Installation of SAP Systems Based on the Application Server ABAP of SAP NetWeaver 7.0 to 7.03 on UNIX : Oracle

THE BEST RUN **SAP**

Content

Document History

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

Version	Date	Description
3.2	2020-01-20	Updated version for Software Provisioning Manager 1.0 SP28 (SL Toolset 1.0 SP28) • New Features: • Support of Oracle 19, documented in: *New Features*, *Oracle Database Software Installation*
3.1	2019-09-16	Updated version for Software Provisioning Manager 1.0 SP27 (SL Toolset 1.0 SP27) • New Features: ○ Oracle 18 c or higher: Support of Transparent Data Encryption (TDE), documented in: *New Features*, *SAP System Database Parameters*, *Support of Oracle Transparent Data Encryption (Oracle TDE)*
3.0	2019-05-27	Updated version for Software Provisioning Manager 1.0 SP26 (SL Toolset 1.0 SP26)
2.9	2019-01-21	Updated version for Software Provisioning Manager 1.0 SP25 (SL Toolset 1.0 SP25)
2.8	2018-09-17	Updated version for Software Provisioning Manager 1.0 SP24 (SL Toolset 1.0 SP24) • New Features ○ New Look and Feel of SL Common GUI with Software Provisioning Manager 1.0 SP24, Patch Level 05, documented in: *New Features*, *Prerequisites for Running the Installer*
2.7	2018-05-07	Updated version for software provisioning manager 1.0 SP23 (SL Toolset 1.0 SP23)

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Version	Date	Description
2.6	2018-01-15	Updated version for software provisioning manager 1.0 SP22 (SL Toolset 1.0 SP22)

- New Features:
  - Signature check for installation archives, documented in: *New Features*, *Downloading SAP Kernel Archives (Archive-Based Installation) Archive-Based Installation for Diagnostics Agent*, *Downloading the SAP Kernel Archives Required for the Dual-Stack Split (Without Operating System and Database Migration)*, *Downloading the SAP Kernel Archives Required for Operating System and Database Migration*
  - Installer Log Files Improvements, documented in: *New Features*, *Useful Information about the Installer*, *Troubleshooting with the Installer*
  - Splitting Off an ABAP Central Services Instance from an Central Instance, documented in: *New Features*, *Splitting Off an ABAP Central Services Instance from an Central Instance*
- *New Features* section restructured: As of SP22, a dedicated subsection for each new SP has been created. New features below SP22 remain in a common table.
- The Java SDT GUI - which was in the SP21 version still available in parallel to the SL Common GUI - has been deprecated with SP22. As of SP22, SL Common GUI is the only available installer GUI :
  - The following sections which were explicitly related to Java SDT GUI were completely removed from this documentation: *Performing a Remote Installation Remote Processing of the Installer (Java SDT GUI only)*, *Starting the Java SDT GUI Separately*, *Running the Installer in Accessibility Mode* (general accessibility information was moved to *Useful Information About the Installer*).
  - The Java SDT GUI-specific information was removed from the common installer sections: *Running the Installer*, *Useful Information About the Installer*, *Interrupted Processing of the Installer*, *Troubleshooting with the Installer*, *Deleting an SAP System or Single Instances*
- New section *Using the Step State Editor (SAP Support Experts Only)* added to section *Additional Information About the Installer*.

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Version	Date	Description
2.5	2017-09-11	Updated version for software provisioning manager 1.0 SP21 (SL Toolset 1.0 SP21) • New Features: ○ Media Signature Check, documented in: *New Features*, *Running the Installer*, *Preparing the Installation Media* . ○ Support of Oracle 12.2, documented in: *Installing the Oracle 12c Database Software* ○ Support of Oracle Database Vault, documented in: *New Features*, *Planning Checklist*, *SAP System Database Parameters*, *Preparation Checklist*, *Post-Installation Checklist*, *Implementing Oracle Database Vault Using the Installer*
2.4	2017-05-22	Updated version for software provisioning manager 1.0 SP20 (SL Toolset 1.0 SP20) • New Features: ○ New SAPUI5-based user graphical interface (GUI) "SL Common GUI", documented in: *Prerequisites for Running the Installer*, *Running the Installer*, *Useful Information About the Installer* ○ Cleanup of operating system users, documented in: *Creating Operating System Users and Groups*
2.3	2017-02-07	Updated version for software provisioning manager 1.0 SP19 (SL Toolset 1.0 SP19) • New Features: Verification of the integrity of data units in Software Provisioning Manager, documented in: *Downloading the Software Provisioning Manager Archive*
2.2	2016-10-07	Updated version for software provisioning manager 1.0 SP18 (SL Toolset 1.0 SP18) • New Features: Option to choose installing an integrated SAP Web Dispatcher during the ASCS instance installation, documented in: ASCS Instance with Integrated SAP Web Dispatcher [page 21]
2.1	2016-06-06	Updated version for software provisioning manager 1.0 SP17 (SL Toolset 1.0 SP17)
2.0	2016-02-15	Updated version for software provisioning manager 1.0 SP10 (SL Toolset 1.0 SP16)
1.91	2015-10-29	Updated version for software provisioning manager 1.0 SP09 (SL Toolset 1.0 SP15)

Version	Date	Description
1.9	2015-10-12	Updated version for software provisioning manager 1.0 SP09 (SL Toolset 1.0 SP15)
1.8	2015-09-14	Updated version for software provisioning manager 1.0 SP09 (SL Toolset 1.0 SP14)
1.7	2015-04-27	Updated version for software provisioning manager 1.0 SP08 (SL Toolset 1.0 SP13)
1.6	2014-11-24	Updated version for software provisioning manager 1.0 SP07 (SL Toolset 1.0 SP12)
1.5	2014-07-07	Updated version for software provisioning manager 1.0 SP06 (SL Toolset 1.0 SP11)
		Instead of a separate installation guide for each UNIX-based operating system, we now deliver a single installation guide for all UNIX-based operating systems. Sections that are only relevant for one or more specific operating systems are highlighted accordingly.
1.4	2014-03-17	Updated version for software provisioning manager 1.0 SP09 (SL Toolset 1.0 SP12)
1.3	2013-10-28	Updated version
1.2	2013-07-15	Updated version
1.1	2013-04-02	Updated version
1.0	2012-11-26	Initial version

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1 About this Document

This installation guide describes how to install an SAP system based on the application server **ABAP** of SAP NetWeaver 7.0 to 7.0 EHP3 using the installation tool Software Provisioning Manager 1.0 SP28 ("installer" for short), which is part of SL Toolset 1.0 SP28.

This guide is valid for the operating systems AIX, HP-UX, Linux, and Solaris, and covers the SAP system products and releases listed in SAP Products Based on SAP NetWeaver 7.0 to 7.0 EHP3 Supported for Installation Using Software Provisioning Manager 1.0 [page 10].

For information about supported operating system and database platforms for the SAP product you want to install, see the Product Availability Matrix at https://support.sap.com/pam .

> **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 .

> **i Note**
>
> Note that for some products - such as SAP NetWeaver 7.0 - a complete system installation is only available for the highest support release. As for the lower support releases, only options for system copy and additional application server instances are provided.

> **⚠ Caution**
>
> Make sure you have read the Before You Start [page 12] section before you continue with this installation guide.

Related Information

1.1   SAP Products Based on SAP NetWeaver 7.0 to 7.0 EHP3 Supported for Installation Using Software Provisioning Manager 1.0

Here you can find a list of SAP products based on SAP NetWeaver 7.0 to 7.0 EHP3 ABAP that are supported for installation using Software Provisioning Manager 1.0.

SAP Product	Based on the following SAP NetWeaver Release
SAP Business Suite 7i 2011: • Enhancement Package 2 for SAP CRM 7.0 • Enhancement Package 6 for SAP ERP 6.0 • Enhancement Package 2 for SAP SCM 7.0 • Enhancement Package 2 for SAP SRM 7.0	SAP NetWeaver 7.0 including Enhancement Package 3
SAP NetWeaver 7.0 including Enhancement Package 3	SAP NetWeaver 7.0 including Enhancement Package 3
SAP Business Suite 7i 2010: • Enhancement Package 1 for SAP CRM 7.0 • Enhancement Package 5 for SAP ERP 6.0 • Enhancement Package 1 for SAP SCM 7.0 • Enhancement Package 1 for SAP SRM 7.0	SAP NetWeaver 7.0 including Enhancement Package 2
SAP NetWeaver 7.0 including Enhancement Package 2	SAP NetWeaver 7.0 including Enhancement Package 2
SAP Business Suite 7 Support Release 1: • SAP CRM 7.0 • Enhancement Package 4 for SAP ERP 6.0 • SAP SCM 7.0 • SAP SRM 7.0	SAP NetWeaver 7.0 including Enhancement Package 1
SAP NetWeaver 7.0 including Enhancement Package 1	SAP NetWeaver 7.0 including Enhancement Package 1
SAP Business Suite 2005: • SAP ERP 6.0 Support Release 3 • SAP CRM 5.0 Support Release 3 • SAP SCM 5.0 Support Release 3 • SAP SRM 5.0 Support Release 3	SAP NetWeaver 7.0 Support Release 3

SAP Product	Based on the following SAP NetWeaver Release
Additional Products: • SAP CRM 2007 • SAP SCM 5.1	SAP NetWeaver 7.0 Support Release 3
SAP NetWeaver 7.0 Support Release 3	SAP NetWeaver 7.0 Support Release 3

1.2 Naming Conventions

This section lists the naming conventions that are currently apply for Software Provisioning Manager 1.0 (the "installer") and terms used in this documentation.

- Software Provisioning Manager 1.0 is the successor of the product- and release-specific delivery of provisioning tools, such as "SAPinst".
  Before you perform an installation from scratch or a target system installation in the context of a system copy, we strongly recommend that you always download the latest version of the Software Provisioning Manager 1.0 which is part of the Software Logistics Toolset 1.0 ("SL Toolset" for short). For more information, see Preparing the Installation Media [page 75].
  This way, you automatically get the latest version with the latest fixes of the tool and supported processes. For more information about Software Provisioning Manager 1.0 as well as products and releases supported by it, see SAP Note 1680045 and https://wiki.scn.sap.com/wiki/display/SL/Software+Provisioning +Manager+1.0+and+2.0 .
  "SAPinst" has been renamed to "Software Provisioning Manager" ("installer" for short) in this documentation, 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_STACK_XML`
  - Names of operating system user groups, such as the additional group `sapinst`
- "usage type", "technical usage", and "product instance"
  As of Software Provisioning Manager 1.0 SP07 (SL Toolset 1.0 SP12), the term "product instance" replaces the terms " usage type" and "technical usage" for SAP systems based on SAP NetWeaver 7.3 including enhancement package 1 and higher. For more information, see SAP Note 1970349 . Note that there is no terminology change for older releases and all mentioned terms can be used as synonyms. As this guide is a generic document, the currently used terms remain but only "product instance" is used from now on when referring to SAP NetWeaver 7.3 EHP1 and higher.
  For more information, see New Features [page 15].
- "installer" refers to "Software Provisioning Manager".
- "SAP system" refers to SAP system based on the application server of SAP NetWeaver Mobile / Banking 7.1 / 7.1 including Enhancement Package 1 / SAP NetWeaver 7.3 / 7.3 including Enhancement Package 1 / Application Server ABAP 7.4 / SAP NetWeaver 7.4 / SAP NetWeaver 7.5 / SAP NetWeaver Application Server for ABAP 7.51 innovation package / SAP NetWeaver Application Server for ABAP 7.52 .

- "ABAP system" refers to SAP system based on the application server ABAP of SAP NetWeaver Mobile / Banking 7.1 / 7.1 including Enhancement Package 1 / SAP NetWeaver 7.3 / 7.3 including Enhancement Package 1 / Application Server ABAP 7.4 / SAP NetWeaver 7.4 / 7.4 SR1.
- "Diagnostics Agent" refers to the SAP Solution Manager Diagnostics Agent which is the remote component of End-to-End Root Cause Analysis. It allows having a connection between SAP Solution Manager and managed systems, and then to collect information from the managed systems for reporting purposes.

1.3   Constraints

You need to consider the following constraints before you start your installation:

- Your operating system platform must be **64-bit**.
- The `startsap` and `stopsap` commands have been deprecated. For more information and for information on alternatives, see Starting and Stopping SAP System Instances Using Commands [page 180].

1.4   Before You Start

Make sure that you have read the Master Guide for your SAP Business Suite application or SAP NetWeaver application and release before you continue with this installation guide.

The Master Guide is the central document leading you through the overall implementation process for your SAP system installation. It contains crucial 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 the Master Guide in your installation package or you can download the latest version from http://help.sap.com.

The following table lists the Master Guides of the SAP system applications for which you can use this installation guide, along with the available quick link or path to the appropriate download location:

Title	Internet Address
Master Guide - SAP NetWeaver 7.0	http://help.sap.com/nw ▶ ❯ `<Including Enhancement Package>` ❯ *Installation and Upgrade* ❯
Master Guide - SAP Enhancement Package `<Release>` for SAP ERP 6.0 powered by SAP NetWeaver	http://help.sap.com/erp ▶ ❯ *Installation and Upgrade* ❯
Master Guide (Including Upgrade Information) - SAP Supplier Relationship Management 7.0 Including SAP Enhancement Package `<Release>`	http://help.sap.com/srm ▶ ❯ *Installation and Upgrade* ❯

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Title	Internet Address
Master Guide (Including Upgrade Information) - SAP Customer Relationship Management 7.0 Including SAP Enhancement Package `<Release>`	http://help.sap.com/crm 🔗 ▶❯ *Installation and Upgrade* ❯
Master Guide SAP Supply Chain Management 7.0 Including SAP Enhancement Package `<Release>` Powered by SAP NetWeaver	http://help.sap.com/scm 🔗 ▶❯ *Installation and Upgrade* ❯

1.5 SAP Notes for the Installation

This section lists the most important SAP Notes relevant for an installation using Software Provisioning Manager

You **must** read the following SAP Notes **before** you start the installation. These SAP Notes contain the most recent information on the installation, as well as corrections to the installation documentation.

Make sure that you have the up-to-date version of each SAP Note, which you can find at https://support.sap.com/notes 🔗 .

SAP Notes for the Installation

SAP Note Number	Title	Description
1680045 🔗	Release Note for Software Provisioning Manager 1.0	Software provisioning manager 1.0 with installation and system copy for SAP NetWeaver-based systems
2378874 🔗	Install SAP Solutions on Linux on IBM Power Systems (little endian)	Information about how to install SAP solutions on Linux on IBM Power Systems (little endian)
2172935 🔗	Installation - SAP Systems Based on SAP NetWeaver on Oracle	Oracle-specific information about the SAP system installation and corrections to this documentation.
2660020 🔗	Central Technical Note for Oracle Database 18c	Information about Oracle 18c with multiple links to notes on Oracle18c
2470660 🔗	Central Technical Note for Oracle Database 12c Release 2 (12.2)	Information about Oracle 12c Release 2 (12.2) with multiple links to notes on Oracle 12c Release 2 (12.2)
1914631 🔗	Central Technical Note for Oracle Database 12c Release 1 (12.1)	Information about Oracle 12c Release 1 (12.1) with multiple links to notes on Oracle 12c Release 1 (12.1)

SAP Note Number	Title	Description
98252	Installing two Oracle databases on a host	This SAP Note is only required if you plan to install more than one Oracle database on the same host.
1431800	Oracle 11.2.0: Central Technical Note	Information about Oracle 11g with multiple links to notes on Oracle 11g
828268	Oracle Database 10g: New functions	Information about Oracle 10g features released for the SAP system
73606	Supported Languages and Code Pages	Information on possible languages and language combinations in SAP systems
1972803	SAP on AIX: Recommendations	This SAP Note contains recommendations and clarifications for many topics relevant for SAP on AIX.
1075118	SAP on HP-UX: FAQ	This SAP Note contains information that is specific to the SAP system installation on HP-UX.
2369910	SAP Software on Linux: General information	This SAP Note contains Linux-specific information about the SAP system installation.
1669684	SAP on Oracle Solaris 11	This SAP Note contains information and references to SAP Notes relevant for Solaris 11
1067221	Composite SAP Note for heterogeneous installation	This SAP Note and its related SAP Notes describe the released operating system and database combinations for heterogeneous SAP systems landscapes.
1258912 (SAP ERP)	PLM Core 7.00 Release Notes and Information	Information and references to other notes about installing PLM Core 7.00 and importing PLM Core 7.00 Support Packages.
915367 (SAP SCM)	TDL: Automatic activation of the transaction data areas	Information about a TDL function and the settings you have to make during a system setup.
1178483 (SAP SCM)	SNC 7.0 Order Documents: Required Customizing	Information about Supply Network Collaboration order documents.
1990240	Support of mixed landscapes (Unicode and Non-Unicode)	Temporarily the system landscape is mixed with Unicode and Non-Unicode systems. You have third party software in your system landscape which does not support Unicode at all. You wonder whether such a heterogeneous system landscape is supported without restrictions.

1.6 New Features

This section provides an overview of the new features in Software Provisioning Manager 1.0 (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 Oracle 19	You can now perform all Software Provisioning Manager 1.0 tasks (installation, system copy, system rename) for SAP systems with the Oracle 19 database. For more information, see Oracle 18 Database Software Installation [page 110] and https://support.sap.com/pam 🔗.	Software Provisioning Manager 1.0 SP28 (SL Toolset 1.0 SP28)
Oracle 18 c or higher: Support of Transparent Data Encryption (TDE)	Software Provisioning Manager 1.0 supports Oracle Transparent Data Encryption (TDE) for SAP NetWeaver-based systems. For more information, see Support of Oracle Transparent Data Encryption (Oracle TDE) [page 170].	Software Provisioning Manager 1.0 SP27 (SL Toolset 1.0 SP27)
Support of Oracle 18	You can now perform all Software Provisioning Manager 1.0 tasks (installation, system copy, system rename) for SAP systems with the Oracle 18 database. For more information, see Oracle 18 Database Software Installation [page 110] and https://support.sap.com/pam 🔗.	Software Provisioning Manager 1.0 SP25 (SL Toolset 1.0 SP25)
New Look and Feel of SL Common GUI	As of version 1.0 SP24 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 1.0 SP24, PL05 (SL Toolset 1.0 SP24)
Installer Log Files Improvements	Installer log files are now available immediately after the installer has been started, that is **before** a product has been selected on the *Welcome* screen. For more information, see Useful Information About the Installer [page 100] and Troubleshooting with the Installer [page 106].	Software Provisioning Manager 1.0 SP22 (SL Toolset 1.0 SP22)
Splitting Off an ABAP Central Services Instance from an Existing Central Instance	With the installer option *Split Off ASCS Instance from existing Central Instance*, you can move the message server and the enqueue work process from an existing central instance to a newly installed ABAP central services instance (ASCS instance). The new ASCS instance is installed while the split is done. For more information, see Splitting Off an ABAP Central Services Instance from an Existing Central Instance [page 174].	Software Provisioning Manager 1.0 SP22 (SL Toolset 1.0 SP22)
Media Signature Check	The signature of media is checked **automatically** by the installer during the *Define Parameters* phase while processing the *Media Browser* screens. As of now the installer only accepts media whose signature has been checked. See also the description of this new security feature in SAP Note 2393060 🔗. For more information, see Preparing the Installation Media [page 75] and Running the Installer [page 95].	Software Provisioning Manager 1.0 SP21 (SL Toolset 1.0 SP21)

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Feature	Description	Availability
Support of Oracle Database Vault	⚠ **Caution** Although Oracle Database Vault is already available in the installer and documented in this guide, it is not yet released to customers until further notice. For more information, see the *Current Restrictions* section in SAP Note 1680045 . Oracle Database Vault 12c has been certified for SAP products that are based on SAP NetWeaver technology. You can now install a new SAP system with Oracle Database 12c and configure Oracle Database Vault in its database. For more information, see Implementing Oracle Database Vault with Software Provisioning Manager 1.0 [page 169].	Software Provisioning Manager 1.0 SP21 (SL Toolset 1.0 SP21)
Support of Oracle 12.2	Software Provisioning Manager (the "installer") now supports SAP system installations with Oracle 12.2. For more information, see Oracle 12 Database Software Installation [page 112].	Software Provisioning Manager 1.0 SP21 (SL Toolset 1.0 SP21)
SL Common GUI with SAPINST 7.49	With the new installer framework version SAPINST 7.49, you can now use the new SAPUI5-based graphical user interface (GUI) "SL Common GUI". For more information, see Useful Information About the Installer [page 100], Running the Installer [page 95] .	Software Provisioning Manager 1.0 SP20 (SL Toolset 1.0 SP20)
Cleanup of Operating System Users	You can now specify during the *Define Parameters* phase that the operating system users are to be removed from group `sapinst` after the execution of the installer has completed. For more information, see *Operating System Users* in SAP System Parameters [page 41].	Software Provisioning Manager 1.0 SP20 (SL Toolset 1.0 SP20)
Verification of Integrity of Data Units in Software Provisioning Manager	The integrity of data units extracted from the Software Provisioning Manager archive is verified. For more information, see Downloading and Extracting the Software Provisioning Manager 1.0 Archive [page 76]. In addition, check SAP Note 1680045 whether additional information is available.	Software Provisioning Manager 1.0 SP19 (SL Toolset 1.0 SP19)
Option to install an SAP Web Dispatcher in an ASCS instance	You can now install an SAP Web Dispatcher in an ASCS instance. You can choose this option while running the ASCS instance installation. For more information, see ASCS Instance with Integrated SAP Web Dispatcher [page 21]	Software Provisioning Manager 1.0 SP18 (SL Toolset 1.0 SP18)

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Feature	Description	Availability
Diagnostics Agent	The Diagnostics Agent is no longer installed automatically with the SAP system. The *Install Diagnostics Agent* check box on the *Install Diagnostics Agent* screen is no longer available. You now have to install the Diagnostics Agent always separately. We recommend that you install it prior to the installation of your SAP system(s). For more information, see the Diagnostics Agent Installation Strategy attached to SAP Note 1365123 , to SAP Note 1833501 , and to SAP Note 1858920 and the attached *Diagnostics Agent Setup Guide*.	Software Provisioning Manager 1.0 SP10 (SL Toolset 1.0 SP16)
Support of Oracle 12 database	You can now perform all Software Provisioning Manager 1.0 tasks (installation, system copy, system rename, dual-stack split) for SAP systems with the Oracle 12 database. For more information, see http://support.sap.com/pam .	Software Provisioning Manager 1.0 SP08 (SL Toolset 1.0 SP13)
Feedback Evaluation Form available in the Software Provisioning Manager:	SAP SE's aim is to provide fast and efficient procedures. To evaluate the procedure you just carried out, we need information generated by the tool during process execution and your experience with the tool itself. A new evaluation form contains a simple questionnaire and XML data generated during the procedure. Port 4239 is used for displaying the feedback evaluation form. For more information, see the *Prerequisites* section in Running the Installer [page 95].	Software Provisioning Manager 1.0 SP07 (SL Toolset 1.0 SP12)
Installation option *ASCS Instance* available for central and distributed system installation	You can also choose to install the ABAP central services instance (ASCS instance) when installing a central system or distributed system based on AS ABAP. So far this was only possible for high-availability systems.	Software Provisioning Manager 1.0 SP05 (SL Toolset 1.0 SP11)

2 Installation Options Covered by this Guide

This section shows the installation options covered by this 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.

    You can install an SAP Web Dispatcher integrated in the ASCS instance.

2.1 Central System

You can install a **central** system on a **single** host.

These are the following instances:

- ABAP central services instance (ASCS instance)
  Contains the ABAP message server and the ABAP enqueue server
  - SAP recommends installing the ASCS instance because this enables you to cluster the message server and enqueue server separately from the central instance.
    However, you can also install your SAP system without the ASCS instance. In this case, follow the instructions in Installing a Central or Distributed System Without the ASCS Instance [page 165].
  - 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 21].
- Database instance (DB instance)
- Central instance

Additionally, you can install one or more dialog instances. For more information, see Dialog Instance [page 23].

The following figure shows an example of SAP instances in a central system.

Central ABAP System
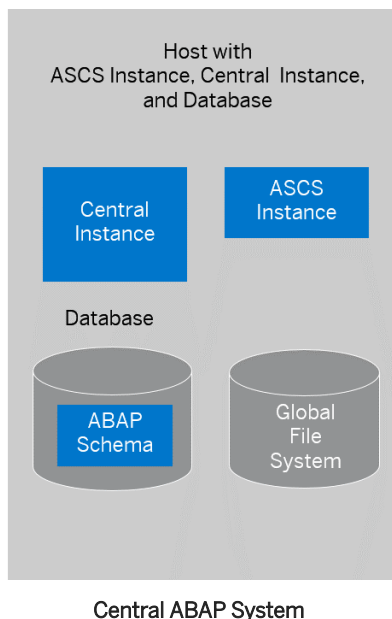
2.2 Distributed System

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

These are the following instances:

- ABAP Central services instance (ASCS instance)
  Contains the ABAP message server and the ABAP enqueue server

> **i Note**
>
> SAP recommends installing the ASCS instance because this enables you to cluster the message server and enqueue server separately from the central instance.
>
> However, you can also install your SAP system without the ASCS instance. In this case, follow the instructions in Installing a Central or Distributed System Without the ASCS Instance [page 165].

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 21].
- Database instance (DB instance)
- Central instance

> **i Note**
>
> You can also use the SAP transport host or the SAP global host as your central instance host.

Optionally, you can install one or more dialog instances. For more information, see Installation of a Dialog Instance [page 23].

The following figure assumes the following:

- The ASCS instance runs on the SAP global host. The SAP global host is the host where the global file system /<sapmnt> resides. For more information, see SAP Directories [page 62].

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If you do not want to install the ASCS instance, you have to prepare the global host.

- The global transport directory resides on a separate SAP transport host. For more information, see SAP Transport Host [page 52].

Distributed ABAP System
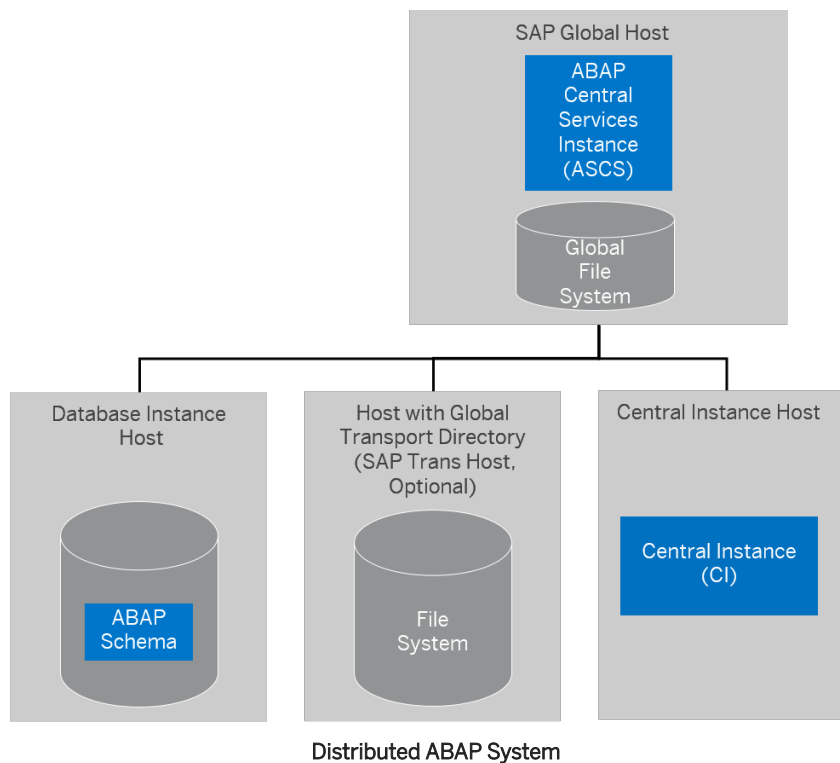
2.3   High-Availability System

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

These are the following instances:

- ABAP central services instance (ASCS instance)
  Contains the ABAP message server and the ABAP enqueue server
  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 21].
- Enqueue replication server instance (ERS instance) for the ASCS instance
- Database instance
- Central instance

We recommend that you run the ASCS instance in a switchover cluster infrastructure.

To increase high-availability by creating redundancy, we recommend that you install dialog instances on hosts different from the central instance host. For more information, see Installation of a Dialog Instance [page 23].

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

This figure assumes the following:

- The ASCS instance and its related ERS instance run on the switchover cluster infrastructure. For more information, see Setting Up File Systems for a High-Availability System [page 70].

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- The global transport directory resides on a separate SAP transport host. For more information, see SAP Transport Host [page 52].

High-Availability System
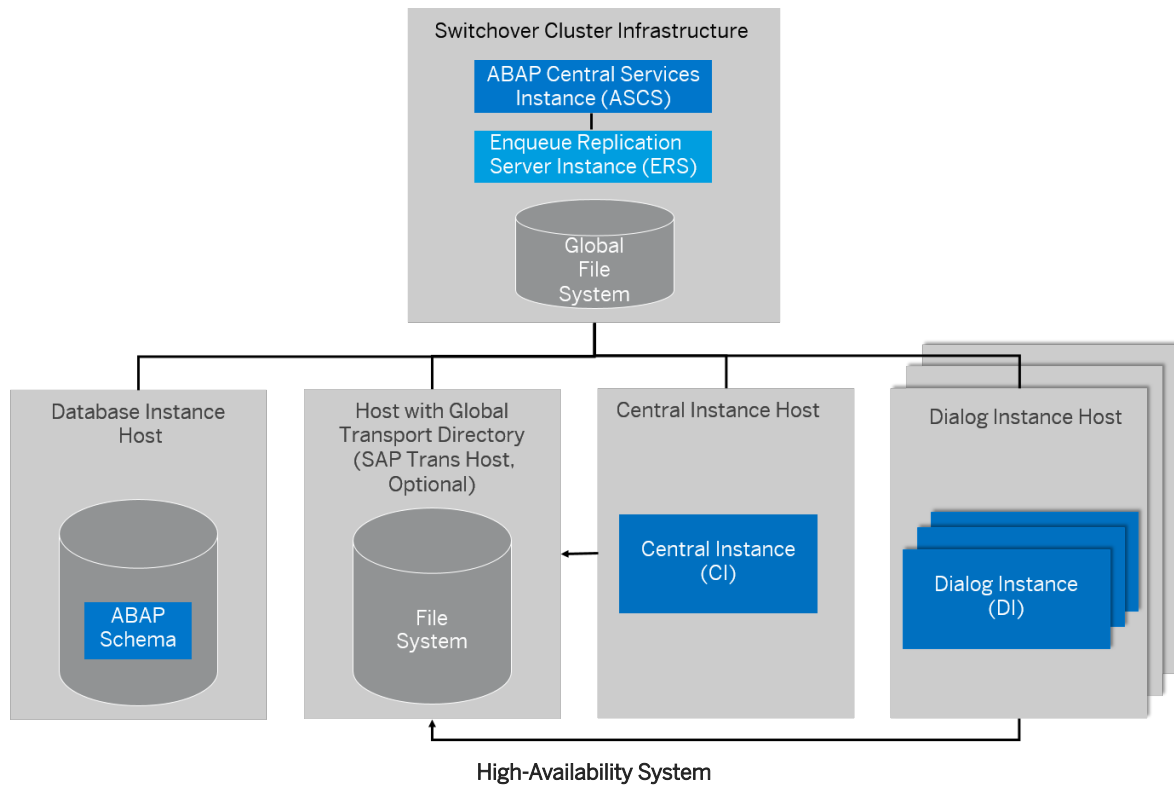
2.4 ASCS Instance with Integrated SAP Web Dispatcher

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 Systems Based on the Application Server ABAP of SAP NetWeaver 7.0 to
7.03 on UNIX : Oracle
Installation Options Covered by this Guide   PUBLIC   **21**
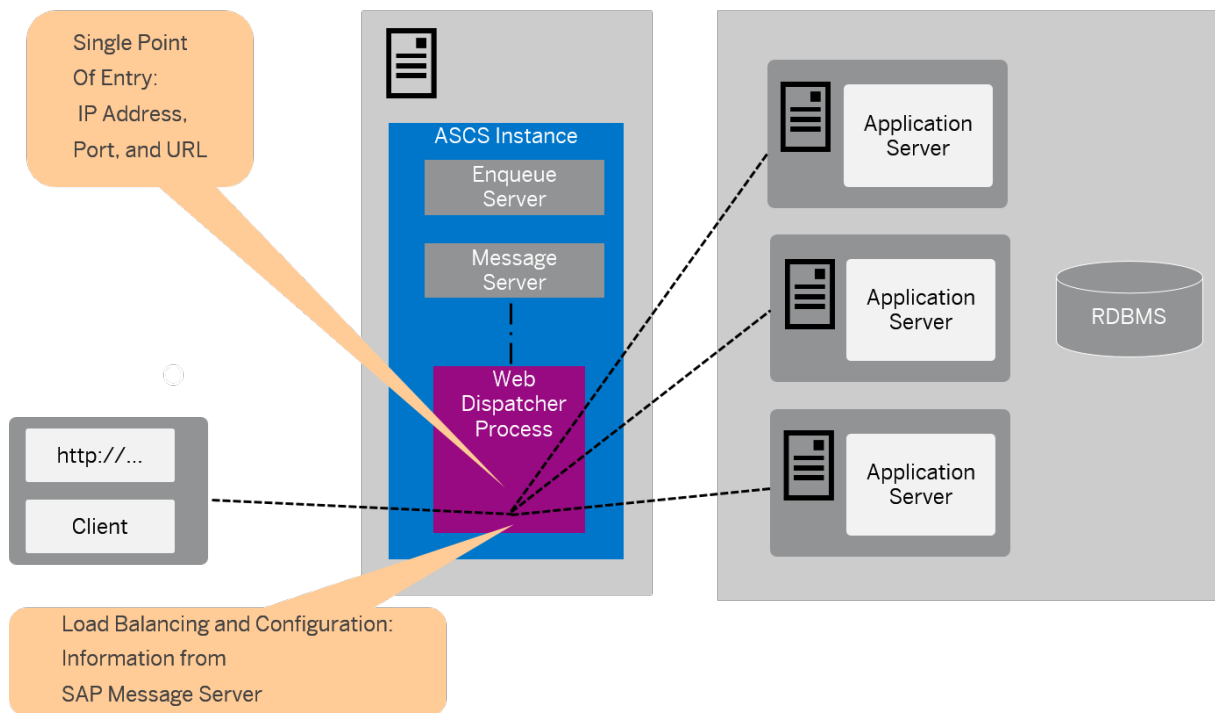
ASCS Instance with Integrated SAP Web Dispatcher

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 which you can find under http://help.sap.com/sltoolset ▶ ▶ *System Provisioning* ▶ *Installation Option of Software Provisioning Manager* ▶ *Guide for SAP Web Dispatcher for SAP NetWeaver 7.0 or Higher* ▶.

More Information

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

http://help.sap.com/nw70 ▶ `<Enhancement Package>` ▶ *Application Help* ▶ **SAP NetWeaver by Key**

2.5 Dialog Instance

You can install one or more dialog instances for an existing SAP system. Dialog instances are optional and can be installed on separate hosts.

A dialog 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 install a dialog instance in an existing non-Unicode system (that has been upgraded to the current release), the dialog instance is automatically installed as a non-Unicode instance. The installer determines if a non-Unicode system exists and chooses the correct executables for the system type.

> **i Note**
>
> If you want to install dialog instances running on an operating system other than the central instance, see Heterogeneous SAP System Installation [page 182]. For example, you need to do this if your central instance runs on Linux for z System but the dialog instance is to run on Windows.

Dialog Instance for a Central System

The following figure shows a central system with dialog instances that run:

- On the main host of the SAP system, that is, on the host on which the central instance and the database instance run
- On dedicated hosts

Installation of SAP Systems Based on the Application Server ABAP of SAP NetWeaver 7.0 to
7.03 on UNIX : Oracle
Installation Options Covered by this Guide   PUBLIC   **23**
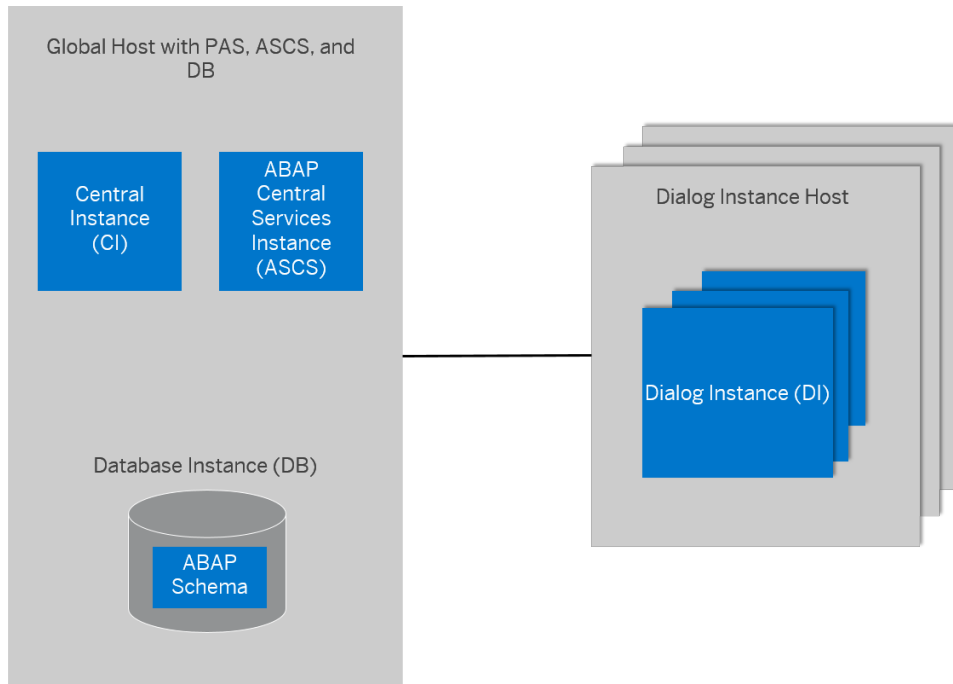
Dialog Instance for a Central ABAP System

For more information, see Central System [page 18].

Dialog Instance for a Distributed System

Dialog Instance for a Distributed ABAP System

Installation of SAP Systems Based on the Application Server ABAP of SAP NetWeaver 7.0 to
7.03 on UNIX : Oracle
Installation Options Covered by this Guide
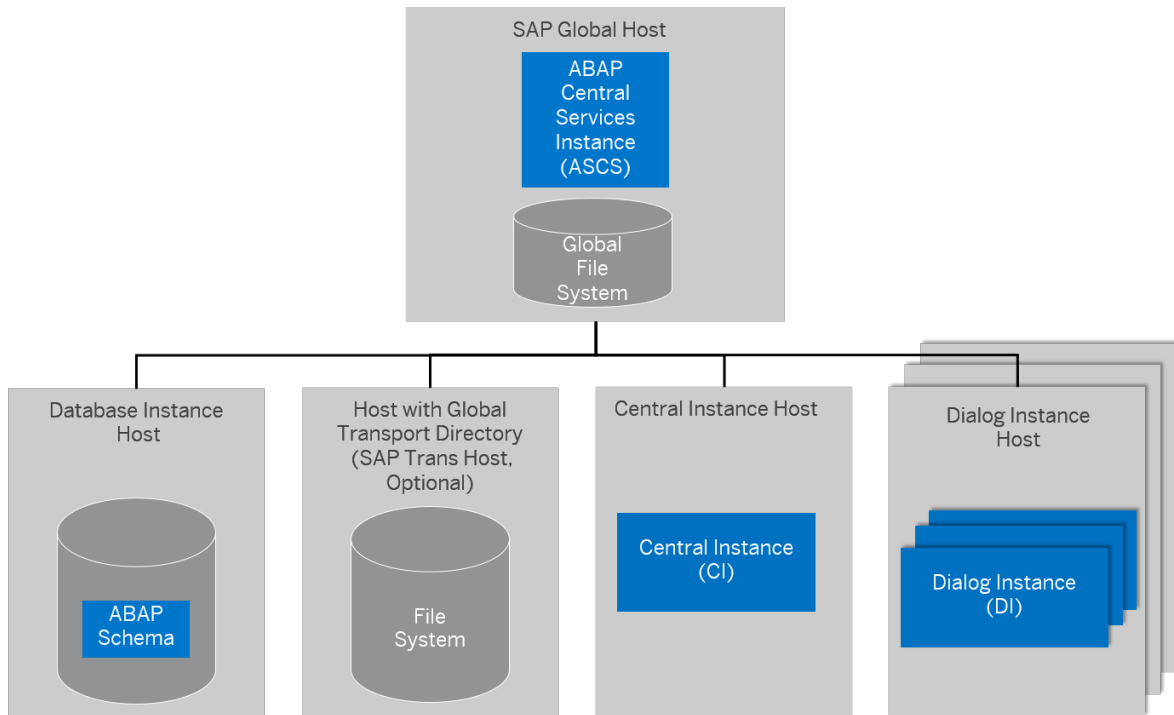
For more information, see Distributed System [page 19].

Dialog Instance for a High-Availability System

The following figure shows a high-availability system with dialog instances that run on:

- The host of the central instance
- Dedicated hosts

This figure assumes the following:

- The ASCS instance and its related ERS instance run on the switchover cluster infrastructure. For more information, see Setting Up File Systems for a High-Availability System [page 70].
- The global transport directory resides on a separate SAP transport host. For more information, see SAP Transport Host [page 52].

Dialog Instance for a High-Availability System
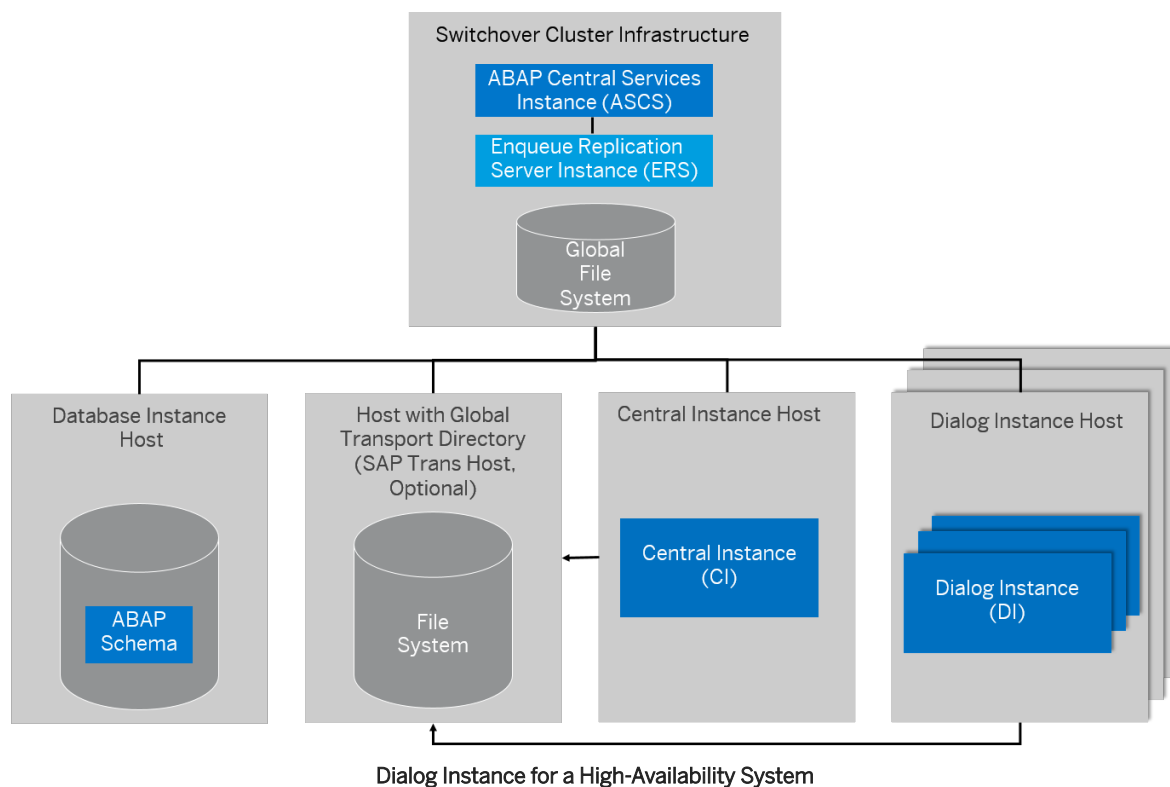
For more information, see High-Availability System [page 20].

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7.03 on UNIX : Oracle
Installation Options Covered by this Guide   PUBLIC   **25**

3 Planning

3.1 Planning Checklist

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

- Central, distributed, or high-availability system
- Dialog instance

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

Prerequisites

1. You have planned your SAP system landscape according to the Master Guide available at the appropriate download location as described in Before You Start [page 12].
2. You have decided on your installation option (see Installation Options Covered by this Guide [page 18]).

Central, Distributed, or High-Availability System

> i Note
>
> In a central system, all mandatory instances are installed on one host. Therefore, if you are installing a central system, you can ignore references to other hosts.
>
> You can install the optional standalone units **J2EE Adapter Engine**, **Partner Connectivity Kit**, **Application Sharing Server** only as a central system.

1. You check the hardware and software requirements [page 27] for each installation host.
2. You plan how to set up user and access management [page 39].
3. You identify Basic SAP System Installation Parameters [page 40].
4. For the database installation, you decide how to distribute your database components to disk [page 50].
5. You decide on the transport host to use [page 52].
6. To install a high-availability system, you read Planning the Switchover Cluster for High Availability [page 53].
7. If you want to implement Oracle Database Vault, make sure that you have read section Implementing Oracle Database Vault with Software Provisioning Manager 1.0 [page 169].
8. Continue with Preparation [page 56].

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Planning

Dialog Instance

1. You check the hardware and software requirements [page 27] for the installation host on which you want to install one or more dialog instances.
2. You identify Basic SAP System Installation Parameters [page 40].
3. Continue with Preparation [page 56].

3.2 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 central 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:
   - The *Prerequisite Checker* in one of two modes:
     - Standalone mode (optional) **before** the installation process
       For more information, see Running the Prerequisite Checker Standalone [page 28].
     - Integrated in the installer (mandatory) **during** the installation process
       For more information, see Running the Installer [page 95].
   - The hardware and software requirements tables in Requirements for the SAP System Hosts [page 29].
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

3.2.1 Running the Prerequisites Check in Standalone Mode (Optional)

When you install an SAP system, the installer automatically starts the prerequisites check, which 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 (OS) and the SAP instances before the actual installation.

Context

> → 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 1.0 archive to a local directory and make the SAP kernel media available as described in Preparing the Installation Media [page 75].
2. Start the installer as described in Running the Installer [page 95].
3. On the *Welcome* screen, choose ▶ `<Product>` ❯ *Software Life-Cycle Options* ❯ *Additional Preparation Options* ❯ *Prerequisites Check* ▶.
4. Follow the instructions in the installer dialogs and enter the required parameters.

   > i Note
   >
   > For more information about each parameter, position the cursor on the parameter field and choose `F1` in the installer.

   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*.
5. 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.

3.2.2 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 29]
Hardware Requirements [page 30]
Software Requirements [page 34]
Other Requirements [page 38]

3.2.2.1   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 .

Operating System	Information
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 .
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-so-laris.html

3.2.2.2 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
Distribution of the Oracle database	We recommend to use a redundant storage solution such as RAID5 for data security reasons.
	To decide how many hard disks are required for your Oracle database, see section *Database System Configuration* in *SAP Database Guide: Oracle (BC-DB-ORA-DBA)* in the SAP Library at:
	http://help.sap.com/nw ▌ *SAP NetWeaver 7.0* `<including Enhancement Package>` ❯ *Application Help* ❯ *SAP NetWeaver by Key Capability* ❯ *Database Administration* ❯ *Database Administration for Oracle* ❯ *SAP Database Guide: Oracle (BC-DB-ORA-DBA)* ❯ *Getting Started with Oracle and the SAP System* ❯
Processing units	**For application server instances and database instances:** The number or 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.

Requirement	Values and Activities

Hard disk space	• **General requirements:**
	  ○ 4.3 GB of temporary disk space for every required installation medium that you have to copy to a local hard disk. For more information, see Preparing the Installation Media [page 75].
	  ○ 1.2 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.
	  For more information about space requirements for the file systems and directories of the instances, see SAP Directories [page 62] and the appropriate database-specific information listed below.
	  ○ ABAP central services instance (ASCS instance)
	    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.
	  ○ Enqueue replication server instance for the ASCS instance (high-availability only)
	    2 GB
	  ○ Database instance:
	    ○ SAP ERP: Minimum 75 GB
	    ○ SAP CRM: Minimum 50 GB
	    ○ SAP SRM: Minimum 55 GB
	    ○ SAP SCM: Minimum 50 GB
	    ○ SAP NetWeaver: Minimum 40 GB
	    For more information about space requirements for the separate file systems and directories, see Oracle Directories [page 67].
	  ○ Central instance:
	    3 GB
	  ○ Dialog instance:
	    3 GB
	  ○ SAP Host Agent:
	    0.5 GB

Requirement	Values and Activities
RAM	

Only valid for 'Platform': AIX

> **i Note**
>
> **AIX only:** Keep in mind that the operating system itself requires about 10% of the available RAM.

End of 'Platform': AIX

The following lists the RAM requirements for each instance.

If you install **several instances** on **one host**, you have to add up the requirements accordingly.

- 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.
- Enqueue replication server instance for the ASCS instance (high-availability only)
  Minimum 1 GB
- Database instance:

  Only valid for 'Software Component': SAP ERP, SAP SCM, SAP SRM
  Minimum 2 GB

  End of 'Software Component': SAP ERP, SAP SCM, SAP SRM

  Only valid for 'Software Component': SAP CRM
  Minimum 1 GB

  End of 'Software Component': SAP CRM

  Only valid for 'Software Component': SAP NetWeaver
  Minimum 2 GB (BW server: Minimum 3 GB)

  End of 'Software Component': SAP NetWeaver

  > **i Note**
  >
  > The default value used by the installer is 50 percent of the entire RAM.

- Central instance:
  Minimum 3 GB (BW server: Minimum 2 GB)
- Dialog instance:
  Minimum 3 GB (SAP BW server: Minimum 2 GB)
- SAP Host Agent:
  1 GB

Only valid for 'Platform': HP-UX

See SAP Note 1112627 for the commands to display the RAM size on HP-UX.

End of 'Platform': HP-UX

Only valid for 'Platform': Linux

See SAP Note 1382721 for the commands to display the RAM size on Linux.

End of 'Platform': Linux

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Requirement	Values and Activities

AIX: Paging space	You need hard disk drives with sufficient paging space. Calculate the required paging space as follows:
	
	• Optimistic strategy:
	  You need at least 20 GB for the **central instance** and at least another 10 GB for every **dialog instance**.
	  In addition, you need at least 20 GB for the **central instance** and at least another 10 GB for the **SCS instance** and also for every **dialog 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. Calculate the required swap space as follows: 2 * RAM, at least 20 GB 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. Calculate the required swap space as follows: 2 * RAM, at least 20 GB 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.
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 .

Requirement	Values and Activities
Verifying paging space size and kernel settings using `memlimits`	You can execute `memlimits` to verify paging space size and kernel settings as follows:

1. Make sure that the `SAPCAR` program is available on the installation host. If `SAPCAR` is not available, you can download it from https://launchpad.support.sap.com/#/softwarecenter .

2. Make the `SAPEXE.SAR` archive available on the installation host. This archive is contained in the folder `K_<Kernel_Version>_<U/N>_<OS>/DBINDEP` of the installation media.

3. To unpack the file `memlimits`, enter the following commands:
   `SAPCAR -xvfg SAPEXE.SAR memlimits`

4. Start `memlimits` using the following command:
   `./memlimits -l 20000`
   If you see error messages, increase the paging space and rerun `memlimits` until there are no more errors.

3.2.2.3 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
Database Software	For more information about supported database platforms, check the Product Availability Matrix (PAM) at http://support.sap.com/pam .
AIX: Operating System Version	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	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`** For information about support time frames of HP-UX, see SAP Note 939891 .

Requirement	Values and Activities
Linux: Operating System Version	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. 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 Oracle 12c with the operating system SUSE Linux Enterprise Server (SLES) 12, see SAP Note 1984787. End of 'Platform': Linux
Solaris: Operating System Version	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`
HP-UX: OS Patches	Contact your OS vendor for the latest OS patches. To check the minimum required OS patches, see SAP Note 837670. SAP only supports the use of native binaries. Always use the appropriate SAP binaries for your processor.
Solaris: OS Patches	Contact your OS vendor for the latest OS patches. Check the relevant SAP Note for required Solaris patches: • Solaris 9 on `SPARC`: SAP Note 550585 • Oracle Solaris 10 on `SPARC`: SAP Note 832871 • Oracle Solaris 10 on x64: SAP Note 908334 • Oracle Solaris 11: SAP Note 1797712
AIX: Kernel Parameters	To adjust AIX Virtual Memory Management settings, see SAP Note 973227.

Requirement	Values and Activities
HP-UX: Kernel Parameters	To run an SAP system, make sure that you check and, if necessary, modify the HP-UX kernel.

> ⚠ **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:

- Oracle Linux: SAP Note 1565179 🔗
- RHEL4: SAP Note 722273 🔗
- RHEL5: SAP Note 1048303 🔗
- RHEL6: SAP Note 1496410 🔗
- RHEL7: SAP Note 2002167 🔗
- SLES9: SAP Note 797084 🔗
- SLES10: SAP Note 958253 🔗
- SLES 11: SAP Note 1310037 🔗
- SLES 12: SAP Note 1984787 🔗

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Requirement	Values and Activities
Solaris: Kernel Parameters	To run an SAP system, you must check and, if necessary, modify the Solaris kernel parameters or resource controls. → Recommendation We recommend that a UNIX system administrator performs all kernel modifications. For more information about current Solaris kernel parameters and about how to modify them, see the relevant SAP Note: • Solaris 9: SAP Note 395438 • Oracle Solaris 10: SAP Note 724713 • 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`.
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`.
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`

Requirement	Values and Activities
HP-UX: Language Libraries	To make sure that the file set `LANG-MIN` is installed, enter the following command: `swlist -v	grep -i lang-min` If nothing is displayed, the file set is not available, and needs to be installed.
System Language	For the installation, you must choose English as the operating system language on all hosts that run SAP software.
Linux: Activated Hardware Drivers	To check the activated hardware drivers, enter the following command: `lsmod`

3.2.2.4 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.
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

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Requirement	Values and Activities
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.

3.3 Planning User and Access Management

You have to plan how you want to configure user and access management for your 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)
- Use 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 91]

More Information

For more information about configuring the user management of your SAP system to be installed, see the SAP Library at

http://help.sap.com/nw ⏩ *SAP NetWeaver 7.0* `<Including Enhancement Package>` ❯ *Application Help* ❯ *SAP NetWeaver by Key Capability* ❯ *Security* ❯ *Identity Management* ❯ *Identity Management for System Landscapes* ❯ *Integration of User Management in Your System Landscape* ⏵

3.4 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*, you perform the installation with default settings. This means that the installer prompts you only for a small selection of input parameters. These parameters include at least the following:
  - SAP System ID and Database Connectivity Parameters
  - SAP system profile directory – only for systems with instances on separate hosts
  - Master password
  - System Landscape Directory (SLD) destination
  For more information about the 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
>
> If you want to install an ASCS instance with an integrated SAP Web Dispatcher instance [page 21], you must choose *Custom*. Otherwise, you are not prompted for the SAP Web Dispatcher installation parameters [page 49] during the *Define Parameters* phase.

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

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The tables in the sections below list the basic system 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

3.4.1 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	Definition
Unicode System	Every **new** installation of an SAP system is Unicode.
	You can only deselect this option if you perform the system copy for a non-Unicode SAP system that has been upgraded to the current release.
	If you install a dialog instance in an existing non-Unicode system (that has been upgraded to the current release), the dialog instance is installed automatically as a non-Unicode instance. The installer checks whether a non-Unicode system exists and chooses the right executables for the system type.
SAP System ID `<SAPSID>`	The SAP System ID `<SAPSID>` identifies the whole SAP 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 a dialog instance, make sure that no Gateway instance with the same SAP system ID (SAPSID) exists in your SAP system landscape.

Parameter	Definition
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 62]. 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 95]. End of 'Platform': HP-UX

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Parameter	Definition
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 a dialog 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`.
Master Password	Common password for all users 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. In this case, make sure that the master password meets the requirements of your operating system. • ABAP users: `SAP*`, `DDIC`, and `EARLYWATCH`. **Basic Password policy** The master password must meet the following requirements: • It must be 8 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 the Oracle database:** • It must not begin with a digit or an underscore • It can contain the following characters: **_**, **#**, **$**, **.**, **a-z**, **A-Z**, **0-9** Depending on the installation option, additional restrictions may apply.

Parameter	Definition
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`.
Path to `SAPCRYPTO.SAR`	The SAP Cryptographic Library is required to enable Secure Sockets Layer (SSL) encryption of HTTP connections. In most cases it is installed automatically from the kernel medium. In case it is not installed automatically and you are prompted for it during the installation, you can download it as described in SAP Note 455033 .
	This software product is subject to export control regulations in Germany as the country of origin and import regulations of your own country. SAP may not yet have a corresponding export license for your user or company. Contact the contract department in your local SAP company. To download the SAP Cryptographic Software from the SAP Help Portal, you need a customer user ID. Before any transfer of these software products to persons, companies or other organizations outside your company, in particular in the case of any re-export of the software products, authorization is required from the German export control authorities. This might also be required from your responsible national export control authorities. This also applies to transfers to affiliated companies. Corresponding laws and regulations in the recipient country may also exist which restrict the import or the use of these software products.

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Installation of SAP Systems Based on the Application Server ABAP of SAP NetWeaver 7.0 to 7.03 on UNIX : Oracle
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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 message 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<Instance_Number_Of_ABAP_Message_Server_Instance>`. The **internal** message server port uses the parameter `rdisp/msserv_internal` with default value `39<Instance_Number_Of_ABAP_Message_Server_Instance>`.

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 57].

For more information about the `sapinst_instdir` directory, see Useful Information About the Installer [page 100].

3.4.2 SAP System Database Parameters

Parameters	Description

Database ID `<DBSID>`	The `<DBSID>` identifies the database instance. The installer prompts you for the `<DBSID>` when you are installing the database instance.
	
	The `<DBSID>` can be the same as the `<SAPSID>`
	
	⚠ **Caution**
	Choose your database ID carefully. Renaming is difficult and requires that you reinstall the SAP system.
	
	• If you want to install a new database, make sure that your database ID:
	   ○ Is unique throughout your organization
	   ○ 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.

Code page	The code page that is used by your database (Unicode or Non-Unicode). i **Note** You only need to enter this parameter if you perform a target system installation as part of a system copy.
Database schema, Passwords	The ABAP database schema is named `SAP<SCHEMA_ID>`. Default name is `SAPSR3`. → **Recommendation** Choose a `<SCHEMA_ID>` that is different from your `<SAPSID>`. It might cause problems when you copy a system where `<SCHEMA_ID>` is the same as `<SAPSID>`, and the database-specific method used for the copy does not allow you to rename the database schemas. In certain situations, you might create a system copy with a new `<SAPSID>`, but where the database schema has the old `<SAPSID>`. This is not a technical problem, but might confuse the system administrator.

Parameters	Description
Oracle Listener Name, Oracle Listener Port	• If you install the database instance on a host where no other Oracle database is installed, you normally do not have to change the default values for Listener Name and Listener Port. • • All dialog instances of an SAP system must use the same Listener Port than the database instance.
Tablespaces, Datafiles	An Oracle database consists of one or more logical storage units called `tablespaces`, which collectively store all of the database's data. Each `tablespace` in an Oracle database consists of one or more files called `datafiles`, which are physical structures that conform to the operating system in which Oracle is running. `MaxDatafileSize` is the initial size of the `tablespace` datafile and its mapping to the new tablespace layout while importing the external file DBSIZE.XML. The installer prompts you to enter `MaxDatafileSize` in MB: • **0**: Datafile size defined in DBSIZE.XML is not changed. • **2000**: Default datafile size. • **10000**: Maximum datafile size. For more information about space requirements of the SAP datafiles (`sapdata 1 – 4`), see Oracle Directories [page 67].
Install Oracle Database Vault	If you want to implement Oracle Database Vault, make sure that you specify this when entering the Oracle Database parameters. For more information, see Implementing Oracle Database Vault with Software Provisioning Manager 1.0 [page 169]
User Accounts for Oracle Database Vault	If you want to implement Oracle Database Vault, make sure that you specify the passwords for the Oracle Database Vault user accounts `secadmin` and `secacctmgr` to be created . For more information, see Implementing Oracle Database Vault with Software Provisioning Manager 1.0 [page 169]
Install Oracle TDE	If you want to implement Oracle Transparent Data Encryption (TDE), you must select checkbox *Install Oracle TDE* on the *Oracle Database* parameter screen. For more information, see Support of Oracle Transparent Data Encryption (Oracle TDE) [page 170].

Parameters	Description
Password of Oracle TDE Master Key	If you want to implement Oracle Transparent Data Encryption (TDE), you must specify the *Password of TDE Master Key* on the *Oracle TDE Configuration* screen.
	For more information, see Support of Oracle Transparent Data Encryption (Oracle TDE) [page 170].

3.4.3 Additional Parameters for an SAP Web Dispatcher Installation Integrated in the ASCS Instance (Optional)

You only need to specify the following parameters during the ASCS instance installation if you perform an integrated installation of a SAP Web Dispatcher instance.

> i Note
>
> You must choose *Custom* parameter mode. Otherwise, you are not prompted for the SAP Web Dispatcher installation parameters during the *Define Parameters* phase.

Parameters	Description
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

ASCS Instance with Integrated SAP Web Dispatcher [page 21]

3.5 Distribution of SAP System and Oracle Database Components to Disks

When you install the SAP system, the main directories required for the system are automatically created. However, during the installation procedure, the installer prompts you to enter drive letters for the main components of the system. This gives you the opportunity to distribute components to disks in the system as you wish.

How you do this significantly affects system throughput and data security, and must therefore be carefully planned. The best distribution depends on your specific environment and must take into consideration factors such as the size of the components involved, security requirements, and the expected workload.

When you work out the assignment of components to disks, you first need to get an overview of the main components and their corresponding directories. Then, on the basis of sample configurations and the recommendations provided in this documentation, you can decide which assignment is best for your particular system.

SAP systems are normally installed on RAID arrays that ensure data redundancy. This documentation therefore focuses on RAID subsystems and drives.

Minimal Configuration

The following figure illustrates an example for a disk configuration for a small test or demo system. Since security and performance play a less crucial role in this type of system, many different configurations are feasible.

> ⚠ Caution
>
> Use the illustrated configuration exclusively for test or demo systems. It is unsuitable for production systems because it only minimally satisfies security and performance requirements.
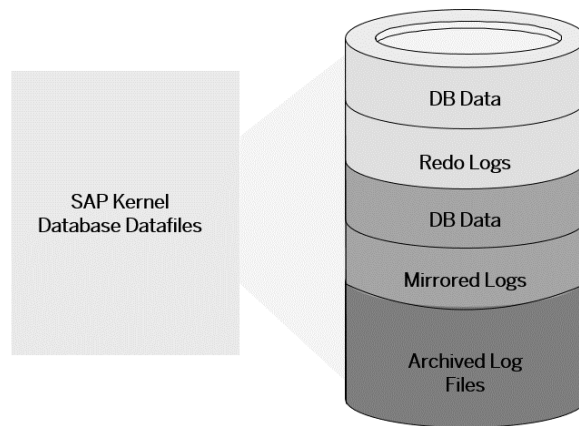
Configuration for Test or Demo System

Distribution of Database Directories to Disks

Disk	Directories
Disk 1	/oracle/\<DBSID\>/\<DB-Release 11\<x\>|12\<x\>|18\<x\>|19\<x\>
	/oracle/\<DBSID\>/origlogA
	/oracle/\<DBSID\>/origlogB
	/oracle/\<DBSID\>/sapdata1
	/oracle/\<DBSID\>/sapdata2
Disk 2	/oracle/\<DBSID\>/mirrlogA
	/oracle/\<DBSID\>/mirrlogB
	/oracle/\<DBSID\>/sapreorg
	/oracle/\<DBSID\>/saptrace
	/oracle/\<DBSID\>/saparch
	/oracle/\<DBSID\>/sapbackup
	/oracle/\<DBSID\>/sapcheck
	/oracle/\<DBSID\>/sapdata3
	/oracle/\<DBSID\>/sapdata4
	/oracle/\<DBSID\>/sapprof
Disk 3	/oracle/\<DBSID\>/oraarch

> **i Note**
>
> - The configuration ensures that no data can be lost, but the process for recovering a damaged database is complicated and time-consuming.
> - The redo logs and database files are located on the same disks. This means that a single disk failure can result in the loss of both the redo logs and database data.
> - The I/O-intensive redo logs are on the same disk volumes as the data files. This can impede performance.
> - An equally good alternative would be to simply place all components on a single RAID 5 array.
> - If you want to perform a Multitenant Database installation, for the complete seed database tablespaces the same `sapdata` directories are used as for the original database (SYSTEM, SYSAUX, and PSAPTEMP).

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 in `/usr/sap/trans`.
- Use a transport directory located on a host other than the global host (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 .

More Information

-
- See the SAP Library:

    http://help.sap.com/nw ↗ ▶ ❯ *SAP NetWeaver 7.0* `<Including Enhancement Package>` ❯ *Application Help* ❯ *Key Areas of SAP NetWeaver* ❯ *Solution Life Cycle Management by Key Capability* ❯ *Software Life*

3.7 Planning the Switchover Cluster for High Availability

You can reduce unplanned downtime for your high-availability (HA) SAP system by setting up a switchover cluster. This setup replicates 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 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.

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 dialog instances. This complements the switchover solution and is an essential part of building HA into your SAP system.

> → Recommendation
>
> We recommend switchover clusters to ensure HA for 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 must choose a proprietary switchover product that works with your operating system.

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

- Check the information and the installation guides available at:
  https://wiki.scn.sap.com/wiki/display/SI/SAP+High+Availability
- The enqueue replication server (ERS) is essential for a high-availability system. You need one ERS for the ASCS installed in your system.

Features

The following graphic shows the essential features of a switchover setup:
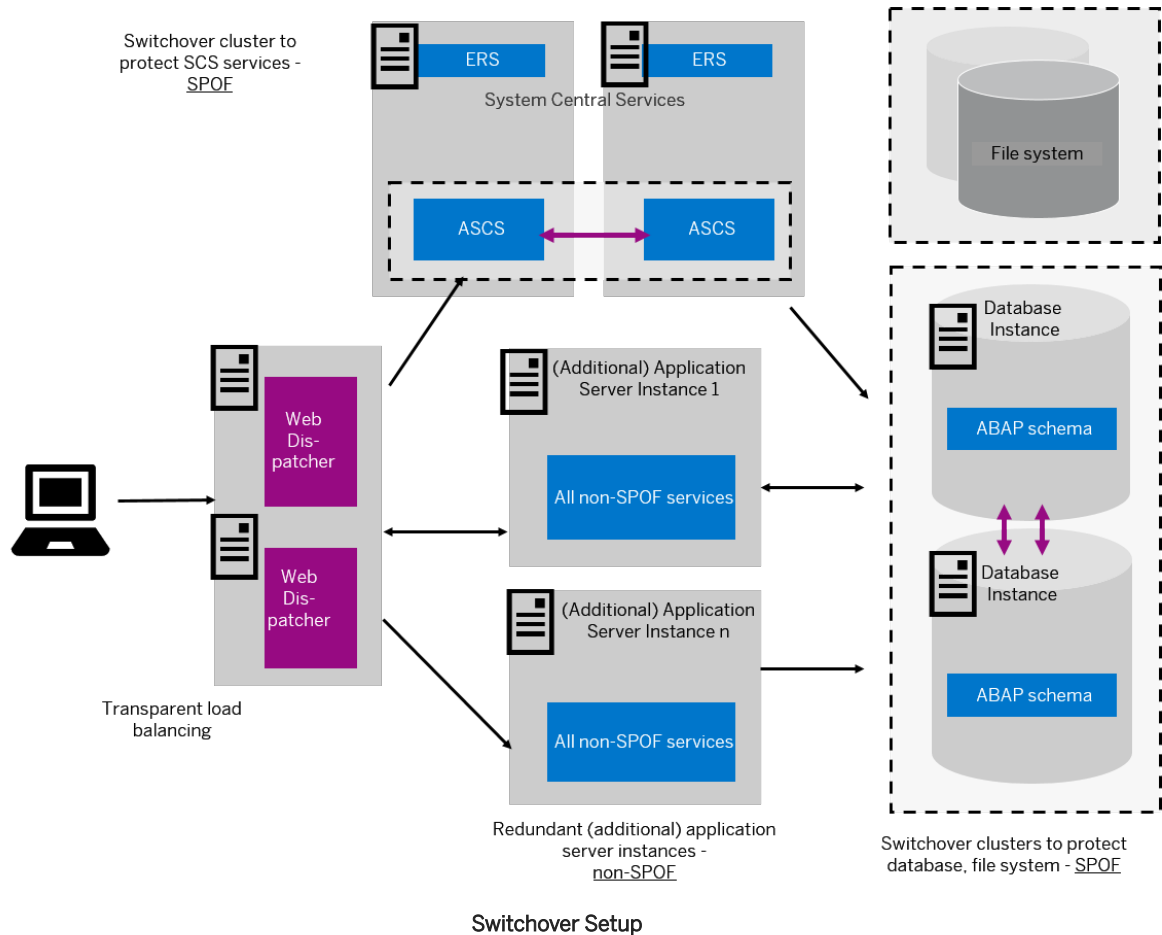
Switchover Setup

> **i Note**
>
> This figure and the figures in this section are only **examples**. Only the instances relevant to the switchover are shown – for example, the primary application server instance is not shown.
>
> These graphics summarize the overall setup and do not show the exact constellation for an installation based on one of the available technologies (ABAP, dual-stack, or Java).
>
> You need to discuss your individual HA setup with your HA partner.

The following graphic shows an example of a switchover cluster in more detail:

Switchover Cluster
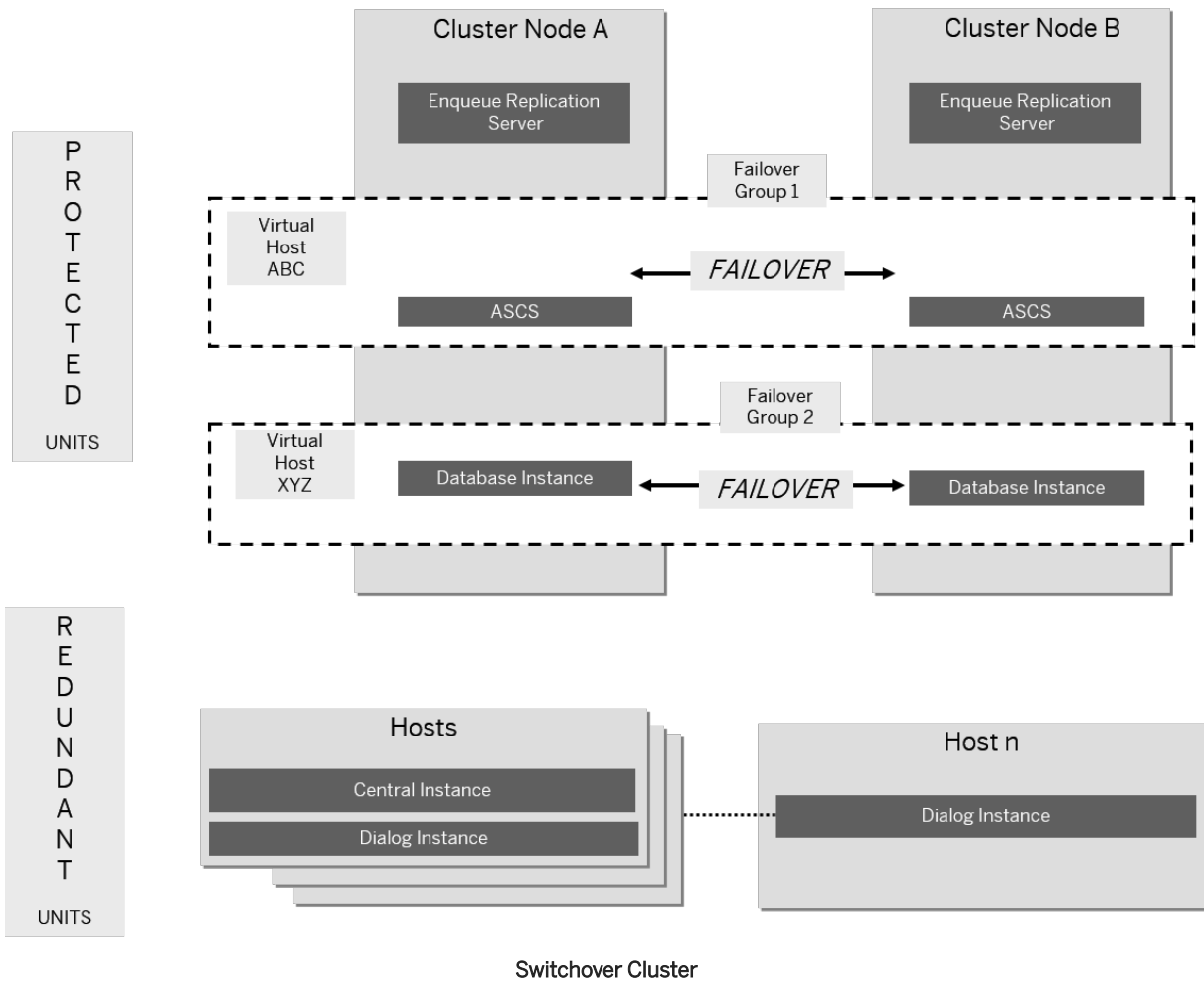
Constraints

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

Make sure that your hardware is powerful 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:

- Central, distributed, or high-availability system
- Dialog instance

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

Central, Distributed, or High-Availability System

> **i Note**
>
> In a central system, all mandatory instances are installed on one host. Therefore, if you are installing a central system, you can ignore references to other hosts.
>
> You can install optional standalone units **J2EE Adapter Engine**, **Partner Connectivity Kit**, **Application Sharing Server** only as a central system.

1. You check that the required operating system users and groups [page 57] are created.
2. You set up the required file systems [page 62] and make sure that the required disk space is available for the directories to be created during the installation.
3. If required, you set up virtual host names [page 74].
4. If you want to install a high-availability system, you perform switchover preparations [page 74].
5. If you want to share the transport directory `trans` from another system, you export [page 87] this directory to your installation hosts.
6. You install the SAP frontend software [page 75] on the desktop of the end user.
7. You check that the required installation media [page 75] are available on each host.
8. If you want to implement Oracle Database Vault, make sure that you have completed the required preparation steps. For more information, see Implementing Oracle Database Vault with Software Provisioning Manager 1.0 [page 169].
9. Continue with Installation [page 82].

Dialog Instance

You have to perform the following preparations on the host where you install the dialog instance:

1. You check that the required operating system users and groups [page 57] are created.

2. You set up file systems [page 62] and make sure that the required disk space is available for the directories to be created during the installation.
3. If required, you set up virtual host names [page 74].
4. If you want to share the transport directory `trans` from another system, you export [page 87] this directory to your installation hosts.
5. You check that the required installation media [page 75] are available on the dialog instance host.
6. If you upgraded the SAP system to which you want to install a new dialog instance, you might have to update instance profiles of the existing system [page 163].
7. Continue with Installation [page 82].

4.2 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 systems users, groups, and services automatically, you can optionally create them **before** the installation. 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 whether 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 ▶ *<Product>* ▶ *Software Life-Cycle Options* ▶ *Additional Preparation Options* ▶ *Operating System Users and Groups* ▶.

For more information, see .

- 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. You make any change to the environment – such as variables, or paths – at your own responsibility.
- Do **not** delete any shell initialization scripts in the home directory of the OS users. This applies even if you do not intend to use the shells that these scripts are for.
- If you use `NFS-V4` file system, you have to create the `ora<dbsid>` user and - if your database release is Oracle 12 - the `oracle` user on the NFS server. You can do this either manually or by running *Operating System Users and Groups*. This user must have the same user ID as the `ora<dbsid>` user and - if your database release is Oracle 12 - the `oracle` user on the database server.
  Otherwise, you see the error message `FSL-02098 Could not change owner of ...` during the installation of the database instance.
- 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.
  ○ 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 a dialog instance for an existing SAP system, you must make sure that the group ID of group `sapinst` created on the host of the dialog instance is different from the group ID of any other group on the central instance host of the existing SAP system.
  ○ If you use local operating system user accounts instead of central user management (for example, NIS), user `<sapsid>adm`, `sapadm`, and the database operating system user must have the same password on all hosts.
  ○ If you use local operating system user accounts, make sure that you install your SAP system in *Custom* mode and specify suitable IDs for user `<sapsid>adm` and group `sapsys` on all hosts. The IDs have to be the same on all hosts. If you choose *Typical* mode, you are not asked to specify the user and group IDs.

- If operating system users already exist, make sure that they are assigned to group `sapinst`.
- 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 a dialog instance. On a dialog instance host you have to enter the same IDs as on the host of the central 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 140].
>
> 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 41].

SAP System Users and Groups

User	Primary Group	Additional Groups	Comment
`root`	No primary group assigned by the installer.	`sapinst`	Superuser of the UNIX operating system
`<sapsid>adm`	`sapsys`	`oper, dba, sapinst` The following groups are always required for Oracle 12, but for Oracle 11 only if you want to use Oracle ASM: `asmoper, asmdba`	SAP system administrator and for Oracle 12 the default database administrator

User	Primary Group	Additional Groups	Comment
ora`<dbsid>`	dba	oper, sapinst, oinstall	Database administrator
			This user is only required on the host where the database instance runs.
oracle	dba	oper, sapinst, asmoper, asmadmin, asmdba, oinstall	Oracle Software Owner and database administrator
			This user is only required on the host where the database instance runs.
			This user is only required for **Oracle 12** or **Oracle 11 with ASM/Exadata**.

SAP System Groups and Members

Groups	Members
sapsys	`<sapsid>`adm
oper	`<sapsid>`adm, ora`<dbsid>`, oracle (always required for Oracle 12; for Oracle 11 only required if you want to use Oracle ASM)
dba	`<sapsid>`adm, ora`<dbsid>`, oracle (always required for Oracle 12; for Oracle 11 only required if you want to use Oracle ASM)
sapinst	root, `<sapsid>`adm, ora`<dbsid>`, oracle (always required for Oracle 12; for Oracle 11 only required if you want to use Oracle ASM)
asmoper	`<sapsid>`adm (always required for Oracle 12; for Oracle 11 only required if you want to use Oracle ASM), Oracle
asmadmin	oracle (always required for Oracle 12; for Oracle 11 only required if you want to use Oracle ASM)
asmdba	`<sapsid>`adm (always required for Oracle 12; for Oracle 11 only required if you want to use Oracle ASM), Oracle
oinstall (always required for Oracle 12; for Oracle 11 only required if you want to use Oracle ASM)	oracle (always required for Oracle 12; for Oracle 11 only required if you want to use Oracle ASM), ora`<dbsid>`

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

4.3 Required File Systems and Directories

The following sections describe the directories that are required for the instances of an SAP system, how to set up file systems and – if required – raw devices on operating system level:

- SAP Directories [page 62]
- Oracle Directories [page 67]
- Setting Up File Systems for High-Availability [page 70]

4.3.1 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 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 (/).

You are prompted only for the `<sapmnt>` directory during the installation.

The following types of directories are created automatically:

- Physically shared directories
- Logically shared directories
- Local directories

Only valid for 'Platform': HP-UX

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

End of 'Platform': HP-UX

The following figure shows the directory structure of the SAP system:
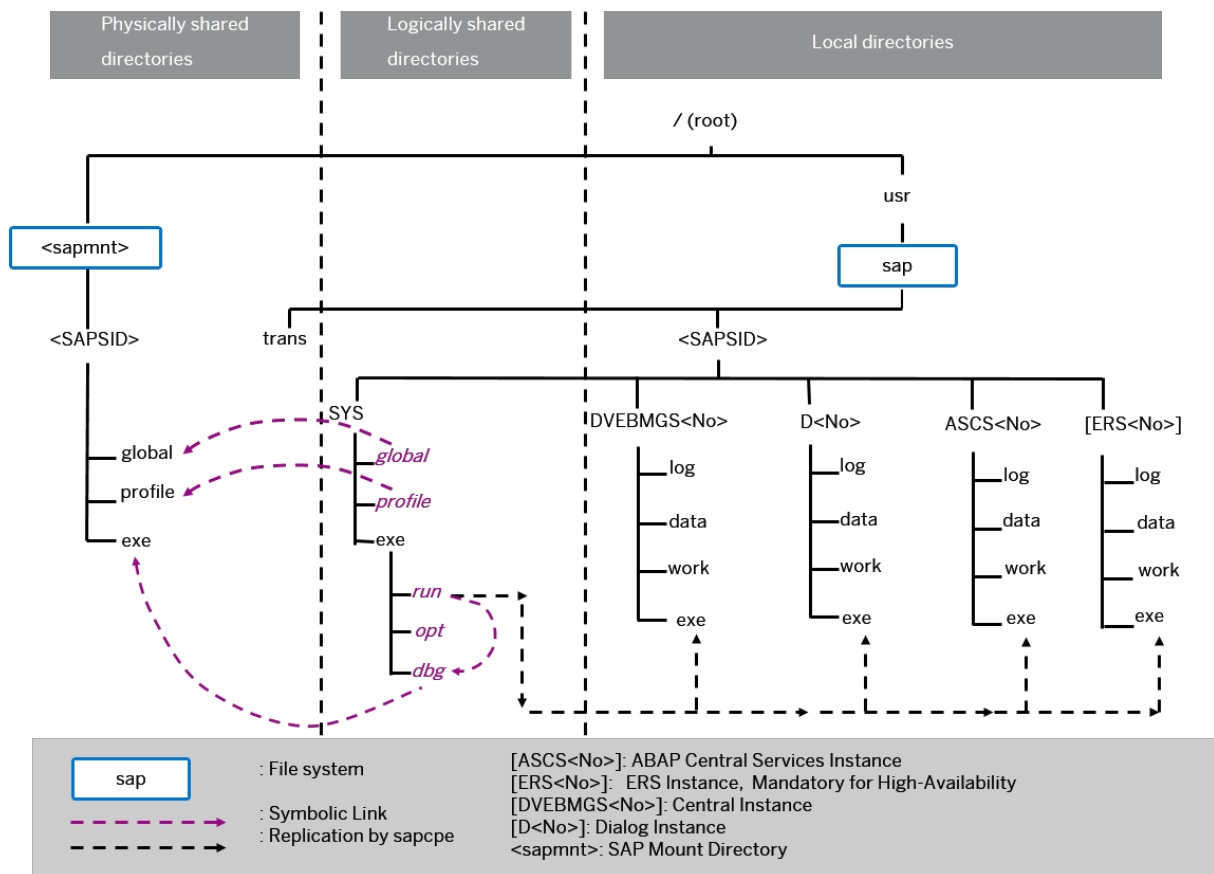
Directory Structure for an ABAP System

Every **new** installation of an ABAP standalone system is Unicode.

Non-Unicode for ABAP is still supported **only** if you perform the system copy for a non-Unicode system that has been upgraded to SAP NetWeaver 7.0 SR3 or higher.

Physically Shared Directories

Physically shared directories reside on the SAP 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. The first installation host is usually the host where the central services instance is to run, but you can also choose another host for `/<sapmnt>/<SAPSID>`.
  You need to manually share this directory with Network File System (NFS) and – for a distributed system such as an HA system or a system with dialog instance – mount it from the other installation hosts.
  The installer creates the following shared subdirectories in `/<sapmnt>/<SAPSID>` 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 88]):
    - `global`
      Contains globally shared data
    - `profile`
      Contains the profiles of all instances
    - `exe`
      Contains executable kernel programs
- The directory `/usr/sap/trans`, which is the global transport directory.
  If you want to use an existing transport directory, you have to mount it before you install the application server instance in question. Otherwise, the installer creates `/usr/sap/trans` locally.
  For more information, see Exporting and Mounting the Global Transport Directory [page 87].

Physically Shared SAP Directories

Directory	Description	Required Minimum Disk Space
`<sapmnt>/<SAPSID>`	SAP system directory	Minimum 3 GB
`/usr/sap/trans`	SAP transport directory	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

Logically shared directories reside on the local hosts with symbolic links to the physically shared directories that reside on the SAP global host. The installer creates the directory `/usr/sap/<SAPSID>/SYS` on each host. The subdirectories contain symbolic links to the corresponding subdirectories of `/<sapmnt>/<SAPSID>` on the first installation host, as shown in the figure above.

The installer uses `sapcpe` to replicate the kernel automatically from `/usr/sap/<SAPSID>/SYS/exe/run` (`DIR_CT_RUN`) to `/usr/sap/<SAPSID>/<Instance_Name>/exe` (`DIR_EXECUTABLE` parameter in the `START`e profile) for each SAP system instance, where `<Instance_Name>` is either `DVEBMGS<Instance_Number>` (central instance) or `D<Instance_Number>` (dialog instance).

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 following entry in the start profile is responsible for this:

`Execute_00 = immediate $(DIR_CT_RUN)/sapcpe$(FT_EXE) pf=$(_PF)`

where `$(_PF)` points to the instance profile.

> ⚠ Caution
>
> Do **not** delete `DIR_CT_RUN` from the instance profile. Otherwise, you cannot restart the system after patches have been applied.

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:
  - The directory of the central instance is called `DVEBMGS<Instance_Number>`.
  - The directory of a dialog instance is called `D<Instance_Number>`.
- The directory of the ABAP central services instance (ASCS instance) is called `ASCS<Instance_Number>`.
- The directory of an enqueue replication server instance (ERS instance) is called `ERS<Instance_Number>` (high availability only).
  For 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>/DVEBMGS<Instance_Number>`	Central instance directory	4 GB
`/usr/sap/<SAPSID>/D<Instance_Number>`	Dialog instance directory	4 GB

Directory	Description	Required Minimum Disk Space
/usr/sap/<SAPSID>/ASCS<Instance_Number>	ABAP central services instance (ASCS instance) directory	2 GB
/usr/sap/<SAPSID>/ERS<Instance_Number>	Enqueue replication server instance (ERS instance) directory for the ASCS (high availability only)	2 GB

Directories of the SAP Host Agent

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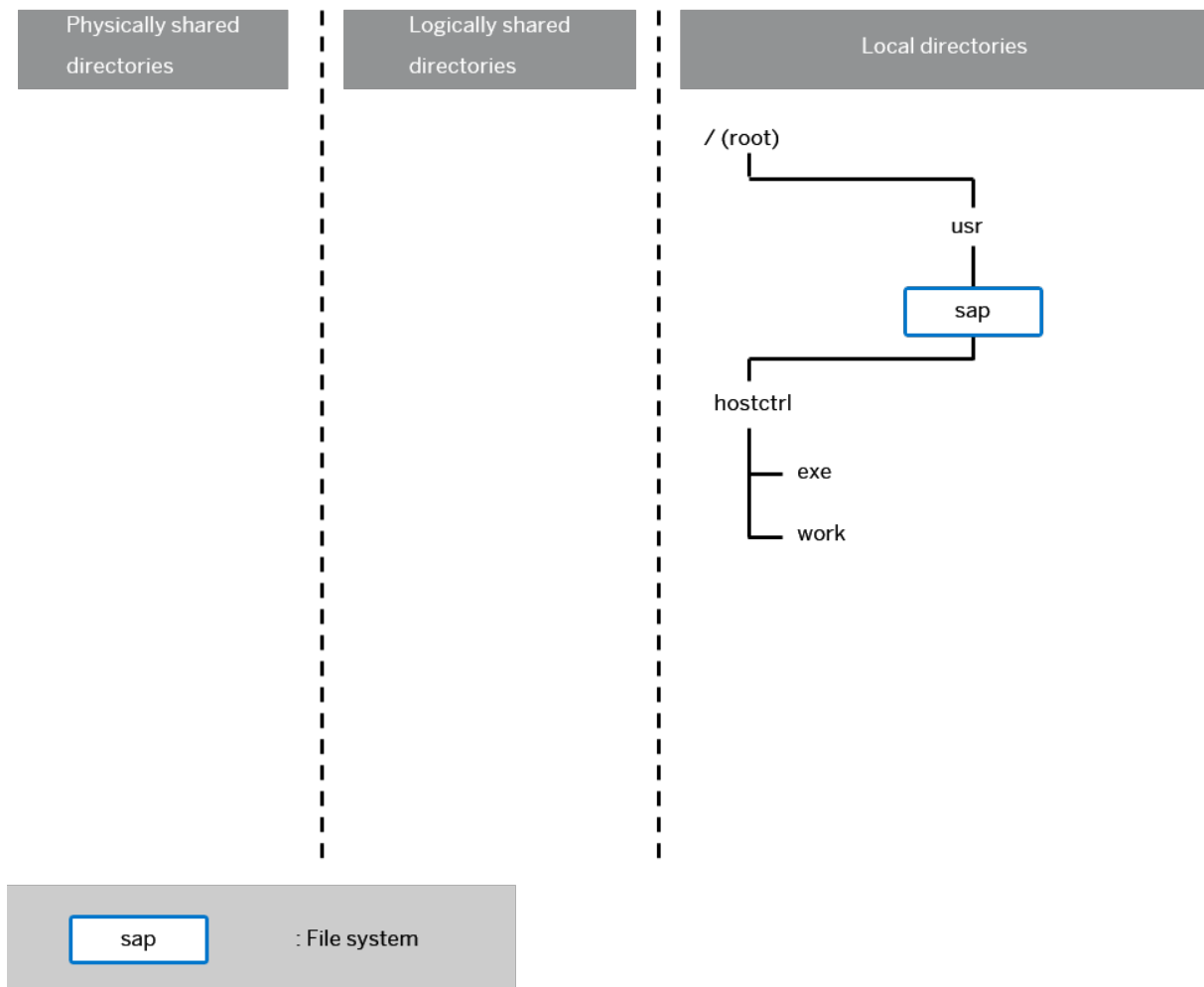
Directory Structure for the SAP Host Agent

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

4.3.2 Oracle Directories

The figure below assumes that you have set up one file system for the `Oracle` directory. However, you have to decide yourself 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 `/`.

Set up the required file system nodes for the Oracle database before the installation.

> **i Note**
>
> The graphics and the table below only list the directories you need to take into consideration for your SAP system installation. They do not provide a complete list of all Oracle directories.
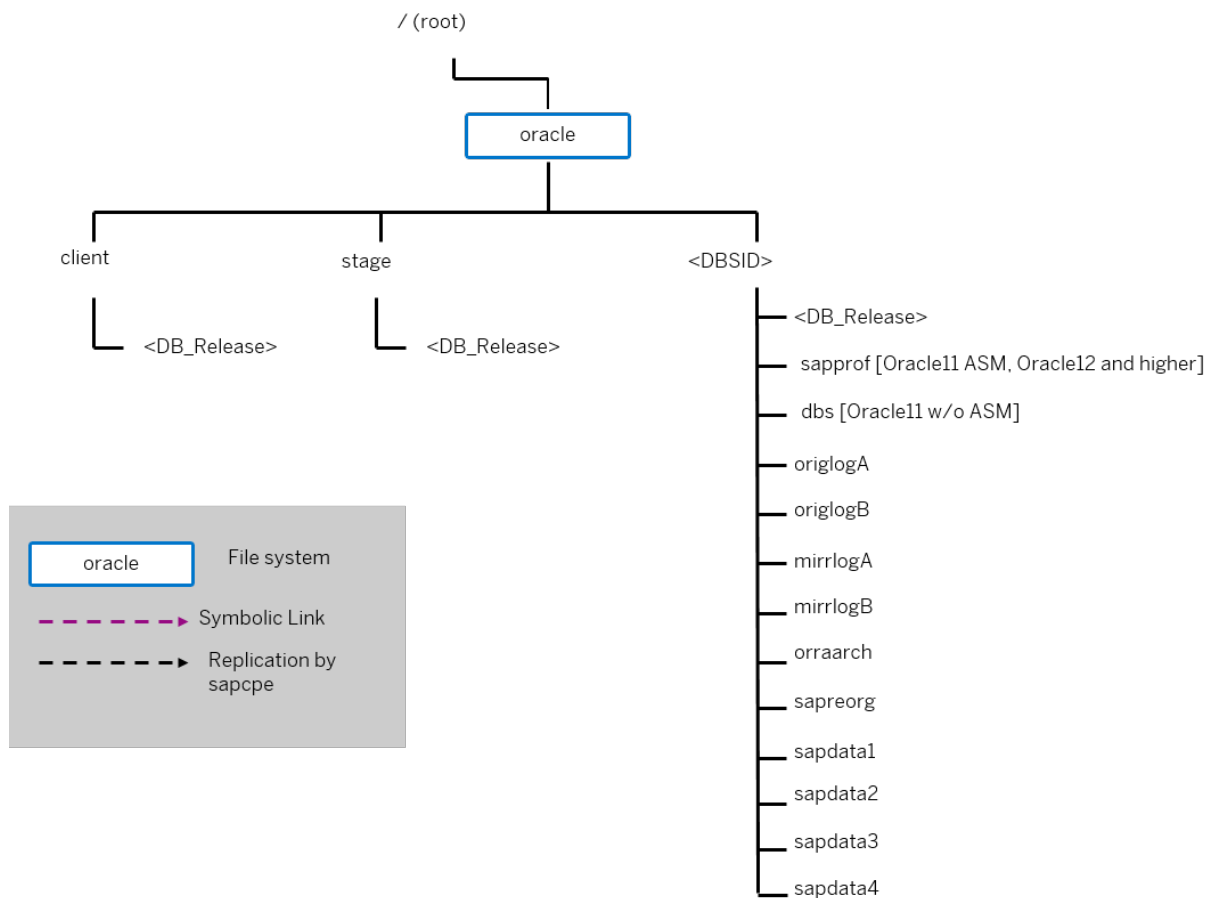
Oracle Directories (Graphical Overview)

The following table provides more information about the Oracle directories in detail, such as about their usage and disk space requirements.

Oracle Directories in Detail

Directory	Description	Required Minimum Disk Space
`/oracle`	Oracle base directory Make sure that the `/oracle` file system has the permissions `755`.	37 GB
`/oracle/client/` `<DB_Release>`	File system for Oracle client software The installer creates directory `/oracle/client/` `<DB_Release>/instantclient` during the installation. ❖ **Example** Oracle 19: `/oracle/client/19<x>` Oracle 18: `/oracle/client/18<x>` Oracle 12: `/oracle/client/12<x>` Oracle 11: `/oracle/client/11<x>_64`	100 MB
`/oracle/stage/` `<DB_Release>`	Installation and upgrade directory for database software (staging area) This directory is also used for Oracle upgrades. We recommend that you do **not** delete it after the installation. ❖ **Example** Oracle 19.`<x>`: `/oracle/stage/19<x>` Oracle 18.`<x>`: `/oracle/stage/18<x>` Oracle 12.`<x>`: `/oracle/stage/12<x>` Oracle 11.2: `/oracle/stage/112_64`	11 GB

Directory	Description	Required Minimum Disk Space
Oracle 11 only: `/oracle/<DBSID>`	Home directory of user `ora<dbsid>` We recommend that `/oracle/<DBSID>` does **not** reside in the root directory. It must reside in a file system with support for large files. Therefore, either create `/oracle/<DBSID>` as a separate file system with support for large files or create `/oracle` as a file system with support for large files and create `/oracle/<DBSID>` as a directory in `/oracle`.	100 MB for files of user `ora<dbsid>` (for example, log files)

Oracle 12 and higher:
`/home/oracle`
`/home/ora<dbsid>`
	Home directories of user `oracle` and user `ora<dbsid>`	100 MB for files of user `ora<dbsid>` (for example, log files)
		
		100 MB for files of user `oracle` (for example, log files)

`/oracle/<DBSID>/` `<DB_Release>`	Home directory for Oracle instance `<DBSID>` (`<ORACLE_HOME>`). ⁂ Example Oracle 19.`<x>`: `/oracle/KB1/19<x>` Oracle 18.`<x>`: `/oracle/KB1/18<x>` Oracle 12.`<x>`: `/oracle/KB1/12<x>` Oracle 11.2: `/oracle/KB1/112_64`	• Database instance: 4.0 GB • All other instances: 200 MB

Oracle 11 with ASM, Oracle 12 and higher:
`/oracle/<DBSID>/`
`sapprof`
	In this directory, the profile for the `Oracle dba` tools `init<DBSID>.sap` and copies of `init<DBSID>.ora` and `spfile<DBSID>.ora` are stored . These files are used by the `Oracle dba` tools.	1 MB

`/oracle/<DBSID>/dbs`	In this directory, the Oracle parameter files `init<DBSID>.ora` and `spfile<DBSID>.ora` are stored. For Oracle 11g **without** ASM, `init<DBSID>.sap` is also located in this directory.	1 MB
`/oracle/<DBSID>/` `origlogA`	Original set A of redo logs	200 MB

Directory	Description	Required Minimum Disk Space
/oracle/`<DBSID>`/ origlogB	Original set B of redo logs	200 MB
/oracle/`<DBSID>`/ mirrlogA	Mirrored set A of redo logs	200 MB
/oracle/`<DBSID>`/ mirrlogB	Mirrored set B of redo logs	200 MB
/oracle/`<DBSID>`/ oraarch	New standard backup file system for Oracle offline redo logs Use a separate disk for the file system /oracle/`<DBSID>`/oraarch. The file system /oracle/`<SAPSID>`/saparch still remains but now only contains brbackup log files. /oracle/`<SAPSID>`/saparch is automatically created by the installer.	For the installation, the archive directory /oracle/`<DBSID>`/ oraarch requires at least 400 MB free disk space. For the operation of your SAP system, we recommend that the archive directory provides enough space for archives between two backups. In a production system, the amount archived each day is between 300 MB and 1 GB.
/oracle/`<DBSID>`/ sapreorg	Working directory for database administration	1.5 GB
/oracle/`<DBSID>`/ sapdata1	SAP data	24 GB For details, see the DBSIZE.XML file at the medium for the installation export (folder EXP1/DB/ ORA/)
/oracle/`<DBSID>`/ sapdata2	SAP data	
/oracle/`<DBSID>`/ sapdata3	SAP data	See also the *Pre-Installation* section in SAP Note 2172935 .
/oracle/`<DBSID>`/ sapdata4	SAP data	

4.3.3 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 for High Availability [page 53].

Context

From the perspective of an SAP application, there are the following types of SAP Directories [page 62]:

- Physically shared directories: `/<sapmnt>/<SAPSID>` and `/usr/sap/trans`
- 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`
- Local directories that contain the SAP instances, such as `/usr/sap/<SAPSID>/ ASCS<Instance_Number>`

HP-UX: 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 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). However, an SAP instance directory `/usr/sap/<SAPSID>/ <Instance_Type><Instance_Number>` that you want to prepare for HA has always to be mounted on the cluster node currently running the instance. Do **not** mount such directories with NFS.

   Therefore, if the host running the central instance is **not** the NFS server host, you might have to mount the file systems for `/<sapmnt>/<SAPSID>` and `/usr/sap/trans` on **different** physical disks from the file system for `/usr/sap/<SAPSID>/<Instance_Type><Instance_Number>`.

   > ⚠ 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.
   > - Replace the links in `/usr/sap/<SAPSID>/SYS` by a physical copy.
   >   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 62]):

   ○ `SYS` – which contains links to the central directory `/<sapmnt>/<SAPSID>`
   ○ `<Instance_Type> <Instance_Number>` – where the name is defined by the type of services and the application server number:
     ○ `DVEBMGS<Instance_Number>` – which contains data for the central instance
     ○ `D<Instance_Number>` – which contains data for a dialog instance
     ○ `ASCS<Instance_Number>` – which contains data for the ABAP central services instance

   Only `<Instance_Type><Instance_Number>` directories need to be migrated with the SAP instances during the switchover.

   Therefore, instead of `/usr/sap/<SAPSID>`, create a file system for `/usr/sap/<SAPSID>/<Instance_Type><Instance_Number>` with the usual `<>` substitutions.

   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 SAP instance is already running. The `ASCS<Instance_Number>` directory can join the `/usr/sap/<SAPSID>` tree instead of mounting on top of it.

   > 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 Enqueue Replication Server instance (ERS instance) and dialog instances. The result is a more efficient use of resources. Use this approach for integrated installations of the application server with ABAP and Java stacks.

3. You assign the **local** (non-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 an example of the file systems and disks in an HA setup.

Note that this is only an example. For more information on a setup that meets your needs, consult your HA partner.

Local Disks – Node A

usr — export — sapmnt
sap — sapmnt — <SAPSID>
<SAPSID>
[S] Node B fails
SYS
— global
— profile
— exe

Shared Disks

<SAPSID>
— global
— profile
— exe

Node A fails
[S]

Local Disks – Node B

sapmnt — export — usr
<SAPSID> — sapmnt — sap
<SAPSID>
SYS
global
profile
exe

Optional

ERS
log — exe — work

ASCS
— work
— log
— data
— exe

ERS
log — exe — work

Optional

Central
Instance
log — exe — work

Dialog
Instance
log — exe — work

Key

→ Mount point *before* switchover

[S] → Mount point *after* switchover

--→ NFS mount point

File Systems and Disks in an HA Setup

4.4 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 without having to reinstall or reconfigure.

Prerequisites

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

Procedure

Proceed as described in SAP Note 962955 .

4.5 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 74], you have to set the installer property SAPINST_USE_HOSTNAME to specify the required virtual host name before you start the installer.

For more information, see SAP System Parameters [page 41].

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.

4.6 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 .

4.7 Preparing the Installation Media

This section describes how to prepare the installation media.

Installation media are available as follows:

- The Software Provisioning Manager 1.0 archive containing the installer.
  You always have to download the latest version of the Software Provisioning Manager 1.0 archive.
- The media containing the software to be installed, which are available as follows:
  - You normally obtain the physical installation media as part of the installation package.
  - You can also download the installation media apart from the Software Provisioning Manager 1.0 archive from https://launchpad.support.sap.com/#/softwarecenter , as described at the end of this section.

> **i Note**
>
> The signature of media is checked **automatically** by the installer during the *Define Parameters* phase while processing the *Media Browser* screens. As of now the installer only accepts media whose signature has been checked. See also the description of this new security feature in SAP Note 2393060 .

Related Information

Downloading and Extracting the Software Provisioning Manager 1.0 Archive [page 76]
Using the Physical Media from the Installation Package [page 77]
Downloading Installation Media [page 80]

4.7.1 Downloading and Extracting the Software Provisioning Manager 1.0 Archive

You must always download and extract the Software Provisioning Manager 1.0 archive from the SAP Software Download Center because you must use the latest version .

Prerequisites

Make sure that your are logged on as a user with `root` authorizations, and that the download directory has at least the permissions 755.

You require the **latest** version of the `SAPCAR` tool to unpack the Software Provisioning Manager 1.0 archive `70SWPM10SP<Support_Package_Number>_<Version_Number>.SAR`. For more information about how to get this tool, see the *Procedure* section below.

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 1.0 archive
   `70SWPM10SP<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. Unpack the Software Provisioning Manager archive to a local directory using the following command:

```
/<Path to SAPCAR>/sapcar -xvf <Path to Download Directory>/
70SWPM10SP<Support_Package_Number>_<Version_Number>.SAR <Path to Unpack
Directory>
```

> ℹ **Note**
>
> Make sure that all users have at least read permissions for the directory to which you 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.

4.7.2 Using the Physical Media from the Installation Package

This section describes how you use the physical installation media as part of the installation package.

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 95]). The installer only accepts media whose signature has been checked. For more information, see SAP Note 2393060.

Procedure

1. Identify the required media for your installation as listed below.

   The following table shows the required media for the installation of an SAP system based on SAP NetWeaver application server ABAP:

   > ℹ **Note**
   >
   > For a central system, where all mandatory instances reside on one host, you need the installation media that are required for the central instance and database instance.

   > ℹ **Note**
   >
   > For more information about which kernel version to use, see SAP Note 1680045. In addition, check the Product Availability Matrix at http://support.sap.com/pam

SAP Instance Installation	Required Media
Global host preparation	○ Software Provisioning Manager 1.0 archive ○ UC or NUC Kernel (folder `K_<Version>_U<N or U>_<OS>`) where `U` means Unicode and `N` means non-Unicode. i Note Every **new** installation of an SAP system is Unicode. You can only use the non-Unicode kernel if you perform the system copy for a non-Unicode SAP system that has been upgraded to the current release.
ABAP central services instance (ASCS instance)	○ Software Provisioning Manager 1.0 archive ○ UC or NUC Kernel (folder `K_<Version>_<N or U>_<OS>`) where `U` means Unicode and `N` means non-Unicode. i Note Every **new** installation of an SAP system is Unicode. You can only use the non-Unicode kernel if you perform the system copy for a non-Unicode SAP system that has been upgraded to the current release.
Central instance	○ Software Provisioning Manager 1.0 archive ○ UC or NUC Kernel (folder `K_<Version>_<N or U>_<OS>`) where `U` means Unicode and `N` means non-Unicode. i Note Every **new** installation of an SAP system is Unicode. You can only use the non-Unicode kernel if you perform the system copy for a non-Unicode SAP system that has been upgraded to the current release. ○ Only valid for 'Software Component': SAP SCM **SAP SCM only:** SAP liveCache End of 'Software Component': SAP SCM ○ RDBMS Client

SAP Instance Installation	Required Media
Database instance	○ Software Provisioning Manager 1.0 archive ○ UC or NUC Kernel (folder `K_<Version>_<N or U>_<OS>`) where `U` means Unicode and `N` means non-Unicode. **i Note** Every **new** installation of an SAP system is Unicode. You can only use the non-Unicode kernel if you perform the system copy for a non-Unicode SAP system that has been upgraded to the current release. ○ Export ○ RDBMS ○ RDBMS Patch (if available) **i Note** For an MCOD system you require the RDBMS Client medium instead of the RDBMS medium and the RDBMS Patch medium (if available).
Dialog instance	○ Software Provisioning Manager 1.0 archive ○ UC or NUC Kernel (folder `K_<Version>_<N or U>_<OS>`) where `U` means Unicode and `N` means non-Unicode. **i Note** If you install a dialog instance in an existing non-Unicode system, the dialog instance is created automatically as a non-Unicode instance. The installer checks whether a non-Unicode system exists and chooses the right executables for the system type. ○ Only valid for 'Software Component': SAP SCM **SAP SCM only:** SAP liveCache End of 'Software Component': SAP SCM

2. Make the installation media available on each installation host as follows:

   a. Download and unpack the latest version of Software Provisioning Manager as described in Downloading and Extracting the Software Provisioning Manager 1.0 Archive [page 76].

   b. Make the installation media containing the software to be installed available.

      You can do this in one of the following ways:

      ○ Copy the required media folders directly to the installation hosts.
      ○ Mount the media on a central media server that can be accessed from the installation hosts.

      i Note

      Depending on your installation type, one or more instances can reside on the same host. You need to keep this in mind when you make the required installation media available on each installation host.

> For a central system, you need to make all required installation media available on the single installation host.

> ⚠ Caution
> - Mount the media locally. We do **not** recommend you to use Network File System (NFS), because reading from media mounted with NFS might fail.
> - If you copy the media to disk, make sure that the paths to the destination location of the copied media do not contain any blanks and commas.
> - If you perform a local installation and there is only one media drive available on your installation host, you must copy at least the Installation Master medium to the local file system.

3. If you want to perform target system installation in the context of a **heterogeneous system copy** you need a migration key. You can generate it at http://support.sap.com/migrationkey🔗.

Related Information

Downloading and Extracting the Software Provisioning Manager 1.0 Archive [page 76]

4.7.3 Downloading Installation Media

This section describes how you download installation media from the SAP Software Download Center.

Procedure

1. Download and unpack the latest version of Software Provisioning Manager as described in Downloading and Extracting the Software Provisioning Manager 1.0 Archive [page 76].
2. Create a download directory on the host on which you want to run the installer.
3. Identify **all** download objects that belong to one installation medium according to the following criteria:

> i Note
> Installation media might be split into several files. In this case, you have to reassemble the required files after the download.

- Download path or location:
  You can download installation media from the SAP Software Download Center using one of the following paths:
  - To download the kernel media, go to https://support.sap.com/sltoolset🔗 ▶ *System Provisioning* ▶ *Software Provisioning Manager 1.0 SP*`<Current Version>` ▶ *Download Kernel releases delivered for SL Toolset* ▶ *SL TOOLSET 1.0 (INSTALLATIONS AND UPGRADES)* ▶ *KERNEL FOR INSTALLATION/SWPM* ▶.

> ℹ **Note**
>
> For more information about which kernel version to use for your current OS version check the Product Availability Matrix at http://support.sap.com/pam👉.

- ○ To download all media required for your SAP product, you can use one of the following navigation paths:

  - ○ https://launchpad.support.sap.com/#/softwarecenter👉▷ *INSTALLATIONS & UPGRADES* ❯ *By Category* ❯ *SAP NETWEAVER AND COMPLEMENTARY PRODUCTS* ❯ `<Product>` ❯ `<Product Release>` ❯

  - ○ https://launchpad.support.sap.com/#/softwarecenter👉▷ *INSTALLATIONS & UPGRADES* ❯ *By Alphabetical Index (A-Z)* ❯ `<First Letter of Product>` ❯ `<Product>` ❯ `<Product Release>` ❯

- ○ Material number
  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
  >
  > ...
  > ```

- ○ Title
  All objects that are part of a medium have the same title, such as `<Solution><Media_Name><OS>` or `<Database>RDBMS<OS>` for RDBMS media.

4. Download the objects to the download directory.
5. To correctly recombine 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 were you unpack the Software Provisioning Manager archive.

Related Information

Downloading Installation Media [page 80]

5 Installation

5.1 Installation Checklist

This section includes the installation steps for the following:

- Central system
- Distributed system
- High-availability system
- Dialog instance

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

Central System

1. You check the prerequisites [page 91] and run the installer [page 95] on the central system host with option *Central System* to install the SAP system.

   > **i Note**
   >
   > By default the SAP system is installed with an ASCS instance. If you do not want to install the ASCS instance, do not run installation option *Central System*. Instead, you have to follow the instructions in Installing a Central or Distributed System Without the ASCS Instance [page 165].

   > **i Note**
   >
   > If you want to install an ASCS instance with integrated SAP Web Dispatcher [page 21], 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 continue with Post-Installation [page 124].

Distributed System

1. If you want to share the transport directory `trans` from another system, you have to mount [page 87] it from this system. Otherwise, we recommend that you share the `trans` directory that is created during the installation of the central instance (`/usr/sap/trans`).

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2. On the **ASCS instance host**, proceed as follows:
    1. You check the prerequisites [page 91] and run the installer [page 95] to install the ABAP central services instance (ASCS instance).

    > i Note
    >
    > If you do not want to install the ASCS instance, do not run installation option *ASCS Instance*. Instead, you have to follow the instructions in Installing a Central or Distributed System Without the ASCS Instance [page 165].

    > i Note
    >
    > If you want to install an ASCS instance with integrated SAP Web Dispatcher [page 21], 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 the global directories [page 88] to the database instance host, to the central instance host, and – if required – to the hosts where you want to install one or more dialog instances.
3. On the **database instance host**, proceed as follows:
    1. You mount the exported global directories [page 88] from the SAP global host (`<sapmnt>/<SAPSID>/exe`, `<sapmnt>/<SAPSID>/profile`, `<sapmnt>/<SAPSID>/global`) and SAP transport host (`/usr/sap/trans`).
    2. You check the prerequisites [page 91] and run the installer [page 95] to install the database instance.
    3. If you want to install Oracle Real Application Clusters (RAC), proceed as described in Installing Oracle Real Application Clusters [page 166].
    4. If you want to install the database instance on Oracle Automatic Storage Management (ASM), proceed as described in Installing Database Instance on Oracle Automatic Storage Management [page 173].
4. On the **central instance host**, proceed as follows:

    > i Note
    >
    > You can use the SAP transport host or the SAP global host as your central instance host.

    1. You mount the exported global directories [page 88] from the SAP global host (`<sapmnt>/<SAPSID>/exe`, `<sapmnt/><SAPSID>/profile`, `<sapmnt>/<SAPSID>/global`) and SAP transport host (`/usr/sap/trans`).
    2. You check the prerequisites [page 91] and run the installer [page 95] to install the central instance.
    3. If you have installed Oracle Real Application Clusters (RAC), you perform the additional steps required for the central instance as described in Installing Oracle Real Application Clusters [page 166].
5. If required, you install one or more dialog instances on the chosen hosts as described in subsection *Dialog Instance* of this section.
    1. You mount the exported global directories [page 88] from the SAP global host (`<sapmnt>/<SAPSID>/exe`, `<sapmnt>/<SAPSID>/profile`, `<sapmnt>/<SAPSID>/global`) and SAP transport host (`/usr/sap/trans`).

2. You check the prerequisites [page 91] and run the installer [page 95] to install the dialog instance.

3. If you have installed Oracle Real Application Clusters (RAC), perform the additional steps for the dialog instance as described in Installing Oracle Real Application Clusters [page 166].

6. You continue with Post-Installation [page 124].

Graphical Overview

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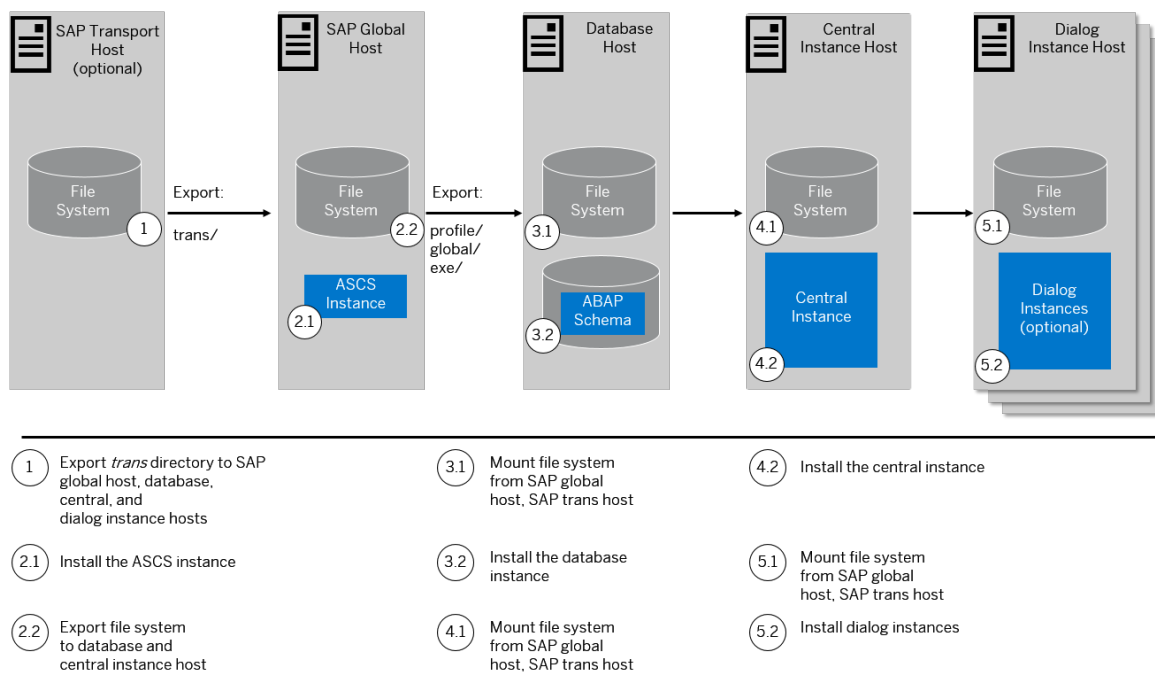
Distribution of Instances in an ABAP System

High-Availability System

This section describes how you install a high-availability (HA) system consisting of two nodes (**host A** and **host B**). For more information, consult your HA partner.

This procedure describes the steps that are required for a hardware cluster consisting of two nodes (host A and host B):

1. If you want to share the transport directory `trans` from another system, you have to mount [page 87] it from this system. Otherwise, we recommend that you share the `trans` directory that is created during the installation of the central instance (see below).

2. You set up the **switchover cluster infrastructure** as follows:

   1. You check the prerequisites [page 91] and run the installer [page 95] to install the ABAP central services instance (ASCS instance) using the virtual host name [page 74] on the primary cluster node, **host A**.

   > **i Note**
   >
   > If you want to install an ASCS instance with integrated SAP Web Dispatcher [page 21], 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 88] in `<sapmnt>/<SAPSID>` to the database host and to the central instance host.
3. You prepare the standby cluster node, **host B**, and make sure that it has all the necessary file systems [page 70], mount points, and (if required) Network File System (NFS).
4. You set up the user environment on the standby node, host B as follows:
   1. You use the same user and group IDs as on the primary node.
   2. You create the home directories of users and copy all files from the home directory of the primary node.

   For more information about the required operating system users and groups, see Creating Operating System Users [page 57].
5. You configure the switchover software and test that switchover functions correctly to **all** standby nodes in the cluster.
6. You repeat the following steps until you have finished installing the enqueue replication server (ERS instance) on **all** nodes in the cluster:
   1. You perform the switchover to a node where you want to install the enqueue replication server instance (ERS instance) for the ABAP central services instance (ASCS instance).
   2. You check the prerequisites [page 91] and run the installer [page 95] to install the enqueue replication server instance (ERS instance) for the ABAP central services instance (ASCS instance).

3. On the **database instance host**, proceed as follows:

> → Recommendation
>
> We recommend that the database instance is part of the hardware cluster or of any other proprietary high-availability solution for the database.

   1. You prepare the database instance host and make sure that it has all the necessary file systems [page 70], mount points, and (if required) Network File System (NFS).
   2. You check the prerequisites [page 91] and run the installer [page 95] to install the database instance.
4. If you want to install Oracle Real Application Clusters (RAC), proceed as described in Installing Oracle Real Application Clusters [page 166].
5. On the **central instance host**, proceed as follows:

> **i** Note
>
> In a high-availability installation, the central instance does **not** need to be part of the cluster because it is no longer a single point of failure (SPOF). The SPOF is now in the ABAP central services instance (ASCS instance), which is protected by the cluster.

   1. You prepare the central instance host and make sure that it has all the necessary file systems [page 70], mount points, and (if required) Network File System (NFS).
   2. You check the prerequisites [page 91] and run the installer [page 95] to install the central instance.
   3. If you want to install Oracle Real Application Clusters (RAC), perform the additional steps required for the central instance as described in Installing Oracle Real Application Clusters [page 166] .

4. If you want to use the shared transport directory `trans` from another system, you also mount [page 87] this directory (see above).

6. We recommend that you install dialog instances with the installer to create redundancy. The application server instances are not a SPOF. Therefore, do **not** include these instances in the cluster.

   1. You mount the global directories [page 88] in `<sapmnt>/<SAPSID>`.
   2. You check the prerequisites [page 91] and run the installer [page 95] to install the dialog instance.
   3. If you want to install Oracle Real Application Clusters (RAC), perform the additional steps required for the dialog instance as described in Installing Oracle Real Application Clusters [page 166].
   4. If you want to use the shared transport directory `trans` from another system, you also mount [page 87] this directory (see above).

7. You continue with Post-Installation [page 124].

Graphical Overview

The following figure provides an overview of how you install the various instances in a high-availability installation:
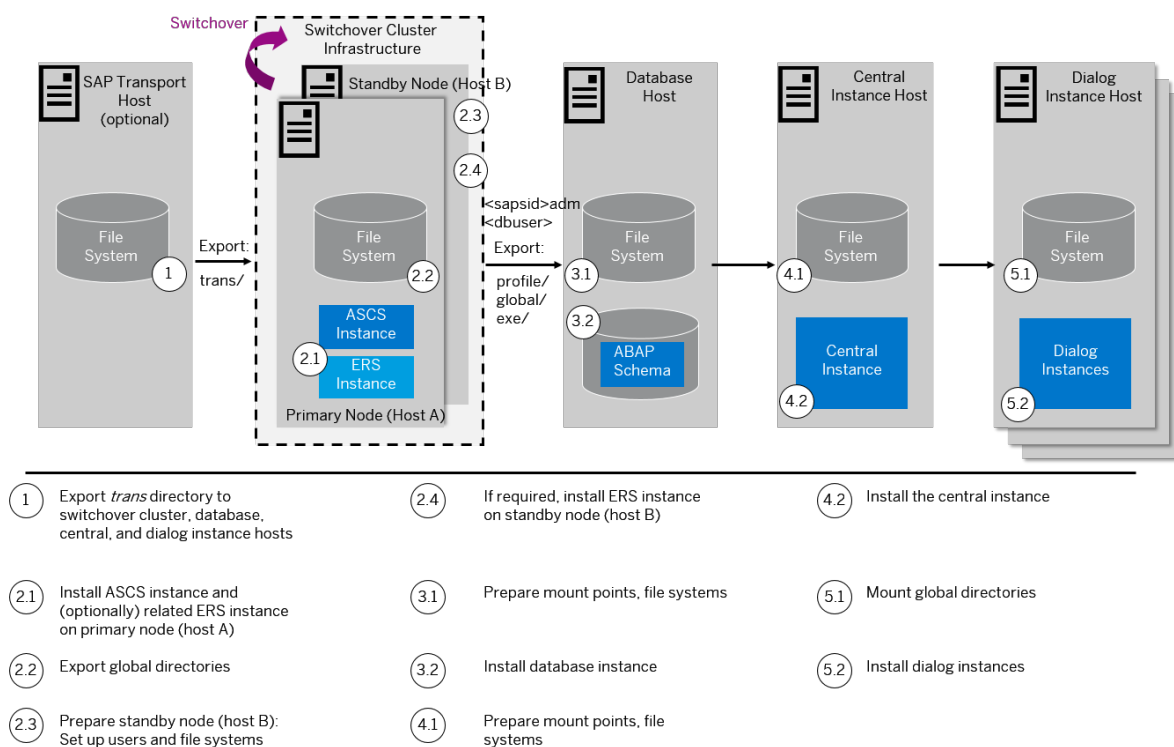
Distribution of Instances in a High-Availability ABAP System

Dialog Instance

You perform the following steps on the host where you install the dialog instance.

1. You make sure that the global directories of the SAP system for which you want to install the dialog instance are mounted [page 88] on the host where you want to install the dialog instance.
2. You check the prerequisites [page 91] and run the installer [page 95] to install the dialog instance.
3. If you want to install Oracle Real Application Clusters (RAC), perform the additional steps required for the dialog instance as described in Installing Oracle Real Application Clusters [page 166] .

4. You continue with .

5.2 Exporting and Mounting the Transport Directory

Make sure that the transport directory exists, that it is exported on the transport directory host, and that it is mounted on each SAP instance installation host.

Context

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. 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 http://help.sap.com/nw70 ➜ *SAP NetWeaver 7.0* `<including Enhancement_Package>` ➜ *Application Help* ➜ *Function-Oriented View: English* ➜ *Solution Life Cycle Management by Key Capability* ➜ *Software Life-Cycle Management* ➜ *Software Logistics* ➜ *Change and Transport System* ➜ *Change and Transport System - Overview (BC-CTS)* ➜ *Basics of the Change and Transport System* ➜ *Transport Management System - Concept* .

- If this 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 this transport directory does not exist, proceed as follows:
  - Create the transport directory (either on the central instance host 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.

1. Log on as user `root` to the central or dialog instance host where `/usr/sap/trans` is to be mounted.
2. Create the mount point `/usr/sap/trans`.
3. 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 SAP system distributed over several hosts, you have to nominate one host as the SAP global host. This is the host on which the global directories are to reside.You have to make sure that the global directories are also available on the hosts on which you intend to install the remaining instances of the SAP system. You do this by exporting the global directories on the SAP global host and mounting them on the installation hosts of the remaining SAP system instances to be installed.

Context

> **Example**
>
> You install an SAP system distributed over several hosts. You decide that the host with theABAP central services instance (ASCS instance) is the SAP global host. You then install the ASCS instance with the physical global directories on the SAP global host. Before you install the remaining instances (central instance, a database instance, dialog instances), you have to export the global directories from the SAP global host and mount them on the installation hosts for the remaining instances.

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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**

  With a homogeneous installation, all SAP system instances are installed on hosts with the **same** UNIX operating system.

  Proceed as follows:

  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 on which you want to install the new instance:

    `<sapmnt>/<SAPSID>/exe`

    `<sapmnt>/<SAPSID>/profile`

    `<sapmnt>/<SAPSID>/global`

    > ⚠ Caution
    >
    > Make sure that the global transport directory is mounted on every host where you want to install an SAP system instance. For more information, see Exporting and Mounting the Transport Directory [page 87]. Otherwise, the installation of this SAP system instance fails.

  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.

- **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 182].

  > 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>/profile`

`<sapmnt>/<SAPSID>/global`

> ⚠ Caution
>
> Do **not** export **`<sapmnt>/<SAPSID>/exe`**.

> ⚠ Caution
>
> Make sure that the global transport directory is mounted on every host where you want to install an SAP instance. For more information, see Exporting and Mounting the Transport Directory [page 87]. Otherwise, the installation fails.

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>/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.

> ⚠ Caution
>
> Do **not** mount **`<sapmnt>/<SAPSID>/exe`** and do not create it locally. It is created automatically during the installation.

Related Information

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Installation

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 39].

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 140].

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 140].

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 95] . 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 100].

- 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 .
  The installer uses `csh` scripts to obtain the environment for user `<sapsid>adm`. This is also true if user `<sapsid>adm` already exists from an earlier SAP system installation, and the shell of this user is not `csh`. Before you start the installer, execute the following command as user `<sapsid>adm` to make sure that the `csh` scripts are up-to-date:

  `/bin/csh -c "source /home/<sapsid>adm/.cshrc;env"`

- Make sure that you have specified the most important SAP system parameters as described in Basic SAP System Installation Parameters [page 40] **before** you start the installation.
- Check that your installation hosts meet the requirements for the installation options that you want to install. For more information, see Running the Prerequisite Checker [page 28].
- If you want to install a dialog instance into an existing system, make sure that you have exported and mounted global directories [page 88].
- If you are installing a second or subsequent SAP system into an existing database (MCOD), make sure that the database is **up and running before** starting the installation.
  Check that the SYSTEM tablespace contains at least 400 MB of free space. If there is not enough space left, increase the size of this tablespace with BRSPACE or BRTOOLS.
  For more information, see Installation of Multiple Components in One Database [page 156].
- Check the value of the environment variable `TEMP`, `TMP`, or `TMPDIR`:

Shell Used	Command

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

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

  ○ 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 variable `TEMP`, `TMP`, or `TMPDIR` points – for example, by using a `crontab` entry.
  ○ 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 .

  ○ Make sure that the temporary directory has the permissions `755`.

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

● 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

- If you want to install a dialog instance to 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. Make sure that you 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_DVEBMGS20_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 SAP Note 2230669 ➦ which describes an improved procedure using `inifile.params`.

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5.6 Running the Installer

This section describes how to run the installation tool Software Provisioning Manager (the "installer" for short).

Prerequisites

For more information, see Prerequisites for Running the Installer [page 91].

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 100].

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 have to confirm that the user is a trusted one. For more information, see SAP Note 1745524 .

2. Make the installation media available.

   For more information, see Preparing the Installation Media [page 75].

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

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

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 want to use a virtual host name, start the installer with the installer property
   > SAPINST_USE_HOSTNAME as follows:
   >
   > **./sapinst SAPINST_USE_HOSTNAME=<Virtual_Host_Name>**
   >
   > For more information, see Using Virtual Host Names [page 74].

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

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 100].
   > 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 91]) 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:

   ○ Install an SAP system

     ○ To install an SAP system based on SAP NetWeaver AS ABAP **from scratch**, choose ▶ `<Product>` ▶ *SAP Application Server ABAP* ▶ `<Database>` ▶ `<System Variant>` ▶.

     ○ To install an SAP system based on SAP NetWeaver AS ABAP **as target system of a system copy**, choose ▶ `<Product>` ▶ *Software Life-Cycle Options* ▶ *System Copy* ▶ `<Database>` ▶ *Target System Installation* ▶ `<System Variant>` ▶ *Based on AS ABAP* ▶.

   ○ Perform other tasks or install additional components

     Go to ▶ `<Product>` ▶ *Software Life-Cycle Options* ▶ and choose 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 input screens 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.

> **i Note**
>
> If you want to install an ASCS instance with integrated SAP Web Dispatcher [page 21], 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.

> **⚠ Caution**
>
> The signature of media is checked **automatically** during the *Define Parameters* phase while processing the *Media Browser* screens.
>
> Keep in mind that this automatic check is only committed once and **not** repeated if you modify artefacts such as SAR archives or files on the media **after** the initial check has been done. This means that - if you modify artefacts later on either during the remaining *Define Parameters* phase or later on during the *Execute Service* phase - the signature is not checked again.
>
> See also the description of this new security feature in SAP Note 2393060 .

8. After you have entered all requested input parameters, the installer displays the *Parameter Summary* screen. This screen shows both the parameters that you entered and those that the installer set by default. If required, you can revise the parameters before starting the installation.

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

   The installer starts the installation and displays the progress of the installation.

   When the installation option has finished successfully, the installer displays the message *Execution of* `<Option Name>` *has completed*.

> **i Note**
>
> o During the installation of the Oracle database instance, the installer stops the installation and prompts you to install the Oracle database software [page 108].
>   This action is not required if you install a system into an existing database (MCOD).
>   After you have finished the installation of the Oracle database, you continue the database instance installation by choosing *OK* in the GUI of the database instance installation.
> o Check SAP Note 828268 for technical information about Oracle Release 10 in SAP environments.
> o Check SAP Note 1431800 for technical information about Oracle Release 11 in SAP environments.
> o Check SAP Note 1914631 for technical information about Oracle Release 12 in SAP environments.
> o If you want to install Oracle Real Application Clusters (RAC), proceed as described in Installing Oracle Real Application Clusters [page 166] after the Software Provisioning Manager has completed the installation of the database instance.
> o If you want to install the database instance on Oracle Automatic Storage Management (ASM), proceed as described in Installing Database Instance on Oracle Automatic Storage Management [page 173] after the Software Provisioning Manager has completed the installation of the database instance.

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> ⚠ 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 41] . You have to 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.

10. If required, install a dialog instance for a central system or distributed system.
11. If required, delete directories with the name `sapinst_exe.xxxxxx.xxxx` after the installer has finished. Sometimes these 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. Save the copy to a physically separate medium, such as a medium or a USB drive that is 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.

12. If you copied installation media to your hard disk, you can delete these files when the installation has successfully completed.
13. 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.

14. 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/`

15. 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 100].

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 1.0 SP24 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 91].
  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 a temporary directory called `sapinst_exe.xxxxxx.xxxx`, which is located in the environment variables `TEMP`, `TMP`, or `TMPDIR`. These files are deleted after the installer has stopped running.
  The temporary directory `sapinst_exe.xxxxxx.xxxx` sometimes remains undeleted. You can safely delete it.
  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 command line parameter **-p**:
  ./sapinst -p.
- If you want to perform the installation in unattended mode, see SAP Note 2230669🔗 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 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.

Option	Definition
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 95] .
2. Make sure that the installation media are still available.

   For more information, see Preparing the Installation Media [page 75].

   > **→ Recommendation**
   >
   > Make the installation media 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 media 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. 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`

4. 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 100].
> 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 91]) 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. 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.

6. On the *What do you want to do?* screen, decide between the following alternatives and continue with *Next*:

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.

5.7.3 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.

5.7.4 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 100].

      ○ 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 102].
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🔗.

5.7.5 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 91].

Procedure

1. Start the installer from the command line as described in Running the Installer [page 95] 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.

5.8 Oracle Database Software Installation

Continue with the section relevant for the release of the Oracle database that you want to install.

    Software Provisioning Manager stops during the installation of the database instance and prompts you to install the Oracle 19 database software.

    Software Provisioning Manager stops during the installation of the database instance and prompts you to install the Oracle 18 database software.

    Proceed as follows to install the Oracle 12 database software.

    Proceed as follows to install the Oracle 11 database software.

5.8.1 Oracle 19 Database Software Installation

Software Provisioning Manager stops during the installation of the database instance and prompts you to install the Oracle 19 database software.

5.8.1.1 Installing the Oracle Database Software

Proceed as follows to install the Oracle database software.

Prerequisites

A graphical user interface (GUI), for example `X11`, is required for the Oracle database software installation with `runInstaller`. For more information, see the documentation of your operating system.

In order to extract the Oracle home image file and later Oracle SAP Bundle Patches (SBPs), the utility "unzip" must be installed on the system. This utility is a prerequisite for the installation of Oracle Database 19c.

Unzip utility version 6.00 or later is required. For more information, see SAP Note 2599248 .

Context

The file format and the installation procedure has been changed for Oracle 19c.

For more information about how to install Oracle Database 19c software, see SAP Note 2660017 .

Procedure

1. Log on as the Oracle database software owner `oracle`.
2. Make sure that the `DISPLAY` (for dialog mode) is set in the environment.
3. Set environment (Bourne Shell) export `DB_SID=<DBSID>`.
4. Start the OUI with the Oracle database software owner user `oracle` as follows:

   `<Media>/<OS>/db_home/SAP/RUNINSTALLER`

   For more information on further options, see SAP Note 2660017.
5. To exit the OUI, choose *Close* and confirm the dialog box that appears.

   In the event of error during the software installation, see the troubleshooting information in SAP Note 1915299.

5.8.1.2 Installing the Current SAP Bundle Patch

After the installation of the Oracle Database software, you need to install the current (that is, the latest) SAP bundle patch (SBP) into the new Oracle home.

Prerequisites

1. Changing the Oracle Home
   - With MOPatch, you install the SAP Bundle Patch (SBP) into the Oracle Home. This updates the Oracle home software to the new SAP Bundle Patch (SBP).
   - You must perform this step before you create or upgrade the database.
2. Changing the Database
   - The database must be adapted to the new SBP by performing certain SBP post-installation tasks (`catsbp`) and by adapting database parameters.
     If you install a new SAP database, we recommend that you perform the SBP post-installation tasks before loading the SAP database. To stop the Software Provisioning Manager after the *Database Creation* phase, mark the checkbox *Stop after step 'createDB' for patch update* on the *Oracle Database* screen. If this is not possible, you must perform these tasks right after the installation of the new system has completed.
   - The step must be done after the database has been upgraded. For detailed instructions see the `SBP README` file.

Check the following SAP Notes to find a cross-reference to the current SAP Note with the list of required patches to be installed.

SAP Notes

Number	Titel
2799920	Patches for 19c: Database

Number	Titel
2799930	Patches for 19c: Grid Infrastructure
2799940	Patches for 19c: Exadata / SuperCluster
2799969	Patches for 19c: Oracle Database Appliance
2799970	Patches for 19c: Oracle Exadata Cloud Service

You must install the SBP using the Oracle tool MOPatch. The Database Upgrade without SBP is not supported.

Procedure

1. Download the required patches.
2. Log on as the Oracle database software owner, that is the `oracle` user.
3. Install the SBP into the new Oracle home according to the instructions in the SBP README file.

5.8.2 Oracle 18 Database Software Installation

Software Provisioning Manager stops during the installation of the database instance and prompts you to install the Oracle 18 database software.

1. Installing the Oracle 18 Database Software [page 110]
   Proceed as follows to install the Oracle 18c database software.
2. Installing the Current SAP Bundle Patch [page 111]
   After the installation of the Oracle Database software, you need to install the current (that is, the latest) SAP bundle patch (SBP) into the new Oracle home.

5.8.2.1 Installing the Oracle 18 Database Software

Proceed as follows to install the Oracle 18c database software.

Prerequisites

A graphical user interface (GUI), for example `X11`, is required for the Oracle database software installation with `runInstaller`. For more information, see the documentation of your operating system.

In order to extract the Oracle home image file and later Oracle SAP Bundle Patches (SBPs), the utility "unzip" must be installed on the system. This utility is a prerequisite for the installation of Oracle Database 18c.

Unzip utility version 6.00 or later is required. For more information, see SAP Note 2599248 .

Context

The file format and the installation procedure has been changed for Oracle 18c.

For more information about how to install Oracle Database 18 software, see SAP Note 2660017 .

Procedure

1. Log on as the Oracle database software owner `oracle`.
2. Make sure that the `DISPLAY` (for dialog mode) is set in the environment.
3. Set environment (Bourne Shell) export `DB_SID=<DBSID>`.
4. Start the OUI with the Oracle database software owner, user `oracle`, as follows:

   `<Media>/<OS>/db_home/SAP/RUNINSTALLER`

   For more information on further options, see SAP Note 2660017 .
5. To exit the OUI, choose *Close* and confirm the dialog box that appears.
   In the event of error during the software installation, see the troubleshooting information in SAP Note 1915299 .

Task overview:

Next task:

5.8.2.2 Installing the Current SAP Bundle Patch

After the installation of the Oracle Database software, you need to install the current (that is, the latest) SAP bundle patch (SBP) into the new Oracle home.

Prerequisites

1. Changing the Oracle Home
   - With MOPatch, you install the SAP Bundle Patch (SBP) into the Oracle Home. This updates the Oracle home software to the new SAP Bundle Patch (SBP).
   - You must perform this step before (!) you create or upgrade the database.
2. Changing the Database

o   The database must be adapted to the new SBP by performing certain SBP post-installation tasks (`catsbp`) and by adapting database parameters.
    If you install a new SAP database, we recommend that you perform the SBP post-installation tasks before loading the SAP database. To stop the Software Provisioning Manager after the *Database Creation* phase, mark the checkbox *Stop after step 'createDB' for patch update* on the *Oracle Database* screen. If this is not possible, you must perform these tasks right after the installation of the new system has completed.

o   The step must be done after the database has been upgraded. For detailed instructions see the `SBP README` file.

Check the following SAP Notes to find a cross-reference to the current SAP Note with the list of required patches to be installed.

SAP Notes

Number	Titel
2660044	Patches for 18c: Database
2660046	Patches for 18c: Grid Infrastructure
2660052	Patches for 18c: Exadata / SuperCluster
2660053	Patches for 18c: Oracle Database Appliance
2660062	Patches for 18c: Oracle Exadata Cloud Service

You must install the SBP using the Oracle tool MOPatch. The Database Upgrade is without SBP not supported.

Procedure

1.   Download the required patches.
2.   Log on as the Oracle database software owner, that is the `oracle` user.
3.   Install the SBP into the new Oracle home according to the instructions in the SBP README file.

Task overview: Oracle 18 Database Software Installation [page 110]

Previous task: Installing the Oracle 18 Database Software [page 110]

5.8.3 Oracle 12 Database Software Installation

Proceed as follows to install the Oracle 12 database software.

The installer prompts you to install the Oracle 12 database software.

1.   Updating the RUNINSTALLER Scripts [page 113]
     You need to update the installation scripts before you start the installation as such.

2. Installing the New Oracle Database 12c Software [page 114]

    Proceed as follows to install the Oracle 12c database software.

3. Installing the Current SAP Bundle Patch [page 117]

    After the installation of the Oracle Database software, you need to install the current (that is, the latest) SAP bundle patch (SBP) into the new Oracle home.

5.8.3.1 Updating the RUNINSTALLER Scripts

You need to update the installation scripts before you start the installation as such.

Context

The SAP-specific installation scripts `RUNINSTALLER` and `12cinstall.sh` are located in directory `SAP` in the Oracle database software stage (that is, `/oracle/stage/122/database/SAP`).

You need to check the patch level of the `RUNINSTALLER` and check in SAP Note 1915301 whether a higher version is available. If a higher version is available, we recommend that you update the Oracle installation scripts, which are attached to SAP Note 1915301 . From there you can download the relevant package for your release. After you have extracted the Oracle software to the staging area, you need to update the installation scripts.

Procedure

1. Check the current version of `RUNINSTALLER` as the database software owner, that is the `oracle` user.

    If you install Oracle 1.22, execute the following commands:

    cd /oracle/stage/122/database/SAP

    ./RUNINSTALLER -version

    If you install Oracle 1.21, execute the following commands:

    cd /oracle/stage/121/database/SAP

    ./RUNINSTALLER -version

2. If a higher patch level is available, download the newer version in SAP Note 1915301 , following the instructions there.

Task overview: Oracle 12 Database Software Installation [page 112]

Next task: Installing the New Oracle Database 12c Software [page 114]

5.8.3.2 Installing the New Oracle Database 12c Software

Proceed as follows to install the Oracle 12c database software.

Prerequisites

A graphical user interface (GUI), for example `X11`, is required for the Oracle database software installation with `runInstaller`. For more information, see the documentation of your operating system.

Context

For more information about the current patch set, see SAP Note 1915313 .

For more information about how to install Oracle Database 12c software, see SAP Note 1915301 .

During the software installation of Oracle 12c use the new recommended `ORACLE_BASE/oracle/<DBSID>`.

Procedure

1. Log on as the Oracle database software owner, that is the `oracle` user.
2. Change to the `stage` directory:

   If you install Oracle 1.22, execute the following commands:

   `cd /oracle/stage/12202/database/SAP`

   If you install Oracle 1.21, execute the following commands:

   `cd /oracle/stage/12102/database/SAP`

3. Make sure that `umask` is set to 022 by entering the following command:

   `umask 022`

4. Make sure that the `DISPLAY` (for dialog mode) is set in the environment.
5. Start the OUI with the Oracle database software owner, user `oracle`, as follows:

   `./RUNINSTALLER`

   For silent operation, enter this command:

   `./RUNINSTALLER -oracle_base /oracle/<DBSID> -silent -nocheck`

   For more information on further options, see SAP Note 1915301 .

6. Respond to the OUI as follows:

Prompt or Condition	Action
Configure Security Updates	Do **not** select the checkbox.
	The run Installer issues a warning.
	Choose *Next* and then *Yes*.
Installation Option	Confirm the pre-selected default *Install database software only* by choosing *Next*.
Database Installation Options	Confirm the default selection *Single Instance database installation* and then choose *Next*.
Database Edition	Confirm the default option *Enterprise Edition* and then choose *Next*.
Installation Location	This screen displays the value of ORACLE_HOME that should be:
	`/oracle/<DBSID>/<Release>`, and
	ORACLE_BASE that should be:
	`/oracle/<DBSID>`
	For more information on setting ORACLE_BASE for your configuration, see SAP Note 1521371 .
	Choose *Next*.
	If you see the following error message from the OUI, you can safely ignore it and continue with the installation:
	`[INS-32008] Oracle base location can't be same as user home directory`
Operating System Groups	This screen displays the operating system groups:
	○ `OSDBA:dba`
	○ `OSOPER:oper`
	○ `OSBACKUPDBA:oper`
	○ `OSDGDBA:dba`
	○ `OSKMDBA:dba`
	○ `OSRACDBA:dba`
	Leave the default and continue with *Next*.

Prompt or Condition	Action
Prerequisite Checks	This screen checks if all the required system prerequisites for installation of the database software have been met. If some of the checks are displayed as *Failed*, you can fix these problems by choosing *Fix & Check Again*. → Recommendation We strongly recommend you to make sure that there are no failed checks before starting the software installation. If not all prerequisites are met and you decide to ignore the warnings about failed checks, you later see the OUI warning `[INS-13016]`.
Summary	Review the information displayed on this screen and choose *Install* to start the installation.
Install Product	Here you can now monitor the installation progress.
Install Product Finish	Here you can now monitor the installation progress. Finish at the end of the software installation execute the Root Scripts as indicated as the root user from another session. If `root.sh` prompts you that a file (`dbhome`, `oraenv`, `coraenv`) already exists, allow `root.sh` to overwrite it so that the new version is copied.If this is the first Oracle product you have installed on this host, also run the oraInstroot.sh script from the central inventory as follows: **`$Oracle_Home/oraInventory/oraInstRoot.sh`**Example If you are using sudo to change to a root user, you run the following command:**`/usr/local/bin/sudo $ORACLE_HOME/oraInventory/`**
Finish	On the *Finish* screen you should see `The installation of Oracle Database was successful.` Click *Close* to exit from OUI.

7. To exit the OUI, choose *Close* and confirm the dialog box that appears.

   In the event of error during the software installation, see the troubleshooting information in SAP Note 1915299 .

Results

The Oracle Database 12c software is now installed. The installation location is referred to – for example, in SAP Notes – as Installation Oracle Home `<IHRDBMS>`. Also the link 122 -> 12201 under `/oracle/<DBSID>` is created.

⁂ Example

`/oracle/<DBSID>/12201`

You now have to .

5.8.3.3   Installing the Current SAP Bundle Patch

After the installation of the Oracle Database software, you need to install the current (that is, the latest) SAP bundle patch (SBP) into the new Oracle home.

Prerequisites

Check SAP Note 2470660 to find a cross-reference to the current SAP Note with the list of required patches to be installed. You must install the SBP using the Oracle tool MOPatch. For more information about MOPatch, see SAP Note 1027012 .

Context

The SBP also delivers a set of upgrade scripts that later automate most of the pre-upgrade and post-upgrade tasks.

Only valid for 'Platform': AIX

> ⚠ Caution
>
> **AIX only:** Make sure that you install the latest SAP Bundle Patch (SBP) immediately after the Oracle software installation. For more information, see SAP Note 1915316 . Otherwise you might have problems during the *Create Database* phase of the database instance installation.

End of 'Platform': AIX

Procedure

1. Download the required patches.
2. Log on as the Oracle database software owner, that is the `oracle` user.
3. Install the SBP into the new Oracle home according to the instructions in the SBP README file.

> **i Note**
>
> The installation of the SBP consists of these steps:
>
> 1. The installation of the SBP software into the Oracle home.
>   This step must be completed before the database is upgraded.
> 2. The change of the database structure and database properties (dictionary, parameter, and properties)
>   This step must be done immediately after the database has been upgraded. For more information, see *Performing SAP Bundle Patch Post-Installation Steps*.

Task overview: Oracle 12 Database Software Installation [page 112]

Previous task: Installing the New Oracle Database 12c Software [page 114]

5.8.4 Oracle 11 Database Software Installation

Proceed as follows to install the Oracle 11 database software.

Context

The installer prompts you to install the Oracle 11 database software.

Procedure

1. You update the Oracle installation scripts [page 119].
2. Only valid for 'Platform': AIX
   AIX only: You perform steps for the AIX operating system [page 119]
   End of 'Platform': AIX
3. You run the Oracle Universal Installer [page 120].
4. You install the required SAP bundle patch [page 123].

5.8.4.1 Updating the RUNINSTALLER Scripts

You need to update the installation scripts before you start the installation as such.

Prerequisites

The SAP-specific installation scripts `RUNINSTALLER`, `RUNINSTALLER_CHECK`, and `11ginstall.sh` are located in directory `SAP` in the Oracle database software stage.

Context

If a newer version is available, we recommend that you update the Oracle Installation scripts, which are attached to SAP Note 1524205 . From there you can download the relevant package for your release. After you have extracted the Oracle software to the staging area, you need to update the installation scripts.

Procedure

1. Check SAP Note 1524205 to see if there is a more recent version of the installation scripts than on the installation medium.
2. If required, download the new version attached to the SAP Note, following the instructions there.

5.8.4.2 Performing Pre-Installation Steps for the AIX Operating System

This topic is only valid for 'Platform': AIX

To install the Oracle database software on the AIX operating system, you need to run the `rootpre.sh` script to adapt the AIX kernel and also execute a command as the `root` user.

Prerequisites

- If several Oracle instances run on one computer, you must shut these down **before** adapting the kernel.
- Make sure that the `ORACLE_HOME` and `ORACLE_SID` environment variables are set.

Procedure

Run the `rootpre.sh` script as follows:

1. Log on to the system with user `ora<dbsid>` if you are not already logged on.
2. Change to the directory `/oracle/stage/112_64/database` using the following command:

   `cd /oracle/stage/112_64/database`
3. Make sure that the user `root` is assigned the environment of `ora<dbsid>`:

   `su root`
4. Call the script `rootpre.sh`:

   `./rootpre.sh`
5. Log off with the user `root`:

   `exit`

End of 'Platform': AIX

5.8.4.3   Installing the Oracle Database Software

Proceed as follows to install the Oracle 11g database software.

Prerequisites

A graphical user interface (GUI), for example `X11`, is required for the Oracle database software installation with `runInstaller`. For more information, see the documentation of your operating system.

Context

Starting with the first patch set for Oracle Database 11g Release 2 (11.2.0.2), Oracle Database patch sets are full installations of the Oracle database software. You only need to install the current Oracle database patch set. For more information about the current patch set, see SAP Note 1431799 .

For more information about how to install Oracle database 11.2 software, see SAP Note 1524205 . Troubleshooting the installation is described in SAP Note 1431796 .

> ⚠ Caution
>
> Before starting to install the Oracle software, make sure that you have updated the installation scripts as described in Updating the RUNINSTALLER Scripts [page 119].

Procedure

1. Log on as the Oracle database software owner `<ora_sw_owner>`.

   If you are already logged on as user `root`, you can switch to the Oracle database software owner, user `<ora_sw_owner>`, by entering the following command:

   `su - <ora_sw_owner>`

2. Change to the `stage` directory:

   `cd /oracle/stage/112_64/database/SAP`

3. Make sure that `umask` is set to 022 by entering the following command:

   `umask 022`

4. Make sure that the `DISPLAY` environment variable is set to **`<Host_Name>:0.0`**, where `<Host_Name>` is the host on which you want to display the GUI of the Oracle Universal Installer (OUI).

Shell Used	Command
Bourne shell (sh)	**`DISPLAY=<host_name>:0.0`** **`export DISPLAY`**
C shell (csh)	**`setenv DISPLAY <host_name>:0.0`**
Korn shell (ksh)	**`export DISPLAY=<host_name>:0.0`**

5. Start the OUI with the Oracle database software owner, user `<ora_sw_owner>`, as follows:

   `./RUNINSTALLER`

   For silent operation, enter this command:

   `./RUNINSTALLER -silent`

   For more information on further options, see SAP Note 1524205 .

6. Respond to the OUI as follows:

Prompt or Condition	Action
Configure Security Updates	Do **not** select the checkbox. The runInstaller issues a warning. Choose *OK* and then *Next*.
Select Installation Option	Confirm the default selections by choosing *Next*.
Grid Installation Options	Confirm the default selection *Single Instance Installation* and then choose *Next*.
Select Product Language	Confirm the default option *English* and then choose *Next*.

Prompt or Condition	Action
Select Database Edition	Confirm the default option *Enterprise Edition* and then choose *Next*.
Specify Installation Location	This screen displays the value for `ORACLE_BASE` which is set in the environment. It also displays the value for `ORACLE_HOME`, which should be `/oracle/DBSID/ <release>`. See **SAP Note** 1521371 to set `ORACLE_BASE` for your configuration. Select this option and then *Next*.
Privileged OS Groups	This screen displays the operating system groups for the DBA and the operator. Normally, these are `dba` and `oper`.
Perform Prerequisite Checks	This screen checks if all the required system prerequisites for installation of the database software have been met. If some of the checks are displayed as *Failed*, you can fix these problems (either by installing the missing patches or configuring the kernel parameters) and run the check again by choosing *Check Again*. → Recommendation We strongly recommend you to make sure that there are no failed checks before starting the software installation.
Summary	Review the information displayed on this screen and choose *Finish*.
Finish	Finish the software installation by executing the `root.sh` script as the `root` user from another session.

7. To exit the OUI, choose *Exit* and confirm the dialog box that appears.

Results

The patch set software is now installed in the installation Oracle home. This is referred to – for example, in SAP Notes – as `<IHRDBMS>`.

❖ Example

```
/oracle<DBSID>/11204
```

You now have to install the required SAP bundle patch [page 109].

5.8.4.4   Installing the Required SAP Bundle Patch

After the Oracle database software installation, you need to install the required SAP bundle patch.

Prerequisites

Check SAP Note 1431800 to find a cross-reference to the current SAP Note with the list of required patches to be installed.

Context

You must install the SAP bundle patch using the Oracle tool MOPatch, which you can find at SAP Note 1027012.

You only need to install the **latest** SAP bundle patch because these patches are cumulative.

The SAP bundle patch also delivers a set of upgrade scripts that automate most of the pre-upgrade and post-upgrade tasks. For more information, see SAP Note 1431793.

Procedure

1. Log on at the operating system level as the Oracle database software owner, user `<ora_sw_owner>`.
2. Install the SAP bundle patch according to the instructions in the SAP bundle patch `README` file.

6 Post-Installation

6.1 Post-Installation Checklist

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

- Central, distributed, or high-availability system
- Dialog instance

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

Central, Distributed, or High-Availability System

> **i Note**
>
> In a central system, all mandatory instances are installed on one host. Therefore, if you are installing a central system, you can ignore references to other hosts.

You have to complete the following post-installation steps, which are described in more detail in the linked chapters:

1. If required, you perform a full installation backup [page 147] immediately after the installation has finished.
2. 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 57].
3. You check whether you can log on to the Application Server ABAP [page 125].
4. You install the SAP license [page 127].
5. If you installed a high-availability system, you set up the licenses for high availability [page 127].
6. You configure the remote connection to SAP support [page 129].
7. You enable the Note Assistant to apply note corrections [page 129].
8. You configure the documentation provided on the SAP Help Portal [page 129].
9. You perform the consistency check [page 131].
10. You configure the Transport Management System [page 132].
11. For production systems it is highly recommended that you connect the system to SAP Solution Manager [page 133].
12. You apply the latest kernel and Support Package stacks [page 135].
13. You perform post-installation steps for the application server ABAP [page 136].
14. If required, you install additional languages and perform language transport [page 138].
15. You configure the user management [page 140].
16. You ensure user security [page 140].
17. You perform the client copy [page 144].

18. On the database instance host, you perform the Oracle-specific post-installation steps [page 145].
19. If you have chosen to enable Oracle Database Vault, make sure that you perform the required configuration steps. For more information, see Implementing Oracle Database Vault with Software Provisioning Manager 1.0 [page 169].
20. You perform a full backup of the installation [page 147].
21. You check the Master Guide for your SAP Business Suite application or SAP NetWeaver application (chapter *Configuration of Systems and Follow-Up Activities*) for further implementation and configuration steps, such as language installation, monitoring, work processes, transports, SAP license, printers, system logs, and connectivity to system landscape directory (SLD).

Dialog Instance

You have to complete the following post-installation steps, which are described in more detail in the linked chapters:

1. If required, you perform an installation backup [page 147] immediately after the installation has finished.
2. 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 57].
3. You check whether you can log on to the Application Server ABAP [page 125].
4. You configure the documentation provided on the SAP Help Portal [page 129].
5. If you installed a dialog instance in a heterogeneous UNIX environment, that is on a host with a UNIX operating system different from the UNIX operating system of the central instance, you have to update the kernel of the dialog instance [page 139].
6. You ensure user security [page 140].
7. You perform an installation backup [page 147] for the dialog instance.
8. If you chose to install an integrated SAP Web Dispatcher instance within the ASCS instance, you log on to the SAP Web Dispatcher Management Console [page 149]
9. If you chose to install an integrated SAP Web Dispatcher instance within the ASCS instance, you configure the SAP Web Dispatcher [page 150]

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**
>
> In a distributed or high-availability system, you check whether you can log on to every instance of the SAP system that you installed.

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 front end as follows:

   o SAP GUI for Windows:
   On the host where you have installed the front end, choose:

   ▶ *Start* ❯ *Programs* ❯ *SAP Front End*`<Release>` ❯ *SAPlogon* ◀

   o 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`.

Related Information

[Installing the SAP Front-End Software [page 75]](#)

6.3 Installing the SAP License

You must install a **permanent** SAP license.

Context

When you install your SAP system, a **temporary** license is automatically installed.

> ⚠ 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 SAP Library at http://help.sap.com/nw ▶ *SAP NetWeaver Platform* ▶ *SAP NetWeaver 7.0* <Including Enhancement Package> ▶ *Application Help* ▶ *Key Areas of SAP NetWeaver* ▶ *Solution Life Cycle Management by Key Capability* ▶ *SAP Licenses* ▶ *SAP License Key / SAP Licensing Procedure* ▶

If you have installed a high-availability system, proceed as described in High Availability: Setting Up Licenses [page 127].

6.4 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

Every SAP system needs a central license, which is determined by the environment of the message server. Since SAP's high-availability (HA) solution stipulates 2 or more cluster nodes (host machines) where the message server is enabled to run, you have to order as many license keys [page 127] 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, 1 key for each machine.

SAP has implemented a license mechanism for transparent and easy use with 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. There is no license problem when only the database is switched over.

Procedure

1. Make sure that the ABAP central services instance (ASCS instance) on the primary host, node A, is running.
2. To find the hardware ID of the primary host, log on to any application server instance of the SAP system and call transaction SLICENSE.
3. Perform a switchover of the ABAP central services instance (ASCS instance) to another node in the cluster and repeat the previous step.

   Repeat this for all remaining nodes in the cluster.
4. To obtain the two license keys, enter the hardware IDs for the primary and backup hosts at:

   http://support.sap.com/licensekey
5. To import the files containing the two licenses, log on to any application server instance of the SAP system and call transaction SLICENSE.
6. Perform a switchover of the ABAP central services instance (ASCS instance) 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.

6.5 Configuring 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.

For more information, see SAP Support Portal at https://support.sap.com/remote-support.html .

6.6 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 by Key Capability* *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 875986 .

6.7 Configuring Documentation Provided on the SAP Help Portal

In transaction `SR13`, you can configure the settings of your backend system to point to documentation that is provided on the SAP Help Portal.

Context

You can configure your backend system to access documentation that is provided on the SAP Help Portal.

Prerequisites

- The documentation you want to access must be available on the SAP Help Portal.
- The users who access the documentation must have access to the Internet.
- You can configure an ABAP system to connect to only one combination of product and version.

If you cannot fulfill one or more of these prerequisites, you must install the documentation in your local system landscape using the download packages or DVDs/CDs provided.

> **i Note**
>
> For more information about installing the documentation in your local system landscape, see the
> Installation of SAP Library guide.

Procedure

1. Open transaction `SR13`.
2. Select the tab *PlainHtmlHttp*.
3. Choose *New Entries*.

> **⚠ Caution**
>
> You have to create entries for both documentation and XML documentation areas for each platform you are using and each language in which you want to provide documentation.
>
> You must use the exact combination of uppercase and lowercase characters specified in the product and version.

To find the correct entry for the Path field, see the list of products and versions attached to SAP Note 2652009 .

4. To create entries for the documentation area, enter the following values:

Name	Value to be entered
Variant	Enter a name for the variant.
Platform	Select the platform relevant for your implementation from the list of available platforms, for example, WN32.
Area	Select *Documentation* from the list; this will display as IWBHELP in the table.
Server Names	https://help.sap.com/http.svc/ahp2
Path	`<product/version>` To find the correct entry for the Path field, see the list of products and versions attached to SAP Note 2652009 .
Language	Select the language you need from the list.

5. To create entries for the XML documentation area, enter the following values:

Name	Value to be entered
Variant	Enter a name for the variant (any name).
Platform	Select the platform relevant for your implementation from the list of available platforms, for example, WN32.
Area	Select *XML Documentation* from the list; this will display as XML_DOCU in the table.
Server Names	https://help.sap.com/http.svc/ahp2
Path	`<product/version>` To find the correct entry for the Path field, see the list of products and versions attached to SAP Note 2652009.
Language	Select the language you need from the list.

6. Repeat steps 4 and 5 for each relevant platform and language.
7. Select one entry as the default language for each platform and area.
8. Save your entries.

Results

You have configured the settings to point to documentation that is provided on the SAP Help Portal.

Related Information

Installation of SAP Library
SAP Note 2149786
SAP Note 2652009

6.8   Performing the Consistency Check

We recommend that you check the consistency of the newly installed SAP ABAP system. 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.

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 176].

- You have logged on to the SAP system [page 125].

Context

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 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* .

6.9 Configuring the Change and Transport System

You must perform some steps in the Transport Management System to be able to use the Change and Transport System.

Procedure

1. Call transaction `STMS` in the ABAP system to configure the Change and Transport System. For more information, see the SAP Library at:

http://help.sap.com/nw ▮▶ *SAP NetWeaver Platform* ❯ *SAP NetWeaver 7.0* `<Including` `Enhancement_Package>` ❯ *Application Help* ❯ *Key Areas of SAP NetWeaver* ❯ *Solution Life Cycle Management by Key Capability* ❯ *Software 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* ▮

2. In addition, you must configure the system change options. For more information, see the SAP Library at:

   http://help.sap.com/nw ▮▶ *SAP NetWeaver Platform* ❯ *SAP NetWeaver 7.0* `<Including` `Enhancement_Package>` ❯ *Application Help* ❯ *Key Areas of SAP NetWeaver* ❯ *Solution Life Cycle Management by Key Capability* ❯ *Software 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 program `RDDIMPDP`.

   You schedule the transport dispatcher in the current client. This is equivalent to the execution of job `RDDNEWPP` in transaction `SE38`.

6.10 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:

   ○ 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* ❯

   ○ 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:

   ○ 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)* ❯

   ○ 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:

   ○ 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* ❯

   ○ 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🔗

6.11 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.

Procedure

- Download and apply the latest Kernel and Support Package stacks using the Software Update Manager (SUM) as described in the documentation *Updating SAP Systems Using Software Update Manager 1.0 SP*<Number> available at http://support.sap.com/sltoolset🔗 ▶ *System Maintenance* ▶ *Software Update Manager (SUM) 1.0 SP* <Latest Version> ▶ *Guides for SUM 1.0 SP* <Latest Version> ▶

- 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
  ```

6.12 Performing Post-Installation Steps for the Application Server ABAP

This section describes the post-installation steps you have to perform for the ABAP application server.

Prerequisites

You have logged on to the application server ABAP as described in Logging On to the Application Server [page 125].

Context

You have to perform the following post-installation steps for the application server ABAP:

- Upload and set system profiles using transaction `RZ10`
- 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 Library at:

SAP Release and SAP Library Quick Link	SAP Library Path (Continued)
SAP NetWeaver 7.0 EHP3 http://help.sap.com/nw703	▶ *Application Help* ❯ *SAP NetWeaver by Key Capability* ❯ *Application Platform by Key Capability* ❯ *Application Server ABAP* ❯ *Administration of Application Server ABAP* ❯ *Monitoring and Administration Tools for Application Server ABAP* ❯ *Configuration in the CCMS* ❯ *Profiles* ❯ *Profile Maintenance* ▌

○ SAP NetWeaver 7.0 EHP2
    http://help.sap.com/nw702
○ SAP NetWeaver 7.0 EHP1
    http://help.sap.com/nw701
○ SAP NetWeaver 7.0
    http://help.sap.com/nw70
	▶ *Application Help* ❯ *SAP NetWeaver by Key Capability* ❯ *Solution Life Cycle Management by Key Capability* ❯ *System Management* ❯ *Configuration* ❯ *Profiles* ❯ *Maintaining Profiles* ▌

- **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.

- **Configuration of 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 J2EE engine) are running.

b. Configure the System Landscape Directory (SLD) data supplier with default settings, using transaction `RZ70`.

- **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.

6.13 Installing Additional Languages and Performing Language Transport

This section tells you how to install and transport additional languages.

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 .

   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 more information about how to transport an additional language, see http://help.sap.com/nw ▶ *SAP NetWeaver Platform* ▶ *SAP NetWeaver 7.0* `<Including Enhancement_Package>` ▶ *Application Help* ▶ *SAP NetWeaver by Key Capability* ▶ *Solution Life Cycle Management by Key Capability* ▶ *Software Life Cycle Management* ▶ *Software Logistics* ▶ *Change and Transport System* ▶ *Language Transport (BC-CTS-LAN)* ▶.

6.14 Dialog Instances in a Heterogeneous UNIX Environment only: Updating the Kernel

If you have installed dialog instances on hosts that have a different UNIX operating system than the central instance, you have to update the kernel of the newly installed dialog instances.

Procedure

1. Stop the dialog instance as described in Starting and Stopping SAP System Instances [page 176].
2. Update the kernel to the same level as the central instance by replacing the old kernel with the new one as follows:

   a. Log on as user `<sapsid>adm` to the host of the dialog instance to be updated.

b. Download the required kernel, as described in SAP Note 19466 .

c. Back up the kernel directory 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 located in the kernel directory):

```
su - root

cd <kernel directory>

./saproot.sh <SAPSID>

exit
```

3. Restart the dialog instance as described in Starting and Stopping SAP System Instances [page 176].

6.15 Configuring User Management

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

For more information, see the SAP Library at:

http://help.sap.com/nw ▶ *SAP NetWeaver Platform* ▶ *SAP NetWeaver 7.0* `<Including Enhancement Package>` ▶ *Application Help* ▶ *SAP NetWeaver by Key Capability* ▶ *Security* ▶ *Identity Management* ▶ *Identity Management for System Landscapes* ▶ *Integration of User Management in Your System Landscape* ▶ *Adding an ABAP System to Your System Landscape* ▶

6.16 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 these 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.

If you change user passwords, be aware that SAP system users might exist in multiple SAP system clients (for example, if a user was copied as part of the client copy). Therefore, you need to change the passwords in all the relevant SAP system clients.

> → Recommendation
>
> 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.
>
> For more information, see:
>
> http://help.sap.com/nw ▶ *SAP NetWeaver Platform* ❭ *SAP NetWeaver 7.0* `<Including Enhancement_Package>` ❭ *Application Help* ❭ *SAP NetWeaver by Key Capability* ❭ *Security* ❭ *Network and Transport Layer Security* ❭

> ⚠ Caution
>
> Make sure that you perform this procedure **before** the newly installed SAP system goes into production. For security reasons, you also need to copy the installation directory to a separate, secure location – such as a separate storage medium – and then delete the installation directory.

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 http://help.sap.com.

> ❖ Example
>
> http://help.sap.com/nw ▶ *SAP NetWeaver Platform* ❭ *SAP NetWeaver 7.0 Including Enhancement Package 2* ❭ *Security* ❭ *SAP NetWeaver Security Guide* ❭

Operating System and Database Users

After the installation, operating system users for SAP system, databaset, 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 41].

Operating System and Database Users

User	User Name	Comment
Operating system user	`<sapsid>adm`	SAP system administrator
		Oracle 12: This is also the default Oracle database administrator
	`oracle`	Oracle database administrator and Oracle software owner (that is, the owner of the database files)
		This user is only available with **Oracle 12** or **Oracle 11 with ASM/Exadata**.
	`ora<dbsid>`	**Oracle 11:** This is the default Oracle database administrator
		Oracle 12: This is the additional Oracle database administrator (that is, the owner of the database files)
Oracle database user	`SAP<SCHEMA_ID>`	Oracle database owner (that is, the owner of the database tables)
	`SYSTEM`	Oracle standard database user
	`SYS`	Oracle standard database user
	`OUTLN`	Oracle standard database user
	`DBSNMP`	Oracle standard database user

SAP Host Agent User

User	User Name	Comment
Operating system user	`sapadm`	SAP system administrator
		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 together with recommendations on how you can ensure the security of these users:

ABAP Users

User	User Name	Comment
SAP system user	SAP*	User exists in at least SAP system clients 000, 001, and 066 ⚠ **Caution** This user has extensive authorizations. Make sure that you assign a secure password.
	DDIC	User exists in at least SAP system clients 000 and 001 ⚠ **Caution** This user has extensive authorizations. Make sure that you assign a secure password.
	EARLYWATCH	User exists in at least SAP system client 066
	SAPCPIC	User exists in at least SAP system clients 000 and 001

More Information

For more information about managing ABAP users, see:

http://help.sap.com/nw ▶ *SAP NetWeaver Platform* ▶ *SAP NetWeaver 7.0* <Including Enhancement_Package> ▶ *Application Help* ▶ *SAP NetWeaver by Key Capability* ▶ *Security* ▶ *Identity Management* ▶ *User and Role Administration of AS ABAP* ▶

6.17 Performing the Client Copy

To get a production client, you have to perform a copy of the SAP reference client.

Context

The installer creates three ABAP clients during the installation, client 000, client 001, and client 066.

Client 000 is the SAP reference client for ABAP.

Use client 000 as source client for the client copy.

Only valid for 'Software Component': SAP SCM

> **i Note**
>
> **SAP SCM:** If you want to mark the client 001 as **not** relevant for liveCache, run report `/SAPAPO/ OM_NON_LC_RELEVANT_CLT` or `/SLCA_NON_LC_RELEVANT_CLIENT` using transaction `SE38`.

End of 'Software Component': SAP SCM

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 Library at http:// help.sap.com/nw ▐▶ *SAP NetWeaver Platform* ❯ *SAP NetWeaver 7.0* `<Including Enhancement_Package>` ❯

6.18   Performing Oracle-Specific Post-Installation Steps

You have to perform the following Oracle-specific post-installation steps.

Procedure

- **Checking the Recommended Oracle Database Parameters**

  When installing the Oracle database, a standard database parameter set is used. To take into account the size and configuration of your SAP system, and to enable new Oracle features, check and apply the parameter settings as described in SAP Note 1431798 (Oracle 11g) or SAP Note 1888485 (Oracle 12.1) or SAP Note 2470718 (Oracle 12.2 and 18.x) .

  You can find an automated script in SAP Note 1171650 to help you check whether your SAP system complies with the database parameter recommendations at any given point in time.

- **Configuring Database User Profiles**

  If the SAP-specific database user profile `SAPUPROF` is not yet installed in the database, configure it as described in SAP Note 1519872 .

- **Updating Oracle Optimizer Statistics**

  To update the Oracle optimizer statistics, do the following:

  a. Execute the following commands as the `ora<dbsid>` user:

     ```
     brconnect -u / -c -f stats -t system_stats;

     brconnect -u / -c -f stats -t oradict_stats;
     ```

  b. Execute the following commands with SQLPlus:

     ```
     SQL> exec dbms_scheduler.disable('GATHER_STATS_JOB');

     SQL> exec dbms_scheduler.disable('ORACLE_OCM.MGMT_CONFIG_JOB');

     SQL> exec dbms_scheduler.disable('ORACLE_OCM.MGMT_STATS_CONFIG_JOB');
     ```

     For Oracle 11g, also execute the following command:

     ```
     SQL> exec DBMS_AUTO_TASK_ADMIN.DISABLE
     ```

     For more information, see SAP Note 974781 .

- **Checking the Version of the Oracle Instant Client**

  If necessary, install the most up-to-date version of the Oracle Instant Client, as described in SAP Note 819829 .

- **Configuring and Administering the Oracle Database**

  Configuring and Administering the Oracle Database

  You have to configure your Oracle database before you start operating it with the SAP system.

  For more information about Oracle database configuration and administration, see the SAP Library at:

SAP Release and SAP Library Quick Link	SAP Library Path (Continued)
http://help.sap.com/nw703	▌ *SAP NetWeaver Platform* ❯ *SAP NetWeaver 7.0* `<Including Enhancement Package 3>` ❯ *Application Help* ❯ *SAP NetWeaver by Key Capability* ❯ *Database Administration* ❯ *Database Administration for Oracle* ▌.
http://help.sap.com/nw702	▌ *SAP NetWeaver Platform* ❯ *SAP NetWeaver 7.0* `<Including Enhancement Package 2>` ❯ *Application Help* ❯ *SAP NetWeaver by Key Capability* ❯ *Database Administration* ❯ *Database Administration for Oracle* ▌.
http://help.sap.com/nw701	▌ *SAP NetWeaver Platform* ❯ *SAP NetWeaver 7.0* `<Including Enhancement Package 1>` ❯ *Application Help* ❯ *SAP NetWeaver by Key Capability* ❯ *Database Administration* ❯ *Database Administration for Oracle* ▌.
http://help.sap.com/nw70	▌ *SAP NetWeaver Platform* ❯ *SAP NetWeaver 7.0* ❯ *Application Help* ❯ *SAP NetWeaver by Key Capability* ❯ *Database Administration* ❯ *Database Administration for Oracle* ▌.

- **Installing the Latest Version of BR*Tools for your Oracle database.**

  Depending on the release of your Oracle Database, follow the instructions in the relevant SAP Note to install the most recent version of BR*Tools:

  - If you have Oracle 18, follow the instructions in SAP Note 2763733 .
  - If you have Oracle 12, follow the instructions in SAP Note 2087004 .
  - If you have Oracle 11, follow the instructions in SAP Note 1430669 .

6.19 Performing a Full Installation Backup

You must perform a **full offline backup** at the end of the installation. This procedure also describes how to use the back-up data for a restore.

> ⚠ 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.

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

> i Note
>
> The following only applies to a standard installation.

1. Back up the following file systems:
   - `/usr/sap/<SAPSID>`
   - `/usr/sap/trans`
   - `/<sapmnt>/<SAPSID>`
   - Home directory of the user `<sapsid>adm`
   - All database-specific directories

   Proceed as follows:

   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>
> ```

2. Back up the operating system using operating system means.
   This saves the structure of the system and all configuration files, such as file system size, logical volume manager configuration and database configuration data.

Restoring Your Backup

If required, you can restore the data that you previously backed up.

> ⚠ **Caution**
>
> Check for modifications to 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. Execute the following commands to restore the data:
   - Restoring the data from tape:
     ```
     cat <tape_device> | compress -cd | tar -xf -
     ```
   - Restoring the data from the file system:
     ```
     cat ARCHIVENAME.tar.Z | compress -cd | tar -xf -
     ```

> **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
> ```

Performing a Full Database Backup

1. Configure your third-party backup tool, if used.
2. Perform a full database backup (preferably offline).

If you use BR*TOOLS for the backup, see *BR*Tools for Oracle DBA* in the *SAP Database Guide: Oracle* at: http://help.sap.com/nw ▶ *SAP NetWeaver Platform* ▶ *SAP NetWeaver 7.0* `<Including Enhancement Package>` ▶ *Application Help* ▶ *SAP NetWeaver by Key Capability* ▶ *Database Administration* ▶ *Database Administration for Oracle* ▶.

6.20 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`

   > **⋆ Example**
   >
   > `https://plx282:44300/sap/wdisp/admin`

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.

For more information on how to change passwords of existing users using the `Admin Handler`, see SAP Library at:

SAP Release and SAP Library Quick Link	SAP Library Path (Continued)
SAP NetWeaver 7.0 EHP3 http://help.sap.com/nw703	▌ *Application Help* › *SAP NetWeaver by Key Capability* › *Application Platform by Key Capability* › *Platform-Wide Services* › *SAP Web Dispatcher* › *Administration of the SAP Web Dispatcher* › *Using the Web Administration Interface* › *Area menu* › *Section "HTTP Handler"* ▌
○ SAP NetWeaver 7.0 EHP2 http://help.sap.com/nw702 ○ SAP NetWeaver 7.0 EHP1 http://help.sap.com/nw701 ○ SAP NetWeaver 7.0 http://help.sap.com/nw70	▌ *Application Help* › *SAP NetWeaver by Key Capability* › *Solution Life Cycle Management by Key Capability* › *System Management* › *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 21]

6.21 SAP Web Dispatcher Configuration

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.

For more information, see the Web Dispatcher documentation in SAP Library at:

SAP Release and SAP Library Quick Link	SAP Library Path (Continued)
SAP NetWeaver 7.0 EHP3 http://help.sap.com/nw703	▶ *Application Help* ❯ *SAP NetWeaver by Key Capability* ❯ *Application Platform by Key Capability* ❯ *Platform-Wide Services* ❯ *SAP Web Dispatcher* ❯

• SAP NetWeaver 7.0 EHP2
   http://help.sap.com/nw702
• SAP NetWeaver 7.0 EHP1
   http://help.sap.com/nw701
• SAP NetWeaver 7.0
   http://help.sap.com/nw70
	▶ *Application Help* ❯ *SAP NetWeaver by Key Capability* ❯ *Solution Life Cycle Management by Key Capability* ❯ *System Management* ❯ *SAP Web Dispatcher* ❯

http://help.sap.com/nw ▶ *SAP NetWeaver Platform* ❯ *SAP NetWeaver 7.0* `<Including Enhancement Package>` ❯ *Application Help* ❯ *Key Areas of SAP NetWeaver* ❯ *Solution Life Cycle Management by Key Capability* ❯ *System Management* ❯ *SAP Web Dispatcher* ❯

Related Information

ASCS Instance with Integrated SAP Web Dispatcher [page 21]

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7.03 on UNIX : Oracle
Post-Installation   PUBLIC   **151**

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 SAP Help Portal at:

https://help.sap.com/viewer/p/SAP_NETWEAVER ▐▶ ▶ *SAP NetWeaver 7.0* `<Including Enhancement Package>` ▶ *Application Help* ▶ *SAP NetWeaver by Key Capability* ▶ *Security* ▶ *Identity Management* ▶ *User and Role Administration of AS 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.
- 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 the 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. If the SAP system has been prepared correctly, the SAP MC presents and analyzes system information that it gathers from various sources, including 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.

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Additional Information

For more information about the SAP MC and about how to configure it to access LDAP directories, see the documentation *SAP Management Console* at the following locations:

Release	Path on SAP Help Portal
• SAP NetWeaver 7.0 • SAP NetWeaver 7.0 including enhancement package 1 • SAP NetWeaver 7.0 including enhancement package 2	http://help.sap.com/viewer/p/SAP_NETWEAVER ▌▶ ❯ *SAP NetWeaver 7.0* `<Including Enhancement Package>` ❯ *Application Help* ❯ *SAP NetWeaver by Key Capability* ❯ *Application Platform by Key Capability* ❯ *Java Technology* ❯ *Administration Manual* ❯ *J2EE Engine* ❯ *J2EE Engine Administration Tools* ❯ *SAP Management Console* ▌
SAP NetWeaver 7.0 including enhancement package 3	https://help.sap.com/viewer/p/SAP_NETWEAVER_703 ▌▶ ❯ *Application Help* ❯ *SAP NetWeaver by Key Capability* ❯ *Solution Life Cycle Management by Key Capability* ❯ *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 where you want to use Active Directory Services and choosing ▌▶ `<Product>` ❯ *Software Life-Cycle Options* ❯ *LDAP Registration* ❯ *Active Directory Configuration* ▌. For more information about running the installer on Windows, see the documentation *Installation Guide - Installation of SAP Systems Based on the Application Server ABAP of SAP NetWeaver* `<Release>` *on Windows:* `<Database>` at http://support.sap.com/sltoolset ✍ ▌▶ ❯ *System Provisioning* ❯ *Installation Option* ▌.

> **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.

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 **once** for your system and choose ▌ `<Product>` ❭ *Software Life-Cycle Options* ❭ *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=<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 Installation of Multiple Components in One Database

You can install **multiple** SAP systems in a **single** database. This is called Multiple Components in One Database (MCOD).

> → Recommendation
>
> MCOD is generally available and there is no intention to de-support this installation feature.
>
> However, SAP recommends that customers should **not** use the MCOD feature when installing new systems.
>
> The major drawbacks are as follows:
>
> - Previous-point-in-time (PPT) recovery of a single system within an MCOD installation becomes a highly complex and time-consuming procedure.
> - SAP Landscape Management (LaMa) is generally not supported for MCOD installations. For more information, see SAP Note 1709155 .
> - There are strong dependencies, for example on the database version used for the MCOD system.
> - Downtime - planned or unplanned - always affects all systems sharing the same database.
>
> **Exception:** In case of a dual-stack split you can use the "Keep Database" option thus keeping ABAP and Java stack in one database. There, the PPT recovery problem does not apply because both stacks belong logically together and would always be recovered jointly anyhow. However, keep in mind that even for this specific case the introduction of SAP Landscape Management would require a split into separate database subsystems.
>
> Additional information is available in SAP Note 2146542 .

MCOD is available with all SAP components and all the major databases for the SAP system. No extra effort is required because the MCOD installation is fully integrated into the standard installation procedure. MCOD is not an additional installation option. Instead, it is an option of the database instance installation.

With MCOD we distinguish two scenarios:

- The installation of an SAP system in a new database
  The system then creates new tablespaces and a new database schema.
- The installation of an additional SAP system in an existing database (MCOD)

The system then automatically creates additional tablespaces in the existing database and a schema user in the existing database.

Prerequisites

- For more information about MCOD and its availability on different platforms, see *Multiple Components in One Database (MCOD)* at: https://wiki.scn.sap.com/wiki/pages/viewpage.action?pageId=448466580 .
- Since SAP does not support mixed solutions with MCOD, your SAP system must contain Unicode SAP instances only.
- Improved sizing required
  You calculate the CPU usage for an MCOD database by adding up the CPU usage for each individual SAP system. You can do the same for memory resources and disk space.
  You can size multiple components in one database by sizing each individual component using the `Quick Sizer` tool and then adding the requirements together. For more information about the `Quick Sizer`, see http://sap.com/sizing .

Features

- Reduced administration effort
- Consistent system landscape for backup, system copy, administration, and recovery
- Increased security and reduced database failure for multiple SAP systems due to monitoring and administration of only one database
- Independent upgrade
  In an MCOD landscape, you can upgrade a single component independently from the other components running in the same database, assuming that the upgraded component runs on the same database version. However, if you need to restore a backup, be aware that all other components are also affected.

> **i Note**
>
> Special MCOD considerations and differences from the standard procedure are listed where relevant in the installation documentation.

Constraints

- We **strongly recommend** that you test MCOD in a test or development system. We recommend that you run MCOD systems in the same context. We do not recommend that you mix test, development, and production systems in the same MCOD.
- In the event of database failure, all SAP systems running on the single database are affected.
- Automated support in an MCOD landscape for the following administrative tasks depends on your operating system and database:
  - Copying a single component from an MCOD landscape to another database at database level.

- Uninstalling a single component from an MCOD landscape requires some additional steps. You can use a remote connection to SAP support to request help with these tasks. For more information, see http://support.sap.com/remoteconnection🔗.
- You **cannot** install a Unicode ABAP system with a non-Unicode ABAP system in one database.
- For the second SAP system, you must use the same `<DBSID>` as for the first SAP system.
- If you install an MCOD system, the `SYSTEM` tablespace must contain at least 400 MB of free space. If there is not enough space left, increase the size of this tablespace with `BRSPACE` or `BRTOOLS`.
- If you decide to turn off archive log mode during the database load phase of the installation, you need to plan downtime for all MCOD systems sharing the database.

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
     ```

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Additional Information

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
```

End of 'Platform': HP-UX

7.3.3 Exporting and Mounting Directories via NFS for Linux

This topic is only valid for 'Platform': 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.

       ○ On Solaris 9, start the NFS server with the following command:

         `/etc/init.d/nfs.server start`

       ○ 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.

       ○ On Solaris 9, start the NFS server with the following command:

         `/etc/init.d/nfs.client start`

       ○ 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   Dialog Instance Installation for an Upgraded System only: Updating Profiles

You only need to perform these steps if you want to install a dialog instance and you have **already** performed the steps listed under "Prerequisites" in this section.

Prerequisites

1. You upgraded your SAP system from an earlier source release as follows:
   - You upgraded your SAP NetWeaver system from an earlier source release to a target release **lower** than SAP NetWeaver 7.0 SR3.
   - You upgraded your SAP ERP system from an earlier source release to a target release **lower** than SAP ERP 6.0 SR3.
   - You upgraded your SAP CRM system from an earlier source release to a target release **lower** than SAP CRM 5.0 SR3.

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- ○ You upgraded your SAP SCM system from an earlier source release to a target release **lower** than SAP SCM 5.0 SR3.
- ○ You upgraded your SAP SRM system from an earlier source release to a target release **lower** than SAP SRM 5.0 SR3.
2. You installed the current Enhancement Package.

Procedure

1. On the SAP Global host, go to folder `/<sapmnt>/<SAPSID>/profile`.

> **i Note**
>
> SAP system profiles are named as follows:
>
> Instance profiles: `<SAPSID>_<INSTANCE_ID>_<Host_Name>`.pfl
>
> Start profiles: `START_<INSTANCE_ID>_<Host_Name>`.pfl

2. Make sure that the parameter `DIR_CT_RUN`, if set, has identical values in the instance profile and the start profile of the central instance:

- ○ If it **is** set in the instance profile, it must **also** be set in the start profile.
- ○ If it is **not** set in the instance profile, it must **not** be set in the start profile either.

3. Change the default profile `DEFAULT.PFL` by setting `rdisp/msserv_internal` to a free port number.

> **⁂ Example**
>
> `DEFAULT.PFL`
>
> **Before the change:**
>
> ...
>
> `rdisp/msserv = sapms<SAPSID>`
>
> ...
>
> **After the change:**
>
> ...
>
> `rdisp/msserv = sapms<SAPSID>`
>
> `rdisp/msserv_internal = <Free_Port_Number>`
>
> ...

4. In a high-availability system, change the instance profile of the ABAP central services instance (ASCS instance) as follows:

   a. Set `rdisp/msserv` to **0**.

   b. Set `rdisp/msserv_internal` to the port number assigned to `rdisp/msserv`.

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> **❖ Example**
>
> Instance profile of the ASCS instance:
>
> **Before the change:**
>
> ...
>
> ```
> rdisp/msserv = 4711
> ```
>
> ...
>
> **After the change:**
>
> ...
>
> ```
> rdisp/msserv = 0
> rdisp/msserv_internal = 4711
> ```
>
> ...

5. Restart all SAP services and instances of your SAP system.

7.5 Installing a Central or Distributed System Without the ASCS Instance

If you decided not to follow the standard installation procedure, which implies the installation of an ABAP central services instance (ASCS instance), you have to perform the additional steps described in this section.

Context

If you decided not to follow the standard installation procedure, which implies the installation of an ABAP central services instance (ASCS instance), you have to perform the additional steps described in the following:

- Central system: You first have to prepare the central system host as global host, and then to separately install the database instance and the central instance. In this case, make sure that you follow the specifically marked instructions in the Installation Checklist. [page 82].
- Distributed system: If you do not want to install the ASCS instance, you have to prepare the relevant host as global host instead. In this case, make sure that you follow the specifically marked instructions in the Installation Checklist. [page 82]

Procedure

- Central System

Do **not** run installation option *Central System*. Instead, you have to install the required SAP system instances separately on the central system. This means you have to run the installation options for a *Distributed System* (except for the *ASCS instance* option) on the **central system host** as follows:

a. You run the installer [page 95] to prepare the central system host as SAP global host using installation option ❚▶ `<Product>` ❯ *Software Life-Cycle Options* ❯ *Additional Preparation Options* ❯ *Global Host Preparation for an ABAP System* ❚.
This sets up the global directories `<sapmnt>/<SAPSID>/exe`, `<sapmnt>/<SAPSID>/profile`, and `<sapmnt>/<SAPSID>/global`.

b. You run the installer [page 95] on the central system host to install the database instance using installation option ❚▶ *Distributed System* ❯ *Database Instance* ❚.

c. You run the installer [page 95] on the central system host to install the central instance using installation option ❚▶ *Distributed System* ❯ *Central Instance* ❚.

- Distributed System

a. Do **not** run installation option *ASCS Instance*. Instead, you have to run the installer [page 95] to prepare the SAP global host using installation option ❚▶ `<Product>` ❯ *Software Life-Cycle Options* ❯ *Additional Preparation Options* ❯ *Global Host Preparation for an ABAP System* ❚.

This sets up the global directories `<sapmnt>/<SAPSID>/exe`, `<sapmnt>/<SAPSID>/profile`, and `<sapmnt>/<SAPSID>/global`.

7.6 Installing Oracle Real Application Clusters

You want to install Oracle Real Application Clusters (RAC) with the Software Provisioning Manager (the "installer") in an SAP environment. This section provides additional information for the RAC installation using the Software Provisioning Manager.

Prerequisites

> ⁂ Example
>
> As an example, this section describes the installation steps for RAC using the following installation parameters:
>
> - `DB_SID=C11`
> - `default ASM data diskgroup=+DATA`
> - `database hostnames (three node cluster)=vhost1,vhost2,vhost3`
> - `three-digit threads=001,002,003` (it is also possible to have `single-digit threads=1,2,3`)

During the installation, the installer executes the Oracle executable `$ORACLE_HOME/bin/srvctl` to create the `<DBSID>` cluster database (`add database`) and adds three instances (`add instance`) on the different hosts. While the database is being loaded, the cluster is disabled (`disable database`).

- When the database installation, database load and also addtional steps like `update statistics`, `setting database users` and `creating secure store` have all finished, the installer sets the database to cluster mode (`cluster_database=true`) and enables the cluster database (`enable database`).
  You can find all these commands in the installer log files `sapinst_dev*.log` in the installation directory (default: `/tmp/sapinst_instdir`):

  > ⚙ Example
  >
  > ```
  > /oracle/C11/<release-specific folder name>/bin/srvctl add database -d C11 -o
  >
  > /oracle/C11/<release-specific folder name> -p +DATA/C11/spfileC11.ora -a DATA
  >
  > /oracle/C11/<release-specific folder name>/bin/srvctl add instance -d C11 -i
  > C11001 -n vhost1
  >
  > /oracle/C11/<release-specific folder name>/bin/srvctl add instance -d C11 -i
  > C11002 -n vhost2
  >
  > /oracle/C11/<release-specific folder name>/bin/srvctl add instance -d C11 -i
  > C11003 -n vhost3
  >
  > /oracle/C11/<release-specific folder name>/bin/srvctl disable database -d C11
  >
  > sqlplus "/ as sysdba"
  >
  > ALTER SYSTEM SET CLUSTER_DATABASE=true
  >
  > exit
  >
  > /oracle/C11/<release-specific folder name>/bin/srvctl enable database -d C11
  > ```

- When the database installation has finished and the installer has stopped, you can check the database status as `Oracle` user or `<sapsid>adm` user with the following command:
  Oracle 11: `srvctl status database -d C11`
  Oracle 12 and higher: `srvctl status database -db C11`

Context

For additional information about how set up SAP systems to use Oracle Real Application Clusters (RACs), see the whitepapers at https://www.sap.com/community/topic/oracle.html 🔗 ▶ *SAP on Oracle Real Application Clusters (RAC)* ❯

These whitepapers describe all required changes to the Oracle database, Oracle network configuration, Oracle instance parameters, and so. However, they do not contain information about RAC installation with the installer.

Procedure

1. You can then start the database on all nodes with the following command:

Oracle 11: `srvctl start database -d C11`

Oracle 12 and higher: `srvctl start database -db C11`

The installer does not start the database on all nodes after the installation has finished. Only the first database RAC node is started.

You need to start all other instances manually after completing the preparation on the other database nodes. In addition, when the installation is finished, the `<sapsid>adm` environment variable `ORACLE_SID` is set to `C11001` on the first node.

2. You prepare all other database instances as described in the following:

   After completing the installation of the first RAC database node, you need to prepare all other database nodes with the installer. These installation preparation steps create the required operating system users and groups and also install the required kernel files like `dba*tools` and SAP Host Agent.

   You can find this option on the *Welcome* screen of the installer at: ▐▶ *Generic Installation Option* ▶ *Oracle* ▶ *Database tools* ▶ *RAC/ASM/Exadata Database Instance Preparation - Kernel* `<Version>` ▐

3. You install the central instance and the dialog instances:

   For the RAC installation, the installer performs some additional steps during the installation of the dialog instance so that the application server of the dialog instance can connect to the cluster nodes. For this the installer updates the `tnsnames.ora` file with some additional RAC-specific entries.

   The installer modifies `tnsname.ora` like in the following example:

   ```
   C11.WORLD
   C11001.WORLD, C11002.WORLD, C11003.WORLD
   C11_DVEBMGS01.WORLD
   C11_D02.WORLD
   ```

   The installer modifies SAP instance or start profiles like in the following example, where `<xx>` is a free sequence number in the instance profile or start profile:

   ```
   SETENV_xx = dbs_ora_tnsname=C11_DVEBMGS01
   SETENV_xx = dbs_ora_tnsname=C11_D02
   ```

   During the installation of the dialog instance, the installer tries to restart the instance but this fails because the RAC services are not registered at the cluster ware. To register the RAC services, the installer creates the required commands in a shell script in the local installation directory.

   You need to execute these shell scripts on one node of the cluster database as follows:

   1. Log on to the database server as the `Oracle` user.
   2. Set the Oracle environment to the home directory of the `RDBMS` using the following command:
      `setenv ORACLE_HOME /oracle/C11/<release-specific folder name>`
   3. Run the shell script using the following command:
      `call <Path_Of_Shell_Script>/C11_DVEBMGS01.sh`

   > ✦ Example
   >
   > **Oracle 11:**

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Entries of the shell script:

```
srvctl add service -d C11 -s C11_DVEBMGS01 -r C11001 -a C11002,C11003 -P
BASIC -y AUTOMATIC -q true -j long -e SELECT -m BASIC -z 3 -w 5

srvctl start service -d C11 -s C11_DVEBMGS01
```

Entries of shell script for the dialog instance server C11_D02.sh:

```
srvctl add service -d C11 -s C11_D02 -r C11002 -a C11001,C11003 -P BASIC -y
AUTOMATIC -q true -j long -e SELECT -m BASIC -z 3 -w 5

srvctl start service -d C11 -s C11_D02
```

Oracle 12 and higher:

Entries of the shell script:

```
srvctl add service -db C11 -service C11_DVEBMGS01 -preferred C11001 -
available C11002,C11003 -tafpolicy BASIC -policy AUTOMATIC -notification true
-failovertype SELECT -failovermethod BASIC -failoverretry 3 -failoverdelay 5
srvctl start service -db C11 -service C11_DVEBMGS01
```

Entries of shell script for the dialog instance server C11_D02.sh:

```
srvctl add service -db C11 -service C11_D02 -preferred C11002 -available
C11001,C11003 -tafpolicy BASIC -policy AUTOMATIC -notification true -
faileovertype SELECT -faileovermethod BASIC -faileoverretry 3 -failoverdelay
5

srvctl start service -db C11 -service C11_D02
```

After you have executed these commands on the database server, the installation of the dialog instance can continue. Now you can start the instance without connection problems.

4. You start the dialog instance instance.

7.7 Implementing Oracle Database Vault with Software Provisioning Manager 1.0

Software Provisioning Manager 1.0 (the "installer" for short) supports Oracle Database Vault. This section provides information about implementing Oracle Database Vault (DV) with the installer.

Prerequisites

- Your Oracle database version must be 12.1 or higher.
- Check the prerequisites, restrictions, and patch requirements as listed in SAP Note 2218115 .

Context

For a new system installation, the installer prompts whether DV is to be installed.

DV requires the following addional users:

- `secadmin`
- `secacctmgr`

These users are created by the installer.

For more information about Oracle Database Vault, see the Oracle Database documentation referred to in SAP Note 2218115 .

Procedure

1. Start the installer and choose the installation option for your system variant as described in Running the Installer [page 95].
2. On the *Oracle Database* screen where you are prompted to enter the required Oracle database parameters, mark the *Install Oracle Database Vault* checkbox.
3. On the *Database Accounts for Oracle Database Vault* screen, specify the following:
   - Provide the passwords for the Oracle Database Vault user accounts `secadmin` and `secacctmgr` which are to be created by the installer.
   - If you want to be enabled after the installation has completed, mark the *Enable Oracle Database Vault* checkbox.

Next Steps

Configure Oracle Database Vault as described in SAP Note 2218115 .

7.8   Support of Oracle Transparent Data Encryption (Oracle TDE)

Oracle Transparent Data Encryption (TDE) for Oracle 18c is supported as of Software Provisioning Manager 1.0 SP27 (the "installer" for short) for SAP systems based on SAP NetWeaver.

Prerequisites

- Oracle database 18c or higher

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- Software Provisioning Manager 1.0 SP 27 or higher
- SAP system is based on SAP NetWeaver 7.0 or higher
- If you perform a system copy or a database refresh with `R3load`, the Oracle database on the target system does not need to have the same encryption type as the Oracle database on the source system. You can always change the encryption type when the Oracle database or the Oracle tablespaces are recreated, and the data are reloaded again in the Oracle database by `R3load`.

Constraints

- Oracle Database 18c only supports TDE tablespace encryption, but not yet TDE full database encryption. For more information, see SAP Note 2485122 .
- With Software Provisioning Manager 1.0 you cannot configure TDE and encrypt tablespaces in the database of an already existing SAP System. You have to do this manually.
    - You can manually configure TDE in an SAP system that already exists.
    - You can manually convert a non-encrypted Oracle SAP database into an encrypted Oracle SAP database.
- With Software Provisioning Manager 1.0 you cannot deconfigure TDE and decrypt the data in the database of an existing SAP system. You have to do this manually.

For more information, see SAP Note 2485122 .

Supported Software Provisioning Manager 1.0 Scenarios

- SAP system installation from scratch
  SAP System Database Parameters [page 47]
- SAP system copy
  When you copy an SAP system with Software Provisioning Manager 1.0, there are two options for copying the database. From a security perspective, the first option is the preferred option as the SAP data remains security encrypted during the whole system copy process.
  See section *Support of Oracle Transparent Data Encryption (Oracle TDE)* in the system copy guides at
  https://support.sap.com/sltoolset > *System Provisioning* > *Copy a System using Software Provisioning Manager* > *System Copy Option of Software Provisioning Manager 1.0*
- SAP system rename
  See section *Support of Oracle Transparent Data Encryption (Oracle TDE)* in the system rename guides at
  https://support.sap.com/sltoolset > *System Provisioning* > *Rename a System using Software Provisioning Manager* > *System Rename Option of Software Provisioning Manager 1.0*
- SAP system database refresh
  See section *Support of Oracle Transparent Data Encryption (Oracle TDE)* in the system copy guides at
  https://support.sap.com/sltoolset > *System Provisioning* > *Copy a System using Software Provisioning Manager* > *System Copy Option of Software Provisioning Manager 1.0*

For more information, see SAP Note 2485122 .

Supported Oracle 18c Configuration Scenarios

- Oracle single instance installation
  Software keystore is located in filesystem
- Real Application Clusters (RAC)
  Installing Oracle Real Application Clusters [page 166]
  Software keystore is shared (in ASM or shared filesystem)
- Automatic Storage Management (ASM)
  Database Instance Installation on Oracle Automatic Storage Management [page 173]
  Software keystore is located in ASM
- Oracle Database Vault
  Implementing Oracle Database Vault with Software Provisioning Manager 1.0 [page 169]
  Oracle TDE and Oracle DV can be combined together.

For more information, see SAP Note 2485122 .

Supported TDE Encryption Algorithms

- Software Provisioning Manager 1.0 allows you to choose which encryption key to use.
- Default Encryption is TDE or AES128.
- NOTDE is the value for No Transparent Data Encryption.
- Currently only user tablespaces can be encrypted.
- Tablespaces `System`, `Psaptemp`, and `Sysaux` are not supported.

Log und SQ files in installation directory for TDE

During the installation, Database Refresh and Systemcopy with `R3load` with Software Provisioning Manager 1.0 the TDE will be set and installed when the *Install Oracle TDE* checkbox is marked.

For a database rename, the wallet is already available with the same master key as before. Only the Auto Login Wallet will be reset. The following log and sql files are created in the installation directory for TDE.

- CreateKeystore.log & CreateKeystore.sql
  - Create keystore log and sql file
  - During the installation or system copy the keystore is created in `$SAPDATA_HOME/orawallet/tde`
- CreateKSKey.log & CreateKSKey.sql
  - Create keystore key log and sql file
  - The Master Key is written to the keystore file `ewallet.p12` and a backup file `ewallet_<number>.p12` is created as well.
- CreateKSAutologin.log & CreateKSAutologin.sql
  - Create keystore auto login log and sql file
  - During startup the wallet will be open automatically. The `Auto Login Wallet` file is `cwallet.sso` in the keystore.

7.9 Database Instance Installation on Oracle Automatic Storage Management

This section provides information on the installation of a database instance on an Oracle Automatic Storage Management (ASM).

Software provisioning manager performs the following steps that differ from the general installation on non-ASM systems:

- It creates the `oracle` user and the additional Oracle groups `oinstall`, `asmdba`, `asmadmin`, and `asmoper`.
- It installs the correct user environment for the `oracle` and `<sapsid>adm` users.

Prerequisites

- You must have installed the Oracle `GRID` software. This software ensures that ASM can be used.
- You must have created the following Oracle disk groups:
  - `+DATA`, `+<DBNAME>_DATA` or `+DATA_<DBMACHINENAME>` for all data files, online redo logs (first copy), and control file (first copy).
  - `+ARCH`, `+<DBNAME>_ARCH` for control file (second copy) and archive redo logs (not for engineered systems such as `Exadata` or `SuperCluster`).
  - `+RECO`, `+<DBNAME>_RECO` or `+RECO_<DBMACHINENAME>` for control file (third copy), online redo log (second copy), `RMAN` backups and fast recovery area.
  - `+OLOG`, `+ MLOG` for redo log file are optional for larger systems (not for engineered systems such as `Exadata` or `SuperCluster`).

More Information

For more information, see SAP on Oracle Automatic Storage Management (ASM) .

Related Information

Creating Operating System Users and Groups [page 57]
Oracle Directories [page 67]
Installation Checklist [page 82]
Ensuring User Security [page 140]

7.10 Installing the SAP Host Agent Separately

The SAP Host Agent is installed automatically during the installation of new SAP instances with SAP kernel 7.20 or higher (integrated installation). If you need to install the SAP Host Agent separately, use the documentation *Installation of SAP Host Agent on UNIX - Using Software Provisioning Manager 1.0* at:

https://support.sap.com/sltoolset 🔗 ▶ ❯ *System Provisioning* ❯ *Install a System using Software Provisioning Manager* ❯ *Installation Option of Software Provisioning Manager 1.0 SP* `<Current Version>` ❯ *Installation Guides - Standalone Engines and Clients* ❯ *SAP Host Agent* ❯

7.11 Splitting Off an ABAP Central Services Instance from an Existing Central Instance

With the installer option *Split Off ASCS Instance from existing Central Instance*, you can move the message server and the enqueue work process from an existing central instance to a newly installed ABAP central services instance (ASCS instance). The new ASCS instance is installed while the split is done.

Prerequisites

The existing SAP system of the central instance must meet the following requirements:

- It was upgraded to an SAP system based on SAP NetWeaver 7.0 or higher
- It does not yet have an ASCS instance

Context

Before the Split

The central instance includes:

- ABAP dispatcher and work processes (dialog, batch, spool, enqueue, or update)
- Gateway
- Internet communication manager (ICM)
- Internet graphics service (IGS)
- ABAP message server

After the Split

An ABAP central services instance (ASCS instance) has been split off from the existing central instance.

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The central instance now includes:

- ABAP dispatcher and work processes (dialog, batch, spool, or update)
- Gateway
- Internet communication manager (ICM)
- Internet graphics service (IGS)

The newly created ABAP central services instance (ASCS instance) includes:

- ABAP message server
- ABAP standalone enqueue server
  The ABAP enqueue work process is now replaced with the ABAP standalone enqueue server.

The Effect of the Split

The following graphic provides an overview of the components contained in the central instance before and after the split, along with the newly created ASCS instance:
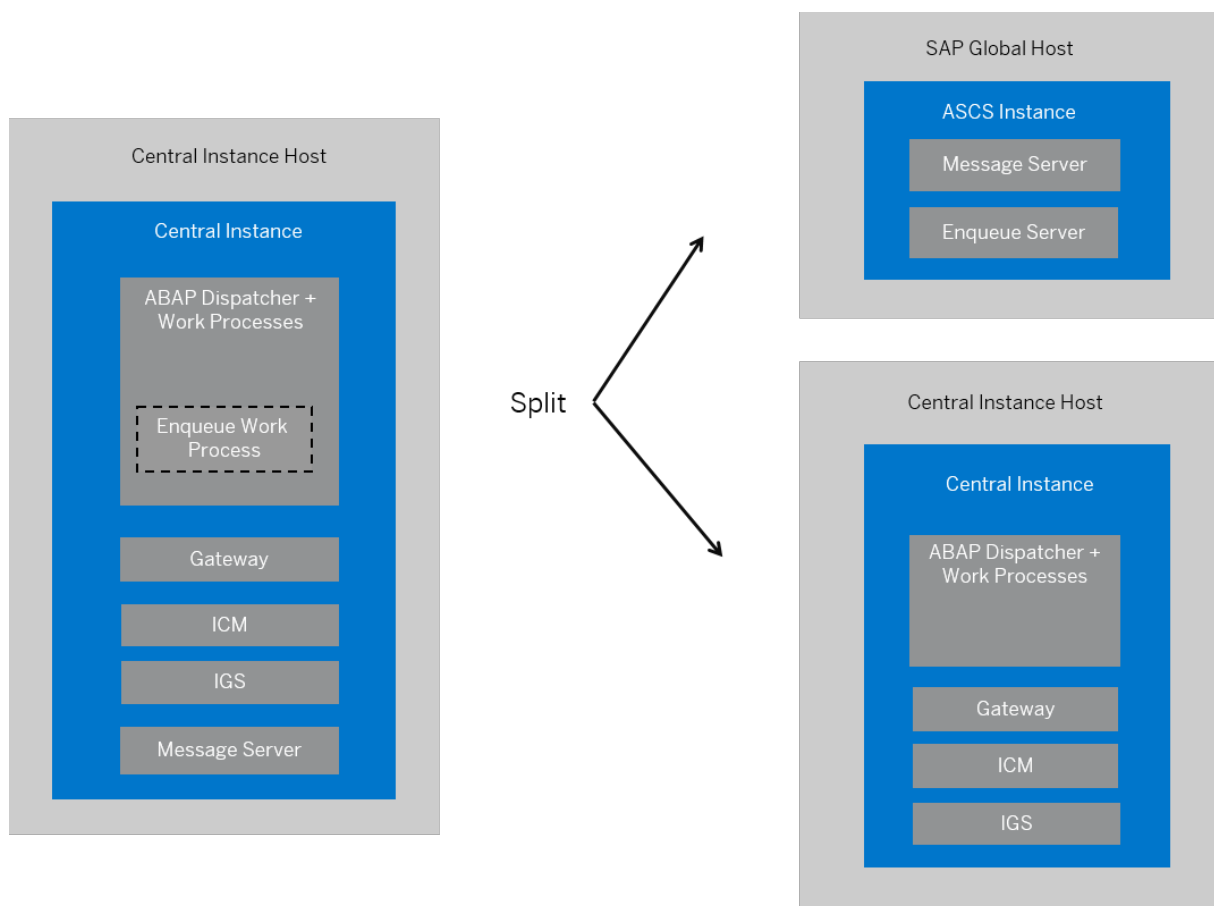
Procedure

1. Plan the basic parameters, as described in SAP System Parameters [page 41]:
   - Choose an instance number for the ASCS instance to be created.

- Note that the message server port is not changed during the split.

2. Check the hardware and software requirements for the ASCS instance to be created as described in Hardware and Software Requirements [page 27].

3. Specify basic SAP System Parameters [page 41] for the ASCS instance to be created.

4. Set up the required file systems [page 62] for the ASCS instance to be created.

5. Check the prerequisites [page 91] and start the installer [page 95] on the host where the ASCS instance is to be created.

6. On the *Welcome* screen, choose ▶ *Generic Options* ❯ *Split Off ASCS Instance from Existing Central Instance* ❯.

7. Follow the instructions on the installer screens 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 entered all requested input parameters, the installer displays the *Parameter Summary* screen. This screen shows both the parameters that you entered and those that the installer set by default. If required, you can revise the parameters before starting the installation.

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

> ⚠ Caution
>
> All SAP system instances are stopped during the split procedure.

The installer starts the installation and displays the progress of the installation. When the installation has successfully completed, the installer shows the dialog *Execution of Split Off ASCS Instance from existing Central Instance has completed.*

9. 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 57].

10. Restart the application server instances [page 176] (central instance and dialog instances if they exist).

11. Check whether you can log on to the application servers [page 125].

12. Ensure user security [page 140] for the operating system users of the newly created ASCS instance.

13. If required, perform an installation backup [page 147].

7.12 Starting and Stopping SAP System Instances

Start or stop SAP system instances in one of the following ways:

- Using the SAP Management Console (SAP MC) [page 177]
- Using commands [page 180].

7.12.1 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).

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 Management Console, refer to SAP Note 1153713 .

- For more information about handling the SAP Management Console, see:

Release	SAP Help Portal Path
○ SAP NetWeaver 7.0 ○ SAP NetWeaver 7.0 including enhancement package 1 ○ SAP NetWeaver 7.0 including enhancement package 3	https://help.sap.com/viewer/p/SAP_NETWEAVER ▶ *SAP NetWeaver 7.0* `<Including Enhancement Package>` ▶ *Application Help* ▶ *SAP NetWeaver by Key Capability* ▶ *Solution Life Cycle Management by Key Capability* ▶ *SAP Management Console* ▶

Release	SAP Help Portal Path
SAP NetWeaver 7.0 including enhancement package 2	https://help.sap.com/viewer/p/SAP_NETWEAVER_702 ❯ ❯ *Application Help* ❯ *SAP NetWeaver by Key Capability* ❯ *Solution Life Cycle Management by Key Capability* ❯ *Solution Monitoring* ❯ *Monitoring in the CCMS* ❯ *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 following documentation:

Release	SAP Help Portal Path
○ SAP NetWeaver 7.0 ○ SAP NetWeaver 7.0 including enhancement package 1 ○ SAP NetWeaver 7.0 including enhancement package 2	https://help.sap.com/viewer/p/SAP_NETWEAVER ❯ ❯ *SAP NetWeaver 7.0 [including Enhancement Package* `<Number>`*]* ❯ *Application Help* ❯ *SAP NetWeaver by Key Capability* ❯ *Solution Life Cycle Management by Key Capability* ❯ *Solution Monitoring* ❯ *Monitoring in the CCMS* ❯ *SAP Microsoft Management Console: Windows* ❯
SAP NetWeaver 7.0 including enhancement package 3	https://help.sap.com/viewer/p/SAP_NETWEAVER_703 ❯ ❯ *Application Help* ❯ *SAP NetWeaver by Key Capability* ❯ *Solution Life Cycle Management by Key Capability* ❯ *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.

     > **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 credentials of the SAP system administrator. 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 central instance `DVEBMGS<Instance_Number>`.
  4. Start dialog 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 dialog instances `D<Instance_Number>`, if there are any.
  2. Stop the central instance `DVEBMGS<Instance_Number>`.

3. Stop the ABAP central services instance `ASCS<Instance_Number>`.
4. Stop the database instance.

7.12.2 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

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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.

7.13   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 *Preparing the Active Directory* in the Windows installation guide for your SAP system solution and database.

Procedure

1. Log on as user `<sapsid>adm`.
2. Enter:

   `ldappasswd pf=<Path_and_Name_of_Instance_Profile>`
3. Enter the required data.

   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`

7.14 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 (see also Exporting and Mounting Global Directories: Distributed and High-Availability Systems [page 88])

7.15 Deleting an SAP System or Single Instances

This section describes how to delete 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.

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> ⚠ 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. If there is a lock on one of the SAP system objects, the uninstall fails. Make also sure that all SAP-related processes are stopped.

  > i Note
  >
  > You do not have to stop the SAP Host Agent. The SAP Host Agent is stopped automatically during the uninstall process.

- Make sure that there are no open sessions by one of the SAP system users when starting the uninstall.

Context

> i Note
>
> With this installer option you do **not** delete the database software.

Note the following when deleting an SAP system:

- We strongly recommend that you delete an SAP system using the installer. To delete an SAP system manually, proceed as described in SAP Note 1229586 .
- You cannot delete an SAP system remotely.
- The installer deletes the database instance but not the database software. You have to delete the database software manually.
- 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 in 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.

Procedure

1. Start the installer as described in Running the Installer [page 95].
2. On the *Welcome* screen, choose: ▶ `<Product>` 〉 *Software Life-Cycle Options* 〉 *Uninstall* 〉 *Uninstall - System / Standalone Engine / Optional Standalone Unit* ◗
3. Follow the instructions in the installer input dialogs 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
Central system	You can delete a central system (where all instances reside on the same host), in one installer run.

Deletion of	Remarks
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:

1. Dialog instances, if there are any

> ⚠ Caution
>
> Do **not** select checkbox *Uninstall all instances of the SAP system from this host* if you do **not** want to uninstall the complete SAP system or standalone engine. For example, do not select this checkbox if you only want to uninstall a dialog instance of an existing SAP system distributed over several hosts. Otherwise the contents of mounted global directories under `/<sapmnt>/` `<SAPSID>/` , such as instance profiles and kernel executables, are also deleted.

2. Central instance
3. Database instance
   Choose whether you want to drop the entire database instance or only one or more database schemas.
   Since the installer only stops local instances automatically, make sure that before deleting the database instance of a distributed system, you stop all remaining instances. You must stop the instance with the message server only after having entered all installer parameters for the deletion of the database instance.
   Before deleting any database schema, make sure that:
   - You have performed a recent offline database backup.
   - You have stopped or deleted all SAP instances belonging to this database schema.
   - You only delete the tablespaces that belong to the selected schema.
     The database tablespace `PSAP<SCHEMA_ID>DB` belongs by default to the Java schema `SAP<SCHEMA_ID>DB`. All other SAP tablespaces belong to the ABAP schema `SAP<SCHEMA_ID>` (or `SAPR3` for older SAP systems).
4. Enqueue Replication Server
5. ABAP central services instance (ASCS instance)

> i Note
>
> To delete system directories mounted from an NFS server, you have to run the installer on the NFS server.

Deletion of	Remarks
Dialog instance	If you want to delete dialog instances of an existing SAP system, you have to run the installer to delete them **locally** on each dialog 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. Delete the Oracle database software with the Oracle Universal Installer (OUI).

   For more information, see Oracle Database Software Uninstallation [page 186].
6. If required, you can delete the directory `/usr/sap/trans` and its content manually.

   The installer does not delete `/usr/sap/trans` because it might be shared.
7. 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.
8. To remove obsolete SLD data, see *More on System Landscape Directory* at: 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*

7.16 Oracle Database Software Uninstallation

You have to deinstall the Oracle database software to complete the uninstallation of the %BC-DB-ORA-LONG% database instance.

Uninstalling the Oracle 19 Database Software [page 187]
   Here you find information about how to uninstall the Oracle 19 database software.

Uninstalling the Oracle 18 Database Software [page 187]
   Here you find information about how to uninstall the Oracle 18 database software.

Uninstalling the Oracle 12 Database Software [page 187]
   Here you find information about how to uninstall the Oracle 12 database software.

Uninstalling the Oracle 11 Database Software [page 187]
   This procedure tells you how to uninstall the database software, starting with Oracle Database 11g Release 2 (11.2).

7.16.1 Uninstalling the Oracle 19 Database Software

Here you find information about how to uninstall the Oracle 19 database software.

Procedure

Proceed as described in SAP Note 1915314 .

7.16.2 Uninstalling the Oracle 18 Database Software

Here you find information about how to uninstall the Oracle 18 database software.

Procedure

Proceed as described in SAP Note 1915314 .

7.16.3 Uninstalling the Oracle 12 Database Software

Here you find information about how to uninstall the Oracle 12 database software.

Procedure

Proceed as described in SAP Note 1915314 .

7.16.4 Uninstalling the Oracle 11 Database Software

This procedure tells you how to uninstall the database software, starting with Oracle Database 11g Release 2 (11.2).

Context

For more information, see SAP Note 1525025 .

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> ⚠ Caution
>
> Do **not** use RunInstaller or the new deinstall tool to remove an Oracle 11.2 database installation. The deinstall tool might not only delete the software from the Oracle home, but also other files (database files, logs, traces, configuration files, inventory) in `<ORACLE_BASE>`.
>
> Therefore, we strongly recommend you to use the procedure below to remove the 11.2 Oracle home software.

Procedure

1. Back up the central Oracle inventory, which is normally located at `$ORACLE_BASE`:

   OS> **`cd $ORACLE_BASE`**

   OS> **`zip -r oraInventory.zip oraInventory`**

2. Check whether Oracle home is registered in the central Oracle inventory:

   OS> **`$ORACLE_HOME/OPatch/opatch lsinventory -all -invPtrLoc $ORACLE_HOME/oraInst.loc`**

   If Oracle home is registered, it appears in the displayed `List of Oracle Homes`. Otherwise, opatch returns error code 73.

   Oracle home must be registered in order to detach it.

3. Detach Oracle home from the central Oracle inventory:

   OS> **`$ORACLE_HOME/oui/bin/runInstaller -silent -detachHome ORACLE_HOME=$ORACLE_HOME -waitForCompletion -invPtrLoc $ORACLE_HOME/oraInst.loc`**

   At the end of the procedure, you see the message:

   `'DetachHome' was successful`

4. Remove the Oracle home software from the file system:

   OS> **`rm -rf $ORACLE_HOME`**

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