	▐▶ *Application Server* ❯ *Application Server Infrastructure* ❯ *Components of SAP NetWeaver Application Server* ❯ *SAP Web Dispatcher* ❯ *Administration of the SAP Web Dispatcher* ◀▌

Related Information

6.27 Gateway Configuration (Optional)

You have to configure the gateway to be able to use it.

> **i Note**
>
> This step is only relevant if you installed a gateway integrated in the ASCS instance. For more information, see ASCS Instance with Integrated Gateway [page 27].

You can find all relevant configuration information in the gateway documentation in the SAP Online Documentation [page 14] at:

Release	SAP Library Path (Continued)
SAP systems based on foundation on ABAP Platform 1809, version for SAP HANA ("ABAP Platform 1809" for short) **and higher**	▐▶ *Application Server ABAP - Infrastructure* ❯ *Components of Application Server ABAP* ❯ *RFC Gateway* ❯ *Administration of the RFC Gateway* ❯ *Configuring the Gateway* ◀▌
SAP systems based on SAP BW/4HANA 2.0	▐▶ *Application Server ABAP - Infrastructure* ❯ *Components of Application Server ABAP* ❯ *RFC Gateway* ❯ *Administration of the RFC Gateway* ❯ *Configuring the Gateway* ◀▌
SAP systems based on SAP BW/4HANA 1.0 SR1 (`<SP08 or higher>`)	▐▶ *Application Server* ❯ *Application Server Infrastructure* ❯ *Components of SAP NetWeaver Application Server* ❯ *Gateway* ❯ *Configuring the Gateway* ◀▌

Related Information

7 Additional Information

The following sections provide additional information about **optional** preparation, installation, and post-installation tasks.

There is also a section describing how to delete an SAP system.

7.1 Integration of LDAP Directory Services

This section explains the benefits of using the SAP system with the Lightweight Directory Access Protocol (LDAP) directory and gives an overview of the configuration steps required to use an SAP system with the directory.

LDAP defines a standard protocol for accessing directory services, which is supported by various directory products such as Microsoft Active Directory, and `OpenLDAP slapd`. Using directory services enables important information in a corporate network to be stored centrally on a server. The advantage of storing information centrally for the entire network is that you only have to maintain data once, which avoids redundancy and inconsistency.

If an LDAP directory is available in your corporate network, you can configure the SAP system to use this feature. For example, a correctly configured SAP system can read information from the directory and also store information there.

> **i Note**
>
> The SAP system can interact with the Active Directory using the LDAP protocol, which defines:
>
> - The communication protocol between the SAP system and the directory
> - How data in the directory is structured, accessed, or modified
>
> If a directory other than the Active Directory also supports the LDAP protocol, the SAP system can take advantage of the information stored there. For example, if there is an LDAP directory on a UNIX or Windows server, you can configure the SAP system to use the information available there. In the following text, directories other than the Active Directory that implement the LDAP protocol are called **generic LDAP directories**.

This section does **not** provide information about the use of LDAP directories with the LDAP Connector. For more information about using and configuring the LDAP Connector for an ABAP system, see the SAP Online Documentation [page 14] at:

Release	SAP Library Path (Continued)
SAP systems based on foundation on ABAP Platform 1809, version for SAP HANA ("ABAP Platform 1809" for short) **and higher**	▶ *Securing the ABAP Platform* ▶ *ABAP Platform Security Guide* ▶ *User Administration and Authentication* ▶ *User Management* ▶ *Identity Management* ▶ *User and Role Administration of Application Server ABAP* ▶ *Configuration of User and Role Administration* ▶ *Directory Services* ▶ *Configuring Connection Data for the Directory Service* ▶ *Configuring Connection Data with the LDAP Connector* ▶ *Configuring the LDAP Connector* ▶
SAP systems based on SAP BW/4HANA 2.0	▶ *Securing the ABAP Platform* ▶ *ABAP Platform Security Guide* ▶ *User Administration and Authentication* ▶ *User Management* ▶ *Identity Management* ▶ *User and Role Administration of Application Server ABAP* ▶ *Configuration of User and Role Administration* ▶ *Directory Services* ▶ *Configuring Connection Data for the Directory Service* ▶ *Configuring Connection Data with the LDAP Connector* ▶ *Configuring the LDAP Connector* ▶
SAP systems based on SAP BW/4HANA 1.0 SR1 (`<SP08 or higher>`)	▶ *Security* ▶ *Identity Management* ▶ *User and Role Administration of Application Server ABAP* ▶ *Configuration of User and Role Administration* ▶ *Directory Services* ▶ *LDAP Connector* ▶

Prerequisites

You can only configure the SAP system for Active Directory services or other LDAP directories if these are **already available** on the network. As of Windows 2000 or higher, the Active Directory is automatically available on all domain controllers. A generic LDAP directory is an additional component that you have to install separately on a UNIX or Windows server.

- You can only configure the SAP system for Active Directory services or other LDAP directories if these are **already available** on the network. As of Windows 2000 or higher, the Active Directory is automatically available on all domain controllers. A generic LDAP directory is an additional component that you have to install separately on a UNIX or Windows server.

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- Make sure that the required software is installed:

Operating System	Required Software
AIX	IBM Tivoli Directory Server client packages
HP-UX	The LDAP libraries listed in SAP Note 541344
Linux	You must have at least the following RPM packages installed: ○ Oracle Linux: openldap2 ○ Red Hat Linux: openldap2 ○ SUSE LINUX openldap2 openldap2-client
Solaris	You must have at least the libldap.so library installed.

Features

In the SAP environment, you can exploit the information stored in an Active Directory or generic LDAP directory by using:

- SAP Logon
- The SAP Microsoft Management Console (SAP MMC)
  For more information about the automatic registration of SAP components in LDAP directories and the benefits of using it in SAP Logon and SAP MMC, see the documentation *SAP System Information in Directory Services* at:
  https://archive.sap.com/documents/docs/DOC-14384
- The SAP Management Console (SAP MC)

SAP Logon

Instead of using a fixed list of systems and message servers, you can configure SAP Logon in the sapmsg.ini configuration file to find SAP systems and their message servers from the directory. If you configure SAP logon to use the LDAP directory, it queries the directory each time *Server* or *Group* selection is chosen to fetch up-to-date information on available SAP systems.

To use LDAP operation mode, check that the sapmsg.ini file contains the following:

[Address]

Mode=LDAPdirectory

LDAPserver=

LDAPnode=

LDAPoptions=

Distinguish the following cases:

- If you use an Active Directory, you must set **LDAPoptions="DirType=NT5ADS"**. For more information, see the SAP system profile parameter `ldap/options`.
- You must specify the directory servers (for example, `LDAPserver=pcintel6 p24709`) if one of the following is true:
  - The client is not located in the same domain forest as the Active Directory
  - The operating system does not have a directory service client (Windows NT and Windows 9X without installed *dsclient*).

  For more information, see the SAP system profile parameter `ldap/servers`.
- For other directory services, you can use *LDAPnode* to specify the distinguished name of the SAP root node. For more information, see the SAP system profile parameter `ldap/saproot`.

SAP MMC

The SAP MMC is a graphical user interface (GUI) for administering and monitoring SAP systems from a central location. It is automatically set up when you install an SAP system on Windows. If the SAP system has been prepared correctly, the SAP MMC presents and analyzes system information that it gathers from various sources, including the Active Directory.

Integrating the Active Directory as a source of information has advantages for the SAP MMC. It can read system information straight from the directory that automatically registers changes to the system landscape. As a result, up-to-date information about all SAP application servers, their status, and parameter settings is always available in the SAP MMC.

If you need to administer distributed systems, we especially recommend that you use the SAP MMC together with Active Directory services. You can keep track of significant events in all of the systems from a single SAP MMC interface. You do not need to manually register changes in the system configuration. Instead, such changes are automatically updated in the directory and subsequently reflected in the SAP MMC.

If your SAP system is part of a heterogeneous SAP system landscape that comprises systems or instances both on Unix and Windows operating systems, you can also use the SAP MMC for operating and monitoring the instances running on Unix.

SAP MC

The SAP MC is a graphical user interface (GUI) for administering and monitoring SAP systems from a central location. The SAP MC is automatically set up when you install an SAP system on any platform. If the SAP system has been prepared correctly, the SAP MC presents and analyzes system information that it gathers from various sources, including a generic LDAP Directory.

Integrating a generic LDAP Directory as a source of information has advantages for the SAP MC. It can read system information straight from the directory that automatically registers changes to the system landscape. As a result, up-to-date information about all SAP application servers, their status, and parameter settings is always available in the SAP MC.

For more information about the SAP MC and about how to configure it to access LDAP directories, see the documentation *SAP Management Console* in the SAP Online Documentation [page 14] at:

Release	SAP Library Path (Continued)
SAP systems based on foundation on ABAP Platform 1809, version for SAP HANA ("ABAP Platform 1809" for short) **and higher**	▶ *Administrating the ABAP Platform* ❯ *Administration Concepts and Tools* ❯ *Solution Life Cycle Management* ❯ *SAP Management Console* ❯
SAP systems based on SAP BW/4HANA 2.0	▶ *Administrating the ABAP Platform* ❯ *Administration Concepts and Tools* ❯ *Solution Life Cycle Management* ❯ *SAP Management Console* ❯
SAP systems based on SAP BW/4HANA 1.0 SR1 (`<SP08 or higher>`)	▶ *Solution Life Cycle Management* ❯ *SAP Management Console* ❯

Configuration Tasks for LDAP Directories

This section describes the configuration tasks for the Active Directory or other (generic) LDAP directories.

- **Configuration Tasks for Active Directory**
  To enable an SAP system to use the features offered by the Active Directory, you have to configure the Active Directory so that it can store SAP system data.
  To prepare the directory, you use the installer to automatically:
  - Extend the Active Directory schema to include the SAP-specific data types
  - Create the domain accounts required to enable the SAP system to access and modify the Active Directory. These are the group `SAP_LDAP` and the user `sapldap`.
  - Create the root container where information related to SAP is stored
  - Control access to the container for SAP data by giving members of the `SAP_LDAP` group permission to read and write to the directory

  You do this by running the installer on the Windows server on which you want to use Active Directory Services and choosing ▶ *Generic Installation Options* ❯ `<Database>` ❯ *Preparations* ❯ *LDAP Registration* ❯ *Active Directory Configuration* ❯. For more information about running the installer on Windows, see the documentation *Installation of SAP ABAP Systems on Windows : SAP HANA 2.0 Database - Using Software Provisioning Manager 2.0* at https://help.sap.com/viewer/swpm20guides

  > **i Note**
  >
  > You have to configure the directory server only **once**. Then all SAP systems that need to register in this directory server can use this setup.

- **Configuration Tasks for Generic LDAP Directories**
  To configure other LDAP directories, refer to the documentation of your directory vendor.

- **Configuration Tasks for Generic LDAP Directories on Windows**
  To configure other LDAP directories, refer to the documentation of your directory vendor. The installer software contains schema extensions for directory servers Netscape/iPlanet (`ldregns4.txt`, `ldregns5.txt`) and OpenLDAP slapd (`ldregslapd.schema`). Both files are located in the directory `\<Unpack_Directory>\COMMON\ADS`. After you have applied the schema extension, you need to create a root container to store the SAP-related information and create a directory user that the SAP application server can use to write information to the directory.

For more information about how to set up a Netscape/iPlanet directory server, see the documentation *SAP System Information in Directory Services* at:
https://archive.sap.com/documents/docs/DOC-14384

- **Enabling the SAP System LDAP Registration**
  Once you have correctly configured your directory server, you can enable the LDAP registration of the SAP system by setting some profile parameters in the default profile.
  To do this, run the installer [page 119] **once** for your system and choose:

  ▐▶ *Generic Installation Options* ❯ `<Database>` ❯ *Preparations* ❯ *LDAP Registration* ❯ *LDAP Support* ❯

  If you use a directory server other than Microsoft Active Directory and/or non-Windows application servers, you have to store the directory user and password information by using `ldappasswd pf=<any_instance_profile>`. The information is encrypted for storage in `DIR_GLOBAL` and is therefore valid for all application servers. After restarting all application servers and start services, the system is registered in your directory server. The registration protocols of the components are `dev_ldap*`. The registration is updated every time a component starts.

7.2   Creating a User for LDAP Directory Access

If you use LDAP directory services, you have to set up a user with a password on the host where the SAP system is running. This permits the SAP system to access and modify the LDAP directory.

Prerequisites

During the SAP instance installation you chose to configure the SAP system to integrate LDAP services.

Context

For more information, see Integration of LDAP Directory Services [page 169].

Procedure

1. Log on as user `<sapsid>adm`.
2. Enter the following:
   `ldappasswd pf=<Path_and_Name_of_Instance_Profile>`
3. Enter the required data.

   > ❖ Example
   >
   > The following is an example of an entry to create an *LDAP Directory User*:
   >
   > **`CN=sapldap,CN=Users,DC=nt5,DC=sap-ag,DC=de`**

7.3 Exporting and Mounting Directories via NFS

Related Information

7.3.1 Exporting and Mounting Directories via NFS for AIX

> This topic is only valid for 'Platform': AIX

This procedure describes how to export and mount directories via NFS for AIX using the command line.

Context

This section only provides the basic procedure. If you need more detailed information, check your OS vendor's documentation.

Procedure

- To export an NFS filesystem, do the following steps:
    a. Take the backup of the exports file:

    `cp -p /etc/exports /etc/exports_bak`

    b. Create an entry for each directory to be exported, using the full path name of the directory:

    `vi /etc/exports`

    c. Read the `/etc/exports` file and export all the directories listed:

    `exportfs -a`

    d. Confirm the exported directory listed:

    `showmount -e`

    e. Confirm the nfs client name and directory list:

    `showmount -a`

- Mounting the NFS filesystem on the client:

a. Verify if the NFS server has exported the directory.

   showmount -e <server_name>

b. Create the mounting directory if not already exist.

   mkdir /local_directory

c. Mount the remote directory on the client:

   mount <ServerName>:/<remote_directory> /<local_directory>

d. Confirm that the NFS filesystem has been mounted:

   df -gt <NFS mount_name>

End of 'Platform': AIX

7.3.2 Exporting and Mounting Directories via NFS for HP-UX

This topic is only valid for 'Platform': HP-UX

This section describes how to export and mount directories via NFS for HP-UX manually.

Context

This section only provides the basic procedure. If you need more detailed information, check your OS vendor's documentation.

Procedure

1. On the host where you want to **export** directories do the following:
    a. Add the file system that you want to export to the file `/etc/dfs/dfstab` using the following syntax:

       share –F nfs –o root= <client_1>:<client_n> access= <client_1>:<client_n> <file system to share>

       share –F nfs –o root=hw5111:hw5115, access=hw511:hw5115 /sapmnt/C11/exe.

       If you encounter problems, try using the FQDN (Fully Qualified Domain Name).
    b. To make the file system available to NFS clients, enter the following command:

       /usr/sbin/shareall

2. On the host where you want to **mount** the directories you exported in the previous step, do the following:
    a. Add the remote file system to `/etc/fstab`.

       hw5115:/sapmnt/C11 /sapmnt/C11 nfs defaults 0 0
    b. Mount the file system.

```
    mount -a
```

7.3.3 Exporting and Mounting Directories via NFS for Linux

To export directories via NFS, perform the following steps.

Context

This section only provides the basic procedure. If you need more detailed information, check your OS vendor's documentation.

The following procedure assumes that the central instance host is the NFS server.

Procedure

1. Log on as user root to the NFS server.
2. Make sure that your host is configured as NFS server as follows:

    ○ On Red Hat Linux, make sure that the output of the command:
      `chkconfig --list nfs`
      The output looks as follows:

      > **⁘ Example**
      >
      > `nfs 0:off 1:off 2:off 3:on 4:on 5:on 6:off`

    ○ On SUSE Linux, enter the following command:
    ○ `yast2`

    You can set up your host as NFS server as follows:

    ○ On Red Hat Linux, enter the following command:
      `system-config-users`
    ○ On SUSE Linux, enter the following command:
      `yast2`

3. To export a directory from a local file system, you can proceed as follows:

    ○ On Red Hat Linux, use the following tool:
      `system-config-nfs`
    ○ On SUSE Linux, use the following tool:
      `yast2`

    Perform the configuration manually.

To perform the configuration manually, proceed as follows:

a. To add a line to the local file `/etc/exports`, enter the following:

`#/etc/exports`

`<directory> <hostname>(<options>)`

> **i Note**
>
> There must **not** be a blank between **`<hostname>`** and**`<options>`**. Otherwise, the directory is exported with default option (ro) (read-only) to the host specified by **`<hostname>`** **and** with the option specified by **`<options>`** to all other hosts.
>
> To export directories on Linux with root permissions, use the option **`no_root_squash`**. For security reason, **only** use this option during installation.

> **⁂ Example**
>
> ○ To export the directory /usr/sap/trans in read-only mode to the NFS client host.wdf.sap-ag.de, enter the following:
> **`#/etc/exports`**
> **`/usr/sap/trans host.wdf.sap-ag.de(ro)`**
> ○ To export the directory in read-write mode with root permissions, enter the following:
> **`#/etc/exports`**
> **`/usr/sap/trans host.wdf.sap-ag.de(rw,no_root_squash)`**
> ○ To export the directory to all NFS clients of the domain using a wildcard (*), enter the following:
> **`#/etc/exports`**
> **`/usr/sap/trans *.wdf.sap-ag.de(rw)`**

b. To activate the changes (that is, inform the NFS daemon about the changes performed in `/etc/exports`), enter the following command:

`exportfs -r`

c. To see a list of all currently exported directories, enter the following command:

`exportfs -v`

For more information, consult the man page by entering **`man exports`**.

4. Log on as user root to the host where the file system is to be imported.

5. To mount the file systems, enter the following command:

`mount <nfs_server>:<file_system> <mount_point>`

> ❖ Example
>
> ```
> mount <nfs_server>:/usr/sap/trans /usr/sap/trans
> ```

End of 'Platform': Linux

7.3.4 Exporting and Mounting Directories via NFS for Oracle Solaris

This topic is only valid for 'Platform': Oracle Solaris

To mount directories via NFS from the host where the directory resides that you want to mount, log on as user root and proceed as follows.

Context

This section only provides the basic procedure. If you need more detailed information, check your OS vendor's documentation.

Procedure

- On the host on which the directory to be mounted resides:
    a. Enter the following command:

       /usr/sbin/share
    b. To add file systems shared via NFS, edit file `/etc/dfs/dfstab`:

       vi /etc/dfs/dfstab

       Add the following line for each file system:

       share -F nfs -o root=<nfsclient1>:<nfsclient2>,anon=0 -d "description"
       <file_system_to_be_shared>

       > ℹ Note
       >
       > Depending on your configuration, a full qualified name may be required for `nfsclient`, for example, `myclient.mydomain.com`.

       > ⚠ Caution
       >
       > After your SAP system has been installed successfully, in the above line you have to change **-o root** to **-o rw** (or remove **anon=0**, respectively) for all exported directories:
       >
       > **share -F nfs -o rw=<nfsclient1>:<nfsclient2> -d "description"**
       > **<file_system_to_be_shared>**

c. If the `/etc/dfs/dfstab` was empty, the NFS server is not active.

   o On Solaris 9, start the NFS server with the following command:
     `/etc/init.d/nfs.server start`

   o On Solaris 10, start the NFS server with the following command:
     `svcadm enable svc:/network/nfs/server:default`

d. To see if the NFS server is active and which partitions are mountable, enter the command:

   `showmount -e <NFS-server>`

- On the host on which the additional instance runs:

   a. If you are mounting NFS disks for the first time, the NFS client software is not active.

      o On Solaris 9, start the NFS server with the following command:
        `/etc/init.d/nfs.client start`

      o On Solaris 10, start the NFS server with the following command:
        `svcadm enable svc:/network/nfs/client:default`

   b. Edit the file `/etc/vfstab` to mount the directory:

      Edit the file `/etc/vfstab` to mount the directory:

      `vi /etc/vfstab`

      Add the following line for each file system:

      `<host_name_where_directory_resides>:<file_system_to_be_shared> - <mount point> nfs - yes -`

      If the mount point exists, mount **`<file_system_to_be_shared>`** with the command:

      `mount <mount point>`

End of 'Platform': Oracle Solaris

7.4   Heterogeneous SAP System Installation

This section provides information on the installation of an SAP system in a heterogeneous system landscape. "Heterogeneous system landscape" means that application servers run on different operating systems.

See SAP Note 1067221 for more information on:

- Supported combinations of operating systems and database systems
- How to install an application server on Windows in a heterogeneous (UNIX) SAP system environment
- Heterogeneous SAP system landscapes with different UNIX operating systems

7.5   SAP Systems Based on Application Server ABAP on One Host with SAP HANA Database - High-Availability Setup Based on SAP HANA System

On **Linux**, you can install SAP systems on the **same host** as the SAP HANA database as a high-availability setup with system replication. This approach is described in this section.

For more information about SAP HANA system replication, see section *Availability and Scalability* in the SAP HANA Administration Guide for SAP HANA Platform guide at https://help.sap.com/hana_platform ▶❯ *Operate* ❯ *Administration* ❭.

As of SAP HANA 2.0 SPS04, see the SAP HANA System Replication guide at https://help.sap.com/hana_platform ▶❯ *Operate* ❯ *Administration* ❭.

7.5.1 Overview

7.5.1.1   Installation Sequence

Context

You need to perform the following main steps to complete the installation:

Procedure

1. Check the Prerequisites [page 183].

2. Do the required Preparation [page 184] steps.

3. Install the SAP HANA database instance and AS ABAP:

   a. Install the empty SAP HANA database instance on the two hosts:

      1. Install the SAP HANA database instance on the primary host (**host A**).
         For more information, see Installation of SAP HANA [page 185]

      2. Install the SAP HANA database instance on the secondary host (**host B**).
         For more information, see Installation of SAP HANA [page 185]

      3. On **host A**, execute the SAP Host Agent (which must be already installed) to bind all virtual host names.
         For more information, see Binding Virtual Host Names [page 187]

      4. Install the enqueue replication server (ERS) instance on the secondary host (**host B**).
         Fore more information, see Installation of the AS ABAP System [page 188]

      Result [page 187]

   b. Install the instances of AS ABAP distributed on the two hosts:

      1. Install the ASCS instance on the primary host (**host A**).
         Fore more information, see Installation of the AS ABAP System [page 188]

      2. Install the enqueue replication server (ERS) instance on the secondary host (**host B**).
         Fore more information, see Installation of the AS ABAP System [page 188]

      3. Install the contents of the SAP HANA database instance on the secondary host remotely into the primary host (**host A**).
         You need to **remotely** (that is, from host B) bring the **contents** of the pre-installed database instance on host B to the pre-installed database on host A. Therefore, you need to perform the installation instructions in this section on host B.
         Fore more information, see Installation of the AS ABAP System [page 188]

      > ⚠ Caution
      >
      > When the installer prompts you for the database host, make sure that you specify the virtual host name bound to the network interface on **host A**.
      >
      > In addition, make sure that you specify the same database ID as you entered during the installation of SAP HANA.

      4. Install the primary application server (PAS) instance on the primary host (**host A**).
         Fore more information, see Installation of the AS ABAP System [page 188]

4. Perform post-installation steps

   a. Back up the new SAP HANA database installation

      Fore more information, see Backing Up the SAP HANA Database [page 198] .

   b. Disable autostart of the Enqueue Replication Server

      Fore more information, see Disabling Autostart of Enqueue Replication Server [page 199] .

   c. Adapt the `hdbuserstore`

      Fore more information, see Adapting hdbuserstore [page 199] .

5. Perform the post-installation configuration of the system:

    a. Configure SAP HANA system replication.

        Fore more information, see Enabling SAP HANA System Replication [page 202] .

    b. Configure memory settings on SAP HANA and AS ABAP.

        Fore more information, see Configuring Memory Settings [page 203] .

    c. Install the required Diagnostics Agents.

        Fore more information, see Diagnostics Agent Installation [page 204] .

7.5.1.2   Failover for Disaster Recovery

Context

In the event of failure of the primary host (**host A**), you need to perform a takeover to recover the system on **host B**:

Procedure

1. Move the virtual IPs and host names.

    For more information, see Moving the Virtual IPs and Virtual Host Names [page 205]

2. Perform takeover of the SAP HANA database.

    For more information, see Performing Takeover of the SAP HANA Database [page 206]

3. Start the missing instance agents and instances on host B.

    For more information, see Registering and Starting Failed Instance Services and Instances from Host A on Host B [page 206]

Related Information

Failover for Disaster Recovery [page 204]

7.5.2 Prerequisites

- Shared file system suitable for high availability and shared between data centers for ABAP host names

- Adaptive computing approach required for all ABAP instances. No local storage or file systems.

7.5.2.1 Hardware and Software Requirements

- The hosts need to be able to support the SAP HANA database plus AS ABAP. Make sure that both hosts meet these **combined** requirements:
  - SAP HANA database – see section *Hardware and Software Requirements* in the *SAP HANA Server Installation and Update Guide* at https://help.sap.com/hana ▶ ❯ `<Version>` ❯ *Installation and Upgrade* ❭.
  - AS ABAP – see Hardware and Software Requirements [page 32]
- The required file systems are created during installation of the SAP HANA database and AS ABAP. However, if required you can set them up before the installation and specify them during the installation procedure.
  For more information, see section *Recommended File System Layout* in the *SAP HANA Server Installation and Update Guide* at https://help.sap.com/hana ▶ ❯ `<Version>` ❯ *Installation and Upgrade* ❭.
- Operating systems supported by SAP HANA are listed in SAP Note 2235581 ⟋.

7.5.3 Preparation

7.5.3.1 Exporting the Shared File System

Procedure

Export the shared file systems. The shared file systems are `/usr/sap/<SAPSID>` and `/sapmnt/<SAPSID>`.

Related Information

Exporting and Mounting Global Directories [page 113]

7.5.3.2 Setting Up Users and Groups

Procedure

Make sure that the following user IDs and group IDs are **identical** on both hosts so they can be accessed in the same way via the shared file system. You can do this either by setting up the users on each host now (that is, before starting the installation) or when prompted during the installation:

- Central groups:
  `sapsys, sapinst`
- Central users:
  `<DA_sid>adm` (diagnostics agent), `<ABAP_sid>adm` (ABAP system), `<DB_sid>adm` (HANA database)
  `sapadm` (SAP host agent)

Related Information

Creating Operating System Users and Groups [page 74]

7.5.4 Installation of SAP HANA

You need to install the SAP HANA database using the SAP HANA installer (hdblcm) tool on **both** hosts, the primary (host A) and secondary (host B). For more information, see the SAP HANA Server Installation and Update Guide at https://help.sap.com/hana ▶ ▶ *Implement* ❯ *Installation and Upgrade* ❯ .

For more information about required configuration steps, see section *Availability and Scalability* in the SAP HANA Administration Guide for SAP HANA Platform at https://help.sap.com/hana_platform ▶ ❯ *Operate* ❯ *Administration* ❯ .

As of SAP HANA 2.0 SPS04, see the SAP HANA System Replication guide at https://help.sap.com/hana_platform ▶ ❯ *Operate* ❯ *Administration* ❯ .

> **i Note**
>
> You install the software in the same way on both host A and host B – that is, the same SIDs and instance numbers for both databases. This is important for system replication and (if required) failover to function correctly. We use the system ID `HAN` in the examples in this section.

> **⚠ Caution**
>
> You must use a different SAP system ID (`<SAPSID>`) for the SAP HANA database than the one you later specify for the installation of the AS ABAP.

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7.5.4.1   Prerequisites

To install the SAP HANA database beforehand, proceed as described in this section.

- You use the tool `hdblcm` or the GUI version `hdblcmgui` to install SAP HANA. In this documentation we use `hdblcm`.
- You must run the installer (`hdblcm` or `hdblcmgui`) as `root` user from the following directory where you downloaded [page 101] and extracted the installation software, such as from one of the following:
    - `<Media root directory>/DATA_UNITS/HDB_LCM_LINUX_X86_64`
    - `<Media root directory>/DATA_UNITS/HDB_LCM_LINUX_PPC64LE`
    - `<Media root directory>/DATA_UNITS/HDB_LCM_LINUX_PPC64`

7.5.4.2   Installing SAP HANA

Prerequisites

You must run the installation described below on host A and on host B.

> ⚠ Caution
>
> Make sure that the operating system and database users and groups are exactly the same on host A and host B.

Procedure

1. Change to the directory containing `hdblcm` and enter the command **`hdblcm`** to start the installation.

2. Choose *Install new system* and select the additional components required:

Option	Description
SAP HANA Studio	Installs the components of the SAP HANA Studio
SAP HANA Lifecycle Manager	Installs the components of the SAP HANA Lifecycle Manager

Option	Description
SAP HANA Database Client	Installs the components of the SAP Database Client

3. Specify the required installation parameters.

   In most cases you can accept the default values unless you have specific requirements, such as for the SAP system ID.

Next Steps

If required, you can check that the SAP Host Agent is running although it should normally be running automatically.

7.5.4.3   Binding Virtual Host Names

Procedure

As `root` on **host A**, execute the SAP Host Agent (which is already installed) to bind all virtual host names as below:

/usr/sap/hostctrl/exe/saphostctrl -function AddIpAddress -ifName eth0 -addr `<virtual host name of database>` -netmask `<subnet mask of network adapter>`>

> ⁂ Example
>
> **/usr/sap/hostctrl/exe/saphostctrl -function AddIpAddress -ifName eth0 -addr hadrdbhan -netmask 255.255.252.0**

7.5.4.4   Result

You now have a SAP HANA system with an empty database on host A and on host B, a shared file system (for the installation of AS ABAP), and a virtual host name for the SAP HANA database, as shown in the figure below.

Host A (PRIMARY)   **Shared File System**   **Host B (SECONDARY)**

/usr/sap/<ABAP SID>
/sapmnt/<ABAP SID>

hadrdb<sid>

<HANA SID>
<HDB##>

/hana

<HANA SID>
<HDB##>
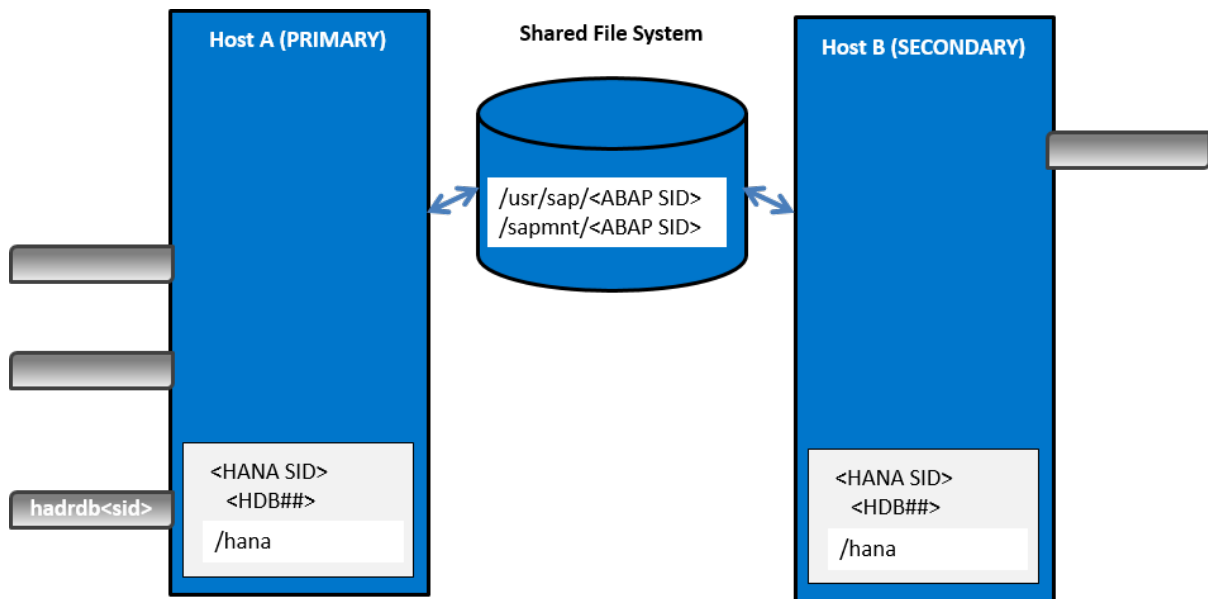
/hana

xx<sid>   = virtual hostname

Note:
- /usr/sap/<ABAP SAPSID> and /sapmnt/<ABAP SAPSID> are the installation directories of the SAP AS ABAP system
- /hana is the installation directory of the SAP HANA database

If required, you can check that the SAP Host Agent is running, although it should normally be running automatically.

Now you are ready to install AS ABAP on host A and on host B.

Related Information

Installation of the AS ABAP System [page 188]
Checking the SAP Host Agent [page 207]

7.5.5 Installation of the AS ABAP System

You need to install the instances of the AS ABAP system distributed on both hosts, using the Software Provisioning Manager as follows:

1. On host A, you run the installer [page 119] to install the primary application server and the ASCS instances.
2. On host A, you install the contents of the SAP HANA database instance on the secondary host remotely into the primary host (**host A**).
   You need to run the installer [page 119] **remotely** (that is, from host B) to bring the **contents** of the pre-installed database instance on host B to the pre-installed database on host A. Therefore, you need to perform the installation instructions in this section on host B.

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> ⚠ **Caution**
>
> When the installer prompts you for the database host, make sure that you specify the virtual host name bound to the network interface on **host A**.
>
> In addition, make sure that you specify the same database ID as you entered during the installation of SAP HANA.

3. On host B, you run the installer [page 119] to install the enqueue replication server instance.

> ⚠ **Caution**
>
> You must use a different SAP system ID (SAPSID) for the AS ABAP system than that already specified for the installation of the SAP HANA database.

7.5.5.1   Preparation

7.5.5.1.1   Mounting the Shared File Systems to Directories

Context

On host A and on host B, do the following:

Procedure

1. Create the following directories:

   ```
   mkdir -p /usr/sap/<SAPSID>
   ```

```
mkdir -p /sapmnt/<SAPSID>
```

2. Mount the shared file systems to these directories:

```
mount <hostname>:<export name / path>/usr/sap/<SAPSID>
mount <hostname>:<export name / path>/sapmnt/<SAPSID>
```

Related Information

Exporting and Mounting Global Directories [page 113]

7.5.5.1.2   Binding the Virtual Host Names

Context

Execute the following commands to bind the virtual host names on the corresponding network adapter of the installation hosts.

> i Note
>
> In most cases you can accept the default values unless you have specific requirements, such as for the SAP system ID.

Procedure

1. On **host A**, execute a SAP Host Agent function to bind all virtual host names to the subnet mask of the network adapter:

```
/usr/sap/hostctrl/exe/saphostctrl -function AddIpAddress -ifName eth0 -addr
<virtual host name of ASCS instance> -netmask <subnet mask of network adapter>
/usr/sap/hostctrl/exe/saphostctrl -function AddIpAddress -ifName eth0 -addr
<virtual host name of PAS instance> -netmask <subnet mask of network adapter>
```

> ✣ Example
>
> ```
> /usr/sap/hostctrl/exe/saphostctrl -function AddIpAddress -ifName eth0 -addr
> hadrcsamg -netmask 255.255.252.0
> /usr/sap/hostctrl/exe/saphostctrl -function AddIpAddress -ifName eth0 -addr
> hadrciamg -netmask 255.255.252.0
> ```

2. On **host B**, execute a SAP Host Agent function to bind all virtual host names to the subnet mask of the network adapter:

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```
/usr/sap/hostctrl/exe/saphostctrl -function AddIpAddress -ifName eth0 -addr
<virtual host name of ERS instance> -netmask <subnet mask of network adapter>
```

> **❖ Example**
>
> ```
> /usr/sap/hostctrl/exe/saphostctrl -function AddIpAddress -ifName eth0 -addr
> hadreramg -netmask 255.255.252.0
> ```

7.5.5.1.3   Reviewing the Installation Parameters

Procedure

During the installation, the installer prompts you for several parameters. To review these before starting the installation, see Basic Installation Parameters [page 46].

Related Information

Basic Installation Parameters [page 46]

7.5.5.1.4   Preparing the Installation Media

Procedure

Download and set up the installation media, making sure you always use the current version. This comprises:

○ The Software Provisioning Manager, containing the installer, which you can get from *Download Software Provisioning Manager* at:
  http://support.sap.com/sltoolset ➦ ▐▶ ❯ *System Provisioning* ❱.
○ The installation media of SAP BW∕4 HANA, or SAP S∕4HANA.

Related Information

Getting the Installation Software [page 93]

7.5.5.2   Installation

7.5.5.2.1   Prerequisites

- You use Software Provisioning Manager (the "installer" for short) to install the various instances.
- You check that you meet the prerequisites described in Prerequisites for Running the Installer [page 115].
- You use the installation options for a *High-Availability System* in the installer, as described below.

Parent topic:

Next task:

7.5.5.2.2   Installing the ASCS Instance on Host A

Procedure

1. Log on to **host A** as the `root` user and change to the directory where you unpacked Software Provisioning Manager archive.
2. Perform the following steps on **host A** to install the ASCS instance:
   a. Enter the following command to start the installer:

      `./sapinst`

      > **i Note**
      >
      > If it is **not possible** to assign the virtual host name to the ASCS instance to be installed by specifying it as an input parameter on the *ASCS Instance* screen (see below), you must assign it by starting the installer with the `SAPINST_USE_HOSTNAME` property:
      >
      > `./sapinst SAPINST_USE_HOSTNAME=<virtual host name of ASCS instance>`
      >
      > For example, if your virtual host name is **hadrcsamg**, enter the following command: `./sapinst SAPINST_USE_HOSTNAME=hadrcsamg`

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b. On the *Welcome* screen, choose the option:

▶ `<your SAP Business Suite scenario>` ❯ *SAP HANA Database* ❯ *Installation* ❯ *Application Server ABAP* ❯ *High-Availability System* ❯ *ASCS Instance* ▶

c. Choose *Next*.

d. Follow the instructions in the installer, entering the parameters you defined.

> ⚠ Caution
>
> You must use a **different** SAP system ID (SID) for the AS ABAP system than that already specified for the installation of the SAP HANA database.

> ⚠ Caution
>
> If you did not start the installer with the `SAPINST_USE_HOSTNAME` property (see above), make sure that you assign the required virtual host name by specifying it in the *ASCS Host Name* field of the *ASCS Instance* screen.

e. On the *Parameter Summary* screen, check all the parameters

If required, you can revise the parameters before starting the installation.

f. To start the installation, choose *Start*.

Results

The installer starts the installation and displays the progress of the installation. When the installation has finished, the installer shows the message:

`Execution of <Option_Name> has completed.`

Task overview: Installation [page 192]

Previous: Prerequisites [page 192]

Next task: Installing the ERS Instance on Host B [page 194]

Related Information

Reviewing the Installation Parameters [page 191]
Running the Installer [page 119]

7.5.5.2.3 Installing the ERS Instance on Host B

Procedure

1. Log on to **host B** as the `root` user and change to the directory where you unpacked Software Provisioning Manager archive.

2. Perform the following steps on **host B** to install the ERS instance:

   a. Enter the following command to start the installer:

   `./sapinst`

   > **i Note**
   >
   > If it is **not possible** to assign the virtual host name to the ERS instance to be installed by specifying it as an input parameter on the *ERS Instance* screen (see below), you must assign it by starting the installer with the `SAPINST_USE_HOSTNAME` property:
   >
   > **`./sapinst SAPINST_USE_HOSTNAME=<virtual host name of ERS instance>`**
   >
   > For example, if your virtual host name is **hadrerhan**, enter the following command: **`./sapinst SAPINST_USE_HOSTNAME=hadrerhan`**

   b. On the *Welcome* screen, choose the option:

   ▶ `<your SAP Business Suite scenario>` ❯ *SAP HANA Database* ❯ *Installation* ❯ *Application Server ABAP* ❯ *High-Availability System* ❯ *Enqueue Replication Server Instance* ❯

   c. Choose *Next*.

   d. Follow the instructions in the installer, entering the parameters you defined.

   > ⚠ **Caution**
   >
   > If you did not start the installer with the `SAPINST_USE_HOSTNAME` property (see above), make sure that you assign the required virtual host name by specifying it in the *ERS Host Name* field of the *ERS Instance* screen.

   e. On the *Parameter Summary* screen, check all the parameters

   If required, you can revise the parameters before starting the installation.

   f. To start the installation, choose *Start*.

   The installer starts the installation and displays the progress of the installation. When the installation has finished, the installer shows the message:

   `Execution of <Option_Name> has completed.`

3. On **host A**, restart the ASCS instance by entering this command:

   `sapcontrol -nr <ASCS instance number> -function RestartInstance`

   A message like the following appears to confirm that the instance has been restarted:

   `29.10.2013 08:53:31`

   `RestartInstance`

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```
OK
```

Related Information

7.5.5.2.4 Installing the Contents of the Database Instance from Host B to Host A

Context

You need to **remotely** (that is, from host B) bring the **contents** of the pre-installed database instance on host B to the pre-installed database on host A. Therefore, you need to perform the installation instructions in this section on host B.

Procedure

1. Log on to **host B** as the root user and change to the directory where you unpacked the Software Provisioning Manager archive.
2. On **host B**, perform the following steps to install the contents of the SAP HANA database into the existing SAP HANA database instance on host A:
   a. Enter the following command to start the installer:
      `./sapinst`
   b. On the *Welcome* screen, choose the option:

      ▶ `<your SAP Business Suite scenario>` ❯ *SAP HANA Database* ❯ *SAP Systems* ❯ *Application Server ABAP* ❯ *High-Availability System* ❯ *Database Instance* ❯
   c. Choose *Next*.
   d. Follow the instructions in the installer, entering the parameters you defined.

> ⚠ Caution
>
> When the installer prompts you for the database host, make sure that you specify the virtual host name bound to the network interface on **host A**.
>
> In addition, make sure that you specify the same database ID as you entered during the installation of SAP HANA.

    e. On the *Parameter Summary* screen, check all the parameters

       If required, you can revise the parameters before starting the installation.

    f. To start the installation, choose *Start*.

Results

The installer starts the installation and displays the progress of the installation. When the installation has finished, the installer shows the message:

```
Execution of <Option_Name> has completed.
```

Task overview: Installation [page 192]

Previous task: Installing the ERS Instance on Host B [page 194]

Next task: Installing the Primary Application Server Instance on Host A [page 196]

Related Information

Reviewing the Installation Parameters [page 191]
Running the Installer [page 119]

7.5.5.2.5   Installing the Primary Application Server Instance on Host A

Procedure

1. Log on to **host A** as the `root` user and change to the directory where you unpacked the Software Provisioning Manager archive.

2. Perform the following steps on **host A** to install the primary application server (PAS) instance:

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a. Enter the following command to start the installer:

```
./sapinst
```

> **i Note**
>
> If it is **not possible** to assign the virtual host name to the PAS instance to be installed by specifying it as an input parameter on the *Primary Application Server Instance* screen (see below), you must assign it by starting the installer with the SAPINST_USE_HOSTNAME property:
>
> ```
> ./sapinst SAPINST_USE_HOSTNAME=<virtual host name for PAS instance>
> ```
>
> For example, if your virtual host name is **hadrciamg**, enter the following command: `./sapinst SAPINST_USE_HOSTNAME=hadrciamg`

b. On the *Welcome* screen, choose the option:

   ▶ `<your SAP Business Suite scenario>` 〉 *SAP HANA Database* 〉 *Installation* 〉 *Application Server ABAP* 〉 *High-Availability System* 〉 *Primary Application Server Instance* 〉

c. Choose *Next*.

d. Follow the instructions in the installer, entering the parameters you defined.

> **⚠ Caution**
>
> When specifying the profile directory, use a **different** SAP system ID (SID) than that already specified for the installation of the SAP HANA database.

> **⚠ Caution**
>
> If you did not start the installer with the SAPINST_USE_HOSTNAME property (see above), make sure that you assign the required virtual host name by specifying it in the *PAS Instance Host Name* field of the *Primary Application Server Instance* screen.

e. On the *Parameter Summary* screen, check all the parameters

   If required, you can revise the parameters before starting the installation.

f. To start the installation, choose *Start*.

Results

The installer starts the installation and displays the progress of the installation. When the installation has finished, the installer shows the message:

```
Execution of <Option_Name> has completed.
```

Task overview: Installation [page 192]

Previous task: Installing the Contents of the Database Instance from Host B to Host A [page 195]

Related Information

7.5.5.3   Post-Installation

If required, you can check the replication of the lock table of the SAP ABAP enqueue replication server (ERS instance).

Related Information

7.5.5.3.1   Backing Up the SAP HANA Database

We recommend that you back up the SAP HANA database after the installation has completed.

Back up the SAP HANA database as described in section *SAP HANA Database Backup and Recovery* of the *SAP HANA Administration Guide*, which you can find here:

https://help.sap.com/viewer/p/SAP_HANA_PLATFORM ▶ ❯ *Administration* ❯

Alternatively, as of SAP HANA 2.0, you can use the SAP HANA cockpit to do so. For more information, see section *Backup and Recovery* of the documentation *SAP HANA Administration with SAP HANA Cockpit*, which you can find here:

https://help.sap.com/viewer/product/SAP_HANA_COCKPIT/ ▶ ❯ *Administration* ❯

> i Note
>
> Make sure that you perform a "Complete Data Backup".

7.5.5.3.2 Disabling Autostart of Enqueue Replication Server

Procedure

Disable autostart of the enqueue replication server (ERS) instance by editing the value of the profile parameter `Autostart` to `0` in the following file:

`/usr/sap/<SID>/ERS11/profile/<ERS instance profile name>`

7.5.5.3.3 Adapting hdbuserstore

Context

On host A and B, the installer writes the physical host names of the SAP HANA database to `hdbuserstore`. However, the **virtual** host names are required. This procedure describes how to achieve this.

Perform the following procedure on **both hosts**.

Procedure

1. Log on as the `<sid>adm` user of AS ABAP.
2. Delete the current entry of `hdbuserstore` with the following command:

   `hdbuserstore delete default`
3. Make the new entry as follows:

   `hdbuserstore set default <virtual host name of SAP HANA database>:3<instance number of SAP HANA database>15 SAP<SAP ABAP Schema SID> <schema password defined during installation>`
4. To check, execute the following command as the `<sid>adm` user of the system AS ABAP:

   `R3trans -d`

Results

The results should look like:

```
R3trans finished (0000)
```

7.5.5.4 Result

You now have a full AS ABAP system, with a loaded database on host A, an empty database on host B, a shared file system, and a set of virtual host names:
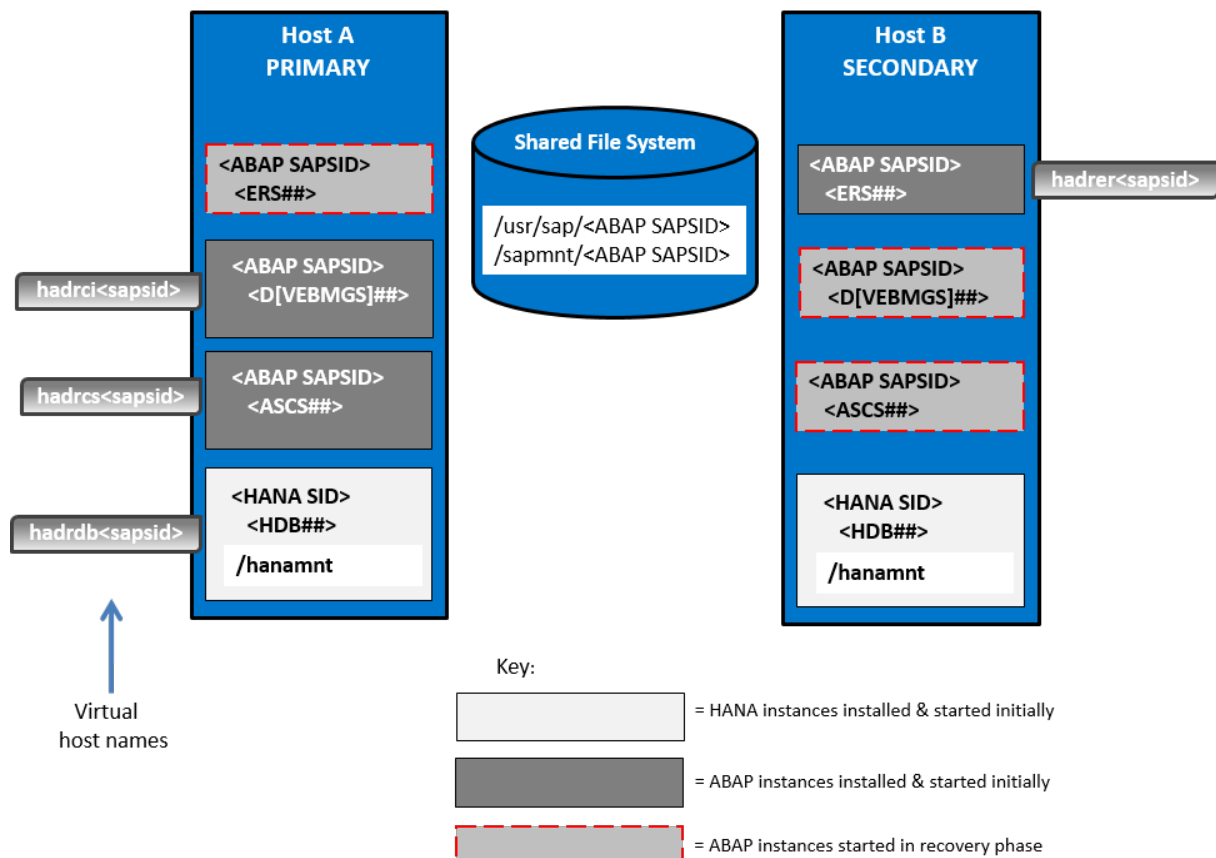
In the SAP Management Console (SAP MC) and the SAP Microsoft Management Console (SAP MMC) with snap-in SAP Systems Manager, you can see the instances that are started initially, as in the examples in the screenshots below, where:

- `<ABAP SID>` = `AMG` with instances:
    - `ASCS01` (virtual host: hadrcsamg)
    - `ERS11` (virtual host: hadreramg)
    - `DVEBMGS10` (virtual host: hadrciamg)
- `<HANA SID>` = `HAN` (instance `HDB00`) running on physical hosts:
    - `hdshanar17`
    - `hdshana02`

For more information on how to start and stop SAP instances, see Starting and Stopping SAP System Instances [page 209].

7.5.6 Post-Installation Configuration

Configuration of SAP HANA System Replication [page 201]

Configuring Memory Settings [page 203]

Diagnostics Agent Installation [page 204]

7.5.6.1 Configuration of SAP HANA System Replication

Enabling SAP HANA System Replication [page 202]

Registering the Secondary SAP HANA System for Replication [page 202]

7.5.6.1.1 Enabling SAP HANA System Replication

Procedure

1. In the SAP HANA Administration Console of the SAP HANA studio, right-click the secondary system and choose *Stop*.
2. In the SAP HANA Administration Console of the SAP HANA studio, select the primary system, right-click and choose ▶ *System Replication* ❯ *Enable System Replication* ❘ and choose *Next*.
3. Enter the *Primary System Logical Name* and choose *Finish*.

7.5.6.1.2 Registering the Secondary SAP HANA System for Replication

Procedure

1. In the SAP HANA Administration Console of the SAP HANA studio, select the primary system, right-click and choose ▶ *System Replication* ❯ *Register Secondary System* ❘.
2. Enter the details for the secondary system, including logical name, physical host name, and user and password.

   If required, you can also select *Start the secondary system after registration*.
3. Choose *Finish*.
4. If you did not start the secondary system in a previous step, perform this action in the SAP HANA Administration Console of the SAP HANA studio.

Next Steps

If required, you can check SAP HANA system replication.

Related Information

Checking SAP HANA System Replication [page 208]

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7.5.6.2 Configuring Memory Settings

You have to make sure that the SAP system and the SAP HANA database do not compete for memory resources.

Context

This procedure is necessary so that the systems – that is, AS ABAP and SAP HANA database – on each host do not compete for memory resources. The exact settings depend on the size of your hosts and the sizing required for each system, SAP HANA and SAP Business Suite.

SAP AS ABAP (for the SAP Business Suite) and the SAP HANA database can only run together on one host if the sizing of ABAP plus the sizing of HANA does not exceed the total size of the HANA server in terms of memory. You configure the values resulting from the ABAP sizing (see SAP note 1793345) with `PHYS_MEMSIZE` and you configure the values for the SAP HANA database with `GLOBAL_ALLOCATION_LIMIT` (see SAP note 1872170). If you have extra memory available, allocate it to the SAP HANA database.

Procedure

1. Change the profile for the SAP HANA database either by using the SAP HANA Administration Console of the SAP HANA studio or at the command line as follows:
   a. On **host A**, modify the following file as user `<SID>adm`:

      `/usr/sap/<DB_SID>/SYS/global/hdb/custom/config/global.ini`

      It must look as follows:

      `[memorymanager]`

      `global_allocation_limit = <your HANA sizing result>`
   b. Repeat this step on **host B**.
2. Change the profile for AS ABAP:
   a. Log on to AS ABAP on **host A**.
   b. Start transaction RZ10.
   c. Edit the profile for the primary application server instance.
   d. Select *Extended maintenance*.
   e. Set the parameter `PHYS_MEMSIZE` to a value suitable for your host size.

7.5.6.3 Diagnostics Agent Installation

Context

You must install a Diagnostics Agent for each installed virtual instance.

Procedure

Install a diagnostics agent as described below:

- SAP Note 1365123 *Installation of Diagnostic Agents*
- SAP Note 1833501 *Diagnostics Agent - Installer Versions*
- http://wiki.scn.sap.com/wiki/display/SMSETUP/Diagnostics+Agent+and+HA+Support
- Diagnostics Agent installation guides at https://help.sap.com/viewer/swpm10guides *System Provisioning Install a System using Software Provisioning Manager Installation Guides - Standalone Engines and Clients - Software Provisioning Manager 1.0 Diagnostics Agent*

7.5.7 Failover for Disaster Recovery

You perform the procedures below if host A fails so that the system can resume operation on host B.

> **i Note**
>
> All SAPGUI sessions are disconnected following failure of host A.
>
> If you have not already done so, mount the shared file systems of the AS ABAP.

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7.5.7.1 Moving the Virtual IPs and Virtual Host Names

Procedure

1. If host A is still running, enter the following commands as `root` on **host A** to unbind the virtual IPs and host names (assuming that eth0 is the production network interface):

   ```
   /usr/sap/hostctrl/exe/saphostctrl -function RemoveIpAddress -ifName eth0 -addr
   <virtual host name of PAS instance>
   ```
   ```
   /usr/sap/hostctrl/exe/saphostctrl -function RemoveIpAddress -ifName eth0 -addr
   <virtual host name of ASCS instance>
   ```
   ```
   /usr/sap/hostctrl/exe/saphostctrl -function RemoveIpAddress -ifName eth0 -addr
   <virtual host name of DB instance>
   ```

   Example:

   ```
   /usr/sap/hostctrl/exe/saphostctrl -function RemoveIpAddress -ifName eth0 -addr
   hadrciamg
   ```

   ```
   /usr/sap/hostctrl/exe/saphostctrl -function RemoveIpAddress -ifName eth0 -addr
   hadrcsamg
   ```

   ```
   /usr/sap/hostctrl/exe/saphostctrl -function RemoveIpAddress -ifName eth0 -addr
   hadrdbhan
   ```

2. On **host B**, enter the following commands to bind the virtual IPs and host names on the new host:

   ```
   /usr/sap/hostctrl/exe/saphostctrl -function AddIpAddress -ifName eth0 -addr
   <virtual host name of PAS instance> -netmask <subnet mask of network adapter>
   ```
   ```
   /usr/sap/hostctrl/exe/saphostctrl -function AddIpAddress -ifName eth0 -addr
   <virtual host name of ASCS instance> -netmask <subnet mask of network adapter>
   ```
   ```
   /usr/sap/hostctrl/exe/saphostctrl -function AddIpAddress -ifName eth0 -addr
   <virtual host name of DB instance> -netmask <subnet mask of network adapter>
   ```

   Example:

   ```
   /usr/sap/hostctrl/exe/saphostctrl -function AddIpAddress -ifName eth0 -addr
   hadrciamg -netmask 255.255.252.0
   ```

   ```
   /usr/sap/hostctrl/exe/saphostctrl -function AddIpAddress -ifName eth0 -addr
   hadrcsamg -netmask 255.255.252.0
   ```

   ```
   /usr/sap/hostctrl/exe/saphostctrl -function AddIpAddress -ifName eth0 -addr
   hadrdbhan -netmask 255.255.252.0
   ```

7.5.7.2 Performing Takeover of the SAP HANA Database

Procedure

On host B, enter the following commands to take over the SAP HANA database on the secondary host:

```
su - hanadm
hdbnsutil -sr_takeover
```

Next Steps

You can also do this using the SAP HANA Administration Console of the SAP HANA studio: right-click the secondary system and choose ▶ *System Replication* ▶ *Perform Takeover* ▶.

7.5.7.3 Registering and Starting Failed Instance Services and Instances from Host A on Host B

Context

On **host B**, do the following to start the required instance agents and instances so that AS ABAP can resume operation.

Procedure

1. Log on as `root` user to the operating system and copy the following entries (retrieved from host A) to the `/usr/sap/sapservices` file on **host B**:

   ```
   LD_LIBRARY_PATH=/usr/sap<SAPSID>/ASCS<number of ASCS instance>
   /exe:$LD_LIBRARY_PATH; export LD_LIBRARY_PATH;
   /usr/sap/<SAPSID>/ASCS<number of ASCS instance>/exe/sapstartsrv
   pf=/usr/sap/<SAPSID>/SYS/profile/<SAPSID>_ASCS<number of ASCS
   instance>_<virtual host name of ASCS instance> -D -u <sapsid>adm
   ```

   ```
   LD_LIBRARY_PATH=/usr/sap/<SAPSID>/DVEBMGS<number of PAS
   instance>/exe:$LD_LIBRARY_PATH; export LD_LIBRARY_PATH;
   /usr/sap/<SAPSID>/DVEBMGS<number of PAS instance>/exe/sapstartsrv
   ```

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```
pf=/usr/sap/<SAPSID>/SYS/profile/<SAPSID>_DVEBMGS<number of PAS
instance>_<virtual host name of PAS instance> -D -u <sapsid>adm
```

Example:

```
LD_LIBRARY_PATH=/usr/sap/AMG/ASCS01/exe:$LD_LIBRARY_PATH; export
LD_LIBRARY_PATH; /usr/sap/AMG/ASCS01/exe/sapstartsrv
pf=/usr/sap/AMG/SYS/profile/AMG_ASCS01_hadrcsamg -D -u amgadm
```

```
LD_LIBRARY_PATH=/usr/sap/AMG/DVEBMGS10/exe:$LD_LIBRARY_PATH; export
LD_LIBRARY_PATH; /usr/sap/AMG/DVEBMGS10/exe/sapstartsrv
pf=/usr/sap/AMG/SYS/profile/AMG_DVEBMGS10_hadrciamg -D -u amgadm
```

2. Log on to **host B** as the operating system user `<sapsid>adm`:

   su – <sapsid>adm

3. Enter the following commands to start the instance agents of the ASCS and PAS instances:

   sapcontrol -nr <number of ASCS instance> -function StartService <SAPSID>

   sapcontrol -nr <number of PAS instance> -function StartService <SAPSID>

4. Enter the following commands to start the ASCS and PAS instances:

   sapcontrol -nr <number of ASCS instance> -function Start

   sapcontrol -nr <number of PAS instance> -function Start

7.5.8 Additional Information

7.5.8.1   Checking the SAP Host Agent

Procedure

1. Check that the SAP Host Agent is installed and running by entering this command:

   /usr/sap/hostctrl/exe/saphostexec –status

   If the SAP Host Agent is running, you see something like this:

   ```
   saphostexec running (pid = 21942)
   ```

   ```
   sapstartsrv running (pid =21944)
   ```

2. If the SAP Host Agent is installed but not running, enter the following:

   /usr/sap/hostctrl/exe/saphostexec -restart

Next Steps

For more information on SAP Host Agent, including how to download and install it, see SAP Note 1031096 .

7.5.8.2 Checking Replication of the Lock Table

Procedure

Check that the lock table from the enqueue server of the ASCS instance for the AS ABAP is being replicated correctly by entering a command as the operating system user `<sid>adm` like the following on **host B**, where the enqueue replication server (ERS) is running:

```
ensmon pf=/sapmnt/<SAPSID>/profile/<profile name of ERS instance> 2
```

Results

This message is displayed if replication is running correctly:

```
Replication is enabled in server, repl. Server is connected
```

```
Replication is active
```

7.5.8.3 Checking SAP HANA System Replication

Procedure

1. In the SAP HANA Administration Console of the SAP HANA studio, choose the *Overview* tab for **host A**.

    The entry for *System Replication Status* is as follows if SAP HANA system replication is functioning correctly:

    ```
    All systems are active and in sync
    ```

2. Choose ▶ *Landscape* ▶ *System Replication* ▮.
    The entry in the column *REPLICATION_STATUS* for each host is as follows if SAP HANA system replication is functioning correctly:

    ```
    ACTIVE
    ```

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7.6 Starting and Stopping SAP System Instances

Start or stop SAP system instances in one of the following ways:

7.6.1 Starting and Stopping SAP System Instances Using the SAP Management Console

You can start and stop all instances of your SAP system using the SAP Management Console (SAP MC)except the database instance.

Prerequisites

- Make sure that the host names defined in the DNS server match the names of the SAP system instance hosts. In particular, keep in mind that host names are case-sensitive. For example, if the names of the SAP system instance hosts are in upper case, but the same host names are defined in the DNS server in lower case, starting and stopping the system does not work.
- If you want to start or restart remote systems or instances, make sure that you have registered them in the SAP Management Console (SAP MC). You do not need to register SAP systems or instances installed on the local host, because the SAP MC displays them automatically.
- The SAP Host Agent is installed on the host where the application server of the SAP system or instance runs.
- You have installed Java Runtime Environment (JRE) 5.0 or higher.
- Your Web browser supports Java.
- Your Web browser's Java plug-in is installed and enabled to run scripting of Java applets.

Context

> **→ Recommendation**
>
> If you experience any issues when starting or using the SAP MC, refer to SAP Note 1153713 .

- For more information about handling the SAP MC, see the SAP Online Documentation [page 14] at:

Release	SAP Library Path (Continued)
SAP systems based on foundation on ABAP Platform 1809, version for SAP HANA ("ABAP Platform 1809" for short) **and higher**	▶ *Administrating the ABAP Platform* ❯ *Administration Concepts and Tools* ❯ *Solution Life Cycle Management* ❯ *SAP Management Console* ❯
SAP systems based on SAP BW/4HANA 2.0	▶ *Administrating the ABAP Platform* ❯ *Administration Concepts and Tools* ❯ *Solution Life Cycle Management* ❯ *SAP Management Console* ❯
SAP systems based on SAP BW/4HANA 1.0 SR1 (`<SP08 or higher>`)	▶ *Solution Life Cycle Management* ❯ *SAP Management Console* ❯

- If your newly installed SAP system is part of a heterogeneous SAP system landscape comprising systems or instances on Windows platforms, you can also start and stop it from a Windows system or instance using the **SAP Microsoft Management Console (SAP MMC)**.
  For more information about handling the SAP MMC, see the SAP Online Documentation [page 14] at:

Release	SAP Library Path (Continued)
SAP systems based on foundation on ABAP Platform 1809, version for SAP HANA ("ABAP Platform 1809" for short) **and higher**	▶ *Administrating the ABAP Platform* ❯ *Administration Concepts and Tools* ❯ *Solution Life Cycle Management* ❯ *SAP Microsoft Management Console: Windows* ❯
SAP systems based on SAP BW/4HANA 2.0	▶ *Administrating the ABAP Platform* ❯ *Administration Concepts and Tools* ❯ *Solution Life Cycle Management* ❯ *SAP Microsoft Management Console: Windows* ❯
SAP systems based on SAP BW/4HANA 1.0 SR1 (`<SP08 or higher>`)	▶ *Solution Life Cycle Management* ❯ *SAP Microsoft Management Console: Windows* ❯

Procedure

- **Starting the Web-Based SAP Management Console**
  1. Start a Web browser and enter the following URL:
     `http://<Host_Name>:5<Instance_Number>13`

     > ✣ Example
     >
     > If the instance number is `53` and the host name is `saphost06`, you enter the following URL:
     >
     > **`http://saphost06:55313`**

     This starts the SAP MC Java applet.

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> **i Note**
>
> If your browser displays a security warning message, choose the option that indicates that you trust the applet.

2. Choose *Start*.
   The SAP Management Console (SAP MC) appears.
   By default, the instances installed on the host you have connected to are already added in the SAP MC.

   > **i Note**
   >
   > If the instances have not been added or if you want to change the configuration to display systems and instances on other hosts, you have to register your system manually. This is described in *Registering Systems and Instances in the SAP Management Console* below.

- **Starting SAP Systems or Instances**

  Similarly, you can start or restart all SAP systems and individual instances registered in the SAP MC.

  1. In the navigation pane, open the tree structure and navigate to the system node that you want to start.
  2. Select the system or instance and choose *Start* from the context menu.
  3. In the *Start SAP System(s)* dialog box, choose the required options.
  4. Choose *OK*.
     The SAP MC starts the specified system or system instances.

     > **i Note**
     >
     > The system might prompt you for the SAP system administrator credentials. To complete the operation, you require administration permissions.
     >
     > Log in as user `<sapsid>adm`.

  Starting SAP System Instances Successively

  If you need to start the instances of an SAP system successively – for example when you want to start a distributed or a high-availability system – proceed as follows:

  1. Start the database instance.
  2. Start the ABAP central services instance `ASCS<Instance_Number>`.
  3. Start the primary application server instance `D<Instance_Number>`.
  4. Start additional application server instances `D<Instance_Number>`, if there are any.

- **Stopping SAP Systems or Instances**

  Similarly, you can stop all SAP systems and individual instances registered in the SAP MC.

  1. Select the system or instance you want to stop and choose *Stop* from the context menu.
  2. In the *Stop SAP System(s)* dialog box, choose the required options.
  3. Choose *OK*.
     The SAP MC stops the specified system or system instances.

     > **i Note**
     >
     > The system might prompt you for the SAP system administrator credentials. To complete the operation, you require administration permissions.
     >
     > Log in as user `<sapsid>adm`.

Stopping SAP System Instances Successively

If you need to stop the instances of an SAP system successively – for example when you want to start a distributed or a high-availability system – proceed as follows:

1. Stop additional application server instances `D<Instance_Number>`, if there are any.
2. Stop the primary application server instance `D<Instance_Number>`.
3. Stop the ABAP central services instance `ASCS<Instance_Number>`.
4. Stop the database instance.

7.6.2 Starting and Stopping SAP System Instances Using Commands

Prerequisites

You are logged on to the SAP system host as user `<sapsid>adm`.

Context

> **i Note**
>
> The **startsap** and **stopsap** commands are deprecated. SAP recommends that you do not use them any longer. For more information, see SAP Notes 1763593 and 809477 .

This section only lists the basic commands how to start or stop an SAP system. You can find a detailed list of all `SAPControl` options and features in the command line help, which you can call as follows:

`/usr/sap/hostctrl/exe/sapcontrol --help`

Procedure

- **Starting an SAP System or Instance**

  - Starting an SAP System:
    You can start an SAP system by executing the following commands from the command line (`<Instance_Number>` can be the number of any instance of the SAP system):
    `/usr/sap/hostctrl/exe/sapcontrol -nr <instance_number> -function StartSystem`

  - Starting an SAP System Instance
    You can start an SAP system instance by executing the following commands from the command line:
    `/usr/sap/hostctrl/exe/sapcontrol -nr <instance_number> -function Start`

For remote instances, the syntax is slightly different, because you also have to apply the **-host** and **-user** parameters:

/usr/sap/hostctrl/exe/sapcontrol -nr <instance_number> -host <remote host> -user <sapsid>adm <password> -function Start

- **Stopping an SAP System or Instance**

    - Stopping an SAP System
      You can stop an SAP system by executing the following commands from the command line
      (**<Instance_Number>** can be the number of any instance of the SAP system):
      /usr/sap/hostctrl/exe/sapcontrol -nr <instance_number> -function StopSystem

    - Stopping an SAP System Instance
      You can stop an SAP system instance by executing the following commands from the command line:
      /usr/sap/hostctrl/exe/sapcontrol -nr <instance_number> -function Stop
      For remote instances, the syntax is slightly different, because you also have to apply the **-host** and **-user** parameters:
      /usr/sap/hostctrl/exe/sapcontrol -nr <instance_number> -host <remote host> -user <sapsid>adm <password> -function Stop

      > i Note
      >
      > The database is not stopped by these commands. You have to stop the database using database-specific tools or commands.

- **Checking System Instance and Processes**

    - With the following command you get a list of system instances, their status, and the ports used by
      them (**<Instance_Number>** can be the number of any instance of the SAP system):
      /usr/sap/hostctrl/exe/sapcontrol -nr <instance_number> -host <remote host> -user <sapsid>adm <password> -function GetSystemInstanceList

    - With the following command you get a list of instance processes and their status:
      /usr/sap/hostctrl/exe/sapcontrol -nr <instance_number> -host <remote host> -user <sapsid>adm <password> -function GetProcessList

- **Troubleshooting**

    If you get an error like "FAIL: NIECONN_REFUSED", execute **sapcontrol -nr <Instance_Number> -function StartService <SAPSID>** to ensure that sapstartsrv is running. Then execute again the start or stop command.

7.7 Uninstalling an SAP System or Single Instances

This section describes how to uninstall a complete SAP system or single SAP instances with the *Uninstall* option of the installer.

Prerequisites

- You have installed your SAP system with standard SAP tools according to the installation documentation.
- You are logged on as a user with `root` permissions.

> ⚠ Caution
>
> Do **not** use the `<sapsid>adm` user to delete the SAP system.

- Make sure that the SAP system, or single instance, or standalone engine, or optional standalone unit to be deleted is down and that you are not logged on as one of the SAP system users. Also check that all SAP-related processes are stopped. If there is a lock on one of the SAP system objects, the uninstall fails.

> i Note
>
> You do not have to stop the SAP Host Agent. The SAP Host Agent is stopped automatically during the uninstall process.

- When starting the uninstall, make sure that there are no SAP system user sessions still open.

Context

Note the following when deleting an SAP system or single instances:

- We strongly recommend that you delete an SAP system or single instances using the installer. However, you can also delete an SAP system or single instance manually. For more information, see SAP Note 1259982 .
- You cannot delete an SAP system remotely.
- If you delete network-wide users, groups or service entries in an environment with Network Information System (NIS), other SAP installations might also be affected. Make sure that the users, groups, and service entries to be deleted are no longer required.
- During the uninstall process, all file systems and subdirectories of the selected SAP system or single instance are deleted. Before you start uninstalling, check that you have saved a copy of all files and directories that you want to keep to a secure location.
- The uninstall process is designed to remove as much as possible of the SAP system to be deleted. If an item cannot be removed, a message informs you that you have to remove this item manually. You can do this either at once or after the uninstall process has finished. As soon as you confirm the message, the uninstall process continues.

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Procedure

1. Start the installer as described in Running the Installer [page 119].
2. On the *Welcome* screen, choose:

   ▶ *Generic Installation Options* ❯ `<Database>` ❯ *Uninstall* ❯ *Uninstall SAP Systems or Single Instances* ❯

3. Follow the instructions on the installer screens to delete a complete SAP system or single instances.

> **i** Note
>
> To find more information on each parameter during the *Define Parameters* phase, position the cursor on the required parameter input field , and choose either `F1` or the *HELP* tab. Then the available help text is displayed in the *HELP* tab.

The following table provides information about deleting a complete system or single instances with the installer.

Deletion of	Remarks
Standard system	You can delete a standard system (where all instances except the database instance reside on the same host) in one installer run.
Distributed or high-availability system	If you want to delete a distributed or high-availability system, you have to run the installer to delete the required instances **locally** on each of the hosts belonging to the SAP system in the following sequence: ⚠ **Caution** Only select checkbox *Uninstall all instances of the SAP system from this host* when removing the last remaining instance of the SAP system. Otherwise the contents of mounted global directories under `/<sapmnt>/<SAPSID>/` such as instance profiles and kernel executables, are also deleted. 1. Additional application server instances, if there are any 2. Primary application server instance 3. Database instance Do **not** delete the SAP HANA database instance. However, you can delete the database clients and the database users on the SAP application servers. 4. ABAP Central services instance (ASCS) **i** Note To delete system directories mounted from an NFS server, you have to run the installer on the NFS server.
Additional application server	If you want to delete additional application server instances of an existing SAP system, you have to run the installer to delete them **locally** on each additional application server instance host.

Deletion of	Remarks
Standalone SAP Host Agent	The SAP Host Agent is automatically uninstalled from a host together with the last remaining SAP system instance.
	If you want to uninstall a **standalone** SAP Host Agent, deselect *Profiles Available* and select *Uninstall Standalone SAP Host Agent* on the *General SAP System Parameters* screen.

4. When you have finished, delete the relevant directory structure on the global host.

5. If you created the directories `/usr/sap/<SAPSID>` and `/<sapmnt>/<SAPSID>` as mount points, but not as directories on the local file system, you have to remove them manually.

6. To remove obsolete SLD data, see the following document: https://wiki.scn.sap.com/wiki/display/SL/More+on+System+Landscape+Directory ➤ *How-to Manage House-Cleaning in the System Landscape Directory - Duplicate System Entries*

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