Installation Guide | PUBLIC
Software Provisioning Manager 1.0 SP47
Document Version: 5.3 – 2026-05-26

Installation of SAP Systems Based on the Application Server ABAP of SAP NetWeaver 7.0 to 7.03 : MS SQL Server

Content

Document History

> **Note**
>
> Before you start reading, make sure you have the latest version of this installation guide, which is available at https://support.sap.com/sltoolset *System Provisioning* *Install a System using Software Provisioning Manager* *Installation Option of Software Provisioning Manager 1.0* .

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

Version	Date	Description
5.3	2026-05-26	Updated version for Software Provisioning Manager 1.0 SP47 (SL Toolset 1.0 SP47)
5.2	2026-02-09	Updated version for Software Provisioning Manager 1.0 SP46 (SL Toolset 1.0 SP46)
5.1	2025-10-06	Updated version for Software Provisioning Manager 1.0 SP45 (SL Toolset 1.0 SP45)
5.0	2025-05-26	Updated version for Software Provisioning Manager 1.0 SP44 (SL Toolset 1.0 SP44)
4.9	2025-02-10	Updated version for Software Provisioning Manager 1.0 SP43 (SL Toolset 1.0 SP43)
4.8	2024-10-07	Updated version for Software Provisioning Manager 1.0 SP42 (SL Toolset 1.0 SP42)
4.5	2024-05-27	Updated version for Software Provisioning Manager 1.0 SP41 (SL Toolset 1.0 SP41)
4.4	2024-02-12	Updated version for Software Provisioning Manager 1.0 SP40 (SL Toolset 1.0 SP40)

Version	Date	Description
4.3	2023-10-09	Updated version for Software Provisioning Manager 1.0 SP39 (SL Toolset 1.0 SP39) Windows operating systems no longer supported for Software Provisioning Manager 1.0 SP39 and higher, according to SAP Note 2998013, have been removed.
4.2.1	2023-10-09	Updated version for Software Provisioning Manager 1.0 SP38 (SL Toolset 1.0 SP38): Last version containing information about no longer supported Windows operating systems according to SAP Note 3346502.
4.2	2023-05-26	Updated version for Software Provisioning Manager 1.0 SP38 (SL Toolset 1.0 SP38)
4.1	2023-02-13	Updated version for Software Provisioning Manager 1.0 SP37 (SL Toolset 1.0 SP37)
4.0	2022-10-10	Updated version for Software Provisioning Manager 1.0 SP36 (SL Toolset 1.0 SP36) Operating systems and CPU architectures no longer supported according to SAP Note 2998013 have been removed.
3.9.1	2022-10-10	Updated version for Software Provisioning Manager 1.0 SP35 (SL Toolset 1.0 SP35): Last version containing information about no longer supported operating systems and CPU architectures according to SAP Note 2998013.
3.9	2022-05-24	Updated version for Software Provisioning Manager 1.0 SP35 (SL Toolset 1.0 SP35)
3.8	2022-02-14	Updated version for Software Provisioning Manager 1.0 SP34 (SL Toolset 1.0 SP34)

Version	Date	Description
3.7	2021-10-11	Updated version for Software Provisioning Manager 1.0 SP33 (SL Toolset 1.0 SP33)
3.6	2021-06-21	Updated version for Software Provisioning Manager 1.0 SP32 (SL Toolset 1.0 SP32)
3.5	2021-02-15	Updated version for Software Provisioning Manager 1.0 SP31 (SL Toolset 1.0 SP31)
3.4	2020-10-05	Updated version for Software Provisioning Manager 1.0 SP30 (SL Toolset 1.0 SP30)
3.3	2020-06-08	Updated version for Software Provisioning Manager 1.0 SP29 (SL Toolset 1.0 SP29)
3.2	2020-01-20	Updated version for Software Provisioning Manager 1.0 SP28 (SL Toolset 1.0 SP28)
3.1	2019-09-16	Updated version for Software Provisioning Manager 1.0 SP27 (SL Toolset 1.0 SP27)
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)
2.7	2018-05-07	Updated version for Software Provisioning Manager 1.0 SP23 (SL Toolset 1.0 SP23)

Version	Date	Description

2.6	2018-01-15	Updated version for Software Provisioning Manager 1.0 SP22 (SL Toolset 1.0 SP22)
		• New Features:
		  • Digital 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*
		  • Software Provisioning Manager Log Files Improvements, documented in: *New Features*, *Useful Information about the Software Provisioning Manager*, *Troubleshooting with the Software Provisioning Manager*
		  • 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-UI - has been deprecated with SP22. As of SP22, SL-UI is the only available GUI of the Software Provisioning Manager :

Version	Date	Description
		• The following sections which were explicitely related to Java SDT GUI were completely removed from this documentation: *Performing a Remote Installation Remote Processing of the Software Provisioning Manager (Java SDT GUI only)*, *Starting the Java SDT GUI Separately*, *Running the Software Provisioning Manager in Accessibility Mode* (general accessibility information was moved to *Useful Information About the Software Provisioning Manager*). • The Java SDT GUI-specific information was removed from the common Software Provisioning Manager sections: *Running the Software Provisioning Manager*, *Useful Information About the Software Provisioning Manager*, *Interrupted Processing of the Software Provisioning Manager*, *Troubleshooting with the Software Provisioning Manager*, *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 Software Provisioning Manager*.
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 Software Provisioning Manager*, *Preparing the Installation Media* .

Version	Date	Description
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-UI", documented in: *Prerequisites for Running the Software Provisioning Manager*, *Running the Software Provisioning Manager*, *Useful Information About the Software Provisioning Manager*
2.3	2017-02-07	Updated version for Software Provisioning Manager 1.0 SP19 (SL Toolset 1.0 SP19)
2.2	2016-10-10	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 Embedded SAP Web Dispatcher [page 25]
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
1.9	2015-10-12	Updated version
1.8	2015-09-14	Updated version
1.7	2015-04-27	Updated version
1.6	2014-11-24	Updated version
1.5	2014-07-07	Updated version
1.4	2014-03-17	Updated version

Version	Date	Description
1.3	2013-10-28	Updated version
1.2	2013-07-15	Updated version
1.1	2013-04-02	Updated version
1.0	2012-12-17	Initial version

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 Software Provisioning Manager 1.0 SP47, which is part of SL Toolset 1.0 SP47.

This guide 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 14].

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

> ⓘ 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/docs/SAP_LANDSCAPE_MANAGEMENT_ENTERPRISE.

> ⓘ 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 20] section before you continue with this installation guide.

Related Information

Naming Conventions [page 15]
Constraints [page 19]
Before You Start [page 20]
SAP Notes for the Installation [page 20]
New Features [page 16]

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 the Software Provisioning Manager 1.0 and terms used in this documentation.

- The Software Provisioning Manager 1.0 is the successor of the product- and release-specific delivery of provisioning tools, such as “SAPinst”. For consistency and better readability, tool names are capitalized throughout this document.
  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 60].
  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 Software Provisioning Manager 1.0 and 2.0.
  “SAPinst” has been renamed to “Software Provisioning Manager” in this documentation, but the terms “SAPinst” and “sapinst” are still used in:
  - The name of the technical framework of the Software Provisioning Manager. For more information about the SAPinst Framework, see SAP Note 3207613 (*SAPinst Framework 753 Central Note*).
  - Texts and screen elements in the Software Provisioning Manager's SL-UI
  - Names of executables, for example `sapinst.exe`
  - Names of command line parameters, for example `SAPINST_USE_HOSTNAME` or `SAPINST_STACK_XML`
- “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 16].
- “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.
- **Profiling for High Availability**

  Only valid for 'High Availability': HA (Windows)

  The profile bars with the wording *Only valid for: HA (Windows)* – for example, as in this section – refer to content that is only valid if you are installing a high-availability (HA) system with Microsoft Failover Clustering. The Windows Server Failover Clustering feature was previously called Microsoft Cluster Service (MSCS). For practical reasons we are continuing to use the abbreviation MSCS in the profile bars and in some sections of this guide.

  End of 'High Availability': HA (Windows)

1.3 New Features

This section provides an overview of the new features in the Software Provisioning Manager 1.0.

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
Certificate revocation list (CRL) required for SAPinst framework	Due to security requirements, a certificate revocation list (CRL) is required for the SAPinst framework of Software Provisioning Manager. For more information, see SAP Note 3207613 and Prerequisites for Running Software Provisioning Manager [page 72].	Software Provisioning Manager 1.0 SP42 (SL Toolset 1.0 SP42)
New SAPinst Framework Version 753	The SAPinst framework patch level has been upgraded from version 749 (SAP Note 2393060 *SAPinst Framework 749 Central Note*) to 753. For more information, see SAP Note 3207613 *SAPinst Framework 753 Central Note*.	Software Provisioning Manager 1.0 SP36 (SL Toolset 1.0 SP36)
Installation requirements for SAP kernels on Windows (C++ runtime environment, VCredist versions)	Manual subsequent installation of the VCredist files by customers may be required during the installation of SAP kernels that are based on specific versions. For more information, see Requirements for the SAP System Hosts [page 33].	Software Provisioning Manager 1.0 SP34 (SL Toolset 1.0 SP34)

Feature	Description	Availability
LOADTOOLS.SAR archive in Software Provisioning Manager	An up-to-date version of the load tools - such as `R3load`, `R3szchk`, `R3ldctl`, `SAPuptool` - which were available so far only in the `SAPEXEDB.SAR` archive of the kernel media, has now been made available in the Software Provisioning Manager archive contained in a LOADTOOLS.SAR archive. For more information, see SAP Note 2472835. For an installation using Unicode kernel version 7.40 or higher, the load tools from the `70SWPM10SP<Support_Package_Number>_<Version_Number>.SAR` are used automatically. The LOADTOOLS.SAR archive in Software Provisioning Manager is also enabled for **non**-Unicode (NUC) SAP kernel version 7.40 or higher. For more information, see Downloading and Extracting the Software Provisioning Manager 1.0 Archive [page 61]	Software Provisioning Manager 1.0 SP32 (SL Toolset 1.0 SP32)
Switch from 7.21_EXT Kernel to 7.22_EXT Kernel	Kernel 7.21 has reached end of maintenance. In addition, some issues have been fixed with the new 7.22_EXT kernel media.	Software Provisioning Manager 1.0 SP31 (SL Toolset 1.0 SP31)
New Look and Feel of SL-UI	As of version 1.0 SP24 Patch Level 5, the Software Provisioning Manager has an updated look and feel of the SL-UI. 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)
Software Provisioning Manager Log Files Improvements	The Software Provisioning Manager log files are now available immediately after the Software Provisioning Manager has been started, that is **before** a product has been selected on the *Welcome* screen. For more information, see Useful Information About Software Provisioning Manager [page 78] and Troubleshooting with Software Provisioning Manager [page 89].	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 Software Provisioning Manager 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 135].	Software Provisioning Manager 1.0 SP22 (SL Toolset 1.0 SP22)
Media Signature Check	The digital signature of media is checked **automatically** by the Software Provisioning Manager during the *Define Parameters* phase while processing the *Media Browser* screens. The Software Provisioning Manager only accepts media whose digital signature has been checked. For more information, see Preparing the Installation Media [page 60] and Running Software Provisioning Manager [page 73].	Software Provisioning Manager 1.0 SP21 (SL Toolset 1.0 SP21)
SL-UI with SAPINST 7.49	With the new Software Provisioning Manager framework version SAPINST 7.49, you can now use the new SAPUI5-based graphical user interface (GUI) "SL-UI". For more information, see Useful Information About Software Provisioning Manager [page 78], Running Software Provisioning Manager [page 73] .	Software Provisioning Manager 1.0 SP20 (SL Toolset 1.0 SP20)

Feature	Description	Availability
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 61]. 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 Embedded SAP Web Dispatcher [page 25]	Software Provisioning Manager 1.0 SP18 (SL Toolset 1.0 SP18)
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)
Windows Domain Organizational Units	You can now specify an optional organizational unit (OU) within the Windows domain where you want the Software Provisioning Manager to create the SAP system accounts. For more information, see SAP System Parameters [page 40]	Software Provisioning Manager 1.0 SP09 (SL Toolset 1.0 SP14)
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 Software Provisioning Manager [page 73].	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)

1.4 Constraints

This section lists the naming constraints that are currently valid for the Software Provisioning Manager 1.0 and this documentation.

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

- Your operating system platform must be **64-bit**.
- Effective immediately, the Software Provisioning Manager no longer supports the deprecated Windows operating system versions 2998013 listed in SAP Note 2998013.

  > **Note**
  >
  > - If your current operating system is listed as deprecated in SAP Note 2998013, we strongly recommend that you migrate to a supported platform.
  > - If you continue to run Software Provisioning Manager on the deprecated Windows operating system versions listed in SAP Note 2998013, you do so at your own risk and without support from SAP. The Software Provisioning Manager 1.0 SP39 and higher will still run on the deprecated Windows operating system versions listed in SAP Note 2998013 but it may run into an error. When you start the Software Provisioning Manager, you will see a warning like the following: *"Platform Support : Support for SAP JVM on Windows Server 2012 (R2) ends October 31th, 2023. See SAP note 2998013."* If you run into an issue, you must use the "frozen" Software Provisioning Manager **1.0 SP38** software and the related installation guide. For more information, see SAP Note 3346502.

- Effective immediately, the Software Provisioning Manager no longer supports the deprecated operating system versions 2998013 listed in SAP Note 2998013.

  > **Note**
  >
  > - If your current operating system is listed as deprecated in SAP Note 2998013, we strongly recommend that you migrate to a supported platform.
  > - If you continue to run Software Provisioning Manager on the deprecated operating system versions listed in SAP Note 2998013, you do so at your own risk and without support from SAP. The Software Provisioning Manager 1.0 SP36 and higher will still run on the deprecated operating system versions listed in SAP Note 2998013 but it may run into an error. When you start the Software Provisioning Manager, you will see a warning like the following: *"Platform Support : Support for SAP JVM on Windows Server 2008 (R2) ends January 14th, 2022. See SAP note 2998013."* If you run into an issue, you must use the "frozen" Software Provisioning Manager **1.0 SP35** software and the related installation guide. For more information, see SAP Note 3220901.

- End of maintenance for SAP NetWeaver 7.0x Application Server **Java**

  > **Note**
  >
  > SAP NetWeaver 7.0x Application Server **Java** reached end of maintenance by the end of 2017. SAP recommends upgrading to a more recent version. For more information, see SAP Notes 1648480 and 2595196. Therefore, the last published version of the Java and dual-stack guides for the last Software Provisioning Manager 1.0 SP22 tool release are no longer available via the common access pages. You can access them via SAP Note 2595196.

1.5 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* ▶
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* ▶

1.6 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
1718413	Inst. SAP Systems Based on SAP NetWeaver 7.0 incl. EHPs: Windows	Windows-specific information about the SAP system installation and corrections to this documentation.
1718414	Inst. SAP Systems Based on SAP NetWeaver 7.0 incl. EHPs: SQL Server	MS SQL Server-specific information about the SAP system installation and corrections to this documentation
73606	Supported Languages and Code Pages	Information on possible languages and language combinations in SAP systems
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.
2384179	Planned support of Windows Server 2016 for SAP products	Support of Windows Server 2016 specific for SAP Products information for the SAP system information.
2751450	SAP Systems on Windows Server 2019	Windows Server 2019-specific information for the SAP system installation
3143497	SAP Systems on Windows Server 2022	Windows Server 2022-specific information for the SAP system installation

SAP Note Number	Title	Description
3579834	SAP Systems on Windows Server 2025	Windows Server 2025-specific information for the SAP system installation
1553465	Installation requirements for SAP kernels on Windows (C++ runtime environment, VCredist versions)	Information about VCredist version

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.

2.1 Central System

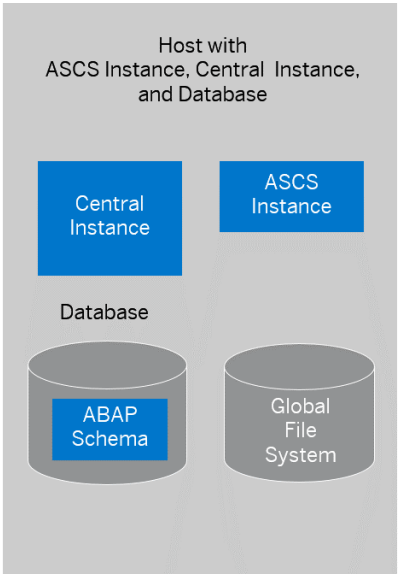
You can install a **central** system on a **single** host.

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 134].
  - Optionally you can install the ASCS instance with an embedded SAP Web Dispatcher. For more information, see ASCS Instance with Embedded SAP Web Dispatcher [page 25].
- Database instance (DB instance)
- Central instance

Additionally, you can install one or more dialog instances. For more information, see Dialog Instance [page 27].

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

  > **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 134].

  Optionally, you can install the ASCS instance with an embedded SAP Web Dispatcher. For more information, see ASCS Instance with Embedded SAP Web Dispatcher [page 25].
- Database instance (DB instance)
- Central instance

Optionally, you can install one or more dialog instances. For more information, see Installation of a Dialog Instance [page 27].

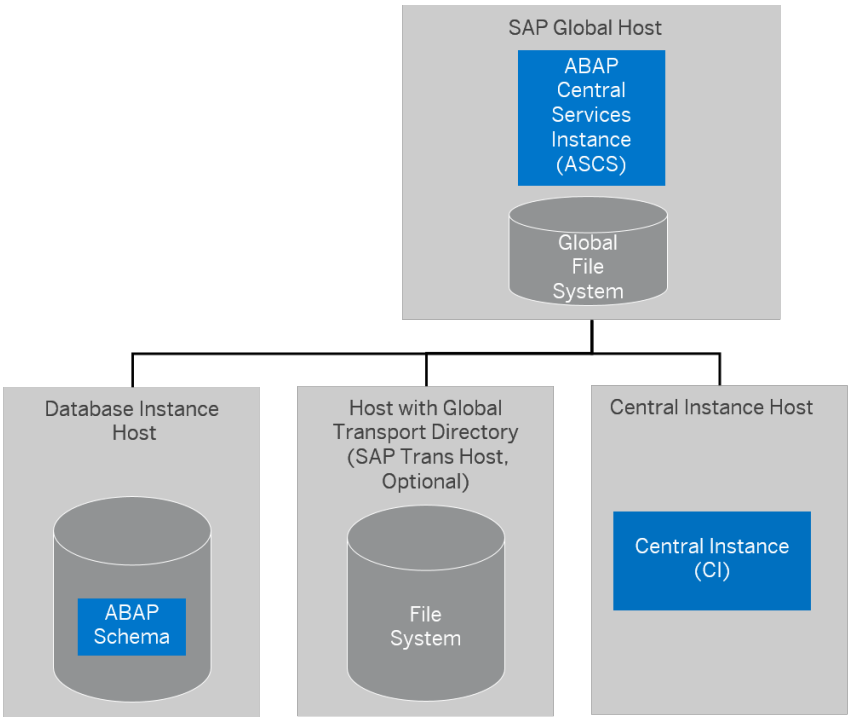
The following figure assumes the following:

- The ASCS instance runs on the SAP global host.
- The central instance runs on a separate host.

  > **Note**
  >
  > You can also install the central instance on the SAP global host.

If there is no ASCS instance installed, the central instance is installed on the SAP global host.

- The transport directory resides on a separate SAP transport host.



Distributed ABAP System

2.3 High Availability System

This topic is only valid for 'High Availability': HA (Windows)

For more information about the system components you have to install and how to distribute them on the specific hosts, see System Configuration in Microsoft Failover Clustering [page 153].

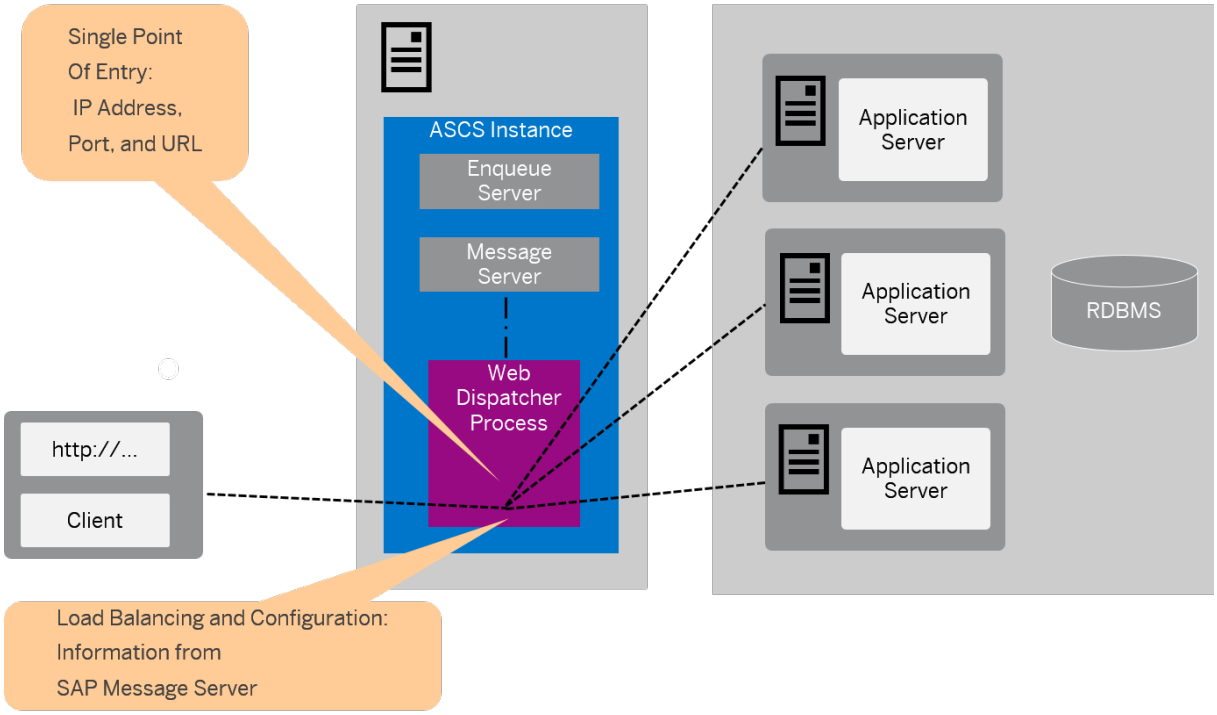
End of 'High Availability': HA (Windows)

2.4 ASCS Instance with Embedded SAP Web Dispatcher

You can install an SAP Web Dispatcher embedded 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.

> **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.



ASCS Instance with Embedded 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 Capability** ▶ *Solution Life Cycle Management by Key Capability* ▶ *System Management* ▶ *SAP Web Dispatcher*

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
- On a dedicated host

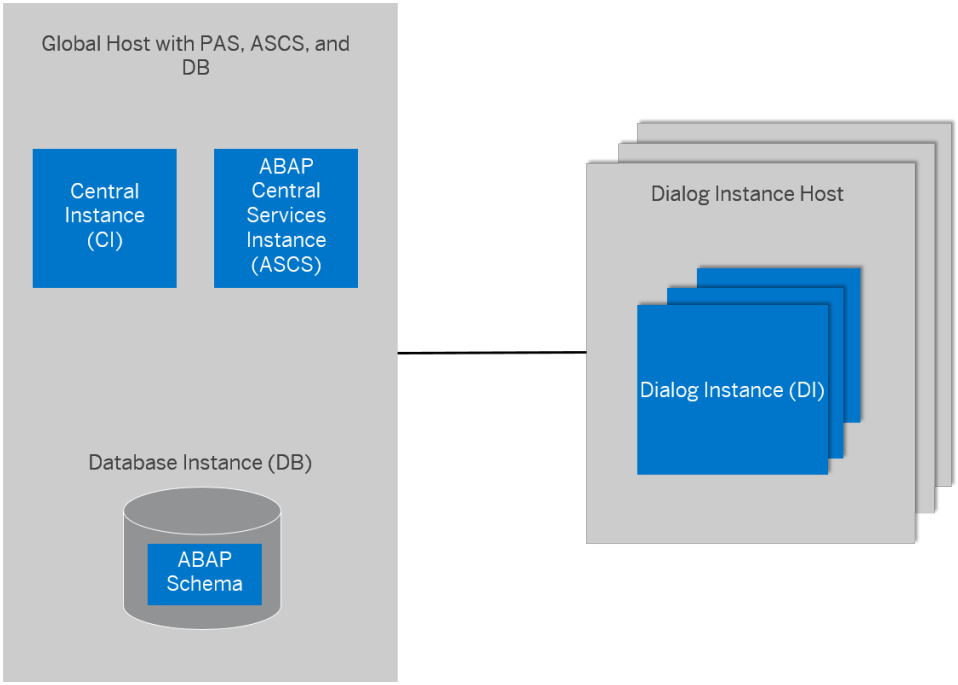
> ⓘ Note
>
> We do not recommend installing dialog instances on the SAP global host.

If you want to install a dialog instance on an existing SAP system, you must perform a domain installation. You must also make sure that your existing SAP system was installed as a domain installation. For more information, see Domain or Local Installation [page 47].

> ⓘ 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 Software Provisioning Manager determines if a non-Unicode system exists and chooses the correct executables for the system type.

Dialog Instance for a Central System

The following figure shows dialog instances that are running on dedicated hosts.

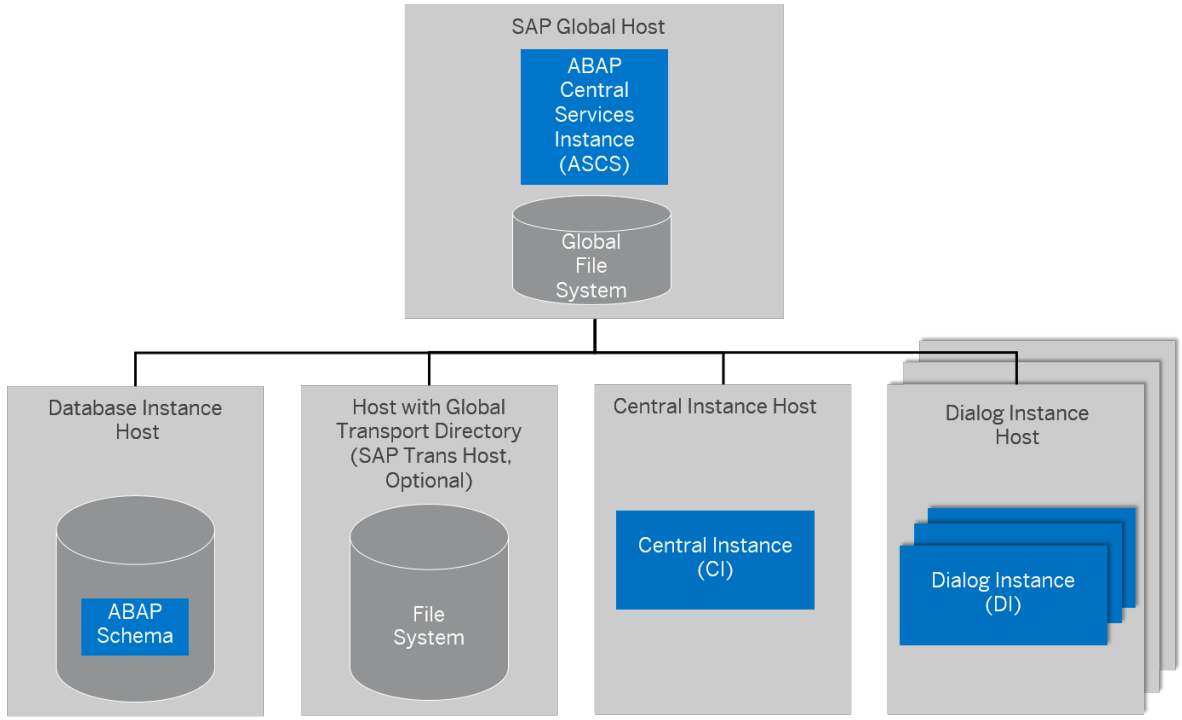


Dialog Instance for a Central ABAP System

For more information, see Central System [page 23].

Dialog Instance for a Distributed System

The following figure shows dialog instances that are running on dedicated hosts.



Dialog Instance for a Distributed ABAP System

For more information, see Distributed System [page 24].

Only valid for 'High Availability': HA (Windows)

Dialog Instance for a High-Availability System

In a high-availability system, you require at least one dialog instance apart from the central instance. For more information about how to install and distribute the application servers in an HA configuration, see System Configuration in Microsoft Failover Clustering [page 153].

End of 'High Availability': HA (Windows)

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 20].
2. You have decided on your installation option (see Installation Options Covered by this Guide [page 23]).

Central, Distributed, or High-Availability System

> **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 31] 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 39].
4. You decide whether you want to perform a domain or local installation [page 47].
5. For the database installation, you decide how to distribute your database components to disk [page 48].
6. You decide on the transport host to use [page 51].
7. Only valid for 'High Availability': HA (Windows)
   To install a high-availability system with **Microsoft Failover Clustering**, you perform the HA-specific planning steps [page 151].
   End of 'High Availability': HA (Windows)
8. Continue with Preparation [page 53].

Dialog Instance

1. You check the hardware and software requirements [page 31] for the installation host on which you want to install one or more dialog instances.
2. You identify Basic SAP System Installation Parameters [page 39].
3. Continue with Preparation [page 53].

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.

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 32].
     - Integrated in the Software Provisioning Manager (mandatory) **during** the installation process
       For more information, see Running the Software Provisioning Manager [page 73].
   - The hardware and software requirements tables in Requirements for the SAP System Hosts [page 33]
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 Software Provisioning Manager 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 60].
2. Start the Software Provisioning Manager as described in Running the Software Provisioning Manager [page 73].
3. On the *Welcome* screen, choose ▶ `<Product>` ▶ *Software Life-Cycle Options* ▶ *Additional Preparation Options* ▶ *Prerequisites Check* ▶.
4. Follow the instructions in the Software Provisioning Manager dialogs and enter the required parameters.

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

   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

This section provides information about the hardware and software requirements for the:

- ABAP central services instance (ASCS)
- Enqueue Replication Server instance (ERS)
- Central services instance (SCS)
- Database instance
- Central instance
- Dialog instance

> **Note**
>
> The dialog instance is optional in a non-HA system, but mandatory in an HA system.

- SAP Host Agent

Only valid for 'High Availability': HA (Windows)

General Requirements for a High-Availability System

- You must validate your failover cluster configuration by running the command `test-cluster` in a PowerShell.
  The *Failover Cluster Validation Report* must not show any errors.
- The cluster nodes of the cluster must be connected by a private and public network:
  - The public network enables communication from the cluster nodes of the cluster to other resources in the local area network (LAN).
  - The private network enables internal communication between the cluster nodes. In particular, it enables the Cluster Service running on all cluster nodes to regularly exchange messages on the state of the cluster nodes so that the failure of resources is quickly detected.
- Each of the cluster nodes in the cluster must have its own local disks and have access to shared disks that can be reached by the cluster nodes via a shared bus.
  All software – except the Windows operating system, the MS SQL server binaries, and the failover cluster software – is stored on the shared disks.
  One of the shared disks must be used exclusively by the quorum (if a single quorum device cluster is used) that stores the cluster registry and records information about the state of the cluster.
  You require at least four shared disks.
  For more information about the distribution of components to local and shared disk, see Distribution of SAP System Components to Disks for Failover Clustering [page 160].
- All disk controllers must be able to support hardware-based RAID.

> **Caution**
>
> You **cannot** use a host with a domain controller as a cluster node.

End of 'High Availability': HA (Windows)

Hardware and Software Requirements

The following tables show the hardware and software requirements. Most of the requirements are valid for every installation host whereas some requirements are instance-specific and are marked accordingly.

> **Note**
>
> - The listed values are sufficient for **development systems** or **quality assurance systems** but not for **production systems**.
> - If you install several SAP instances on one host, you need to add up the requirements.
> - Only valid for 'High Availability': HA (Windows)
>
>   If you install **multiple** SAP systems in one Microsoft failover cluster, make sure that together with your hardware partner you have set up the correct sizing for your system configuration.
>
>   End of 'High Availability': HA (Windows)
> - For up-to-date information on the released and supported operating system and database versions for your SAP product, see the *Product Availability Matrix (PAM)* at: http://support.sap.com/pam.

Hardware Requirements

Hardware Requirement	Requirement	How to Check
Minimum disk space	• Database software: 4 GB • ABAP central services instance (ASCS) (not including paging file): 5 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 productive use of the SAP Web Dispatcher, you need to reserve at least 5 GB. • Database instance (not including paging file): Only valid for 'Software Component': SAP NetWeaver 18 GB End of 'Software Component': SAP NetWeaver Only valid for 'Software Component': SAP ERP 48 GB End of 'Software Component': SAP ERP Only valid for 'Software Component': SAP SCM 20 GB End of 'Software Component': SAP SCM Only valid for 'Software Component': SAP SRM 32 GB End of 'Software Component': SAP SRM Only valid for 'Software Component': SAP CRM 30 GB End of 'Software Component': SAP CRM • Only valid for 'High Availability': HA (Windows) **High Availability only:** Enqueue replication server instance (ERS) (not including paging file): 5 GB End of 'High Availability': HA (Windows) • Central instance (not including paging file): 5 GB	To check disk space: 1. Open PowerShell in elevated mode, and enter the following command: `get-volume` 2. Check the value *SizeRemaining* of the disk you want to install on.

Hardware Requirement	Requirement	How to Check
	• In addition, you require 4 GB RAM per additional platform. • Dialog instance (not including paging file): 2.5 GB • SAP Host Agent: 256 MB • Temporary disk space for every required installation medium that you have to copy to a local hard disk: Up to 6 GB	
Minimum RAM	• All instances, except SAP Host Agent: 8 GB If you install the ASCS instance with an integrated SAP Web Dispatcher, see SAP Note 2007212 for memory consumption in productive use. • SAP Host Agent: 0.5 GB	To check RAM: Open PowerShell in elevated mode, and enter the following command: `Get-WmiObject Win32_ComputerSystem`
Paging file size	For more information, see SAP Note 1518419.	To check paging file size: For more information, see Checking and Changing the Paging File Settings on Windows Server [page 125]
Processing units	For application server instances and database instances: The number of physical or virtual processing units usable by the operating system image must be equal to or greater than 2. For an ASCS instance running on a separate host: One physical or virtual processing unit usable by the operating system image might be sufficient. Examples of processing units are processor cores or hardware threads (multithreading). In a virtualized environment, ensure that adequate processor resources are available to support the workloads of the running SAP systems.	–

Hardware Requirement	Requirement	How to Check
Suitable backup system	–	–

Software Requirements

Software Requirement	Requirement	How to Check

Windows operating system	• **64-bit version** of one of the following Windows Server Editions of a supported Windows operating system:
	  • Windows Server Standard Edition
	  • Windows Server Datacenter Edition
	
	⚠ Caution
	Make sure that you install the **English** language pack so that your support requests can be handled quickly.
	• For any version of Windows Server, you need the latest supported service pack
		To check your Windows version:
		
		Open PowerShell in elevated mode, and enter the following command:
		
		`Get-WmiObject Win32_OperatingSystem | select caption`
		
		Only valid for 'High Availability': HA (Windows)
		
		ⓘ Note
		High Availability only:
		You must add the operating system feature *Failover Clustering* on **all** cluster nodes.
		
		End of 'High Availability': HA (Windows)

Database software	• ABAP central services instance (ASCS), Central services instance, or dialog instance:
	  • SQL Server Native Access Client (SNAC) software
	  • Latest service pack and hotfix, or cumulative update if available
	For more information, see SAP Note 62988.
	• Database instance:
	  • SQL Server Enterprise Edition: Server Software
	  • Latest service pack and hotfix, or cumulative update, if available.
	For more information, see SAP Note 62988.
	  • Unicode collation SQL_Latin1_General_CP850_BIN2
		–

Software Requirement	Requirement	How to Check
Important information about the delivery of Microsoft Visual C++ redistributables (VCredist) versions with Software Provisioning Manager 1.0	The Software Provisioning Manager 1.0 no longer delivers any VCredist versions that are no longer in maintenance by the manufacturer Microsoft. SAP cannot therefore assume maintenance responsibility for these 3rd party components At the time of delivery, this affects VCredist 2005 and 2010. As a result, a manual subsequent installation of the VCredist files by the customer may be required during the installation of SAP kernels that are based on these specified versions. For more information, see SAP Note 1553465 - *Installation requirements for SAP kernels on Windows (C++ runtime environment, VCredist versions)*	–
Windows regional settings	*English (United States)* must be set by default. For more information about localized Windows versions, see SAP Note 362379. You can install additional languages but the default setting for new users must always be *English (United States)*.	Choose *Start* > *Control Panel* > *Clock, Language, and Region* > *Language*.
Minimum Web Browser	Make sure that you have at least one of the following web browsers installed on the host where you run the Software Provisioning Manager 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-UI, and to display the Evaluation Form and send it to SAP.	Choose *Start* > *Control Panel* > *Programs and Features*.

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 71]

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 Software Provisioning Manager 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 Software Provisioning Manager 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.

  > ⓘ Note
  >
  > If you want to ASCS Instance with Embedded SAP Web Dispatcher [page 25], you must choose *Custom*. Otherwise, you are not prompted for the SAP Web Dispatcher installation parameters [page 47] during the *Define Parameters* phase.

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

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 Software Provisioning Manager screens.

Related Information

SAP System Parameters [page 40]
SAP System Database Parameters [page 46]
Additional Parameters for an SAP Web Dispatcher Installation Embedded in the ASCS Instance (Optional) [page 47]

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 Software Provisioning Manager 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 Software Provisioning Manager checks whether a non-Unicode system exists and chooses the right executables for the system type.

Parameter	Definition
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.
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. Only valid for 'High Availability': HA (Windows) **ⓘ Note** If you install the central instance and the dialog instances on the cluster nodes of a Microsoft failover cluster, SAPinst by default assigns the same instance number. If you install the central instance and the dialog instances on hosts that are not part of a Microsoft failover cluster, we recommend that you use the same instance number for them. If the instance number is already used on other hosts, you have to assign a different instance number for the central instance and the dialog instances. End of 'High Availability': HA (Windows) To find out the instance numbers of SAP systems that already exist on the installation host, look for subdirectories ending with <Instance_Number> of local \usr\sap\<SAPSID> directories. For more information, see SAP Directories [page 117]. **⚠ Caution** Do **not** use 43, and 89 for the instance number because: • 43 is part of the port number for high availability • 89 is part of the port number for Windows Terminal Server

Parameter	Definition
SAP System Profile Directory	`\\<SAPGLOBALHOST>\sapmnt\<SAPSID>\SYS\profile` The Software Provisioning Manager 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 Software Provisioning Manager 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*.
Master Password	Common password for all users created during the installation: **Note** If a user already exists, you are prompted to confirm the password for this user. **Basic Password policy** The master password must meet the following requirements: • It must be 8 to 30 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 Windows:** • If a user already exists, you are prompted to confirm the password for this user. • Depending on the configuration of the password policy, additional restrictions might apply. Depending on the installation option, additional restrictions may apply. **→ Recommendation** The Master Password feature can be used as a simple method to obtain customer-specific passwords for all newly created users. A basic security rule is not to have identical passwords for different users. Following this rule, we strongly recommend individualizing the values of these passwords after the installation is complete. For more information, see Ensuring User Security [page 108].

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.

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

Password of Operating System Users	The passwords of the operating system users **must** comply with the Windows password policy. The Software Provisioning Manager processes the passwords of operating system users as follows:
	
	• If the operating system users do **not** exist, the Software Provisioning Manager creates the following users:
	  • `<sapsid>adm`
	  This user is the SAP system administrator user and is a member of the local `Administrators` group.
	  • `SAPService<SAPSID>`
	  This user is the Windows account to run the SAP system and is **not** a member of the local `Administrators` group.
	  • `sapadm`
	  The SAP Host Agent user `sapadm` is used for central monitoring services. The Software Provisioning Manager creates this user by default as a local user without being a member of the local `Administrators` group.
	  If required, you can change this user to become a domain user on the *Parameter Summary* screen. For more information, see Performing a Domain Installation Without Being a Domain Administrator [page 124]. For security reasons, however, SAP strongly recommends to create this user as a local user.
	The Software Provisioning Manager 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 Software Provisioning Manager prompts you for the existing password, except if the password of these users is the same as the master password.
	
	Note
	This does not apply if the `<dasid>adm` user already exists. The Software Provisioning Manager prompts you for the password even if the password of this user is the same as the master password.
	
	Caution
	Make sure that you have the required user authorization [page 57] for these accounts before you start the installation with the Software Provisioning Manager.

Parameter	Definition
Windows Domain Organizational Units	You can choose the organizational units (OUs) within the Windows domain where you want to create the SAP system accounts. By default, the Software Provisioning Manager creates the domain users `SAPService<SAPSID>`, `<SAPSID>adm`, and the domain group `SAP_<SAPSID>_Globaladmin` in the domain Users container. Here you can specify an optional organizational unit where the Software Provisioning Manager creates these domain users and group. The user who performs the installation needs read and write permissions to this organizational unit. The OU feature is only available when you select *Custom mode* in SWPM and choose *Use Domain of current user*. For more information, see SAP Note 2247673.

3.4.2 SAP System Database Parameters

Parameters	Description

Database ID `<DBSID>`	The `<DBSID>` identifies the database instance. The Software Provisioning Manager prompts you for the `<DBSID>` when you are installing the database instance.
	
	The `<DBSID>` must 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.

Database instance name	MS SQL Server instance name You can also specify a remote database instance. **Dependencies** For a named instance, enter `<hostname>\<Instance_Name>`. In a high-availability environment, enter the virtual host name.

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

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

> **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 Software Provisioning Manager. You have to assign a password for this user.

Related Information

ASCS Instance with Embedded SAP Web Dispatcher [page 25]

3.5 Domain or Local Installation

Use

Before you install the SAP system, you have to decide whether you want to perform a **domain** or **local** installation, since this affects how the user account information is stored and accessed.

For more information about the differences between a local and domain installation, go to *Start* > *Help and Support* and search for *What is the difference between a domain and a workgroup?*.

Domain Installation

In a domain installation, the user account information is stored centrally in one database on the domain controller and is accessible by all hosts in the system.

You have to perform a domain installation if one of the following applies:

- You install a system distributed over several hosts.
- Only valid for 'High Availability': HA (Windows)
  You install a high-availability system with Microsoft Failover Clustering.
  End of 'High Availability': HA (Windows)
- You use a common transport host for several SAP systems running on different computers.

Local Installation

In a local installation, all Windows account information is stored locally on one host and is not visible to any other hosts in the system.

If the SAP system is to run on a **single** machine (central system), you can perform a local installation.

> ### Note
>
> If your SAP system was installed as a local installation and you want to later change to a domain installation, you can use the system rename option. For more information, see the *System Rename Guide* for your SAP system at:
>
> https://support.sap.com/sltoolset *System Provisioning*

More Information

Required User Authorization for the Installation [page 57]

3.6 Distribution of SAP System 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 Software Provisioning Manager 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 obtain 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.

The table below gives you an overview of the main SAP system components, directories, and their purpose.

A good distribution to disks ensures that:

- Enough free space is available for system growth.
- The data is secure.

- Performance is good.

System Components and their Directories

Directory Type	Directory Structure	Description
SAP System	`\usr\sap` `\usr\sap\trans`	SAP kernel and related files SAP transport directory
Database Management System (DBMS)	`\Program Files\Microsoft SQL Server`	SQL Server program files including the `master`, `msdb`, and `tempdb` database files.

SAP Database	`\<SAPSID>DATA0`
	`\<SAPSID>DATA1`
	`\<SAPSID>DATA2`
	`\<SAPSID>DATA3`
	`...`
	`\<SAPSID>DATA<N>`
		Database data files 1– <N>

SAP Database Transaction Log	`\<SAPSID>log<N>`	Database transaction log files

Database Components

When you install an SAP system with MS SQL Sever, the central components of the database are the SQL Server **program files**, **tempdb files**, **SAP database data files** and **SAP database transaction log files**. The log files record all the changes made to the database to enable restore and recovery. The `tempdb` holds all temporary tables and stored procedures. The data files contain the data for the SAP system.

- SAP Database Data Files
  The data files are created by default in the directories `\<SAPSID>DATA<N>` on the disk with the most free available space. The first data file is called `<SAPSID>DATA0.mdf` and subsequent files `<SAPSID>DATA<N>.ndf`, where `<N>` denotes the number of the file.
  For performance reasons, locate the data files on a separate disk system. They should not be included in the same disk system as the log files or other SQL Server program and database files. To ensure data redundancy, we recommend the use of at least RAID 5.
- Transaction Log File
  The transaction log for the database is created by default in the directory`\<SAPSID>LOG1` on the disk with the most free available space. The log file is called `<SAPSID>LOG1.ldf`.
  The transaction log file records all the changes made to the database and, if required, enables modifications to be redone or undone. It plays a crucial role when the database has to be restored due to database damage or media failure. For this reason it should be stored very securely. We recommend the use of RAID 1, which implements hardware-based mirroring.
- Program Files
  The files other than the SAP database data and transaction log files are created in the subdirectories of `\Program Files\Microsoft SQL Server`. These include the SQL Server program files and the

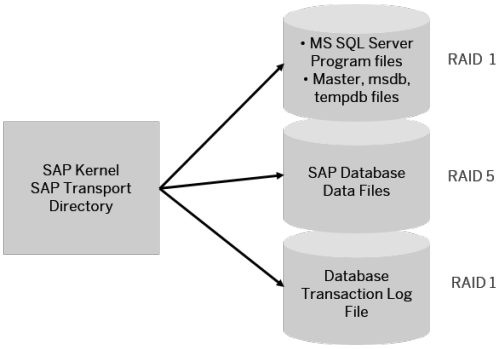
`master`, `msdb`, and `tempdb` database files. Locate these on a separate, third, disk system and not on the same disks as the transaction log files or SAP database data files. We recommend the use of RAID 1.
For performance reasons, it is advisable to place the `tempdb` files on a fast disk system. This is particularly recommended because the `tempdb` is frequently accessed during SQL Server operation and could otherwise affect performance.

> ### Note
>
> After the initial installation of the database software, the `tempdb` is located in a subdirectory of `\Program Files\Microsoft SQL Server`. However later, when the Software Provisioning Manager builds and loads the database, it is transferred to a new `\TEMPDB` directory and extended to a size of 300 MB.

Distribution of Main Directories to RAID Array

The following graphic illustrates how the main directories that are created during the installation can be distributed to RAID arrays. The distribution is suitable for an average-sized production system. Keep in mind that this is only an example and that no single solution is fitting for all environments.

> ### Note
>
> The SAP kernel files and the transport directory can be assigned to any of the arrays depicted, but must both be located on the same array. The transport directory does not necessarily have to reside on the central instance host.



Distribution of Components to RAID Arrays

Distribution of Directories to Arrays

Array 1	`\Program files\Microsoft SQL Server`
	`\TEMPDB`

Array 2	\<SAPSID>DATA0 \<SAPSID>DATA1 \<SAPSID>DATA2 \<SAPSID>DATA3 ... \<SAPSID>DATA<N>
Array 3	\<SAPSID>log1

Optimizing Performance

If you wish to optimize performance, isolate the `tempdb` on a separate, fast disk. This improves performance significantly because the `tempdb` is continually accessed during MS SQL Server operation.

A further option for improving performance is to place the Windows paging file on a separate, fast disk.

3.7 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 Software Provisioning Manager creates during the installation of the SAP system by default on the global host in `<Drive>:\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 [page 59].

More Information

- SAP Directories [page 117]
- 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*

Cycle Management > *Software Logistics* > *Change and Transport System* > *Change and Transport System – Overview* > *Basics of the Change and Transport System* > *Transport Management System – Concept*

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

> **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. Disable the Windows Server firewall [page 54] operating system users and groups on each host.
2. You perform basic preparations on Windows [page 55].
3. You check that you have the required user authorization for running the Software Provisioning Manager [page 57].
4. If required, you set up virtual host names [page 58].
5. If required, you prepare the SAP system transport host [page 59] for your SAP system.
6. You install the SAP frontend software [page 60] on the desktop of the end user.
7. You check that the required installation media [page 60] are available on each host.
8. Only valid for 'High Availability': HA (Windows)
   To install a high-availability system with Microsoft Failover Clustering, you also perform the HA-specific preparation tasks [page 151].
   End of 'High Availability': HA (Windows)
9. Continue with Installation [page 69].

Dialog Instance

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

1. Disable the Windows Server firewall [page 54] operating system users and groups on each host.

2. You perform basic preparations on Windows [page 55].
3. You check that you have the required user authorization for running the Software Provisioning Manager [page 57].
4. If required, you prepare the SAP system transport host [page 59] for your SAP system.
5. You check that the required installation media [page 60] 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 132].
7. Continue with Installation [page 69].

4.2 Disabling the Windows Server Firewall on Windows Server

The Windows firewall – which is turned on by default on all Windows versions – is configured to allow only a small set of Windows-specific inbound IP connections. By default, outbound connections are not limited to rules and are therefore not restricted by the firewall.

The firewall settings apply to local policies. For domain policies that override local policies, other rules might apply.

To avoid any problems with non-configured TCP/IP ports that are used by the SAP system, you need to disable the firewall on all Windows hosts before you install the SAP system with the Software Provisioning Manager. We recommend that you secure network access to the SAP application servers with a real physical firewall or use a router Access Control List (ACL).

Procedure

Only valid for 'High Availability': HA (Windows)

> **Note**
>
> In a high-availability system, you have to disable the firewall on **all** failover cluster nodes.

End of 'High Availability': HA (Windows)

Open PowerShell in elevated mode, and enter the following command:

```
Set-NetFirewallProfile -enabled false
```

4.3 Performing Basic Windows Preparation Steps

Use

This section informs you about basic preparation steps that you have to perform before you install the SAP system, including the following:

- Deactivate the file and directory attribute caches
- Checking the Windows file system
- Checking the Windows domain structure (domain installation only)
- Deciding whether you want to use organizational units (OUs) in the Windows domain (domain installation only)

Procedure

Deactivate the File and Directory Attribute Caches

You need to set the following three file and directory attribute caches to 0:

For more information, see 3358301.

Perform as follows:

1. Open PowerShell
2. Enter the following three commands:
   - Set-SmbClientConfiguration -FileInfoCacheLifetime 0
   - Set-SmbClientConfiguration -FileNotFoundCacheLifetime 0
   - Set-SmbClientConfiguration -DirectoryCacheLifetime 0

Checking the Windows File System

You need to check which Windows file system you are using on hosts where you want to install the SAP system.

You should use the Windows file system ReFs or NTFS. Older Windows Server versions must use NTFS.

> ⓘ Note
>
> Do **not** install the SAP system on a FAT partition.

Perform the check as follows:

- Use PowerShell:
  1. Open PowerShell in elevated mode, and enter the following command:
     ```
     get-volume
     ```
  2. Check that the value *FileSystem* is ReFs or NTFS.
- Use Windows Explorer:
  1. Open the Windows Explorer.
  2. Select the relevant disk.

3. Choose *Properties* > *General*.
   The system displays the type of file system in use.
4. Check that the file system is NTFS.

Checking the Windows Domain Structure

> **Note**
>
> You do **not** need this step for a local installation.

For a domain installation, we recommend that you check that all SAP system hosts are members of a single Windows domain. We recommend this for all SAP system setups.

We assume that you are familiar with checking Windows domain structures. For more information, see the Windows documentation.

In Windows, you can implement either of the following domain models for the SAP system:

- Extra domain
  In this model, the SAP system is embedded in its own domain, which is specially defined for SAP. A second domain exists for the user accounts.
  In Windows, the SAP domain and user domain must be incorporated in a domain tree. In this tree, the user accounts must form the root domain and the SAP domain must be a child domain of this.
- Single domain
  In this model, the SAP system, and the user accounts are included in a single domain.

> **Caution**
>
> You cannot create local users and groups on the host that is used as domain controller. Therefore, we do **not** support running an SAP instance (including the database instance) on the host where the domain controller is installed.

Deciding Whether to Use Organizational Units (OUs) in the Windows Domain

> **Note**
>
> You do **not** need this step for a local installation.

For a domain installation, the Software Provisioning Manager needs to create certain OS users for SAP and database operations in the Windows domain, also called the “Active Directory” (AD). These users are created by default in the AD container “Users”.

Depending on a customer's AD landscape and security policy, there are certain restrictions on where to store users and groups in AD. Contact the administrator of your AD infrastructure to understand where to store all SAP and database-related domain users and domain groups.

The SAP Software Provisioning Manager offers to define an existing OU in AD to create all needed SAP and database users in this OU.

There are many different scenarios and prerequisites concerning how to use OUs. For more information, see SAP Note 2247673, which explains these issues in detail and shows some examples of how to use them.

> ⚠ Caution
>
> The Software Provisioning Manager does **not** create OUs. The Software Provisioning Manager does **not** move existing domain users or groups. The Software Provisioning Manager does **not** delete existing users, groups, OUs, nor any other object in a Windows domain.
>
> The only exception to this rule is the Uninstall option in the software provisioning manager.

4.4 Required User Authorization for Running Software Provisioning Manager

Although the Software Provisioning Manager automatically grants the required rights to the user account used for the installation, you have to check whether this account has the required authorization to perform the installation. The authorization required depends on whether you intend to perform a **domain** or **local** installation. If necessary, you have to ask the system administrator to grant the account the necessary authorization **before** you start the installation. If you attempt the installation with an account that has not the required authorization, the installation aborts.

This section informs you about the authorization required for a domain and a local installation.<sapsid>adm

Procedure

> ⚠ Caution
>
> Do **not** use the user < or the built-in administrator account for the installation of the SAP system.

Domain Installation

For a domain installation the account used for the installation needs to be a member of the local `Administrators` group. In many old installation guides, you find the information that the account must be a member of the `Domain Admins` group. The account can be either a member of the `Domain Admins` group or belong to the `Domain Users` group and have the necessary rights to create/modify objects in the domain.

For a list of the required permissions, see Performing a Domain Installation without being a Domain Administrator [page 124].

All machines in the system must belong to the same domain. In a domain installation, the user information is stored centrally on the domain controller and is accessible to all hosts in the system.

If the SAP system is to be distributed across **more than one** machine, SAP strongly recommends that you perform a domain installation to avoid authorization problems.

> ⚠ Caution
>
> - If you install a system distributed over several hosts as a local installation, this can lead to authorization problems for the operating system users `<sapsid>adm` and `SAPService<SAPSID>`. It can also lead to

problems with the transport directory, which is usually shared by several SAP systems. SAP does **not** support distributed SAP systems running with a local user account..

- Only valid for 'High Availability': HA (Windows)
  In a Microsoft failover cluster configuration, you always have to perform a **domain** installation.
  End of 'High Availability': HA (Windows)
- For performance and security reasons, SAP does not support an SAP system installation on a domain controller.

Local Installation

For a local installation the account used for the installation needs to be a member of the local `Administrators` group of the machine involved. In a local installation, all Windows account information is stored locally on one host and is not visible to any other hosts in the system.

If the SAP system is to run on a **single** machine, you can perform a local installation.

> ⚠ Caution
>
> Do not use the Windows built-in account `Administrator` or the renamed built-in account to install your SAP system with the Software Provisioning Manager. The built-in account only has restricted network access rights that are required by the Software Provisioning Manager. If you renamed the built-in account `Administrator`, do not create a new account named `Administrator`.

For a local installation, you need to:

1. Check that the account used for the installation is a member of the local `Administrators` group.
2. If required, obtain these rights by asking the system administrator to enter the account as a member of the local `Administrators` group.

Related Information

Performing a Domain Installation Without Being a Domain Administrator [page 124]

4.5 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.

Only valid for 'High Availability': HA (Windows)

> ⚠ Caution
>
> - Only use virtual host names if this is explicitly stated in the parts of this installation guide specific to high availability. Otherwise, use the physical host name.

- Do not start the Software Provisioning Manager with the command line parameter SAPINST_USE_HOSTNAME=<virtual hostname> on failover cluster nodes.

End of 'High Availability': HA (Windows)

Prerequisites

- Make sure that the virtual host name can be correctly resolved in your Domain Name System (DNS) setup.
- Make sure that you configured the Windows operating system properly to use virtual host names. For more information, see SAP Note 1564275.

Procedure

To install a **non-high-availability** system using virtual host names, proceed as described in SAP Note 1564275.

4.6 Preparing the SAP System Transport Host

Use

The transport host has a directory structure that is used by the SAP transport system to store transport data and metadata.

When you install an SAP system, the Software Provisioning Manager by default creates the transport directory on the global host in `\usr\sap\trans`.

If you do not intend to use the directory structure of the system you are going to install, but want to use another new transport directory on another host, or an existing transport directory in your system landscape, you need to prepare that transport host:

- If the directory structure already exists, you must set up its security to allow the new system to write to it.
- If it does not yet exist, you must create the core directory structure and a share to export it for other computers as well as set the security on it.

The transport directory `\usr\sap\trans` is used by the Change and Transport System (CTS). The CTS helps you to organize development projects in the ABAP Workbench and in Customizing, and then transport the changes between the SAP systems in your system landscape. For more information, see:

http://help.sap.com/netweaver under ▶ *<Your release and enhancement package>* ▶ *Application Help* ▶ *Function-Oriented View* ▶ *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* ▶

Procedure

1. If the transport directory does not yet exist, do the following:
   1. Create the directory `\usr\sap\trans` on the host to be used as the transport host.
   2. Share the `usr\sap` directory on the transport host as `SAPMNT` and set the permission for *Everyone* to *Full Control* for this share.
      This enables the Software Provisioning Manager to address the transport directory in the standard way as `\\SAPTRANSHOST\SAPMNT\trans`.
2. Grant *Everyone* the permission *Full Control* for the transport directory.

> ⚠ Caution
>
> Remove the *Full Control to Everyone* permission after you have finished the installation with the Software Provisioning Manager and only grant *Full Control* on this directory to the `SAP_<SAPSID>_GlobalAdmin` groups of all the systems that are part of your transport infrastructure. The Software Provisioning Manager assigns the appropriate rights with the help of an additional `SAP_LocalAdmin` group.
>
> For more information, see Automatic Creation of Accounts and Groups [page 144].

4.7 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

4.8 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 Software Provisioning Manager.
  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://me.sap.com/softwarecenter, as described at the end of this section.

> **Note**
>
> The digital signature of media is checked **automatically** by the Software Provisioning Manager during the *Define Parameters* phase while processing the *Media Browser* screens. The Software Provisioning Manager only accepts media whose digital signature has been checked.

Related Information

Downloading and Extracting the Software Provisioning Manager 1.0 Archive [page 61]
Using the Physical Media from the Installation Package [page 63]
Downloading Complete Installation Media [page 66]

4.8.1 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 of the `70SWPM10<Support_Package_Number>_<Version_Number>.SAR` archive.

Prerequisites

- Make sure that you use the **latest** version of the SAPCAR tool when manually extracting the Software Provisioning Manager archive. You need the SAPCAR tool to be able to unpack and verify software component archives (*.SAR files). *.SAR is the format of software life-cycle media and tools that you can download from the SAP Software Download Center.

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

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

  1. Go to https://me.sap.com/softwarecenter > *SUPPORT PACKAGES & PATCHES* > *By Category* > *SAP TECHNOLOGY COMPONENTS* > *SAPCAR*.
  2. Select the SAPCAR for your operating system and download it to an empty directory.

3. Even if you have the latest SAPCAR already available, we strongly recommend that you verify its digital signature anyway, unless you downloaded it directly from https://me.sap.com/softwarecenter/ yourself. You can do this by verifying the checksum of the downloaded SAPCAR tool:
    1. Depending on what operating system you are using, compute a hash of the downloaded SAPCAR tool, using the SHA-256 algorithm used by SAP .
    2. Now verify the digital signature of the downloaded SAPCAR tool by comparing the hash with the checksum (generated by SAP using the SHA-256 algorithm) from the *Content Info* button in the *Related Info* column on the right-hand side of the place where you downloaded the SAPCAR tool.
4. To improve usability, we recommend that you rename the executable to **SAPCAR**.

For more information about SAPCAR, see SAP Note 212876.

- 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.

Context

An up-to-date version of the load tools - such as `R3load`, `R3szchk`, `R3ldctl`, `SAPuptool` - which were available so far only in the SAPEXEDB_`<...>`.SAR archive of the kernel media, has now been made available in the Software Provisioning Manager archive (`70SWPM10SP<Support_Package_Number>_<Version_Number>`.SAR), in a sub-archive named `LOADTOOLS`.SAR, located in the `COMMON/LOADTOOLS` folder. For an installation using kernel version 7.40 or higher, the load tools from the `70SWPM10SP<Support_Package_Number>_<Version_Number>`.SAR are used **automatically** instead of the loadtools available in the SAPEXEDB_`<...>`.SAR archive of the kernel media. **There is no action required from your side**, the Software Provisioning Manager uses the relevant loadtools automatically once you run it from the extracted `70SWPM10SP<Support_Package_Number>_<Version_Number>`.SAR archive. For more information, see SAP Note 2472835.

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

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

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

> ⚠ 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.

4.8.2 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 digital signature of **installation media** is checked **automatically** by the Software Provisioning Manager during the *Define Parameters* phase while the *Media Browser* screens are processed (see also Running Software Provisioning Manager [page 73]). The Software Provisioning Manager only accepts media whose digital signature has been checked.

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:

   > ⓘ 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.

   > ⓘ Note
   >
   > For more information about which kernel version to use, see the following information sources::
   >
   > **Central SAP Notes**
   >
   > 2083594 - SAP Kernel Versions and SAP Kernel Patch Levels
   >
   > 3116151 - SP Stack Kernel Schedule Forecast
   >
   > 2083594 - SAP Kernel Versions and SAP Kernel Patch Levels
   >
   > 1969546 - Release Roadmap for Kernel 74x and 75x
   >
   > 1802333 - Finding information about regressions in the SAP kernel
   >
   > 19466 - Downloading SAP kernel patches

2966761 - Overview of SAP Kernel Correction Archives

2966621 - Overview of Kernel-Related Software Components

953653 - Rolling Kernel Switch

The white paper Update Strategy for the Kernel of the Application Server ABAP in On Premise Landscapes provides SAP recommendations on how to patch the SAP kernel.

In addition, check the Product Availability Matrix at: http://support.sap.com/pam.SAP Note 1680045

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. **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. **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. **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 media (MS SQL Server Native Access Client (SNAC) software installation only)

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. **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 (SQL Server database software installation only)
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. **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 Software Provisioning Manager 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 61].
   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.

      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

      - 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 domain installation and do not want to copy the media but use network drives for mapping the installation media, make sure that the `<sapsid>adm` user has access to the UNC paths of the network drives.

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 https://support.sap.com/en/my-support/keys.html.

Related Information

Downloading and Extracting the Software Provisioning Manager 1.0 Archive [page 61]

4.8.3 Downloading Complete Installation Media

This section describes how you can download complete 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 61].
2. Create a download directory on the host where you want to run the Software Provisioning Manager.
3. You identify the required media as listed in Using the Physical Media from the Installation Package [page 63] .
4. Identify **all** download objects that belong to one medium according to one of the following:

   > ⓘ 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:
     - To download the complete kernel media, go to https://me.sap.com/softwarecenter/ ▶ ▶ *SUPPORT PACKAGES & PATCHES* ▶ *By Category* ▶ *ADDITIONAL COMPONENTS* ▶ *SAP KERNEL* ▶ *SAP KERNEL 64-BIT UNICODE* ▶ *SAP KERNEL* `<Version>` *64-BIT UNICODE* ▶ `<Select your OS>` ▶.
       - Select ▶ *#DATABASE INDEPENDENT* ▶ to download the database-independent parts of the kernel.

         > ✤ Example
         >
         > ```
         > SAPEXE_1110-80002623.SAR
         > Kernel Part I (753) (*)
         > ```

SAPEXE_1118-80002612.SAR

- Select ▶ <Your DB> ◀ to download the database-independent parts of the kernel.

  Example

  ```
  SAPEXEDB_1110-80002623.SAR
  Kernel Part II (753) (*)
  ```

- To download the remaining media required for your SAP product, you can use one of the following navigation paths:
  - https://me.sap.com/softwarecenter ▶ *INSTALLATIONS & UPGRADES* ▶ *By Category* ▶ *SAP NETWEAVER AND COMPLEMENTARY PRODUCTS* ▶ <Product> ▶ <Product Release> ◀
  - https://me.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:
  <Kernelpart>_<Sequence Number>-<Material Number>

  Example

  ```
  SAPEXE_1110-80002623.SAR
  Kernel Part I (753) (*)
  SAPEXE_1111-80002623.SAR
  Kernel Part I (753) (*)
  SAPEXE_1112-80002623.SAR
  Kernel Part I (753) (*)
  ```

  Example

  ```
  SAPEXEDB_1110-80002623.SAR
  Kernel Part II (753) (*)
  SAPEXEDB_1111-80002623.SAR
  Kernel Part II (753) (*)
  SAPEXEDB_1112-80002623.SAR
  Kernel Part II (753) (*)
  ```

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

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

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

   Caution

   Make sure that you unpack each installation media to a separate folder. Do not unpack installation media to the same folder where you unpack the Software Provisioning Manager archive.

Do not unpack installation media to the same folder where you unpack the SAP kernel archives for archive-based installation.

5 Installation

5.1 Installation Checklist

This section includes the installation steps for the following:

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

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

Central System

1. You install the MS SQL Server database software [page 71].

   > **Note**
   >
   > If you want to use AlwaysOn where multiple SQL Servers host one database, see Database High-Availability with SQL Server Always On [page 127].

2. You check the prerequisites [page 72] and run the software provisioning manager [page 73] on the central system host with option *Central System* to install the SAP system.

   > **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 134].

   > **Note**
   >
   > If you want to install an ASCS instance with embedded SAP Web Dispatcher [page 25], 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.

3. You continue with Post-Installation [page 92].

Distributed System

1. On all hosts, except the database instance host, you install the MS SQL Server Native Access Client (SNAC) software [page 71].For more information, see SAP Note 2313067.

   > **Note**
   >
   > If you want to use AlwaysOn where multiple SQL Servers host one database, see Database High-Availability with SQL Server Always On [page 127].

2. On the database instance host, you install the MS SQL Server database software [page 71].
3. On the **ASCS instance host**, you check the prerequisites [page 72] and run the software provisioning manager [page 73] to install the ABAP central services instance (ASCS instance) and to prepare this host as the SAP global host.

   > **Note**
   >
   > If you do not want to install the ASCS instance, do not run installation option *ASCS Instance*.
   >
   > Instead, you have to run the Software Provisioning Manager to prepare the SAP global host using installation option <Product> > *Software Life-Cycle Options* > *Additional Preparation Options* > *Global Host Preparation for an ABAP System* .

   > **Note**
   >
   > If you want to install an ASCS instance with embedded SAP Web Dispatcher [page 25], 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.

4. On the database instance host, you check the prerequisites [page 72] and run the software provisioning manager [page 73] to install the database instance.
5. On the central instance host, you check the prerequisites [page 72] and run the software provisioning manager [page 73] to install the central instance.
6. If required, you install one or more dialog instances on the chosen hosts as described in subsection *Dialog Instance* of this section.
7. You continue with Post-Installation [page 92].

High-Availability System

1. To install a high-availability system with Microsoft Failover Clustering, you perform the HA-specific installation tasks [page 151].
2. You continue with Post-Installation [page 92].

Dialog Instance

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

1. You install the MS SQL Server Native Access Client (SNAC) software [page 71]. For more information, see SAP Note 2313067.
2. You check the prerequisites [page 72] and run the software provisioning manager [page 73] to install the dialog instance.
3. You continue with Post-Installation [page 92].

5.2 Installing the SQL Server Database Software

Use

Before you install your SAP system, you have to install the SQL Server database software.

Procedure

For more information about how to install the SQL Server database software for your SAP system, see section "Installing SQL Server <release> for a New SAP System" in the document *Upgrade to and Installation of SQL Server <release>*, which you can find using the SAP NetWeaver Guide Finder at https://help.sap.com/viewer/nwguidefinder.

5.3 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 108].

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 108].

5.4 Prerequisites for Running Software Provisioning Manager

Make sure you fulfil the following prerequisites before running the Software Provisioning Manager.

- For the SL-UI, 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-UI:
    - Google Chrome (recommended)
    - Mozilla Firefox
    - Microsoft Edge

    Always use the latest version of these web browsers.
  - If you copy the SL-UI 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-UI.

  > ⚠ Caution
  >
  > The Software Provisioning Manager uses a self-signed certificate, which is used temporarily only while the Software Provisioning Manager is running. This certificate is not trusted by the browser unless it is imported manually by the user running the Software Provisioning Manager. This behavior is intentionally designed in this way because - unlike ordinary public web servers - the Software Provisioning Manager has different usage patterns. You must configure your browser do trust the self-issued certificate of the Software Provisioning Manager after carefully performing the “thumbprint” verification described in Running Software Provisioning Manager [page 73] . For more information about adding trusted certificates, see the documentation of your browser.

  For more information about the SL-UI, see Useful Information About Software Provisioning Manager [page 78].

- The SAPinst framework of Software Provisioning Manager checks certificates for the Software Provisioning Manager, archives and media and therefore uses a certificate revocation list (CRL). Make sure that this CRL is available. For more information, see SAP Note 3207613.

- Make sure that you use an account with the required user authorization to run the Software Provisioning Manager [page 57].
- Make sure that you have specified the most important SAP system parameters as described in Basic SAP System Installation Parameters [page 39] **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 32].
- If you want to install a dialog instance to an existing SAP system, make sure that:
  - The service definitions for the SAP start services are configured correctly and refer to the correct profile files.
  - There are no profile backup files with an underscore "_" in their profile name. If so, replace the "_" with a ".".

    > Example
    >
    > Rename `<Drive>:\usr\sap\S14\SYS\profile\S14_DVEBMGS20_wsi6408_12` to **`<Drive>:\usr\sap\S14\SYS\profile\S14_DVEBMGS20_wsi6408.12`**.
- 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 Software Provisioning Manager and the SL-UI.
    If this port cannot be used, you can assign a free port number by executing `sapinst.exe` 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 Software Provisioning Manager 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.exe` with the following command line parameter:
    `SAPINST_HTTP_PORT=<Free Port Number>`
- If you want to perform the installation in unattended mode, see System Provisioning Using an Input Parameter File [page 80] which describes an improved procedure using `inifile.params`.

5.5 Running Software Provisioning Manager

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

Prerequisites

For more information, see Prerequisites for Running Software Provisioning Manager [page 72].

Context

The Software Provisioning Manager has a web browser-based GUI named “SL-UI of the Software Provisioning Manager” - “SL-UI” for short.

This procedure describes an installation where you run the Software Provisioning Manager and use the SL-UI, that is you can control the processing of the Software Provisioning Manager from a browser running on any device.

For more information about the SL-UI, see Useful Information About Software Provisioning Manager [page 78].

Procedure

1. Log on to the installation host using an account with the Required User Authorization for Running Software Provisioning Manager [page 57].

   > ⚠ Caution
   >
   > Do **not** use an existing `<sapsid>adm or built-in-administrator user`.

   If your security policy requires that the person running the Software Provisioning Manager is not allowed to know administrator credentials 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 `sapinst.exe` 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 60].

3. Start the Software Provisioning Manager from the directory to which you unpacked the Software Provisioning Manager archive.

   `sapinst.exe` (in a command prompt)

   `.\sapinst.exe` (in PowerShell)

   By default, the SL-UI uses the default browser defined for the host where you run the Software Provisioning Manager. However, you can also specify another supported web browser available on the host where you start the Software Provisioning Manager. You can do this by starting the `sapinst` executable with command line option **`SAPINST_BROWSER=<Path to Browser Executable>`**, for example **`SAPINST_BROWSER=firefox.exe`**.

   > ⓘ Note
   >
   > If you want to use a virtual host name, open a command prompt or PowerShell window in elevated mode and change to the directory to which you unpacked the Software Provisioning Manager archive .
   >
   > Start the Software Provisioning Manager with the following command:
   >
   > **`sapinst.exe SAPINST_USE_HOSTNAME=<Virtual_Host_Name>`** (in a command prompt)
   >
   > **`.\sapinst.exe SAPINST_USE_HOSTNAME=<Virtual_Host_Name>`** (in PowerShell)

For more information, see Using Virtual Host Names [page 58].

4. The Software Provisioning Manager now starts and waits for the connection with the SL-UI.

   If you have a supported web browser (see Prerequisites for Running Software Provisioning Manager [page 72]) installed on the host where you run the Software Provisioning Manager, the SL-UI starts automatically by displaying the *Welcome* screen.

   If the SL-UI does not open automatically, you can find the URL you require to access the SL-UI at the bottom of the *Program Starter* window of the Software Provisioning Manager. You find the icon of the *Program Starter* window in the taskbar of your Windows host. Open a supported web browser and run the URL from there.

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

Note

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

1. Terminate the Software Provisioning Manager as described in Useful Information About Software Provisioning Manager [page 78].
2. Restart the Software Provisioning Manager from the command line with the **`SAPINST_GUI_HOSTNAME=<hostname>`** property.
   You can use a fully-qualified host name.

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 Software Provisioning Manager.
   Proceed as follows to get the certificate fingerprint or thumbprint from the server certificate printed in the Software Provisioning Manager console:
   1. Go to the `sapinst_exe.xxxxxx.xxxx` directory in the temporary directory to which the Software Provisioning Manager has extracted itself:
      `%userprofile%\.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-UI opens in the browser by displaying the *Welcome* screen.

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

> **Note**
>
> Products with the addition "SAP internal only" are only for SAP internal purposes and may not be used outside of this purpose.

- 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*.

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

7. If the Software Provisioning Manager prompts you to log off from your system, log off and log on again.
   The Software Provisioning Manager restarts automatically.
8. Follow the instructions on the Software Provisioning Manager input screens and enter the required parameters.

> **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.

> **Note**
>
> If you want to install an ASCS instance with embedded SAP Web Dispatcher [page 25], 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 digital 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 digital signature is not checked again.
>
> See also the description of this new security feature in SAP Note 2393060.

9. After you have entered all requested input parameters, the Software Provisioning Manager displays the *Parameter Summary* screen. This screen shows both the parameters that you entered and those that the Software Provisioning Manager set by default. If required, you can revise the parameters before starting the installation.
10. To start the installation, choose *Next*.

    The Software Provisioning Manager starts the installation and displays the progress of the installation.

    When the installation option has finished successfully, the Software Provisioning Manager displays the message *Execution of* `<Option Name>` *has completed*.
11. If required, install a dialog instance for a central system or distributed system.
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 delete the `.sapinst` directory within the home directory of the user with which you ran the Software Provisioning Manager:

    ```
    %userprofile%\.sapinst\
    ```
14. The Software Provisioning Manager 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 Software Provisioning Manager log files in the `sapinst_instdir` directory. For more information, see Useful Information About Software Provisioning Manager [page 78].

5.6 Additional Information about Software Provisioning Manager

The following sections provide additional information about the Software Provisioning Manager.

Useful Information About Software Provisioning Manager [page 78]
This section contains some useful technical background information about the software provisioning manager and the Software Provisioning Manager's SL-UI.

System Provisioning Using an Input Parameter File [page 80]
Provisioning with Software Provisioning Manager, for example installation, of SAP systems in unattended mode with an input parameter file.

How to Avoid Automatic Logoff by Software Provisioning Manager [page 84]

Restarting Interrupted Processing of Software Provisioning Manager [page 85]
Here you find information about how to restart the Software Provisioning Manager if its processing has been interrupted.

Entries in the Services File Created by Software Provisioning Manager [page 89]

Troubleshooting with Software Provisioning Manager [page 89]
This section tells you how to proceed when errors occur while the Software Provisioning Manager is running.

Using the Step State Editor (SAP Support Experts Only) [page 90]
This section describes how to use the `Step State Editor` available in the Software Provisioning Manager.

5.6.1 Useful Information About Software Provisioning Manager

This section contains some useful technical background information about the software provisioning manager and the Software Provisioning Manager's SL-UI.

- The Software Provisioning Manager has a framework named “SAPinst”. For more information about the current SAPinst Framework version and its features, see SAP Note 3207613 (*SAPinst Framework 753 Central Note*).
- The Software Provisioning Manager has the web browser-based “SL-UI of the Software Provisioning Manager” - “SL-UI” for short.
  The SL-UI 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 user interface technology for the user are:
  - Zero foot print, since only a web browser is required on the client
  - Controls and functionality, for example, view logs in web browser.

  As of version 1.0 SP24 Patch Level 5, the Software Provisioning Manager has an updated look and feel of the SL-UI. For more information, see https://blogs.sap.com/2018/11/10/new-look-for-software-provisioning-manager/.
  The SL-UI 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-UI, the Software Provisioning Manager provides a pre-generated URL in the *Program Starter* window. If you have a supported web browser installed on the host where you run the Software Provisioning Manager, the SL-UI starts automatically.
  By default, the SL-UI uses the default browser defined for the host where you run the Software Provisioning Manager. However, you can also specify another supported web browser available on the host where you start the Software Provisioning Manager. You can do this by starting the `sapinst` executable with command line option **`SAPINST_BROWSER=<Path to Browser Executable>`**, for example **`SAPINST_BROWSER=firefox.exe`**.
  Alternatively you can open a supported web browser on any device and run the URL from there.
  For more information about supported web browsers see Prerequisites for Running Software Provisioning Manager [page 72].
  If you need to run the **SL-UI** in **accessibility mode**, apply the standard accessibility functions of your web browser.

- As soon as you have started the `sapinst.exe` executable, the Software Provisioning Manager creates a `.sapinst` directory underneath the `<Drive>:\Users\<User>` directory where it keeps its logs and other technical files. `<User>` is the user which you used to start the Software Provisioning Manager.
  After you have reached the *Welcome* screen and selected the relevant Software Provisioning Manager option for the SAP system or instance to be installed , the Software Provisioning Manager creates a directory `sapinst_instdir`, where it keeps its logs and other technical files, and which is located directly in the `%ProgramFiles%` directory. If the Software Provisioning Manager is not able to create `sapinst_instdir` there, it tries to create `sapinst_instdir` in the directory defined by the `TEMP` environment variable.
  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.
  The Software Provisioning Manager records its progress in the `keydb.xml` file located in the `sapinst_instdir` directory. Therefore, if required, you can continue with the Software Provisioning Manager 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 Software Provisioning Manager. 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 Software Provisioning Manager extracts itself to a temporary directory called `sapinst_exe.xxxxxx.xxxx`, which is located in `%TEMP%`, `%TMP%`, `%TMPDIR%`, or `%SystemRoot%`. These files are deleted after the Software Provisioning Manager 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 Software Provisioning Manager, which might be useful if an error occurs.

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

- To see a list of all available Software Provisioning Manager properties (command line options) and related documentation, open a command prompt and start the Software Provisioning Manager with command line parameter `-p`:
  ```
  sapinst -p
  ```
- If you want to perform the installation in unattended mode, see System Provisioning Using an Input Parameter File [page 80] which describes an improved procedure using `inifile.params`.
- If required, stop the Software Provisioning Manager by choosing the *Cancel* button.

  > ⓘ Note
  >
  > If you need to terminate the Software Provisioning Manager, choose *File* > *Exit* in the menu of the *Program Starter* window.

5.6.2 System Provisioning Using an Input Parameter File

Provisioning with Software Provisioning Manager, for example installation, of SAP systems in unattended mode with an input parameter file.

Prerequisites

Provisioning of SAP systems can also be done in unattended mode without the user interface of Software Provisioning Manager. This means that, after inserting the required parameters into a parameter-file and running the sapinst executable by providing the path to this parameter-file , the installation will run in the background and no further user interaction is required.

Context

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

Since the new Web-based SL-UI (see Useful Information About Software Provisioning Manager [page 78]) was introduced in 2017 there are two ways to run the unattended mode: "`observer mode`" and "`non-observer mode`".

Observer Mode

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

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

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

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

Non-Observer Mode

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

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

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

```
SAPINST_SKIP_DIALOGS=true
SAPINST_START_GUISERVER=false
```

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

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

Restrictions

In exceptional cases, parameters prompted or displayed in the Software Provisioning Manager UI are not maintainable in the input parameter file. If one of those parameters, that are only available in the UI mode of the Software Provisioning Manager, is needed for your unattended installations, you should create a ticket in the best fitting component below BC-INS to get the issue analyzed.

Must Know about the Input Parameter File

- The input parameter file only contains values that you entered in the SL-UI of Software Provisioning Manager.
- With the `SAPinst 753.0.6` or by other means patch we provide a better encryption of passwords in Software Provisioning Manager files:
  If the input parameter file has parameters which are encrypted with AES256 encryption, the `instkey.pkey` file available in the installation directory contains the key for the encryption. The `instkey.pkey` file must be always located in the same directory as the input parameter file and is used to decrypt the values of the encrypted parameters. If you need to copy an input parameter file to another directory, you must also copy the `instkey.pkey` file to this directory.
- Not explicitly set parameters are documented as comments in the generated input parameter file.
- Each parameter has got a documentation assigned as a comment on top.

  Example

  Example for a parameter that is not used and therefore commented out:

  ```
  # Specify whether Software Provisioning Manager is to drop the schema if
  it exists. <= Documentation
  # HDB_Schema_Check_Dialogs.dropSchema = false
  ```

  Example

  Example for a parameter that is used:

  ```
  # The name of the database schema. <= Documentation
  HDB_Schema_Check_Dialogs.schemaName = SAPABAP2
  ```

- You have to manually provide the media information, using the following convention:

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

  - For each media location you must **manually** insert a dedicated line in your input parameter file. The Software Provisioning Manager does not automatically take over the media locations you entered while processing the *Media Browser* dialog.
  - For `<media_name>` you can choose any value, but the `<location>` must be unique.

- To find out the required media entries, open the summary.html file which you can find in the installation directory and go to the *Dialog "Media"* section.
- Make sure that you enter the full paths to all required media, relative paths are not sufficient.

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

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

- If one media contains several subfolders, you can specify it in one of the following ways:

  > ### Example
  >
  > The SAP Export DVDs/media:
  >
  > ```
  > Installation Master    /usr/local/TESI/SWPM/slinst_d_stream/
  > IM_OS400_PPC64
  > Installation Export NW73 (folder EXP1)    /sapmnt/mediaserver2/
  > arch04_6/51042309/DATA_UNITS/EXP1
  > Installation Export NW73 (folder EXP3)    /sapmnt/mediaserver2/
  > arch04_6/51042309/DATA_UNITS/EXP3
  > Installation Export NW73 (folder EXP2)    /sapmnt/mediaserver2/
  > arch04_6/51042309/DATA_UNITS/EXP2
  > ```

  - By specifying each subfolder:

    ```
    SAPINST.CD.PACKAGE.ExportNW73EXP1=/sapmnt/mediaserver2/
    arch04_6/51042309/DATA_UNITS/EXP1

    SAPINST.CD.PACKAGE.ExportNW73EXP2=/sapmnt/mediaserver2/
    arch04_6/51042309/DATA_UNITS/EXP3

    SAPINST.CD.PACKAGE.ExportNW73EXP3=/sapmnt/mediaserver2/
    arch04_6/51042309/DATA_UNITS/EXP3
    ```

  - By specifying only the root-folder:

    ```
    SAPINST.CD.PACKAGE.ExportNW73=/sapmnt/mediaserver2/arch04_6/51042309
    ```

- **Restriction:** Currently you can only specify complete media, not paths to single files like `*.SAR` archives.
- When performing a system copy, you need to add one additional media path:

  ```
  SAPINST.CD.PACKAGE.MIGRATION1 = <full path to ABAP Export media>
  ```

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

Procedure

1. You plan and prepare the run as described in Planning [page 30] and Preparation [page 53].
2. Create your input parameter file as follows:
   1. Start Software Provisioning Manager as described in Running Software Provisioning Manager [page 73].
   2. Choose the option you want to run, and follow the instructions on the screens by entering all parameter values.
   3. Stop after the *Parameter Summary* screen has been displayed.
   4. Find the input parameter file named "`inifile.params`" in the installation directory.
      - In the same directory, you will also find the `instkey.pkey` file with the keys for the encrypted parameters. For more information, see *Must Know about the Input Parameter File* above.
      - In the same directory, you will also find the `summary.html` file with the required media locations. For more information, see *Must Know about the Input Parameter File* above.
   5. If required, you can rename the "`inifile.params`" file as you wish.
3. Adjust the values of the input parameter file as follows:
   1. Edit your input parameter file and modify the parameters according to your needs.
   2. Add required media or archives information line by line.
4. Identify the Product-ID:
   - To start in unattended mode, you need to know the component ID for the option that are required for your provisioning scenario.
     Proceed as follows:
     1. Open the `sapinst_dev.log` in the installation directory.
     2. Check for the "product-id"

        Example

        ```
        product-id=NW_ABAP_ASCS:NW750.ADA.ABAP
        ```
   - Alternatively, you can check the header of the generated input parameter file.

     Example

     ```
     product id 'NW_ABAP_ASCS:NW750.ADA.ABAP'
     ```
5. Run the Software Provisioning Manager [page 73] with the parameters required for unattended mode:
   - Make sure that the `instkey.pkey` file with the keys for the encrypted parameters is available in the same directory as the input parameter file. Otherwise the encrypted parameters cannot be decrypted. For more information, see *Must Know about the Input Parameter File* above.

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

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

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

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

6. After Software Provisioning Manager has completed, perform follow-up activities as described in Post-Installation [page 92].

Related Information

SAP Note 2230669 Provisioning with Software Provisioning Manager - for example installation - of SAP systems in unattended mode with an input parameter file.

SAP Note 2849054 Software Update Manager Automation with Software Provisioning Manager

SAP Note 2742212 Unattended installation fails with "Empty directory name is not allowed." message

SAP Note 2626837 'isUnicode': Radio group contains an invalid value ''. Valid values are: false|true|

SAP Note 2669183 ASCS installation failure with Software Provisioning Manager unattended mode (Non-Observer mode)

SAP Note 2482103 Installation with Software Provisioning Manager in unattended mode using input parameter file fails

SAP Note 2974889 Installation with Software Provisioning Manager in unattended mode fails in step getDBInfo due to missing paramerters

5.6.3 How to Avoid Automatic Logoff by Software Provisioning Manager

When you install the SAP system, the installation tool checks whether the user account used for the installation has the required privileges and authorization.

For a local or domain installation, the account needs to be a member of the local `Administrators` group.

For domain installations the account can be either a member of the `Domain Admins` group, or belongs to the `Domain Users` group and has the necessary rights to create/modify objects in the domain.

For a list of the required permission, see Performing a Domain Installation without being a Domain Administrator [page 124]

In both cases, the user account must be authorized to do the following:

- Act as part of the operating system

- Adjust memory quotas for a process
- Replace a process level token

If the user account does not have these rights assigned, the Software Provisioning Manager assigns them and automatically logs the account off to activate them. To avoid the software provisioning manager logging the account off, you can set these rights manually before you start the installation.

Procedure

You perform the following steps to assign these rights to the user account used for the installation.

1. Press `Ctrl` + `Esc` and choose *Windows Tools* > *Computer Management* > *Local User and Groups* > *Administrators* .
2. Double-click the *Administrators* group.
3. In the *Administrators* window, choose the required user and choose *Add*.
   The selected user appears under *Members*.
4. Confirm your entry and then repeat the steps for each remaining policy that the user requires for the installation.
5. Log off and log on again to apply the changes.

Related Information

Required User Authorization for Running Software Provisioning Manager [page 57]

5.6.4 Restarting Interrupted Processing of Software Provisioning Manager

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

Context

The processing of the Software Provisioning Manager might be interrupted for one of the following reasons:

- An error occurred during the *Define Parameters* or *Execute* phase:
  The Software Provisioning Manager 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 Software Provisioning Manager by choosing *Cancel* in the SL-UI.

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

The following table describes the options in the dialog box:

Option	Definition
Retry	The Software Provisioning Manager retries the installation from the point of failure without repeating any of the previous steps. This is possible because the Software Provisioning Manager 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 Software Provisioning Manager displays the same dialog box again.
Stop	The Software Provisioning Manager stops the installation, closing the dialog box and the Software Provisioning Manager's SL-UI. The Software Provisioning Manager records its progress in the `keydb.xml` file. Therefore, you can continue with the Software Provisioning Manager from the point of failure without repeating any of the previous steps. See the procedure below.
Continue	The Software Provisioning Manager continues the installation from the current point.
View Log	Access installation log files.

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 Software Provisioning Manager [page 73] .
2. Make sure that the installation media are still available.

   For more information, see Preparing the Installation Media [page 60].

   > → 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.
3. Restart the Software Provisioning Manager by double-clicking **`sapinst.exe`** from the directory to which you unpacked the Software Provisioning Manager archive.

By default, the SL-UI uses the default browser defined for the host where you run the Software Provisioning Manager. However, you can also specify another supported web browser available on the host where you start the Software Provisioning Manager. You can do this by starting the `sapinst` executable with command line option **`SAPINST_BROWSER=<Path to Browser Executable>`**, for example **`SAPINST_BROWSER=firefox.exe`**.

4. The Software Provisioning Manager is restarting.

   If you have a supported web browser (see Prerequisites for Running Software Provisioning Manager [page 72]) installed on the host where you run the Software Provisioning Manager, the SL-UI starts automatically by displaying the *Welcome* screen.

   If the SL-UI does not open automatically, you can find the URL you require to access the SL-UI at the bottom of the *Program Starter* window of the Software Provisioning Manager. You find the icon of the *Program Starter* window in the taskbar of your Windows host. Open a supported web browser and run the URL from there.

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

> **Note**
>
> If the host specified by `<hostname>` cannot be reached due to a special network configuration, proceed as follows:
>
> 1. Terminate the Software Provisioning Manager as described in Useful Information About Software Provisioning Manager [page 78].
> 2. Restart the Software Provisioning Manager from the command line with the **`SAPINST_GUI_HOSTNAME=<hostname>`** property.
>   You can use a fully-qualified host name.

> **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 Software Provisioning Manager.
>   Proceed as follows to get the certificate fingerprint or thumbprint from the server certificate printed in the Software Provisioning Manager console:
>   1. Go to the `sapinst_exe.xxxxxx.xxxx` directory in the temporary directory to which the Software Provisioning Manager has extracted itself:
>   `%userprofile%\.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-UI 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 Software Provisioning Manager does not continue the interrupted installation option. Instead, it moves the content of the old Software Provisioning Manager directory and all Software Provisioning Manager-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 Software Provisioning Manager 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 Software Provisioning Manager continues the interrupted installation from the point of failure.

5.6.5 Entries in the Services File Created by Software Provisioning Manager

After the installation has finished successfully, the Software Provisioning Manager has created the following entries for port names in `<Drive>:\WINDOWS\system32\drivers\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.

5.6.6 Troubleshooting with Software Provisioning Manager

This section tells you how to proceed when errors occur while the Software Provisioning Manager is running.

Context

If an error occurs, the Software Provisioning Manager:

- Stops processing
- Displays a dialog informing you about the error

Procedure

1. Check SAP Note 3207613 (*SAPinst Framework 753 Central Note*) for known Software Provisioning Manager 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 Software Provisioning Manager log files (`sapinst.log` and `sapinst_dev.log`) for errors, choose the *LOG FILES* tab.

       > **Note**
       >
       > The *LOG FILES* tab is only available if you have selected on the *Welcome* screen the relevant Software Provisioning Manager 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 the files in the `.sapinst` directory underneath the `<Drive>:\Users\<User>` directory, where `<User>` is the user that you used to start the Software Provisioning Manager.
       >
       > For more information, see Useful Information About Software Provisioning Manager [page 78].

     - To check the log and trace files of the Software Provisioning Manager's SL-UI for errors, go to the directory `%userprofile%\.sapinst\`
     - Then continue by choosing *Retry*.
   - If required, abort the Software Provisioning Manager by choosing *Cancel* in the tool menu and restart the Software Provisioning Manager. For more information, see Restarting Interrupted Processing of Software Provisioning Manager [page 85].
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.

5.6.7 Using the Step State Editor (SAP Support Experts Only)

This section describes how to use the `Step State Editor` available in the Software Provisioning Manager.

> **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 Software Provisioning Manager meets the requirements listed in Prerequisites for Running Software Provisioning Manager [page 72].

Procedure

1. Start the Software Provisioning Manager from the command line as described in Running Software Provisioning Manager [page 73] with the additional command line parameter **`SAPINST_SET_STEPSTATE=true`**
2. Follow the instructions on the Software Provisioning Manager 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 Software Provisioning Manager during the *Execute Service* phase. By default all steps are in an initial state. Underneath each step, you see the assigned Software Provisioning Manager 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 Software Provisioning Manager to pause.
   - Mark the checkbox in front of the *Skip* option of the steps which you want the Software Provisioning Manager 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 Software Provisioning Manager 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 Software Provisioning Manager.
5. Continue until you have run through all the steps of the *Execute Service* phase of the Software Provisioning Manager.

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

> **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 system backup [page 112] immediately after the installation has finished.
2. You check whether you can log on to the Application Server ABAP [page 93].
3. You install the SAP license [page 95].
4. You configure the remote connection to SAP support [page 96].
5. You enable the Note Assistant to apply note corrections [page 96].
6. You configure the documentation provided on the SAP Help Portal [page 96].
7. You perform the consistency check [page 98].
8. If required, you set up symbolic links for application servers [page 99].
9. You configure the Transport Management System [page 100].
10. For production systems it is highly recommended that you connect the system to SAP Solution Manager [page 101].
11. You apply the latest kernel and Support Package stacks [page 103].
12. You perform post-installation steps for the application server ABAP [page 104].
13. If required, you install additional languages and perform language transport [page 107].
14. You configure the user management [page 108].
15. You ensure user security [page 108].
16. You perform the client copy [page 111].
17. You perform a full installation backup [page 112].
18. 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. You check whether you can log on to the Application Server ABAP [page 93].
2. You configure the documentation provided on the SAP Help Portal [page 96].
3. If required, you set up symbolic links for application servers [page 99].
4. You ensure user security [page 108].
5. You perform a full installation backup [page 112].
6. If you chose to install an embedded SAP Web Dispatcher instance within the ASCS instance, you log on to the SAP Web Dispatcher Management Console [page 114]
7. If you chose to install an embedded SAP Web Dispatcher instance within the ASCS instance, you configure the SAP Web Dispatcher [page 115]

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

> ⓘ 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:
   - SAP GUI for **Windows**:
     1. Press `Windows` + `Q`, and enter *SAP Logon* in the *Search* field.
     2. Choose *SAP Logon*.
   - SAP GUI for **Java**:
     1. Press `Windows` + `Q`, and enter *SAP GUI for Java* `<Release>`
     2. Choose *SAP GUI for Java* `<Release>`.

   The *SAP Logon* appears.

   > **Note**
   >
   > You can alternatively enter the command **`guilogon`** in the SAP GUI installation directory to start SAP GUI for Java.
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 60]

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.

Only valid for 'High Availability': HA (Windows)

> ⓘ Note
>
> The license key is bound to the hardware key of the host where the message server is running.
>
> In a high-availability system with Microsoft Failover Clustering, the message server is part of the (A)SCS instance that can run on a different cluster node. Therefore you must install the SAP license on both nodes.
>
> You have to do failover from the first cluster node where the (A)SCS instance is installed to the second cluster node. Use the hardware key of the second cluster node for the installation of the second SAP license.

End of 'High Availability': HA (Windows)

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* ▶

6.4 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.

6.5 Enabling Note Assistant to Apply Note Corrections

Use the Note Assistant to implement note corrections in your ABAP system.

Context

The Note Assistant allows you to automatically implement note corrections in your ABAP system. For more information about the Note Assistant, see https://support.sap.com/noteassistant and https://help.sap.com/netweaver ▶ *SAP NetWeaver Platform* ▶ `<Release>` ▶ *Application Help* ▶ *SAP NetWeaver Library: Function-Oriented View* ▶ *Solution Life Cycle Management* ▶ *Software Logistics* ▶ *Note Assistant*.

Procedure

1. Follow the instructions in SAP Note 2836302 for enabling the Note Assistant for TCI and digitally signed SAP Notes.
2. Apply important SAP Notes for SAP_BASIS as described in SAP Note 1668882.

6.6 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 media provided.

> **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

6.7 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 the SAP System [page 137].

- You have logged on to the SAP system [page 93].

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*.

6.8 Creating Symbolic Links on Windows Server for Application Servers

Use

On Windows Server you can create symbolic links for dialog instances to simplify their administration.

Only valid for 'High Availability': HA (Windows)

In a high-availability system, you can additionally create symbolic links for the central instance.

End of 'High Availability': HA (Windows)

Symbolic links for application servers let you access from your local host the SYS directory that is located on the global host, without having to specify its UNC path. Instead you can browse, for example, in the Windows explorer on your local host to the SYS directory and its subdirectories on the global host.

Procedure

To create symbolic links, perform the following steps:

1. Open a PowerShell command in elevated mode, and enter the following PowerShell command in a single line:
   ```
   cmd /c mklink /d <localdisk>:\usr\sap\<SAPSID>\SYS \
   \<sapglobalhost>\sapmnt\<SAPSID>\SYS
   ```
   > **Note**
   >
   > Enter a blank before `\\<sapglobalhost>\....`
2. If you use a central transport directory, you can also create the following link in PowerShell:
   ```
   cmd /c mklink /d <localdisk>:\usr\sap\trans \\<trans_dir_host>\sapmnt\trans
   ```
   > **Note**
   >
   > The transport directory host `<trans_dir_host>` and the `<sapglobalhost>` can be identical.

> **Caution**
>
> The command `mklink` creates the link without checking whether the link target exists or can be accessed. If the link does not work after you created it, make sure that it exists and check that the UNC path can be accessed.

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. Only valid for 'High Availability': HA (Windows)

   In a high-availability system with Microsoft Failover Clustering, you must configure **all** systems in the TMS landscape. To do this, implement SAP Note 943334.

   End of 'High Availability': HA (Windows)

4. Schedule a job for the transport dispatcher program (`RDDIMPDP`).

   You schedule the job by executing program `RDDNEWPP2` in client 000 using a user that is different from the `DDIC` user. For more information, see the program documentation of `RDDNEWPP2`.

   > **Note**
   >
   > Note that it is sufficient to schedule the job in client 000.

6.10 Connecting the System to SAP Solution Manager

Here you find information about how to connect your newly installed SAP system to the SAP Solution Manager in your system landscape.

> **Note**
>
> You can skip this section if your newly installed SAP system is itself a SAP Solution Manager system.

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 7.2:
     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* ▶ *Importing Landscape Data, CIM Model, and CR Content*
   - 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*
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. Alternatively, systems can send information directly to the LMDB in SAP Solution Manager, without an SLD, as described in 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* ▶ *Importing Landscape Data, CIM Model, and CR Content*.

   For more information, see *Handling Technical Systems' Data - System Landscape Directory* at https://support.sap.com/en/tools/software-logistics-tools/landscape-management-process/system-landscape-directory.html.
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 7.2:
     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* ▶ *Importing Landscape Data, CIM Model, and CR Content* ▶ *Synchronization with an SLD*
   - 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)*
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 7.2:
  http://help.sap.com/solutionmanager ▶ *Version 7.2 SPS* <No> ▶ *Application Help (English)* ▶ *Technical Infrastructures* ▶ *Landscape Management Database (LMDB)* ▶ *Managing Technical System Information*
- 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*

Related Information

Setting Up the Landscape Management Infrastructure
Importing Landscape Data, CIM Model, and CR Content
Synchronization with an SLD
Managing Technical System Information
Handling Technical Systems' Data - System Landscape Directory

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.

Prerequisites

If the central instance host and the dialog instance host run on different operating systems or platforms, all application servers **must** have the same kernel patch level.

Context

For more information about release and roadmap information for the SAP Kernel versions, and how this relates to SAP system support packages - including important notes on downward compatibility and release dates - see the central SAP Kernel notes:

Central SAP Notes

2083594 - SAP Kernel Versions and SAP Kernel Patch Levels

3116151 - SP Stack Kernel Schedule Forecast

2083594 - SAP Kernel Versions and SAP Kernel Patch Levels

1969546 - Release Roadmap for Kernel 74x and 75x

1802333 - Finding information about regressions in the SAP kernel

19466 - Downloading SAP kernel patches

2966761 - Overview of SAP Kernel Correction Archives

2966621 - Overview of Kernel-Related Software Components

953653 - Rolling Kernel Switch

The white paper Update Strategy for the Kernel of the Application Server ABAP in On Premise Landscapes provides SAP recommendations on how to patch the SAP kernel.

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.

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 93].

Context

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

- Upload and set system profiles using transaction `RZ10`
- Configure the number of work processes
- Create logon and RFC server groups using transactions `SMLG` and `RZ12`
- Create operation modes using transaction `RZ04`
- Schedule standard jobs using transaction `SM36`
- Configuration of SLD data supplier using transaction `RZ70`
- Perform load generation using transaction `SGEN`

For more information, see the appropriate sections below.

Procedure

- **Upload and Set System Profiles using Transaction RZ10**

  You upload system profiles, such as default profile and instance profile, from the file system into the database of the target system using transaction `RZ10`.

  For more information about how to maintain SAP system profiles, see the SAP 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*

- **Configure the number of work processes**

  SAP systems are installed with a minimum number of work processes. This is only an initial configuration to get you started after the installation. It is not detailed enough for a production system because the optimal number of each type of work process depends on the system resources and on the number of users working in each SAP system application. For more information about how many work processes to configure and how to set the number, see SAP Note 39412.

- **Create Logon and RFC Server Groups using Transactions SMLG and RZ12**

  You create the following:

  - Logon groups using transaction `SMLG`
  - RFC server groups using transaction `RZ12`

  Specify the following:

  - Name of the logon or RFC server group
  - Instance name (application server)
  - Group type attributes are optional

  If required, you create the RFC server group `parallel_generators`.
- **Create Operation Modes using Transaction RZ04**

  You check for existing operation modes and - if required - create a new operation mode using transaction `RZ04`.

  Specify the following:

  - Name of the operation mode
  - Short description
  - Optional: monitoring properties variant

  Select the corresponding checkbox to assign the operation mode to the following:

  - Time table (assignment only from 0-24 h)
  - Current application server instance
- **Schedule Standard Jobs using Transaction SM36**

  You schedule SAP standard jobs using transaction `SM36`.

  If a standard job is already scheduled, it is kept. Only missing jobs are scheduled.
- **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.

    > **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
2. Perform the language transport using transaction SMLT:

   > **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

> **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 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* ▶

6.15 Ensuring User Security

You need to ensure the security of the users that the Software Provisioning Manager 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 Software Provisioning Manager by default assigned the master password [page 40] to all users created during the installation unless you specified other passwords.

→ Recommendation

The Master Password feature can be used as a simple method to obtain customer-specific passwords for all newly created users. A basic security rule is not to have identical passwords for different users. Following this rule, we strongly recommend individualizing the values of these passwords after the installation is complete.

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:

Operating System and Database Users

User	User Name	Comment
Operating system user	`<sapsid>adm`	SAP system administrator
	`SAPService<SAPSID>`	User to run the SAP system

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* ▶

6.16 Performing the Client Copy

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

Context

The Software Provisioning Manager 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.

> ⚠ Caution
>
> After the import of a new, small client into a production system, some reports might suddenly run much more slowly. This can cause the database to hang due to database locks. For more information, see SAP Note 724047.

Only valid for 'Software Component': SAP SCM

> ⓘ 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>` ▶ *Application Help* ▶ *SAP NetWeaver by Key Capability* ▶ *Solution Life Cycle Management by Key Capability* ▶ *Software Life Cycle Management* ▶ *Software Logistics* ▶ *Change and Transport System* ▶ *BC - Client Copy and Transport (BC-CTS-CCO)* ▶

6.17 Performing a Full System Backup

You must perform a full system backup after the configuration of your SAP system. If required, you can also perform a full system backup after the installation (recommended). In addition, we recommend you to regularly back up your database.

Prerequisites

- You are logged on as user `<sapsid>adm`.
- You have shut down the SAP system and database.

Procedure

For more information about backing up your SAP system on Windows, see:

Release	SAP Library Path
SAP NetWeaver 7.0	–
SAP NetWeaver 7.0 including enhancement package 1	http://help.sap.com/nw701 ▶ *Operations* ▶ *Technical Operations for SAP NetWeaver* ▶ *General Administration Tasks* ▶ *Backup and Restore* ▶ *Backing Up and Restoring Your SAP System on Windows*
SAP NetWeaver 7.0 including enhancement package 2	http://help.sap.com/nw702 ▶ *Application Help* ▶ *SAP NetWeaver by Key Capability* ▶ *Solution Life Cycle Management by Key Capability* ▶ *General Administration Tasks* ▶ *Backup and Recovery* ▶ *Backing Up and Restoring Your SAP System on Windows*
SAP NetWeaver 7.0 including enhancement package 3	http://help.sap.com/nw703 ▶ *Application Help* ▶ *SAP NetWeaver by Key Capability* ▶ *Solution Life Cycle Management by Key Capability* ▶ *Backup and Recovery* ▶ *Backing Up and Restoring Your SAP System on Windows*

For more information about backing up your SQL Server database, see:

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 Microsoft SQL Server* ▶ *SAP/ MS SQL Server DBA in CCMS*

6.18 Logging on to the SAP Web Dispatcher Management Console

This section describes how to log on to the SAP Web Dispatcher.

Context

> ⓘ Note
>
> This step is only required if you chose to install an embedded 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 Embedded SAP Web Dispatcher [page 25]

6.19 SAP Web Dispatcher Configuration

After installing SAP Web Dispatcher, you must configure it to be able to use it.

> **Note**
>
> This step is only required if you chose to install an embedded 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 Release and SAP Library Quick Link	SAP Library Path (Continued)
• 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 Embedded SAP Web Dispatcher [page 25]

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 SAP Directories

This section describes the directories that are available in an SAP system.

Only valid for 'High Availability': HA (Windows)

If you want to install a high-availability system, see also Directories in a Microsoft Failover Environment [page 162].

End of 'High Availability': HA (Windows)

The Software Provisioning Manager automatically creates the following directories during the installation:

- `\usr\sap`
  This directory is created on the:
  - **Global** host and **shared** with the network share `sapmnt`

    Only valid for 'High Availability': non-HA

    In a non-high-availability-system, you can install the central instance or the (A)SCS instance on the global host or on any other host.

    End of 'High Availability': non-HA

    Only valid for 'High Availability': HA (Windows)

    In a high-availability system, the ASCS instance is installed on the global host.

    End of 'High Availability': HA (Windows)

    On global hosts, the `\usr\sap` directory contains general SAP software, global, and local (instance-specific) data. For this, the Software Provisioning Manager creates the global directory `usr\sap\<SAPSID>\SYS`, which physically exists only once for each SAP system. It consists of the following subdirectories:
    - `global` – contains globally shared data
    - `profile` – contains the profiles for all instances
    - `exe` – contains the executable replication directory for all instances and platforms
  - **Local** host and **shared** with the name `saploc`.

    Only valid for 'High Availability': HA (Windows)

    In a high availability system, this directory is located on a local disk. You have at least two disk drives with a `usr\sap` directory structure.

    End of 'High Availability': HA (Windows)

    On local hosts, the `\usr\sap\<SAPSID>\<Instance_Name>` directory contains copies of the SAP software and local (instance-specific) data.

> **Note**
>
> - Since SAP traces for the instance are created in `\usr\sap`, make sure that there is sufficient space available in this directory. Changes in SAP profiles can also affect the disk space.
> - The executables on the local host are replicated from those on the global host every time the local instance is started. The SAP copy program `sapcpe` compares the binaries in the `<Platform>` directory on the global host and the binaries in the `exe` directory on the application server. If the binaries in the `exe` directory are older than those in the `<Platform>` directory, `sapcpe` replaces them with the newer version of the global host.

Other application servers access the global data using the Universal Naming Convention (UNC) path `\\<SAPGLOBALHOST>\sapmnt`. The SAP programs access their instance-specific data with the UNC path `\\<SAPLOCALHOST>\saploc`. If the UNC path points to a local directory, the local path (and not the UNC path) is used to access the directory.
The parameters SAPGLOBALHOST and SAPLOCALHOST have the **same** values on the global host.

Only valid for 'High Availability': HA (Windows)

> **Note**
>
> In a high-availability system, file shares that are pointing to directories on shared disks are only visible or can be accessed with the virtual host name of the cluster group the shared disks belong to.
>
> This lets you have several shares with the same name pointing to different disks (multi-SID).

End of 'High Availability': HA (Windows)

- `\usr\sap\trans`
  The transport directory contains SAP software for the transport of objects between SAP systems. The Software Provisioning Manager by default creates it on the SAPGLOBALHOST.
  If you want to have it created on another host or if you want to use an existing transport host from your SAP system landscape, you can specify another host during the installation. In this case, you have to prepare that host for the new SAP system to use it. For more information, see Preparing the SAP System Transport Host [page 59].

Directory Structure

The following figures show how the physical directory `\usr\sap` is shared on the global host in a central and in a distributed system. In both cases, the UNC paths are used as follows:

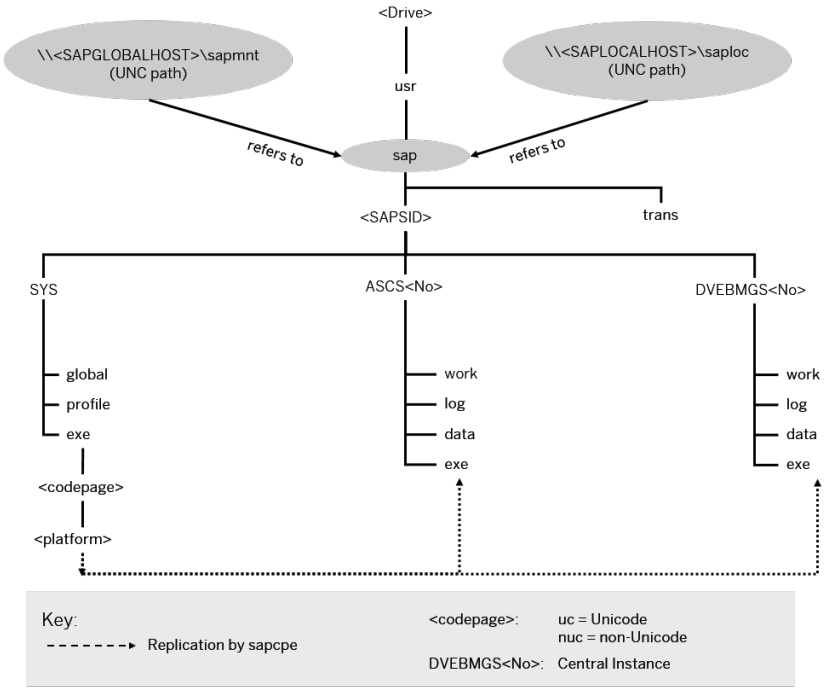
- `\\<SAPGLOBALHOST>\sapmnt` to access global directories
- `\\<SAPLOCALHOST>\saploc` to access local instance-specific data

> **Note**
>
> There are the following instance names available in an SAP system:
>
> ABAP central services instance: ASCS`<Instance_Number>`
>
> Only valid for 'High Availability': HA (Windows)
>
> **High Availability only:** Enqueue Replication Server instance: ERS`<Instance_Number>`
>
> End of 'High Availability': HA (Windows)

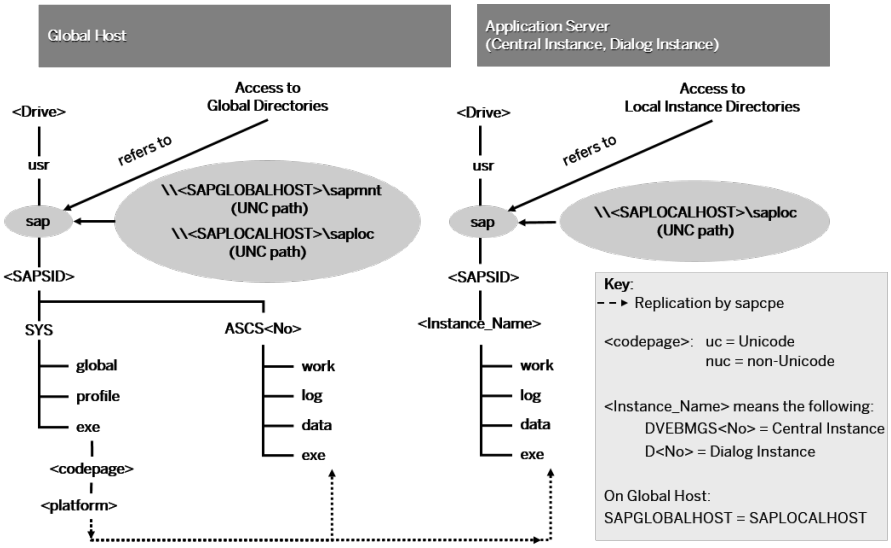
Central instance: `DVEBMGS<Instance_Number>`

Dialog instance: `D<Instance_Number>`

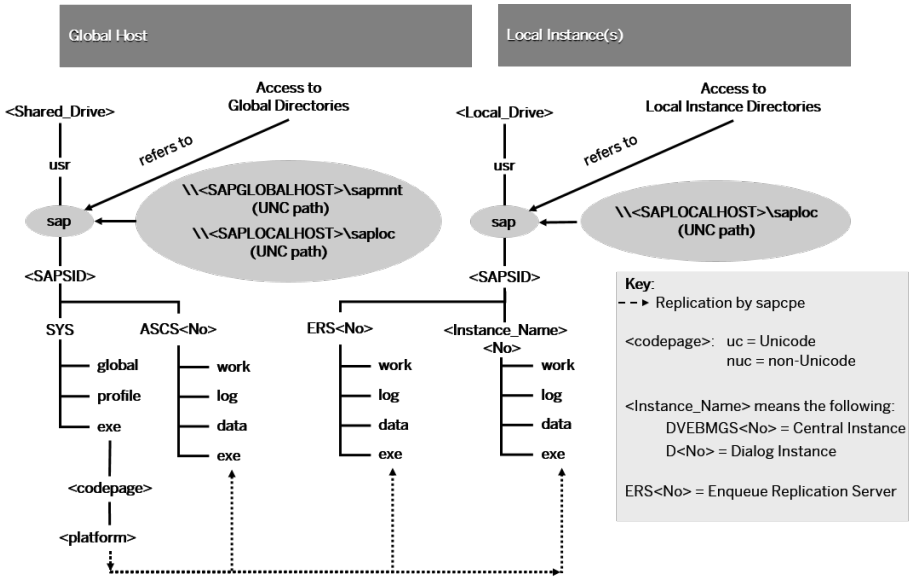
> **Note**
>
> Every new installation of an SAP system is Unicode.



Directory Structure on the Global Host in a Central ABAP System



Directory Structure in a Distributed ABAP System



Directory Structure in a High-Availability ABAP System

7.2 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.

> ⚠ Caution
>
> SAP recommends that you no longer use the LDAP configuration options provided by the Software Provisioning Manager, because current security guidelines make it unsafe to run SAP applications on a domain controller. Instead, SAP recommends that you follow the instructions in SAP Note 3251648 to enable LDAP directory service integration of your SAP system with Active 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.

> ⓘ 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. 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.

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

You can also use the SAP Management Console (SAP MC) for administering and monitoring SAP systems from a central location.

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 Software Provisioning Manager to automatically:

> ⚠ Caution
>
> SAP recommends that you no longer use the LDAP configuration options provided by the Software Provisioning Manager, because current security guidelines make it unsafe to run SAP applications on a domain controller. Instead, SAP recommends that you follow the instructions in SAP Note 3251648 to enable LDAP directory service integration of your SAP system with Active Directory.

- 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 Software Provisioning Manager and choosing ▶ `<Product>` ▶ *Software Life-Cycle Options* ▶ *LDAP Registration* ▶ *Active Directory Configuration*.

> ⓘ 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. The Software Provisioning Manager software contains schema extensions for directory servers Netscape/iPlanet (`ldregns4.txt`, `ldregns5.txt`) and OpenLDAP slapd (`ldregslapd.schema`). Both files are located in the directory `\<Unpack_Directory>\COMMON\ADS`. After you have applied the schema extension, you need to create a root container to store the SAP-related information and create a directory user that the SAP application server can use to write information to the directory.

For more information about how to set up a Netscape/iPlanet directory server, see the documentation *SAP System Information in Directory Services* at:

https://archive.sap.com/documents/docs/DOC-14384

Enabling the SAP System LDAP Registration

Once you have correctly configured your directory server, you can enable the LDAP registration of the SAP system by setting some profile parameters in the default profile.

To do this, run the Software Provisioning Manager **once** for your system and choose:

> ⚠ Caution
>
> SAP recommends that you no longer use the LDAP configuration options provided by the Software Provisioning Manager, because current security guidelines make it unsafe to run SAP applications on a domain controller. Instead, SAP recommends that you follow the instructions in SAP Note 3251648 to enable LDAP directory service integration of your SAP system with Active Directory.

`<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.

7.3 Performing a Domain Installation Without Being a Domain Administrator

It is not required to perform the installation of the SAP system with a user who is a member of the `Domain Admins` group. For security reasons most customers do not provide this permission to SAP or database administrators. If the `Domain Admin` right has been granted, you can start any SAP installation because the user will have all necessary rights to install a standard, distributed or high-availability system.

An alternative is to ask the domain administrator to grant the required permissions to the user which installs SAP or the database. This domain user must be a member of the local `Administrators` group. In most cases the domain administrator will define an OU (Organizational Unit) structure, where all SAP systems and their related domain objects belong to.

To perform the installation with a domain user, the user account must meet the following requirements:

1. Create/Delete/Modify Users and Groups within OUs only. Ask the AD administrator about the company's OU concept.

2. Create/Delete/Modify Computer Objects within this OU. This is required for users which install SAP or database applications in Failover Clusters, SAP Landscape Management environments or other high-availability (HA) environments.
   Optional rights might be necessary related to your company's security policy, for example:
3. Create/Delete/Modify DNS server records within a specific DNS zone, where the Windows hosts with SAP software belong to.
4. Create/Delete/Modify Organizational Unit objects within a specific OUs only.

For standard and distributed installations (not HA installations!) the domain administrator can prepare the user and group objects in the domain for you. In this case, the domain user which will be used for the installation does not need any of the above permissions.

The required objects in the domain are:

1. Domain group `SAP_<SAPSID>_GlobalAdmin`
   The group scope should be `GLOBAL`, the group type should be `SECURITY`.
2. Two new SAP system users `<sapsid>adm` and `SAPService<SAPSID>`.
3. The users `<sapsid>adm` and `SAPServiceSAPSID` must be members of the domain group `SAP_<SAPSID>_GlobalAdmin`.

> **Note**
>
> The Software Provisioning Manager creates the operating system user for the SAP Host Agent by default as a local user that is not
>
> a member of the local Administrators group. If you want to create this user manually as a domain user,
>
> you must perform the following steps:
>
> Creating the SAP Host Agent User and Group Manually
>
> 1. Create the new global group `SAP_GlobalAdmin`
> 2. Create the SAP system user `sapadm`.
> 3. Add the user sapadm to the newly created group `SAP_GlobalAdmin`.
>
> However, for security reasons we strongly recommend that you create this user as a local user.

7.4 Checking and Changing the Paging File Settings on Windows Server

This section describes how to check and change the paging file size on Windows Server with PowerShell.

The PowerShell commands also work in previous Windows versions where PowerShell is available.

> **Note**
>
> Some paging file operations require a reboot of the server to activate the changes you made. Wmi-commands do not indicate whether a reboot is required or not. Therefore, we recommend rebooting your system every time you change the paging file settings with PowerShell.

Prerequisites

Always start the PowerShell in elevated mode (run as administrator).

Procedure

Checking the Size of a Paging File

1. Start Windows PowerShell.
2. Check whether the default value *Automatic manage pagefile size for all devices* is activated.

   > **Note**
   >
   > We do not support automatically managed page file sizes.

   To check this, enter the following command:
   ```
   (Get-WmiObject Win32_Pagefile) -eq $null
   ```
   If *Automatic manage pagefile size for all devices* is enabled, the output value is *True*.
   If necessary, disable *Automatic manage pagefile size for all devices* with the following command:
   ```
   $sys = Get-WmiObject Win32_Computersystem –EnableAllPrivileges
   $sys.AutomaticManagedPagefile = $false
   $sys.put()
   ```
3. Check the size of the paging files with the following command:
   ```
   Get-WmiObject WIN32_Pagefile | Select-Object Name, InitialSize, MaximumSize, FileSize
   ```
   The output looks like the following:

   ```
   Name                 InitialSize
   MaximumSize              FileSize
   ----                 -----------
   -----------              --------
   C:\pagefile.sys                0                      0
   41943040000
   E:\pagefile.sys            40000                  80000
   41943040000
   ```

   In this example, in the first line, the *InitialSize* and *MaximumSize* values of a paging file are 0, which means that the paging file size is *system managed* (not recommended).
   In the second line, the paging file size has a minimum and a maximum size (recommended).

Changing the Size of a Single Paging File

Changing the *InitialSize* and *MaximumSize* values of a paging file to a size other than 0, will automatically switch off *system managed size*.

In the following example, we change the size of the paging file on *C:* to the *InitialSize* of 40 GB and to the *MaximumSize* of 80 GB.

Use the following commands in a PowerShell:

```
$Pagefile = Get-WmiObject Win32_PagefileSetting | Where-Object {$_.name -eq “C:\pagefile.sys”}
```

```
$Pagefile.InitialSize = 40000
$Pagefile.MaximumSize = 80000
$Pagefile.put()
```

Typically, you choose the same value for *InitialSize* and *MaximumSize*.

> **Note**
>
> The sum of all paging files *InitialSize* values must be equal to or higher than the value recommended for your SAP system.

Creating a Second Paging File on Another Disk

You might want to create a second or additional paging files to improve system performance, or if your disk does not have enough space.

To do so, enter the following commands in a PowerShell:

```
$Pagefile = Get-WmiObject Win32_PagefileSetting
$pagefile.Name = “E:\pagefile.sys”
$pagefile.Caption = “E:\pagefile.sys”
$pagefile.Description = “’pagefile.sys’ @ E:\”
$pagefile.SettingID =”pagefile.sys @ E:”
$pagefile.InitialSize = 80000
$pagefile.MaximumSize = 80000
$pagefile.put()
```

Deleting a Paging File on a Specific Device

To delete a paging file, enter the following commands in a PowerShell:

```
$pagefile = Get-WmiObject Win32_PagefileSetting | Where-Object {$_.name -eq
“E:\pagefile.sys”}
$pagefile.delete()
```

7.5 Database High-Availability with SQL Server Always On

SQL Server 2012 introduced a new feature called Always On. With Always On, you can use multiple SQL Servers to host one database.

For more information on installing SAP system on Always On, see SAP Note 1772688.

For more information about SQL Server Always On, Always On Groups and Always On Listener and Endpoints, see the following Microsoft KB articles:

- **Getting Started with Always On Availability Groups**
  https://msdn.microsoft.com/en-us/library/gg509118.aspx

- **Creation and Configuration of Availability Group**
  https://msdn.microsoft.com/library/ff878265.aspx
- **Database Mirroring Endpoints in Always On Nodes**
  https://msdn.microsoft.com/en-us/library/ms179511.aspx
- **Microsoft Blog**
  https://blogs.msdn.microsoft.com/saponsqlserver/2012/02/07/sql-server-2012-alwayson-what-is-it/

7.6 Database Installation for Multiple Components with MS SQL Server

Each SAP system in your SAP environment needs its own database back end. With SQL Server you have the following options to distribute your systems across the available hardware resources. They differ with respect to hardware requirements, database administration, flexibility, and scalability, but all require careful hardware sizing to avoid performance bottlenecks and scalability problems.

- Exclusive database server
  In this system landscape, each database server (with or without a central instance) hosts exactly one SAP database. From an installation planning perspective, this is the simplest solution. It is the most scalable setup, but it requires the most hardware. You typically use this option for medium-sized and large production and development systems.
- Named SQL Server istances
  With the use of named instances, you can install multiple, independent SQL Server instances on a single database server. These instances share CPU, memory, and disk resources, but are completely independent from each other in terms of administration.
- Multiple databases in an SQL Server instance
  SQL Server lets you operate multiple user databases in a single SQL Server instance. Contrary to named instances, the databases share the temporary system database `tempdb`, the SQL Server Windows process, and the SQL Server memory pool. Therefore, this setup is less scalable than named instances, but at the same time requires less system resources. It can be a flexible solution for small and medium-sized systems.
- Multiple Components in One Database (MCOD) (not recommended)
  Multiple database back ends are stored in the same database, each in its own database schema. For the database administrator, the database containing these multiple components looks similar to a single entity. While this approach is not as flexible as the other options, its simplicity makes it an attractive solution for small SAP environments.

More Information

- Default or Named MS SQL Server Instances [page 129]
- Multiple Components in One Database (MCOD) [page 130]

7.6.1 Default or Named MS SQL Server Instances

When you install MS SQL Server, you can install two different types of instances:

- Default instance
- Named instance

When you plan your system configuration, you must decide which instance type you want to install. The following clarifies the difference between the two.

Default Instance

A **default** instance is the most common form of an MS SQL Server installation in an SAP environment. Typically, one MS SQL Server instance is installed together with a single SAP database instance. In this configuration, all MS SQL Server components and functionality are exclusively available for the SAP database instance.

In a less frequently implemented configuration, a single MS SQL Server instance is installed together with more than one SAP database instance on the same computer. In this type of configuration, the MS SQL Server components such as executables, system database instances, and utilities **exist only once** and have to be shared by all SAP database instances. Since all the database instances on the computer have to be managed with a single copy of the MS SQL Server, certain administrative tasks on one database instance cannot be performed in isolation without affecting the other database instances.

> → Recommendation
>
> If you plan to install only one SAP database instance on a computer, we recommend that you use a default instance.

Named Instance

The advantage of named instances is that you can set up several SAP database instances on the same machine and administer each one separately with its own copy of the MS SQL Server. The main components of the MS SQL Server are available exclusively for each instance and can be used only by that instance. Only a few resources such as client utilities have to be shared by all the instances because they are only installed once. During the installation, each named instance is given a name that is the same as the SAP system name, thus enabling a unique assignment of instances to SAP database instances.

A named instance is recommended, if you plan to install more than one SAP database instance on the same host. Several named instances and the default instance can coexist on the same computer and function in isolation of each other.

7.7 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.

> ⓘ Note
>
> SAP does not support that you install two or more SAP Business Warehouse (SAP BW) systems in one database using MCOD.

With MCOD we distinguish two scenarios:

- The installation of an SAP system in a new database
- The installation of an additional SAP system in an existing database (MCOD)

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.

> **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 is **not** possible. You have to perform a homogeneous system copy with R3load instead.
  - 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.
- Only valid for 'High Availability': HA (Windows)
  You **cannot** install multiple components in one database with Microsoft Failover Clustering. For more information, see High Availability with Microsoft Failover Clustering [page 150].
  End of 'High Availability': HA (Windows)
- For the first SAP system, the `<DBSID>` must be the same as the `<SAPSID>`.
- For the second SAP system, you must use the same `<DBSID>` as for the first SAP system.
- Since the Software Provisioning Manager turns off database logging during the database load phase of the installation, you need to perform a full database backup afterwards.

7.8 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.
   - 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 `\usr\sap\<SAPSID>/profile`.

   > ⓘ 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. Only valid for 'High Availability': HA (Windows)

   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`.

   ### Example

   Instance profile of the ASCS instance:

   Before the change:

   ```
   ...
   rdisp/msserv = 4711
   ...
   ```

   After the change:

   ```
   ...
   rdisp/msserv = 0
   rdisp/msserv_internal = 4711
   ...
   ```

   End of 'High Availability': HA (Windows)

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

7.9 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 69].
- 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 69]

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 software provisioning manager [page 73] 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* ▶.
  b. You run the software provisioning manager [page 73] on the central system host to install the database instance using installation option ▶ *Distributed System* ▶ *Database Instance* ▶.
  c. You run the software provisioning manager [page 73] 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 software provisioning manager [page 73] 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`.

7.10 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 (embedded installation). If you need to install the SAP Host Agent separately, use the documentation *Installation of SAP Host Agent on Windows - 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 Software Provisioning Manager 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

Only valid for 'High Availability': HA (Windows)

> **Note**
>
> This installation option is not supported in a high-availability system.

End of 'High Availability': HA (Windows)

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.

The central instance now includes:

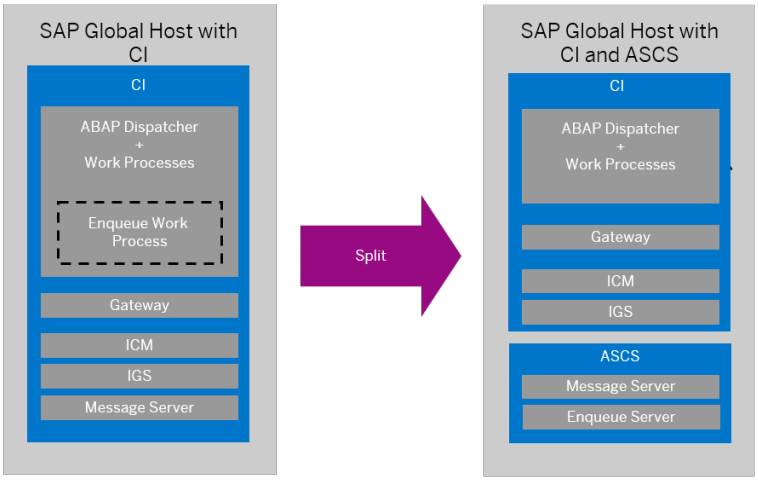
- ABAP dispatcher and work processes (dialog, batch, spool, or update)
- Gateway
- Internet communication manager (ICM)
- Internet graphics service (IGS)

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:



CI = Central Instance
ASCS = Central Services Instance for ABAP

Splitting Off an ASCS Instance in an ABAP System

Procedure

1. Plan the basic parameters, as described in SAP System Parameters [page 40]:
   - 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 31].
3. Specify basic SAP System Parameters [page 40] for the ASCS instance to be created.

4. Check the prerequisites [page 72] and start the Software Provisioning Manager [page 73] on the host where the ASCS instance is to be created.
5. On the *Welcome* screen, choose *Generic Options* > *Split Off ASCS Instance from Existing Central Instance*.
6. Follow the instructions on the Software Provisioning Manager screens and enter the required parameters.

   > **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 Software Provisioning Manager displays the *Parameter Summary* screen. This screen shows both the parameters that you entered and those that the Software Provisioning Manager set by default. If required, you can revise the parameters before starting the installation.
7. To start the installation, choose *Start*.

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

   The Software Provisioning Manager starts the installation and displays the progress of the installation. When the installation has successfully completed, the Software Provisioning Manager shows the dialog *Execution of Split Off ASCS Instance from existing Central Instance has completed.*
8. Restart the application server instances [page 137] (central instance and dialog instances if they exist) that were not already restarted by the Software Provisioning Manager.
9. Check whether you can log on to the application servers [page 93].
10. Ensure user security [page 108] for the operating system users of the newly created ASCS instance.
11. If required, perform an installation backup [page 112].

7.12 Starting and Stopping the SAP System

You use this procedure to start and stop the SAP system or single instances after the installation with the **SAP Microsoft Management Console (SAP MMC)** or SAPControl.

> **Caution**
>
> Note the following restrictions about starting and stopping the database instance with the SAP MMC or SAPControl:
>
> Only valid for 'High Availability': non-HA
>
> You can use the SAP MMC or SAPControl to start the database instance. To stop the database instance, however, you must use the relevant database administration tools.
>
> End of 'High Availability': non-HA

Only valid for 'High Availability': HA (Windows)

In a HA system, you can neither start nor stop the database instance with the SAP MMC or SAPControl. For more information, see Starting and Stopping the SAP System in an HA Configuration [page 175].

End of 'High Availability': HA (Windows)

Prerequisites

The user who wants to start and stop the SAP system or instances with the SAP MMC, must be a member of the local administrators group.

Procedure

Starting and Stopping the SAP System with the SAP MMC

With the SAP MMC, you can start or stop installed SAP instances – except the database instance – locally on the host that you are logged on to. If the SAP MMC is configured for central system administration, you can start or stop the entire system from a single host.

> **Note**
>
> - You can also start and stop a UNIX system with the SAP MMC.
> - The SAP MMC is not available on Windows Server Core.

For more information about the SAP MMC, see the following documentation:

Release	SAP Help Portal Path
• SAP NetWeaver 7.0 SR3 • SAP NetWeaver 7.0 incl. EHP1 • SAP NetWeaver 7.0 incl. EHP2	https://help.sap.com/viewer/p/SAP_NETWEAVER ▶ *SAP NetWeaver 7.0 <Including Enhancement Package>* ▶ *Application Help* ▶ *Function-Oriented View: English* ▶ *Solution Life Cycle Management by Key Capability* ▶ *Solution Monitoring* ▶ *Monitoring in the CCMS* ▶ *SAP Microsoft Management Console: Windows*
SAP NetWeaver 7.0 incl. EHP3	https://help.sap.com/viewer/p/SAP_NETWEAVER_703 ▶ *Application Help* ▶ *Function-Oriented View: English* ▶ *Solution Life Cycle Management by Key Capability* ▶ *SAP Microsoft Management Console: Windows*

To start or stop the SAP system with the SAP MMC, perform the following steps:

1. Start the SAP MMC on the SAP system host.
2. Right-click the SAP system node and choose *Start* or *Stop*.
   All SAP instances listed under the system node start or stop in the correct order.

3. If the SAP system is installed on multiple hosts (distributed or high-availability system), you have the following options to start or stop your system:
   - You start or stop the SAP instances using the SAP MMC on each host.
   - You add the remote instances to the SAP MMC configuration to start or stop all instances from a single SAP MMC.
     To do so, do one of the following:
     - You configure the SAP MMC manually. For more information, see *Changing the Configuration of the SAP MMC* in the SAP MMC documentation.
     - You use the automatic LDAP registration. For more information, see *Configuring SAP MMC for Active Directory Services* in the SAP MMC documentation.

Starting and Stopping the SAP System with SAPControl

To start or stop the SAP system with SAPControl (`sapcontrol.exe`), perform the following steps:

- To start or stop the complete SAP system – except the database instance – with SAPControl, open a PowerShell in elevated mode, and enter the following command:
  ```
  sapcontrol -prot PIPE -nr <Instance_Number> -function StartSystem
  sapcontrol -prot PIPE -nr <Instance_Number> -function StopSystem
  ```
- To start or stop a single instance with SAPControl, open a PowerShell in elevated mode, and enter the following command:
  ```
  sapcontrol -prot PIPE -nr <Instance_Number> -function Start
  sapcontrol -prot PIPE -nr <Instance_Number> -function Stop
  ```

7.13 Configuring the Windows Server Firewall after SAP installation

Use

In Windows Server the firewall is configured to allow only a small set of Windows-specific inbound IP connections.

Therefore, we recommend that you do **not** turn on the Windows firewall after you have installed your SAP system. Instead, we recommend that you secure network access to your SAP system with the physical firewall or a router Access Control List (ACL) within your datacenter.

If, for some reason, you want to use the Windows Server firewall, you have to configure the Windows firewall and define a set of *Inbound Rules* for the TCP/IP port numbers that are used by your system. Otherwise, your SAP system might not operate.

For more information about the port numbers used, see the documentation *TCP/IP Ports of All SAP Products* at:https://help.sap.com/viewer/ports.

Ports listed with the default value *Not active* in this document are not configured.

Only valid for 'High Availability': HA (Windows)

> ⚠ Caution
>
> In a high-availability system, you have to configure the firewall on **all** cluster nodes.

End of 'High Availability': HA (Windows)

SQL Server Ports and Client Connections

This section provides general information about the client connections and used ports with SQL Server. This information helps you to correctly configure the Windows Server firewall for the SQL Server ports, as described below.

With SQL Server you have the following instance types:

- Default instance
  The default instance uses per default TCP port 1433 to connect to the database server.
- Named instances
  Named instances use a random port. This port is fixed while the SQL Server service is running, but might change when the SQL Server service starts.

  > ⓘ Note
  >
  > If you use a firewall, we strongly recommend to use fixed port numbers for Named Instances. You can set up fixed port numbers for named instances in the *SQL Server Configuration Manager*. For more information, see the *SQL Server Books Online*.

If an SQL Server client connects to the database server, it uses:

- The same SQL Server instance port on the server side
- A separate but random port on the client side

To find out the server port number from the client side, you have the following options:

- You use SQL Server Browser, which uses UDP port 1434. This port tells the client which SQL Server port is used.
- If you do not use SQL Browser, look for the port number in the SQL Server Error Log. Add the port number in the connection string of the instance profile as shown in the following example:

  > ✤ Example
  >
  > This example shows how the connection string, looks before and after the change for a default and named instance:
  >
  > - **Connection string before change:**
  >   Default instance: `<hostname>`
  >   Example: `SAPSQLSERVER`
  >   Named instance: `<hostname>\<instancename>`
  >   Example: `SAPSQLSERVER\PRD`
  > - **Connection string after change with added port number:**
  >   Default instance: `tcp:<hostname>,<port>`
  >   Example: `tcp:SAPSQLSERVER,1433`
  >   Named instance: `tcp:<hostname>\<instancename>,<port>`
  >   Example: `tcp:SAPSQLSERVER\PRD,1500`

We recommend you to use the following best practices with SQL Server for Windows Server firewall settings:

- Use a default instance.
  Define the inbound rules for TCP port 1433.
- If you use a named instance, we recommend you to set up a fixed port number in the *SQL Server Configuration Manager* and to use SQL Server Browser.
  Define the inbound rules for this fixed TCP number, as well as for UDP port 1434, which is used by SQL Server Browser.

Prerequisites

You turn on the disabled firewall [page 54] as follows:

- Open Windows PowerShell in elevated mode, and enter the following command:
  `Set-NetFirewallProfile "public","domain","private" -enabled true`
- You turn on the disabled firewall as follows:
  Open Windows PowerShell in elevated mode, and enter the following command:
  `Set-NetFirewallProfile "public","domain","private" -enabled true`

Procedure

This procedure provides an example how to set *Inbound Rules* for the ports of an ABAP server that was installed with the following settings:

Instance number	00
Port type	TCP
Ports	3200, 3300, 4800, 8000, 3600, 50013, 1433, 1434

- Open Windows PowerShell in elevated mode, and enter the following command:
  `New-NetFirewallRule -DisplayName “SAP ABAP Server 00" -Direction Inbound -Protocol TCP -LocalPort 3200,3300,4800,8000,3600,50013,1433,1434 -Action Allow`
- You turn on the disabled firewall as follows:
  Open Windows PowerShell in elevated mode, and enter the following command:
  `Set-NetFirewallProfile "public","domain","private" -enabled true`

> **Note**
>
> Port 1433 is only required if programs running on other hosts must access SQL Server using TCP/IP, such as when you have installed additional SAP dialog instances or you run SQL Server Management Studio on a remote computer.

> **Note**
>
> If you want to use, for example, a different IP scope for port 50013, which is used by the connection SAP Start Service – SAP Management Console, you can restrict the IP access to a small number of SAP

administrators. Then delete this port from the SAP ABAP Server 00 rule and create a new rule for port 50013 with a more restrictive scope.

7.14 SAP System Security on Windows

In a standard SAP system installation, the Software Provisioning Manager automatically performs all steps relevant for security. Although the Software Provisioning Manager makes sure that the system is protected against unauthorized access, you must still check that no security breaches can occur.

For central and straightforward administration of the SAP system, you have to install distributed SAP systems with multiple application servers in a Windows **domain**. This section describes the user accounts and groups that the Software Provisioning Manager creates during a domain installation and shows how these are related to the SAP directories.

User Accounts

The Software Provisioning Manager creates the following accounts for SAP system administration:

User account	Description
`<sapsid>adm`	This is the SAP system administrator account that enables interactive administration of the system.
`SAPService<SAPSID>`	This is the user account that is required to start the SAP system. It has the local user right to log on as a service. The advantage of the additional `SAPService<SAPSID>` account is that it does not allow interactive logon, which prevents abuse of the account. Therefore, you do not need to set an expiration date for the password and you do not have to set the option *user must change password at next logon.*
`sapadm`	This is the user for the SAP Host Agent. By default it is a local user and not a member of the local `Administrators` group. You can change this user into a domain user on the *Parameter Summary* screen. For security reasons, however, SAP strongly recommends to create this user as a local user. The SAP Host Agent contains all of the required elements for centrally monitoring any host with the Alert Monitor or the SAP NetWeaver Administrator.

Domain and Local Groups

The only function of a domain group is to group users at the domain level so that they can be placed in the appropriate local groups.

Only local groups are created and maintained on each local host. A local group can only be given permissions and rights to the system where it is located. The system is part of a particular domain, and the local group can contain users and domain (global) groups from this domain.

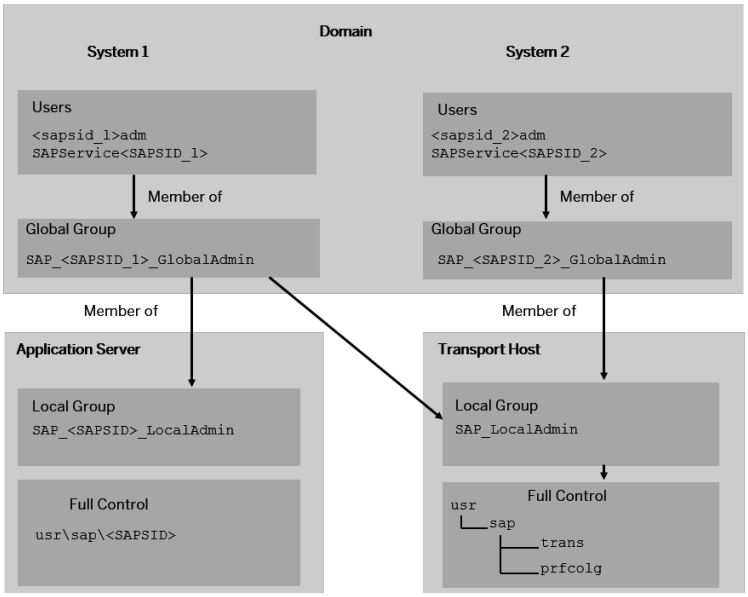
During a domain installation, the Software Provisioning Manager creates the following domain and local groups:

Group	Description
`SAP_LocalAdmin`	This local group is created on all hosts, but is particularly important for the transport host. Members of the group have full control over the transport directory (`\usr\sap\trans`) that allows transports to take place between systems. The `SAP_<SAPSID>_GlobalAdmin` groups of all the SAP systems that are part of the transport infrastructure are added to the `SAP_LocalAdmin` group. Therefore, the users `<sapsid>adm` and `SAPService<SAPSID>` of all systems in the transport infrastructure are members of the `SAP_LocalAdmin` group and have the required authorizations necessary to initiate and execute transports.

SAP Directories

The Software Provisioning Manager protects the SAP directories under `\usr\sap\<SAPSID>` by only granting the group `SAP_<SAPSID>_LocalAdmin` full control over these directories.

The following graphic illustrates the users and groups that are created by the Software Provisioning Manager for the `<sapsid>adm` and `SAPService<SAPSID>` users in a system infrastructure consisting of two SAP systems.



User Groups and Accounts

> ### Note
>
> SAP_An access control list (ACL) controls access to SAP system objects. For maximum security in the SAP system, only the following are members of **all** SAP system object ACLs:
>
> - Local group `SAP_<SAPSID>_LocalAdmin`
> - Group `Administrators`
> - User `SYSTEM`

More Information

Automatic Creation of Accounts and Groups [page 144]

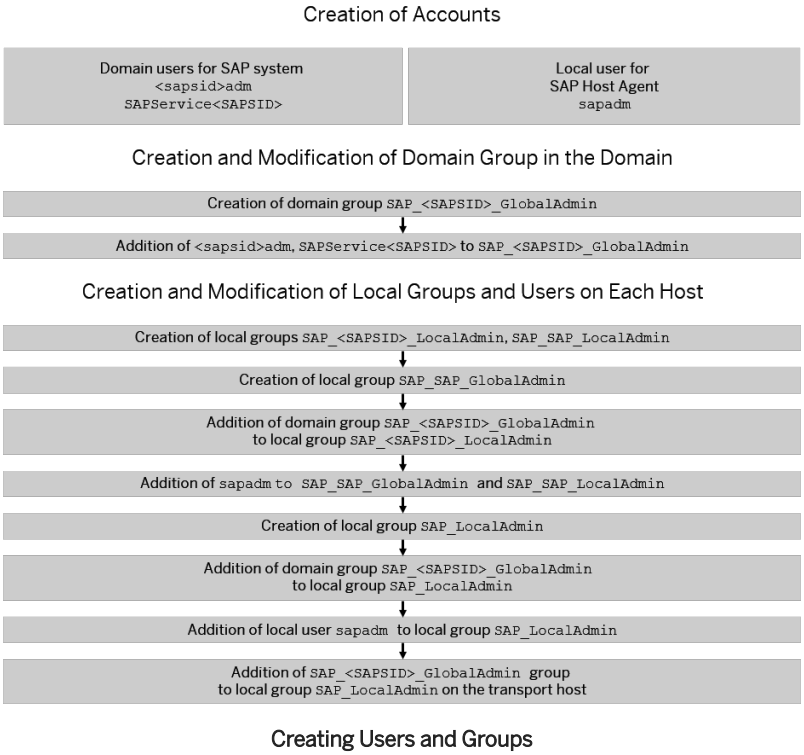
7.15 Automatic Creation of Accounts and Groups

The Software Provisioning Manager automatically creates the accounts and groups required for the secure operation of the SAP system with Windows during the installation, as described in SAP System Security on Windows [page 142].

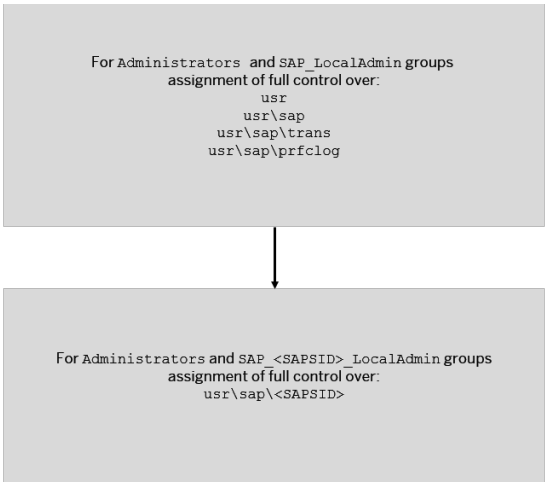
Features

The following figures show the steps that the Software Provisioning Manager performs to create the users and groups and assign the required rights to SAP directories.

The first figure shows the users that are created during a domain installation, with the SAP Host Agent operating system users being local users.



Creating Users and Groups



Assigning Rights to SAP Directories

7.16 Uninstalling an SAP System or Single Instances

This section describes how to uninstall a complete SAP system or single SAP instances with the *Uninstall* option of the Software Provisioning Manager.

Prerequisites

- You have installed your SAP system with standard SAP tools according to the installation documentation.
- You are logged on with a user account that has the required authorization to run the Software Provisioning Manager tool and the SAP system. For more information, see Required User Authorization for Running Software Provisioning Manager [page 57].

  > ⚠ 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.

  > ⓘ 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

> **Note**
>
> With this Software Provisioning Manager option you do **not** delete the database software.You have completed a DMO to SAP S/4HANA 1809 and higher. Next, you want to do an SAP Uninstall to delete your SAP source system on IBM i. The SAP Uninstall requires some manual prerequisite steps to finish successfully. For example the profile directory must be adapted. For more information, see the SAP Note

Note the following when deleting an SAP system:

- You cannot delete an SAP system remotely.
- The Software Provisioning Manager 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.
- If you uninstall an SAP instance and you plan to install another SAP instance with the same System ID, first reboot the Windows host to clear all user cached information. For more information, see SAP Note 2296310.

Procedure

1. Start the Software Provisioning Manager as described in Running Software Provisioning Manager [page 73].
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 Software Provisioning Manager input dialogs to delete a complete SAP system or single instances.

   > **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 Software Provisioning Manager.

Deletion of	Remarks
Central system	You can delete a central system (where all instances reside on the same host), in one Software Provisioning Manager run.
Distributed or high-availability system	If you want to delete a distributed or high-availability system, you have to run the Software Provisioning Manager to delete the required instances **locally** on each of the hosts belonging to the SAP system in the following sequence: **⚠ Caution** Only select checkbox *Uninstall all instances of the SAP system from this host* when removing the last remaining instance of the SAP system. Otherwise the contents of mounted global directories under `\\<sapglobalhost>\<sapmnt>\<SAPSID>\`, such as instance profiles and kernel executables, are also deleted. 1. Dialog instances, if there are any 2. Central instance If the Software Provisioning Manager stops responding while trying to delete the central instance, do the following: 1. Close the Software Provisioning Manager with *Cancel* and *Exit*. 2. Log off and log on again. 3. To finish uninstalling the central instance, restart the Software Provisioning Manager. 3. Database instance Choose whether you want to drop the entire database instance or only one or more database schemas. Since the Software Provisioning Manager 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 Software Provisioning Manager parameters for the deletion of the database instance. 4. Only valid for 'High Availability': HA (Windows) Enqueue Replication Server End of 'High Availability': HA (Windows) 5. ABAP central services instance (ASCS instance)
Dialog instance	If you want to delete dialog instances of an existing SAP system, you have to run the Software Provisioning Manager to delete them **locally** on each dialog instance host.
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 SQL Server database software using the SQL Server Uninstaller, which you can find on Windows at *Add/Remove Programs*.
6. Delete the local user group `SAP_<SAPSID>_LocalAdmin` manually as follows:
   - Open a PowerShell in elevated mode and enter the following command:
     net localgroup SAP_<SAPSID>_LocalAdmin /delete
7. If required, you can delete the directory `\usr\sap\trans` and its contents manually.
   The Software Provisioning Manager does not delete `\usr\sap\trans` because it might be shared.
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*
9. If the following directories and files exist, delete them by entering the following command:

   `WRKLNKSAP`

   - `/usr/sap/trans/cofiles/*<SAPSID>*`
   - `/usr/sap/trans/data/*<SAPSID>*`
   - `/usr/sap/trans/log/*<SAPSID>*`
   - `/usr/sap/trans/buffer/*<SAPSID>*`

   Choose **4** (*Remove*) on every file that is found by the command **`WRKLNKSAP`**.

   > **Example**
   >
   > For example, for directory `/usr/sap/trans/data`, enter the following command:
   >
   > **`WRKLNKSAP DIR('/usr/sap/trans/data/*<SAPSID>*')`**
   >
   > Choose **4** (*Remove*) on the listed files.

   > **Note**
   >
   > To limit the command **`WRKLNKSAP`**, choose **`Subset`** (in the upper right part on the screen).

10. If the following directories exist, delete them by entering the following commands:

    `RMVDIR DIR('/sapmnt/<SAPSID>') SUBTREE(*ALL)`

    `RMVDIR DIR('/usr/sap/trans/config/<SAPSID>') SUBTREE(*ALL)`

    > **Note**
    >
    > If you are removing a system from an independent ASP also delete the contents from the following directories:
    >
    > **`RMVDIR DIR('/<IASP_Name>/usr/sap/<SAPSID>') SUBTREE(*ALL)`**
    >
    > **`RMVDIR DIR('/<IASP_Name>/sapmnt/<SAPSID>') SUBTREE(*ALL)`**

11. If the kernel library of the system you just deleted was only used by the deleted system, you can remove it.
    - To remove the kernel library from the library list, enter the following command:
      `RMVLIBLE LIB(SAP<SAPSID>IND)`
    - To delete the kernel library, enter the following command:
      `DLTLIB LIB(SAP<SAPSID>IND)`

Results

The SAP system is now deleted. If you want to reinstall an SAP system, you can use the same <SAPSID> as the one of the SAP system you deleted.

8 High Availability with Microsoft Failover Clustering

You can install a high-availability SAP system with *Microsoft Failover Clustering*. The Failover Clustering software improves the availability of the system and protects it against failure and unplanned downtime, enabling 24-hour operation, 365 days a year.

With high availability, you enable critical system components, known as "Single Points of Failure (SPOFs)", to be automatically switched from one machine to the other, if hardware or software problems arise on one machine. With the help of this switchover – or failover – the system can continue functioning.

Apart from enabling failover when hardware problems occur, you can also use Failover Clustering to avoid downtime when you perform essential system maintenance. If you need to maintain one host (failover cluster node), you can deliberately switch the cluster resources to the other host (failover cluster node) and temporarily operate it there while maintenance is in progress. When maintenance work is finished, you can easily move the resources back to their original node and continue operating them there.

When you are setting up the SAP system with Microsoft Failover Clustering, you combine standard installation steps, described earlier in this documentation, with cluster-specific steps, described here.

You have the following options to install a high-availability SAP system with Microsoft Failover Clustering:

- You install one SAP system in **one** Microsoft Failover Cluster.
- You install one SAP system in **two** Microsoft Failover Clusters.
- You install **several** SAP systems in **one** or **more** Microsoft Failover Clusters with two or more Microsoft Failover Cluster nodes.

You have the following options to install the database instance with an high-availability SAP system:

- You install the database instance in the same failover cluster as the SAP system.
- You install the database instance on a different host or cluster on either the same or a different operating system.
- You use third-party high-availability solutions to improve the availability of your database instance.

Important Information

To install a new SAP system with Microsoft Failover Clustering, you have to perform a number of extra steps specially required for the cluster and configure the SAP system so that it can take advantage of the cluster functionality:

- Since the correct configuration of network addresses is absolutely essential for the cluster to function properly, you have to perform a number of additional steps that are necessary to set up and check address resolution.
- You install the SQL Server Failover Cluster on all cluster nodes of the database instance host.
- Since the cluster hardware has at least two nodes that have access to all local and shared storage devices, you have to install some components on all nodes and pay attention to special rules for distributing components to local disks, shared disks, or external file shares.

- You have to install and configure the ASCS instance to run on two cluster nodes in one Microsoft Failover Cluster.

> **Note**
>
> If you have an existing SAP system and plan to migrate to a failover cluster with new hardware, you install the SAP system using a **system copy**.
>
> For more information about the system copy, see the *System Copy Guide* for your SAP system at:
>
> http://support.sap.com/sltoolset *System Provisioning* *System Copy Option*
>
> The system copy guide does **not** include the cluster-specific information, which is described here.

Terminology

- In this documentation the hosts in a Microsoft Failover Cluster are referred to as first cluster node and additional cluster node(s):
  - The **first** cluster node is the cluster node where you perform the general installation of an SAP system, for example where the database or (A)SCS instance is to be installed.
  - The **additional** cluster node is the node where you configure the already installed SAP instances to run in Microsoft Failover Clustering.

8.1 Checklist for a High-Availability System

This section includes the steps that you have to perform for your SAP system using Microsoft Failover Clustering. Detailed information about the steps is available in the relevant section.

Planning

1. You check that you have completed the same planning activities [page 30] as for a non-HA system, including the hardware and software requirements [page 31].
2. You decide how to set up your SAP system components in a Microsoft failover cluster [page 153].
3. You decide how to distribute SAP system components to disks for a high-availability system [page 160].
4. You read Directories in a Microsoft Failover cluster Configuration [page 162].
5. You read IP Addresses in a Microsoft Failover Cluster Configuration [page 163].
6. You obtain IP addresses for a high-availability system [page 166].

Preparation

1. You check that you have completed the same preparations [page 53] as for a non-HA system.
2. To make sure that all preparation steps have been correctly performed, check that you can move the disk resources from one cluster node to another so that they are accessible from a single node at any time.

Installation

1. You make sure that:
   1. You are logged on as a domain administrator user or a domain user, who has the necessary rights on all cluster nodes. For a list of the required permissions, see Performing a Domain Installation without being a Domain Administrator [page 124].
   2. > ⓘ Note
      >
      > In Failover Cluster configurations, make sure that the account of the cluster (<clustername>$) has full rights in the OU (Organizational Unit) on which your Domain administrator configures the SAP users and the SAP group.
      >
      > If these rights are missing, SWPM will try to add the cluster network name resource to the SAP cluster group. However, because the cluster itself has no rights to add the related computer object (CNO) to the OU, SWPM will stop and show the error message `<access denied>`.
   3. You do **not** use the user `<sapsid>adm` unless specified.
   4. If you are prompted during the installation process, log off and log on again.
2. On **all** cluster nodes of the database instance host, you install the MS SQL Server failover cluster [page 168].
3. You configure the first cluster node [page 169].
4. You install the database instance on the first cluster node [page 170] of the database instance host.
5. You configure the additional cluster node [page 171].
6. You install the central instance [page 172].
7. You install at least one dialog instance [page 173].

Post-Installation

1. You install the permanent SAP licenses on all cluster nodes.
2. You perform the post-installation checks for the enqueue replication server.
3. You perform the same post-installation steps [page 92] as for a non-HA system.

Additional Information

- Moving Cluster Groups, or Services and Applications, or Roles [page 174]

- Starting and Stopping the SAP System in a Microsoft Failover Cluster [page 175]

8.2 Planning

The following sections provide information about how to plan the installation of the SAP system for Microsoft Failover Clustering. For a complete list of all steps, see section *Planning* in the Installation Checklist for a High-Availability System [page 151].

8.2.1 System Configuration with Microsoft Failover Clustering

The following chapters provide information about the configuration of your SAP system with Microsoft Failover Clustering. It describes the components you have to install for an SAP system running in a Microsoft Failover Cluster, and how to distribute them on the specific host. For more information, see:

- SAP System Components in a Microsoft Failover Cluster [page 153]
- Multiple SAP Systems in One Microsoft Failover Cluster [page 157]
- Multiple SAP Systems in Multiple Microsoft Failover Clusters [page 158]
- Enqueue Replication Server in a Microsoft Failover Cluster [page 159]

8.2.1.1 SAP System Components in a Microsoft Failover Cluster

In a Microsoft Failover Cluster configuration you have the following components for your SAP system:

SAP System Components in an HA Configuration

Component	Number of Components per SAP System	Single Point of Failure (SPOF)
ASCS instance (message services and enqueue services)	1	yes
Database instance (*)	1	yes
Application server (central instance, dialog instance)	1-<N>	no

(*) the database instance can also be installed outside the Microsoft Failover Cluster.

- To protect the SPOFs ((A)SCS instance, database instance), you have to use Microsoft Failover Clustering. If a hardware or software problem occurs on the first cluster node, the clustered (A)SCS instance and the clustered database automatically fail over to another node.

If you need to maintain the cluster node where the (A)SCS instance and database are running, you can switch these instances to another node. When maintenance work is finished you move the (A)SCS and database instance back to the original node.

- To protect system components that are non-SPOFs, for example application servers, you have to install them as multiple components. In this case, you must install at least two application servers (one central instance and at least one dialog instance) on two different hosts. You have the following options:
  - You install the central instance and the dialog instance on the cluster nodes of a Microsoft Failover Cluster. You install them on a **local** disk. Any additional dialog instances are installed on hosts outside of the Microsoft Failover Cluster.
    If you have to maintain a cluster node, you have to stop the central or dialog instance on that node. When you have finished maintenance, you restart the instances.

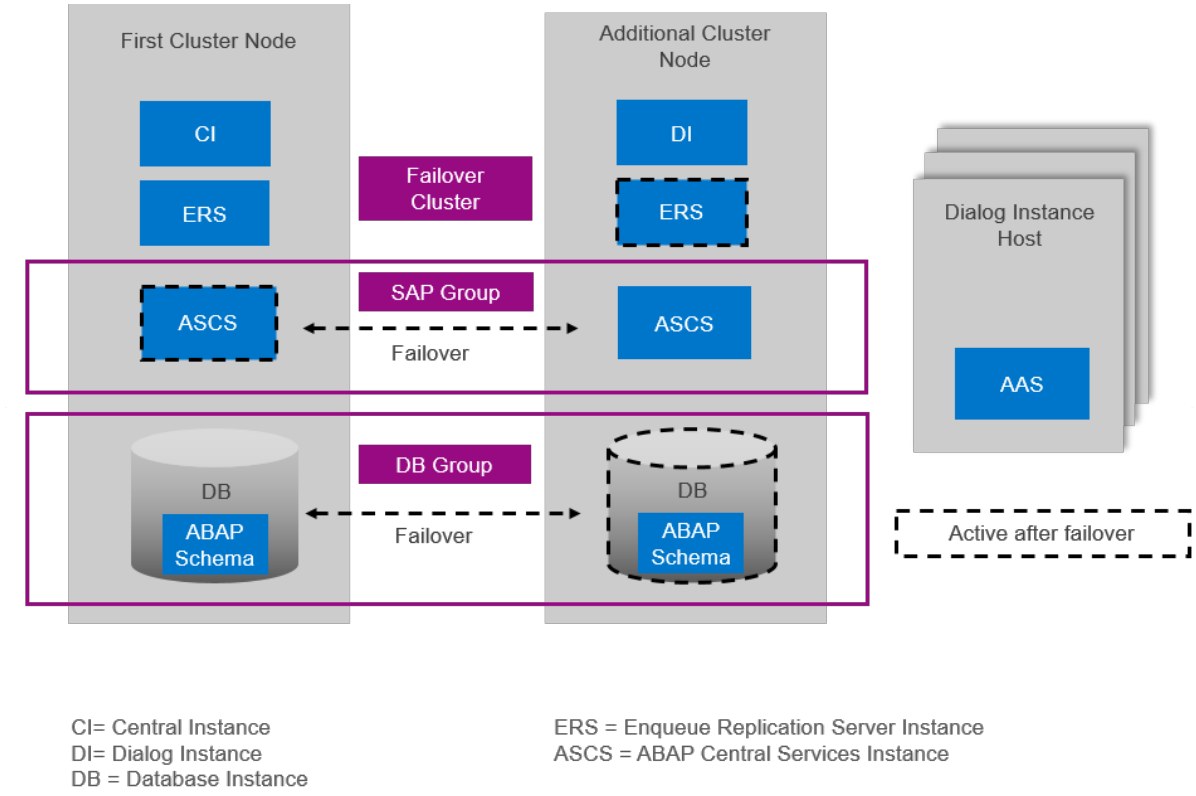
    > ⓘ Note
    >
    > If you install the central instance and the dialog instance on the cluster nodes, you must perform the hardware sizing for the failover cluster host, as in this case the application server is always running on this host. This increases system load and might impact performance. Note that, as usual in an Microsoft Failover Cluster setup, the (A)SCS and database instances also switch to run on the failover cluster host in the event of failover, which temporarily also increases system load.

  - You install the central instance and all dialog instances on hosts, which are not part of a Microsoft Cluster.

SAP System Components in One Microsoft Failover Cluster

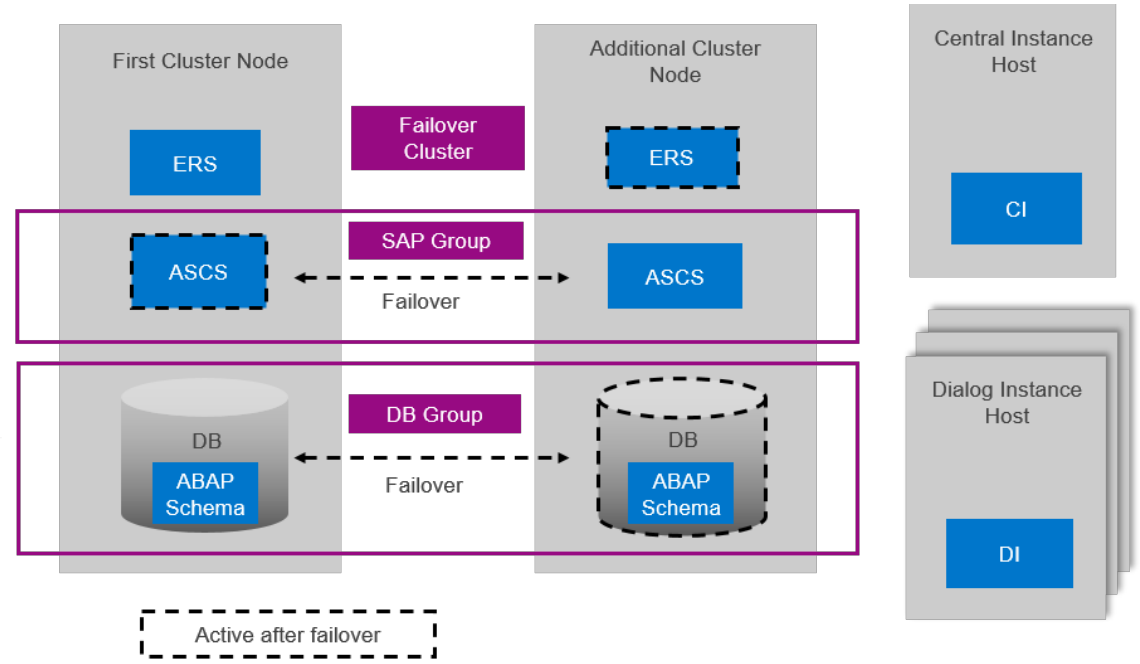
The following figures show examples for the installation of SPOFs and non-SPOFs of an SAP system in one Microsoft Failover Cluster with two nodes.

The first figure shows a Microsoft Failover Cluster configuration where the non-SPOFs components (central instance, dialog instance) are installed locally on the cluster nodes. Any additional dialog instances are installed outside the Microsoft Failover Cluster on separate hosts.



ABAP System with SPOFs, where non-SPOFs are installed locally on the Failover Cluster Nodes

The following figure shows an HA configuration, where the non-SPOFs components (central instance, dialog instance) are installed on separate hosts that are not part of the Microsoft Failover Cluster.



CI = Central Instance
DI= Dialog Instance
DB = Database Instance

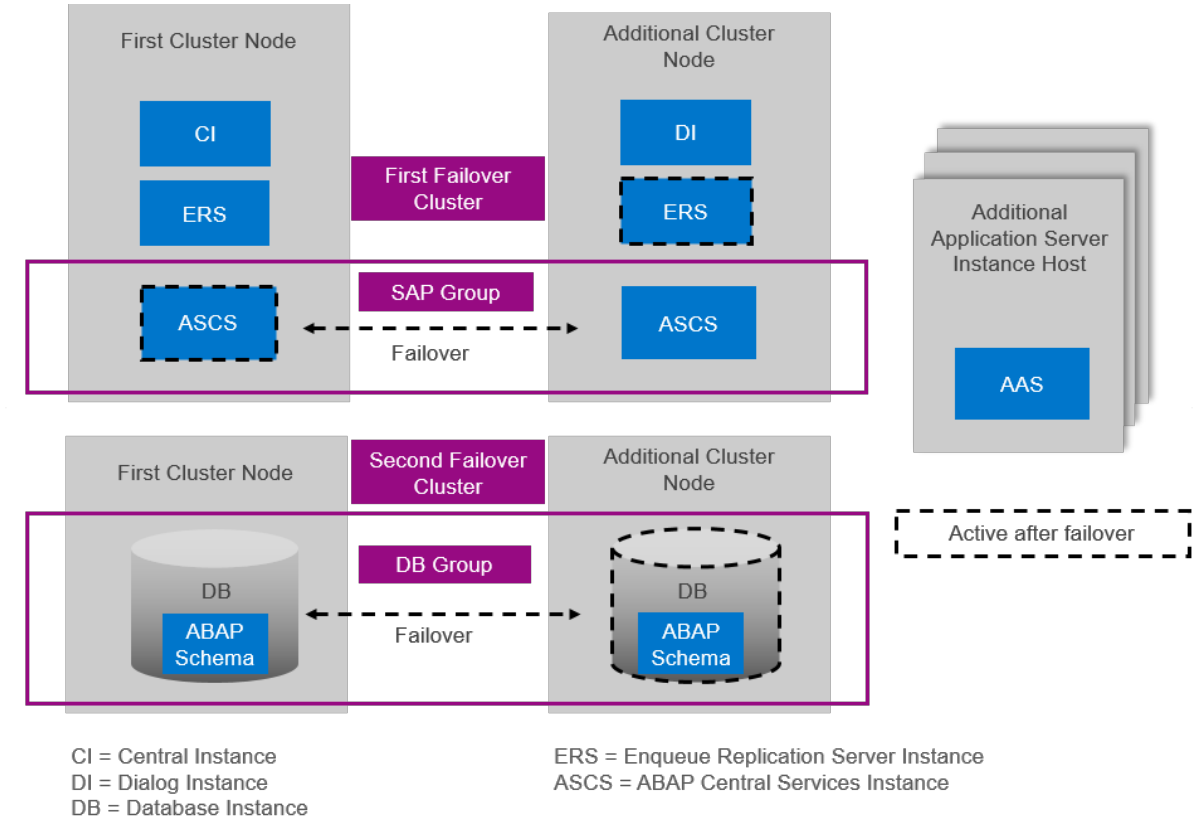
ERS = Enqueue Replication Server Instance
ASCS = ABAP Central Services Instance

ABAP System where the non-SPOFs are installed on hosts outside of the Microsoft Failover Cluster

SAP System Components in Two Microsoft Failover Clusters

Besides installing your SAP system within one Microsoft Failover Cluster, you can also set up two Microsoft Failover clusters and distribute the SPOF system components on these clusters to protect them against system failure.

The following figure shows an example where the database instance for the SAP system is installed in one Microsoft Failover Cluster, and the (A)SCS instance is installed on the second Microsoft Failover Cluster. The application servers (central instance, dialog instance) can either be installed on a local disk on the cluster nodes or on separate hosts that are not part of the Microsoft Failover Cluster.



ABAP System

8.2.1.2 Multiple SAP Systems In One Microsoft Failover Cluster

Before SAP NetWeaver 7.0, SAP only supported the installation of **one** clustered SAP system in **one** Microsoft Failover Cluster with two cluster nodes. The reason was that the cluster share `sapmnt` resource could only be assigned to **one** cluster group and could only point to one shared drive. .

The solution was to rename the cluster share `sapmnt` resource into `sapmnt<SAPSID>`, and use junctions, which pointed to the local disk. This is no longer required.

> ⚠ Caution
>
> All additional local instances such as an enqueue replication server, central instance, or dialog instance are installed on the local disk where the `saploc` share is pointing to. Make sure that you have enough space on this local disk.

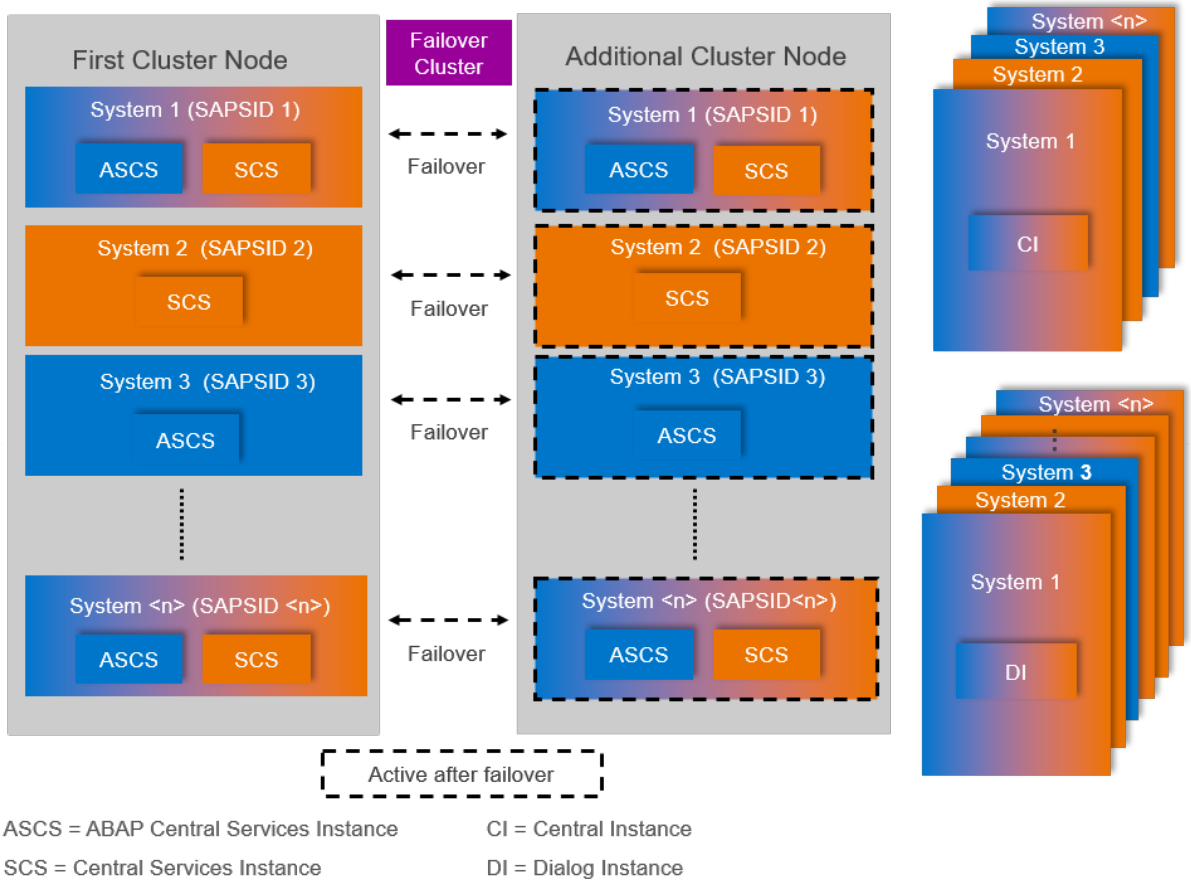
Every SAP system is placed in a separate cluster group with the unique name `SAP<SAPSID>`. Each SAP cluster group has its own shared disk, IP address, network name, `sapmnt` share, as well as a SAP service resource (or generic service resource), and the SAP instance resource.

If you have a Microsoft Failover Cluster configuration with three or more cluster nodes, the following restrictions apply:

- The (A)SCS instance must be configured to be able to perform a fail over between two cluster nodes in one Microsoft Failover Cluster. For more information, see SAP Note 1634991.

- If the database supports the installation on several cluster nodes, the database instance can be installed on more than two cluster nodes in one Microsoft Failover Cluster.

The following figure shows the installation of multiple SAP systems in one Microsoft Failover Cluster. For each SAP system you have to install one central and at least one dialog instance.



Multiple SAP Systems in One Microsoft Failover Cluster

8.2.1.3 Multiple SAP Systems In Multiple Microsoft Failover Clusters

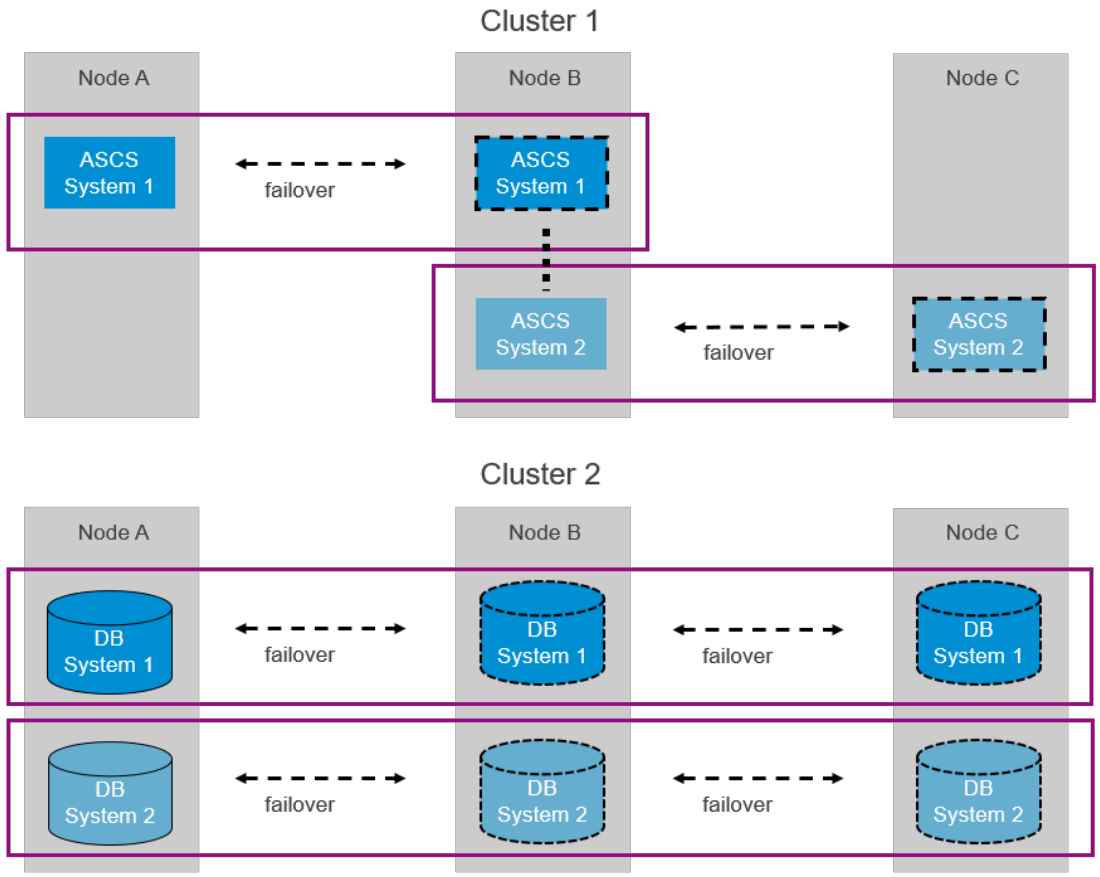
Besides installing multiple SAP systems in one Microsoft Failover Cluster, you can also install multiple SAP systems in several Microsoft Failover Clusters with two or more cluster nodes.

For this failover cluster configuration, the following restrictions apply:

- The ASCS instance must be configured to run on two cluster nodes in one Microsoft Failover Cluster. For more information, see SAP Note 1634991.
- If the database supports the installation on several cluster nodes, the database instance can be installed on more than two cluster nodes in one Microsoft Failover Cluster.

The following figure shows the installation of multiple SAP systems in two Microsoft Failover Clusters with three cluster nodes, called Node A, B, and C. In this example, the ASCS instances are installed in the first Microsoft Failover Cluster, and the database instances for the two SAP systems are installed on the second Microsoft Failover Cluster. The application servers can be either installed on a local disk on the cluster nodes or outside the Microsoft Failover Cluster on separate hosts.

> **Note**
>
> If you use an enqueue replication server, you must configure the enqueue replication server, and the ASCS instance on **two** nodes.
>
> For more information, see SAP Note 1634991.



Multiple SAP Systems in Two Microsoft Failover Clusters

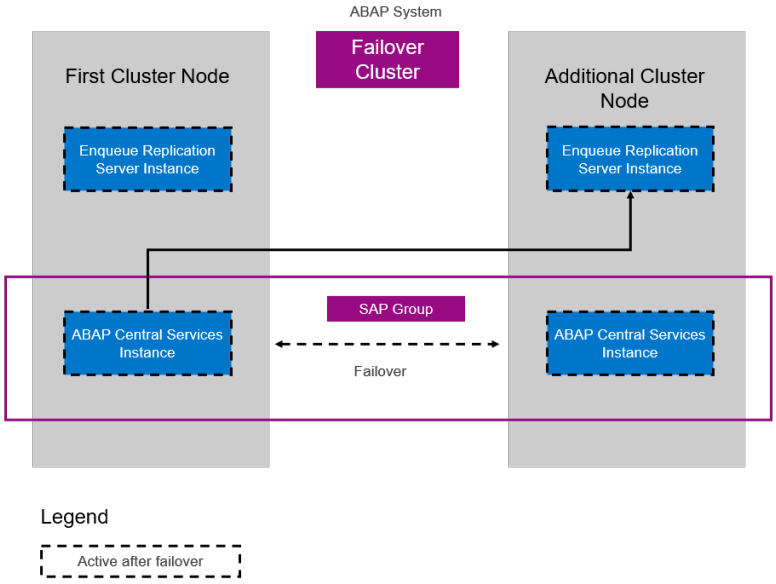
8.2.1.4 Enqueue Replication Server in a Microsoft Failover Cluster

The enqueue replication server contains a replica of the lock table (replication table) and is an essential component in a high-availability setup. It is installed on the two cluster nodes where the (A)SCS instance is installed and configured to run, even if you have more than two cluster nodes.

In normal operation the enqueue replication server is always active on the host where the (A)SCS instance is **not** running.

If an enqueue server in a Microsoft failover cluster with two nodes fails on the first cluster node, the enqueue server on the additional cluster node is started. It retrieves the data from the replication table on that node and writes it in its lock table. The enqueue replication server on the second cluster node then becomes inactive. If the first cluster node is available again, the enqueue replication server on the second cluster node becomes active again.

The following figure shows the enqueue replication server mechanism in an Microsoft failover cluster configuration with two nodes:



Enqueue Replication Server Mechanism on One Microsoft Failover Cluster with Two Nodes

8.2.2 Distribution of SAP System Components to Disks for a Microsoft Failover Cluster

When planning the high-availability installation, keep in mind that the cluster hardware has two different sets of disks:

- Local disks that are connected directly to the cluster nodes
- Shared disks that can be accessed by all cluster nodes via a shared interconnect

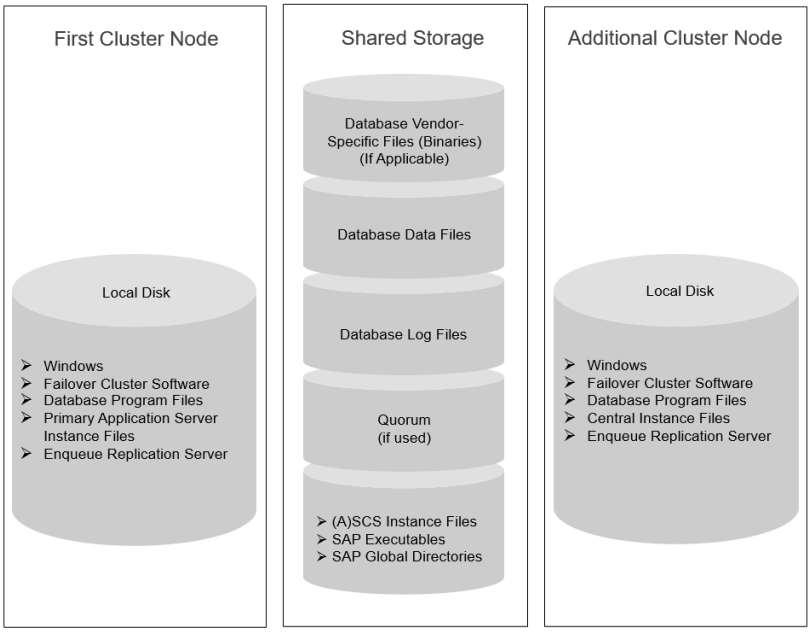
> ⓘ Note
>
> Shared disk is a synonym for the cluster resource of *Resource type* `Physical disk`.

You need to install the SAP system components in both the following ways:

- Separately on all cluster nodes to use the local storage on each node
- On the shared storage used in common by all cluster nodes
  You install the following on **different** shared disks:
  - Database instance files, if the database instance is installed in a Microsoft failover cluster.
  - Database shared binaries
  - (A)SCS instance
  - SAP system executables
  - Single quorum device, if used

> ⚠ Caution
>
> You **must not** install any SAP or database components on the quorum disk.

The following figure shows a cluster configuration, where the (A)SCS and DB instance are installed in the same cluster. It illustrates how to distribute the database data files, the SAP system executables, and the quorum resource (if used) to **different** disks. Only with this distribution of files to distinct disks is it possible to move the SAP system and database as separate entities in a failover situation.



Distribution of SAP System Components in a Failover Cluster

Quorum Configurations on Windows

On Windows there are several quorum configurations available. The configuration to use mainly depends on the cluster setup, such as the number of cluster nodes, the storage type (single or distributed), and the number of data centers. For more information, see the Windows documentation.

The default quorum configuration used on Windows Server is called *Node and Disk Majority* for clusters with more than two nodes.

With this quorum configuration, each node and the witness disk maintain its own copy of the cluster configuration data. This ensures that the cluster configuration is kept running even if the witness disk fails or is offline.

> ⓘ Note
>
> The disk layout of the Node and Disk Majority and the Single Quorum Device Cluster is identical.

> ⚠ Caution
>
> If you do not use the default quorum configuration for your operating system, contact your hardware partner, who can help you to analyze your needs and set up your cluster model. SAP supports these configurations if they are part of a cluster solution offered by your Original Equipment Manufacturer (OEM), or Independent Hardware Vendor (IHV).

Geographically Dispersed Cluster (Geospan)

The standard Windows failover clustering configuration consists of two cluster nodes and a shared disk storage with all technical components located in the same data center. In a geographically dispersed cluster, also know as a geospan cluster, the cluster nodes are distributed across at least two data centers to avoid the full outage of a data center in the event of disaster.

A geospan configuration requires a more sophisticated disk storage architecture since a shared disk storage can only be located in one data center and might therefore be a single point of failure (SPOF). To prevent the disk storage becoming a SPOF, you have to configure the storage system in each data center and to replicate its content to the storage system of the other data center.

Replication can either be synchronous or asynchronous, depending on the:

- Functionality of the disk storage subsystem
- Acceptable amount of data loss during a failover
- Physical layout of the disk storage area network
  This includes the distance between the storage systems, signal latency, capacity, and speed of the network connection.
- Customer budget
- Functionality supported by the database vendor

The database components in geospan configurations are often no longer part of the Microsoft failover cluster and the database is replicated by pure database techniques, such as shadow database, log shipping, and mirrored database.

8.2.3 Directories in a Microsoft Failover Cluster Configuration

The following tables show the directories where the main software components for a high-availability system are stored:

Directories on Local Disks on Cluster Nodes

Component	Default Directory
A supported operating system [page 33]	`%windir%`
Microsoft Failover Clustering software	`%windir%\Cluster`
Only if FSC option is used: ASCS instance	`<Local_Drive>:\usr\sap\<SAPSID>\ASCS<Instance_Number>`
Application server	`<Local_Drive>:\usr\sap\<SAPSID>\<Instance>`
Enqueue replication server	`<Local_Drive>:\usr\sap\<SAPSID>\ERS<Instance_Number>`

Component	Default Directory
Diagnostics Agent (optional)	`<Local_Drive>:\usr\sap\<DASID>\SMDA<Instance_Number>`
SAP Host Agent	`%Program Files%\SAP\hostctrl`

Directories on Shared Disks

Component	Default Directory
Cluster *quorum resource* (if used)	`<Drive>:\Cluster`
SAP global and instance directories During the installation of an SAP system distributed over several hosts, you can now specify that the SAP Global directories are installed on a host different from the ASCS instance host. For more information, see SAP Note 3349121.	`<Drive>:\usr\sap ...`
tempdb databases	`<Drive>:\TEMPDB`
msdb, model, master, shared binaries	`<Drive>:\mssql`

SAP data files	`<Drive>:\<SAPSID>DATA0`
	`<Drive>:\<SAPSID>DATA1`
	`<Drive>:\<SAPSID>DATA2`
	`<Drive>:\<SAPSID>DATA3`
	`...`
	`<Drive>:\<SAPSID>DATA<N>`

SAP log files	`<Drive>:\<SAPSID>log<N>`

8.2.4 IP Addresses in a Microsoft Failover Cluster Configuration

A part of the installation process that is unique to Microsoft Failover Clustering is the configuration of host names and IP addresses in the network. This is a particularly important task because the addressing plays a key role in the switchover procedure. Addressing must be set up correctly so that the system can take advantage of the cluster functionality and switch between nodes when hardware problems arise.

This section explains the different types of IP addresses and their function in the switchover mechanism of **one** Microsoft failover cluster with **two** cluster nodes.

Types of IP Addresses

In a proper configured cluster with at least two nodes, there are at least seven IP addresses and corresponding host names for your SAP system. You have two IP addresses for each cluster node, one IP address for the cluster, one for the SAP cluster group, and one for the database cluster group.

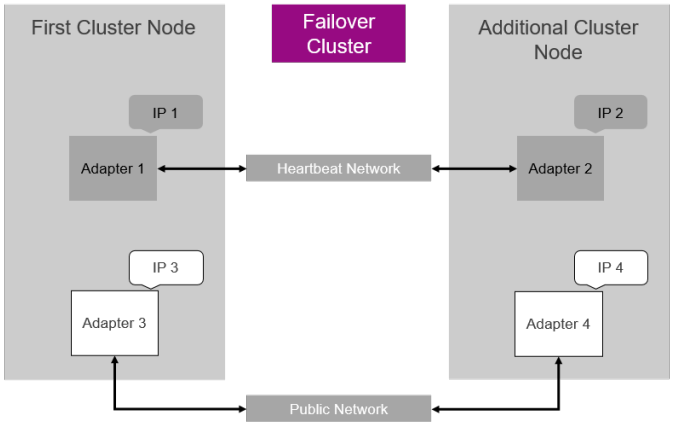
Some of the addresses are assigned to the **network adapters** (network interface card, NIC) whereas others are virtual IP addresses that are assigned to the **cluster groups**.

Physical IP Addresses Assigned to Network Adapters

A Microsoft failover configuration has two networks:

- A public network that is used for the communication between the central instance, application servers, and the LAN.
- A private network that is used internally for communication between the nodes of the cluster, also called heartbeat.

The following figure shows a Microsoft failover cluster with two nodes and illustrates the adapters required for the public and private networks, and their corresponding physical IP addresses. A physical IP address, in contrast to a virtual one, is stationary and permanently mapped to the same adapter.



Adapters and IP Addresses Required for Public and Private Networks in an Microsoft Failover Cluster with Two Nodes

Host Names Assigned to Network Adapters

Each of the physical IP addresses of the network adapters must have a corresponding host name. For example, on the left-hand node in the figure above, you might assign the IP addresses of the public and private network adapters as follows:

IP Addresses and Host Names

Network Adapter	IP Address	Host Name
Adapter 1 (private network)	10.1.1.1	`clusA_priv`

Network Adapter	IP Address	Host Name
Adapter 3 (heartbeat network)	192.168.1.1	`clusA`

> ⚠ Caution
>
> - The IP address and host name of the **public** network adapter is also the IP address and name of the machine. In our example, this means that the machine that is the cluster node on the left in the figure has the name `clusA`.
> - Do **not** confuse the **host name** with the **computer name**. Each node also has a computer name, which is often the same as the host name.
>   The computer name is displayed in the node column of the *Failover Cluster Management*. However, it is **not** required for the TCP/IP communication in the cluster. When you configure IP addresses and corresponding names, keep in mind that it is the **host names** that are important for the cluster, not the computer names.

Virtual IP Addresses Assigned to Cluster Groups

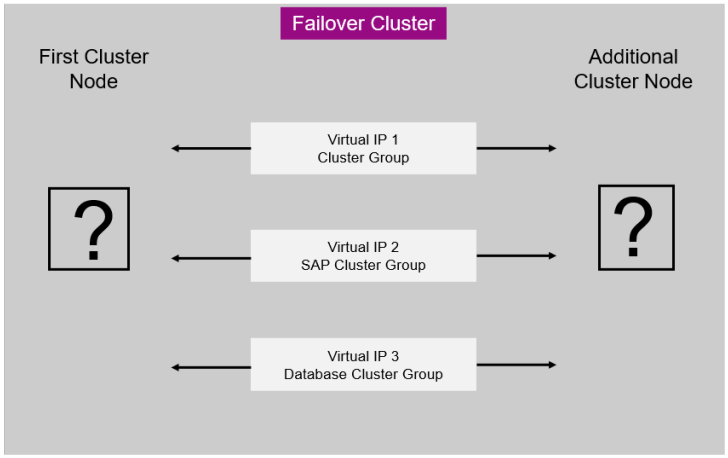
After you have installed the SAP system and fully configured the cluster, the critical system resources are bound together in three different **groups**. Each of these groups requires a virtual IP address and network name that is permanently mapped to the group and not to a particular node. The advantage of this is that, whenever a group is moved between nodes, its IP address and network name move together with the group.

> ⚠ Caution
>
> If you have more SAP systems in the same Microsoft failover cluster, you need for each system an extra IP address and network name for the SAP and database cluster group.

A Microsoft failover configuration has the following groups:

- SAP cluster group for each clustered SAP system
- Database cluster group for each clustered SAP system
- Cluster group

The following figure illustrates how the virtual IP addresses of the database group and SAP group can move from one node to the other during a failover.



Failover of Virtual IP Addresses

8.2.5 Obtaining IP Addresses for a Microsoft Failover Cluster Configuration

This chapter describes how to obtain the IP addresses for the network adapters (cards) that are required to install and run your high-availability system.

Context

For a clustered system, you have to configure IP addresses correctly. During the installation procedure you have to assign at least seven IP addresses and host names. You normally obtain these names and addresses from the system administrator.

Procedure

Ask the system administrator to give you the addresses and host names listed in the tables below, which show an example for a configuration with one Microsoft failover cluster with two nodes. You need to enter the addresses and host names later during the installation process.

The column *Defined During* indicates at which stage of the installation of the operating system and the SAP system the addresses are defined in the system.

> ⚠ Caution
>
> Use the names **exactly** as specified by the system administrator.

> ⓘ Note
>
> In the following tables we are still using the terminology cluster group, and not the Windows Server terminology Roles.

Physical IP Addresses

Component	Example for Physical IP Address	Example for Physical Host Name	Purpose	Defined During
First cluster node: adapter for heartbeat network	10.1.1.1	`clusA_priv`	Address for internode communication on the heartbeat network	Windows installation
First cluster node: adapter for public network	129.20.5.1	`clusA`	Address of the first cluster node for communication with application servers and LAN (this is the same as the address of the first cluster node)	Windows installation
Additional cluster node: adapter for heartbeat network	10.1.1.2	`clusB_priv`	Address for internode communication on the heartbeat network	Windows installation
Additional cluster node: adapter for public network	129.20.5.2	`clusB`	Address of the additional cluster node for communication with application servers and LAN (this is the same as the address of the additional cluster node)	Windows installation

Virtual IP Addresses

Component	Example for Virtual IP Address	Example for Host Name	Purpose	Defined During
Cluster group	`129.20.5.3`	`clusgrp`	Virtual address and name of the cluster group. It identifies the cluster and is used for administration purposes.	Failover cluster software configuration
Database cluster group	`129.20.5.4`	`dbgrp`	Virtual address and name for accessing the group of database resources, regardless of the node it is running on	Execution of HA-wizard or database-specific cluster scripts

Component	Example for Virtual IP Address	Example for Host Name	Purpose	Defined During
SAP cluster group	`129.20.5.5`	`sapgrp`	Virtual address and name for accessing the group of SAP resources, regardless of the node it is running on	Configuration of SAP system for high availability with the Software Provisioning Manager on the first node

8.3 Preparation

This section provides information about how to prepare the installation of the SAP system for Microsoft Failover Clustering. For a complete list of all steps, see section *Preparation* in the Installation Checklist for a High-Availability System [page 151].

1. You check that you have completed the same preparations [page 53] as for a non-HA system.
2. To make sure that all preparation steps have been correctly performed, check that you can move the disk resources from one cluster node to another so that they are accessible from a single node at any time.

8.4 Installation

The following sections provide information about how to install the SAP system in a high-availability environment. For a complete list of all steps, see section *Installation* in the Installation Checklist for a High-Availability System [page 151].

.

8.4.1 Clustering the SQL Server Database Server Software

Use

If you use a high-availability system with Microsoft Failover Clustering, you have to cluster the SQL Server database software.

Procedure

For more information about how to cluster the SQL Server database software for a high-availability SAP system, see section “Clustering the SQL Server <Release> Database Server Software” in *Upgrade to and*

Installation of SQL Server <Release>, which you can find using the SAP NetWeaver Guide Finder at https://help.sap.com/viewer/nwguidefinder.

8.4.2 Configuring the First Cluster Node

Use

The following procedure describes how to configure the first cluster node.

When you run the *First Cluster Node* option it:

- Creates the `saploc` share, pointing to a local disk
- Creates the `sapmnt` share, pointing to a local disk
- Installs the ABAP central services instance (ASCS) and prepares this host as the SAP global host
- Creates the SAP cluster group and adds the ASCS instance to the SAP cluster group
- Installs the enqueue replication server instance (ERS instance) for the ASCS instance
- Installs the SAP Host Agent

> ⚠ Caution
>
> When you reboot during the conversion to failover clustering, resources fail over to the other cluster node. Therefore, after each reboot, you have to return the system to the state it was in before the reboot, and move the resources back to the original node.

Prerequisites

- You are logged on to the first cluster node as domain administrator or as a domain user who has the required administration rights. For a list of the required permissions, see Performing a Domain Installation without being a Domain Administrator [page 124].
- You must install the ASCS instance on a shared disk, and the ERS instance and SAP Host Agent on a local disk.

Procedure

1. Run the Software Provisioning Manager and choose:
   <Product> ▸ *<System>* ▸ *<Database>* ▸ *High-Availability System* ▸ *First Cluster Node*.

   > ⓘ Note
   >
   > If the Software Provisioning Manager prompts you to log off from your system, log off, and log on again.

2. Enter the required parameter values.

> **Note**
>
> - For more information about the input parameters, position the cursor on a parameter and press F1 in the Software Provisioning Manager.
> - If you have a Microsoft cluster configuration with more than two nodes in one cluster, apply SAP Note 1634991.

More Information

Moving Cluster Groups or Services and Applications or Roles [page 174]

8.4.3 Installing the Database Instance

Use

This procedure describes how to install the database instance on the first cluster node.

Prerequisites

- The SAP cluster group is *Online* on the first cluster node.
- The DB cluster group is *Online* on the first cluster node.
- The *shared disks* that are used to install the SAP Data files, Transaction Logs, and Tempdb database files are included in the *MSSQL Group*.
- You have created the dependency on these shared disks for the *SQL Server* or *SQL Server(<Named_Instance>)* resource.

Procedure

Perform the following steps on the **first** cluster node.

1. Run the Software Provisioning Manager [page 73] and on the *Welcome* screen, choose:
   

2. Follow the instructions in the Software Provisioning Manager dialogs and enter the required parameter values.
   1. For the profile UNC path you have to use the UNC path of the **virtual** (A)SCS host name, for example: `\\<SAPGLOBALHOST>\sapmnt\<SAPSID>\SYS\profile`.
      In an HA-system, the virtual host name of the (A)SCS instance is the same as the SAP global host name.

2. For the `tempdb` database, specify shared disks that are included in the MSSQL group.
3. Distribute the transaction logs and SAPdata files to at least two different shared disks that are included in the *MSSQL* group. For more information, see: Distribution of Components to Disks for Failover Clustering [page 160].

> ⓘ Note
>
> For more information about the input parameters, position the cursor on a parameter and press the F1 key in the Software Provisioning Manager.

8.4.4 Configuring the Additional Cluster Node

Prerequisites

- You are logged on to the additional cluster node as domain administrator or as a domain user who has the required administration rights. For a list of the required permissions, see Performing a Domain Installation without being a Domain Administrator [page 124].
- You have already performed the First Cluster Node [page 169] option.

Context

This procedure describes how to configure the additional cluster node.

When you run the *Additional Cluster Node* option it:

- Configures the additional cluster node to run the SAP cluster group
- Creates the `saploc` share, pointing to a local disk
- Installs the enqueue replication server instance (ERS) for the ASCS instance
- Installs the SAP Host Agent

> ⚠ Caution
>
> - You must install the ERS and SAP Host Agent on a local disk.
> - When you reboot during the conversion to failover clustering, resources fail over to the other cluster node. Therefore, after each reboot, you have to return the system to the state it was in before the reboot, and move the resources back to the original node.

Procedure

1. Run the Software Provisioning Manager and choose:

   <Product> ▸ *<System>* ▸ *<Database>* ▸ *High-Availability System* ▸ *Additional Cluster Node*

> **Note**
>
> If the Software Provisioning Manager prompts you to log off from your system, log off and log on again.

2. Enter the required parameter values.

> **Note**
>
> - For more information about the input parameters, position the cursor on the parameter and press F1 in the Software Provisioning Manager.

> **Caution**
>
> Do not accept default values, as they may come from SAP systems that already exist on the cluster.

When you have made all required entries, the Software Provisioning Manager begins processing and converts the SAP instances on the other cluster node for operation in Microsoft failover clustering.

Related Information

Moving Cluster Groups, or Services and Applications, or Roles [page 174]

8.4.5 Installing the Central Instance

Use

The following procedure describes how to install the central instance for Microsoft Failover Clustering.

You have the following options to install the central instance:

- You install the central instance on a cluster node.
  In this case, bring the SAP cluster group online on this node, and make sure that the central instance number is different from the (A)SCS instance number.
- You install the central instance on a host outside of the Microsoft failover cluster.
  In this case, you have to install the database client software on this host.

Procedure

1. Run the Software Provisioning Manager [page 73] and choose:
   <Product> ▸ *<System>* ▸ *<Database>* ▸ *High-Availability System* ▸ *Central Instance*
2. If the Software Provisioning Manager prompts you to log off, choose *OK* and log on again.
3. Follow the instructions in the Software Provisioning Manager dialogs and enter the required parameter values.

> **Note**
>
> - For more information about the input parameters, position the cursor on a parameter and press F1 in the Software Provisioning Manager.
> - If you install the central instance on an cluster node, make sure that on the screen *SAP System > General Parameters* for the:
>   - *Profile Directory*, you use the UNC path of the **virtual** (A)SCS host name, for example: `\\<SAPGLOBALHOST>\sapmnt\<SAPSID>\SYS\profile`.
>   In a HA-system, the virtual host name of the (A)SCS instance is the same as the SAP global host name.
>   - *Installation Drive*, you choose the local disk where you want to install the central instance.

4. Check that the central instance is running.

8.4.6 Installing the Dialog Instance

Use

You have to install at least **one** dialog instance for a high-availability configuration. You have the following options to install the dialog instance:

- You install the dialog instance on a cluster node.
  In this case, bring the SAP cluster group online on this node, and make sure that the dialog instance number is different from the (A)SCS instance number.
- You install the dialog instance on a host outside of the Microsoft failover cluster.
  In this case, you have to install the database client software on this host.

Procedure

1. Run the Software Provisioning Manager [page 73] and choose:
   <Product> > *<System>* > *<Database>* > *High-Availability System* > *Dialog Instance*
2. If the Software Provisioning Manager prompts you to log off, choose *OK* and log on again.
3. Follow the instructions in the Software Provisioning Manager dialogs and enter the required parameter values.

> **Note**
>
> - For more information about the input parameters, position the cursor on a parameter and press F1 in the Software Provisioning Manager.
> - If you install the dialog instance on an cluster node, make sure that on the screen *SAP System > General Parameters* for the:
>   - *Profile Directory*, you use the UNC path of the **virtual** (A)SCS host name, for example: `\\<SAPGLOBALHOST>\sapmnt\<SAPSID>\SYS\profile`
>   In a HA-system, the virtual host name of the (A)SCS instance is the same as the SAP global host name.

- Dialog instance, you enter the **same** instance number as for the central instance.
- *Installation Drive*, you choose the **local** disk where you want to install the dialog instance.

4. When you have finished, change the instance profile of the dialog instance so that the number of its work processes equals the number of work processes of the central instance.
5. If required, install additional dialog instances outside of Microsoft failover cluster.

> ⓘ Note
>
> Make sure that on the screen *SAP System > General Parameters* for the *Profile Directory*, you use the UNC path of the **virtual** (A)SCS host name, for example:
>
> `\\<SAPGLOBALHOST>\sapmnt\<SAPSID>\SYS\profile`
>
> In a HA-system, the virtual host name of the (A)SCS instance is the same as the SAP global host name.

8.5 Post-Installation

To complete and check the installation of the SAP system for a high-availability configuration, you need to perform the general post-installation steps [page 92] listed in this guide, if required.

8.6 Additional Information

The following sections provide additional information about:

- Moving Cluster Groups, or Services and Applications, or Roles [page 174]
- Starting and Stopping the SAP System in a Microsoft Failover Cluster Configuration [page 175].

8.6.1 Moving Cluster Groups, or Services and Applications, or Roles

Use

When you reboot during the conversion to Microsoft Failover Clustering, cluster resources fail over to the other cluster node. Therefore, you have to return the system to the state it was in before the reboot, and move the resources back to the original node.

To move the database, SAP, or disk cluster groups from one cluster node to the other, you use the following:

To move the database, or ASCS from one cluster node to the other, you use either the Failover Cluster Manager tool or PowerShell

> **Note**
>
> Microsoft changed the term “cluster groups” in the Failover Cluster Manager tool to Roles. If you use PowerShell, the term “cluster group” is still used for all cluster operations.

Procedure

Moving Roles, or Services and Applications, or Groups

To move the roles or services, proceed as follows:

- 1. To move a role, open PowerShell in elevated mode, and enter the following command:
  `move-clustergroup "<role name>"`
  2. Repeat these steps for each role that you want to move.
- **Moving Roles or Cluster Groups**
  To move the roles proceed as follows:
  1. To move a role, open PowerShell in elevated mode, and enter the following command:
  move-clustergroup -name "<role name>"
  2. Repeat these steps for each role that you want to move. If you have more than 2 nodes in your cluster, you can specify the specific cluster node for the move:
  move-clustergroup -name "<role name>" -Node "<cluster node name>" -Wait 0

8.6.2 Starting and Stopping the SAP System in a Microsoft Failover Cluster Configuration

An SAP high-availability system with Microsoft Failover Clustering is typically configured into two cluster groups: one cluster resource group contains the database resources, the other group contains the SAP (A)SCS instance.

> **Note**
>
> When starting a whole SAP system, you first need to start the database instance and then the remaining SAP instances.
>
> When stopping a whole SAP system, you first need first to stop all SAP instances and then the database instance.

With the *SAP MMC*, or *SAPControl* you can start and stop the clustered or non-clustered SAP instances – except the clustered database and (A)SCS instance.

With certain HA administration tools (*Cluster Administrator* , *Failover Cluster Manager* , or *PowerShell*), you can only start or stop a clustered SAP instances, such as the (A)SCS instance or the database instance.

Procedure

Starting and Stopping a Complete System or a Single Instance with SAP MMC or SAPControl

With the *SAP MMC*, or the command line tool *SAPControl*, you can start or stop the complete SAP system or a single clustered or non-clustered SAP instance, except the database instance.

To start or stop the database instance, you have to use the tools described in “Starting and Stopping the clustered (A)SCS and Database Instance”.

For more information about *SAP MMC* or *SAPControl*, see Starting and Stopping the SAP System [page 137].

> **Note**
>
> - To use *SAP MMC* or *SAPControl* for starting or stopping a clustered SAP instance, the `"SAP <SID> <No> Service"` resource of the clustered instance must be online. Therefore, SAP recommends keeping the `"SAP <SID> <No> Service"` cluster resource always online, and using the *SAP MMC* or *SAPControl* to start or stop a clustered instance.
> - You can also start *SAPControl* in the *PowerShell*.
> - The SAP MMC is not available on the Server Core for Windows Server 2012 (R2) and higher.

Starting and Stopping the clustered (A)SCS and Database Instance

With certain HA administration tools, such as *PowerShell* or *Failover Cluster Manager* , you can only start or stop a clustered SAP instances, such as the (A)SCS instance or the database instance. For all other non-clustered instances, such as dialog instances or the central instance, you must use the SAP MMC or *SAPControl*.

> **Note**
>
> You first have to start the (A)SCS instance and then the database instance, whereas you first have to stop the database instance and then the (A)SCS instance.

- Using *PowerShell*
  To start or stop the clustered (A)SCS instance or the database instance with *PowerShell* do the following:
  1. To start the clustered database instance, open *PowerShell* in elevated mode, and enter the following command:
     `start-clusterresource <Database Resource>`
  2. To start the clustered (A)SCS instance, open *PowerShell* in elevated mode, and enter the following command:
     `start-clusterresource "SAP <SAPSID> <Instance_Number> Instance"`
  3. To stop the clustered (A)SCS instance, open *PowerShell* in elevated mode, and enter the following command:
     `stop-clusterresource "SAP <SAPSID> <Instance_Number> Instance"`
  4. To stop the clustered database instance, open *PowerShell* in elevated mode, and enter the following command:
     `stop-clusterresource <Database Resource>`
- Using *Failover Cluster Manager*
  With the *Failover Cluster Manager*, you can only start or stop clustered instances such as the (A)SCS instance or the database instance.
  For all other non-clustered instances, such as dialog instances or the central instance, you must use the *SAP MMC* or *SAPControl*.

To start or stop the clustered (A)SCS instance or the database instance with the *Failover Cluster Manager* do the following:

1. Start the *Failover Cluster Manager* by choosing *Start* > *Administrative Tools* > *Failover Cluster Manager*.
2. To start the database instance, right-click the database instance `<database_resource>`, and choose *Bring this resource online*.
3. To start the (A)SCS instance, select the relevant service and application *SAP <SAPSID>*.
   In the right-hand pane, under *Other Resources*, right-click the resource *SAP <SAPSID> <Instance_Number> Instance*, and choose *Bring this resource online*.
4. To stop the (A)SCS instance, select the relevant service and application *SAP <SAPSID>*.
   In the right-hand pane, under *Other Resources*, right-click the resource *SAP <SAPSID> <Instance_Number> Instance*, and choose *Take this resource offline*.
5. To stop the database instance, right-click the database instance `<database_resource>`, and choose *Take this resource offline*.

A Appendix

A.1 Online Information from SAP

More information is available online as follows:

Title	Internet Address
Upgrade to and Installation of SQL Server 2022 in an SAP Environment	https://help.sap.com/docs/help/4872fb4190244a9bafccfd80fcd6e13b/0d0117252b4b45de97d7daa7c62ad970.html

A.2 Using PowerShell

SAP uses Windows PowerShell to run and describe Windows commands.

For Windows Server, SAP only uses Windows PowerShell to run and describe Windows commands.

Windows PowerShell is a powerful tool integrated in the Windows operating system. It uses object-oriented methodology, which allows fast and stable script development.

For more information about the Windows PowerShell, see:

http://technet.microsoft.com/en-us/scriptcenter/dd742419.aspx

There you can find links to the online help, online documentation, scripting repository, downloads, and blogs.

If you want to use the PowerShell feature, note the following:

- Windows Server 2022 or 2025 contain PowerShell 5.1
  For more information, see SAP Note 3143497 and Windows Management Framework (WMF) 5.x Release Notes
- Windows Server 2019
  Windows Server 2019 contains PowerShell 5.1
- Windows Server 2016
  Windows Server 2016 contains PowerShell 5.1
- Windows Server 2012 R2
  Windows Server 2012 R2 contains PowerShell 4.0.
  You can update to PowerShell 5.1 (search the internet for *Windows Management Framework 5.1*).
- Windows Server 2012
  Windows Server 2012 contains PowerShell 3.0.
  You can update to PowerShell 5.1 (search the internet for *Windows Management Framework 5.1*).

How to Work with PowerShell

Most commands that are used in `cmd.exe` are also available in the PowerShell (defined as aliases).

You can use well-known commands, such as `cd`, `type`, `copy`, `move`, `mkdir`, `delete`, `rmdir`. There is also online help available, which you can access by typing the command: **`help`** (or **`help <command>`**).

This is a list of differences between PowerShell and `cmd.exe`:

- Before you can run PowerShells scripts (text files with the file extension `.ps1` that contain PowerShell statements), you might have to change the default security setting to allow the execution of non-signed scripts as follows:
  `set-executionpolicy ("unrestricted")`
- By default, when double-clicking PowerShell scripts (`.PS1` files) in the Windows explorer, this does not execute the script as is the default for `.cmd` files, but opens the script in an editor. If you want to activate automatic script execution after a double-click, you have to change the value `HKEY_CLASSES_ROOT\Microsoft.Powershellscript.1\Shell\Open\Command` from `notepad.exe` to the full path of the PowerShell executable.
- The output of PIPE commands is not just a stream of characters (strings) but a stream of objects. You can easily access the properties and methods for these objects (see the process list DLL example below).
- The current working directory is not part of the directory search path that the PowerShell looks at for scripts and programs. The PowerShell only searches directories listed in the environment variable path. Therefore, you might have to run a local program with `./sapcontrol.exe` or specify its full path.
- You can use the UNIX-like directory delimiters, such as `cd /usr/sap/C11`.
- You can have your current working directory in a UNC path (`cd \\sapglobalhost\<sapmnt>`).
- The shell distinguishes between environment variables and shell variables:
  - Use of shell variables:
    Definition: **`$x="hello"`**
    Reference: **`write-host $x`**
  - Use of an environment variable:
    Definition: **`$env:x="hello"`**
    Reference: **`write-host $env:x`**
- The PowerShell has an interesting container concept called `ps-drives`. Within `ps-drives` you can navigate in other objects, such as the registry or shell internal lists in the same way as you typically navigate in a file system (`cd, dir, del`, and so on).
  `dir env`: to get a list of environment variables
  `dir variable`: to get the list of shell variables
  `dir HKLM`: to get a list of registry keys in HKEY_LOCAL_MACHINE
  `get-psdrive` to get a list of available ps-drives
- Windows PowerShell has full access to the .NET runtime. You can directly access missing functions in the PowerShell via .NET.
- With Windows PowerShell, you can create GUI-class user interfaces using Windows forms.

PowerShell Commands

The following table lists some PowerShell commands:

Command	Explanation
`stop-service sap*`	Stops all Windows services with service name starting with "SAP"
`get-process`	Lists currently started processes on your system
`get-process | sort starttime | select -last 1`	Lists the last started process on your computer
`get-process | sort starttime | select -last 1 | format-list -proper *`	Lists all properties of the last started process
`get-process | sort starttime | select -last 1 | get-member`	Lists all process class members (properties and methods) of the last started process
`get-process | % {$_.name;"----------";$_.modules}`	Lists all processes, and the executables and DLLs the processes loaded
`$processes = (get-process | sort starttime)`	Defines a shell variable `$processes`, which contains an array of process objects
`$processes.length`	The number of processes in the array (is equivalent to the number of processes on your computer)
`$processes[$processes.length-1].kill()`	Invokes the kill method (terminate process) of the last started process
`(dir a.txt).set_attributes("readonly")`	Sets the file `a.txt` to "read-only"

Important Disclaimers and Legal Information

Hyperlinks

Some links are classified by an icon and/or a mouseover text. These links provide additional information.
About the icons:

- Links with the icon  : You are entering a Web site that is not hosted by SAP. By using such links, you agree (unless expressly stated otherwise in your agreements with SAP) to this:
  - The content of the linked-to site is not SAP documentation. You may not infer any product claims against SAP based on this information.
  - SAP does not agree or disagree with the content on the linked-to site, nor does SAP warrant the availability and correctness. SAP shall not be liable for any damages caused by the use of such content unless damages have been caused by SAP's gross negligence or willful misconduct.
- Links with the icon  : You are leaving the documentation for that particular SAP product or service and are entering an SAP-hosted Web site. By using such links, you agree that (unless expressly stated otherwise in your agreements with SAP) you may not infer any product claims against SAP based on this information.

Videos Hosted on External Platforms

Some videos may point to third-party video hosting platforms. SAP cannot guarantee the future availability of videos stored on these platforms. Furthermore, any advertisements or other content hosted on these platforms (for example, suggested videos or by navigating to other videos hosted on the same site), are not within the control or responsibility of SAP.

Beta and Other Experimental Features

Experimental features are not part of the officially delivered scope that SAP guarantees for future releases. This means that experimental features may be changed by SAP at any time for any reason without notice. Experimental features are not for productive use. You may not demonstrate, test, examine, evaluate or otherwise use the experimental features in a live operating environment or with data that has not been sufficiently backed up.
The purpose of experimental features is to get feedback early on, allowing customers and partners to influence the future product accordingly. By providing your feedback (e.g. in the SAP Community), you accept that intellectual property rights of the contributions or derivative works shall remain the exclusive property of SAP.

Example Code

Any software coding and/or code snippets are examples. They are not for productive use. The example code is only intended to better explain and visualize the syntax and phrasing rules. SAP does not warrant the correctness and completeness of the example code. SAP shall not be liable for errors or damages caused by the use of example code unless damages have been caused by SAP's gross negligence or willful misconduct.

Bias-Free Language

SAP supports a culture of diversity and inclusion. Whenever possible, we use unbiased language in our documentation to refer to people of all cultures, ethnicities, genders, and abilities.

www.sap.com/contactsap