Installation Guide

CUSTOMER

Software Provisioning Manager 1.0
Document Version: 2.2 – 2017-07-19

Installation of SAP Systems Based on the Application Server Java of SAP NetWeaver 7.0 to 7.02 on Windows: SAP MaxDB

Content

Document History

> **Note**
>
> Before you start the implementation, make sure you have the latest version of this document, which is available at https://support.sap.com/sltoolset *System Provisioning*.

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

Table 1:

Version	Date	Description
2.2	2016-10-07	Updated version for software provisioning manager 1.0 SP18 (SL Toolset 1.0 SP18):
2.1	2016-06-06	Updated version for software provisioning manager 1.0 SP17 (SL Toolset 1.0 SP17)
2.0	2016-02-15	Updated version for software provisioning manager 1.0 SP10 (SL Toolset 1.0 SP16)
1.9	2015-10-12	Updated version for software provisioning manager 1.0 SP09 (SL Toolset 1.0 SP15)
1.8	2015-09-14	Updated version for software provisioning manager 1.0 SP09 (SL Toolset 1.0 SP14)
1.7	2015-04-27	Updated version for software provisioning manager 1.0 SP08 (SL Toolset 1.0 SP13)
1.6	2014-11-21	Updated version for software provisioning manager 1.0 SP07 (SL Toolset 1.0 SP12)
1.5	2014-07-07	Updated version
1.4	2014-03-17	Updated version
1.3	2013-10-28	Updated version
1.2	2013-07-15	Updated version
1.1	2013-04-02	Updated version

Version	Date	Description
1.0	2012-12-17	First version for software provisioning manager 1.0

1 Introduction

1.1 About this Document

This installation guide describes how to install an SAP system based on the application server **Java** of SAP NetWeaver using the installation tool Software Provisioning Manager 1.0 SP18 (“installer” for short), which is part of SL Toolset 1.0 SP18.

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

> **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 10] section before you continue with this installation guide.

1.2 Naming Conventions

- Software Provisioning Manager is the successor of the product- and release-specific delivery of provisioning tools, such as SAPinst.
  Before you perform an installation from scratch or a target system installation in the context of a system copy, we recommend that you always download the latest version of the Software Provisioning Manager which is part of the Software Logistics Toolset 1.0 (SL Toolset for short). For more information, see Preparing the Installation Media [page 57].
  This way, you automatically get the latest SAPinst version including latest fixes in the tool and supported processes. For more information about Software Provisioning Manager as well as products and releases supported by it, see SAP Note 1680045 and http://scn.sap.com/docs/DOC-30236.
  As a result, “SAPinst” has been renamed to “Software Provisioning Manager 1.0” (“installer” for short) in this documentation.
  However, the term “SAPinst” is still used in:
  - Texts and screen elements in the Software Provisioning Manager GUI
  - Naming of executables, for example `sapinst.exe`
- “installer” refers to Software Provisioning Manager 1.0.
- “SAP system” refers to SAP system based on the application server of SAP NetWeaver 7.0 / 7.0 including Enhancement Package 1 / 7.0 including Enhancement Package 2 / 7.0 including Enhancement Package 3.

- “Java system” refers to SAP system based on the application server Java of SAP NetWeaver 7.0 / 7.0 including Enhancement Package 1 / 7.0 including Enhancement Package 2 .
- “Diagnostics” refers to diagnostics in SAP Solution Manager.
- “Diagnostics Agent” refers to the agent of diagnostics in SAP Solution Manager.

Windows Operating System

In this document, “Windows Server 2008 (R2), or Windows Server 2012 (R2)” – with (R2) written in parentheses – means that the information applies to **both** Windows Server 2008 and Windows Server 2008 R2, or Windows Server 2012 and Windows Server 2012 R2.

Profiling for High Availability

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

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

End of 'High Availability': HA (Windows)

1.3 Constraints

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

- ⚠ Caution

  SAP is going to restrict maintenance for operating system versions that have been initially released with SAP kernel 7.2<x> but are no longer supported for SAP kernel 7.40 and higher. The following Software Provisioning Manager operating system versions are affected:

  - WINDOWS SERVER ON IA32 32BIT
  - WINDOWS ON IA64
  - WINDOWS ON X86_64 64BIT: < 6.0 aka Windows 2008

  With the release of Software Provisioning Manager 1.0 SPS 18, the `70SWPM*.SAR` archive will stop working on the above listed outdated operating system versions.

  Instead of using the `70SWPM*.SAR` archive, you must use the `RMOS70SWPM*.SAR` archive for these outdated operating system versions.

  Keep in mind that the `RMOS70SWPM*.SAR` archive will not receive improvements in the future. SAP maintenance for `RMOS70SWPM*.SAR` will be finally stopped by the end of 2017.

SAP recommends upgrading the operating system to a more recent version and using `RMOS70SWPM*.SAR` to export from existing SAP systems.

- Your operating system platform must be **64-bit**.

1.4 Before You Start

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

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

You can find a printed version of the Master Guide in your installation package or you can download the latest version from SAP Service Marketplace.

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 under http://service.sap.com/instguides:

Table 2:

Title	Internet Address
Master Guide - SAP NetWeaver 7.0	http://help.sap.com/nw70 *Installation and Upgrade Information*
Master Guide - SAP Enhancement Package `<Release>` for SAP ERP 6.0 powered by SAP NetWeaver	http://help.sap.com/erp *Installation and Upgrade Information*
Master Guide (Including Upgrade Information) - SAP Supplier Relationship Management 7.0 Including SAP Enhancement Package `<Release>`	http://help.sap.com/srm *Installation and Upgrade Information*
Master Guide (Including Upgrade Information) - SAP Customer Relationship Management 7.0 Including SAP Enhancement Package `<Release>`	http://help.sap.com/crm *Installation and Upgrade Information*
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 Information*

1.5 New Features

The table below provides an overview of the new features in Software Provisioning Manager.

Make sure that you also read the release notes for your SAP product at http://help.sap.com ▶ ▶ <Product Area> ▶ <Product> ▶ <Release> ▶ *What's New – Release Notes* ▶.

Table 3:

Feature	Description	Availability
Diagnostics Agent	The Diagnostics Agent is no longer installed automatically with the SAP system. The *Install Diagnostics Agent* check box on the *Install Diagnostics Agent* screen is no longer available. You now have to install the Diagnostics Agent always separately. We recommend that you install it prior to the installation of your SAP system(s). For more information, see the Diagnostics Agent Installation Strategy attached to SAP Note 1365123, to SAP Note 1833501, and to SAP Note 1858920 and the attached *Diagnostics Agent Setup Guide*.	Software Provisioning Manager 1.0 SP10 (SL Toolset 1.0 SP16)
Windows Domain Organizational Units	You can now specify an optional organizational unit (OU) within the Windows domain where you want the installer to create the SAP system accounts. For more information, see SAP System Parameters [page 32]	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 the Installer [page 65].	Software Provisioning Manager 1.0 SP07 (SL Toolset 1.0 SP12)

1.6 SAP Notes for the Installation

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

Table 4: 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.
2365014	Installation of SAP Systems Based on SAP NetWeaver: SAP MaxDB	Platform-specific information about the SAP system installation (ABAP and Java) and corrections to this documentation.
820824	FAQ: SAP MaxDB/liveCache technology	Frequently asked questions (FAQ) on SAP MaxDB
1732161	SAP Systems on Windows Server 2012 (R2)	Windows Server 2012 (R2)-specific information for the SAP system installation
73606	Supported Languages and Code Pages	Information on possible languages and language combinations in SAP systems
737368	Hardware requirements of Java Development Infrastructure	Information on the hardware requirements for usage type Development Infrastructure (DI), which depends on the size of your development team.
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.

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.

- Central system [page 13]
- Distributed system [page 14]
- Only valid for 'High Availability': HA (Windows)
  High-availability system [page 15]
  End of 'High Availability': HA (Windows)
- You can install dialog instances [page 16] to an existing system.
- You can install an SAP Host Agent [page 19] separately.

2.1 Central System

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

Only valid for 'Software Component': SAP NetWeaver

> **Note**
>
> You can install the following **optional standalone units** only as a central system, but not as a distributed or high-availability system:
>
> - Application Sharing Server
> - J2EE Adapter Engine
> - Partner Connectivity Kit

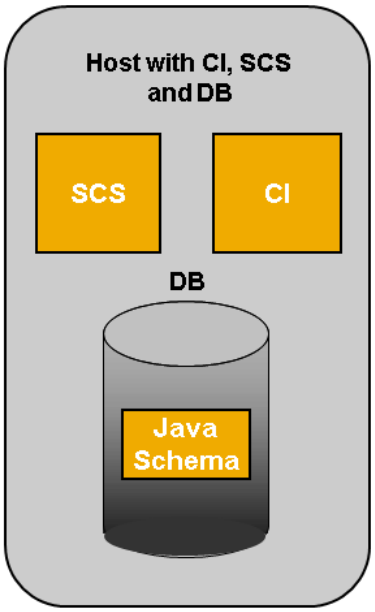
End of 'Software Component': SAP NetWeaver

These are the following instances:

- Central services instance (SCS instance)
- Database instance (DB instance)
- Central instance

Additionally you can install one or more dialog instances. For more information, see Dialog Instance [page 16].

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



SCS = Central Services Instance
CI = Central Instance
DB = Database Instance

Figure 1: Central Java System

2.2 Distributed System

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

These are the following instances:

- 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 16].

Only valid for 'Software Component': SAP NetWeaver

> **Note**
>
> You can install the following **optional standalone units** only as a central system [page 13], but not as a distributed or high-availability system:
>
> - Application Sharing Server
> - J2EE Adapter Engine

- Partner Connectivity Kit

End of 'Software Component': SAP NetWeaver

The following figure assumes the following:

- The central instance runs on a separate host.

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

- The SCS instance runs on the SAP global host.
- The transport directory resides on a separate SAP transport host.

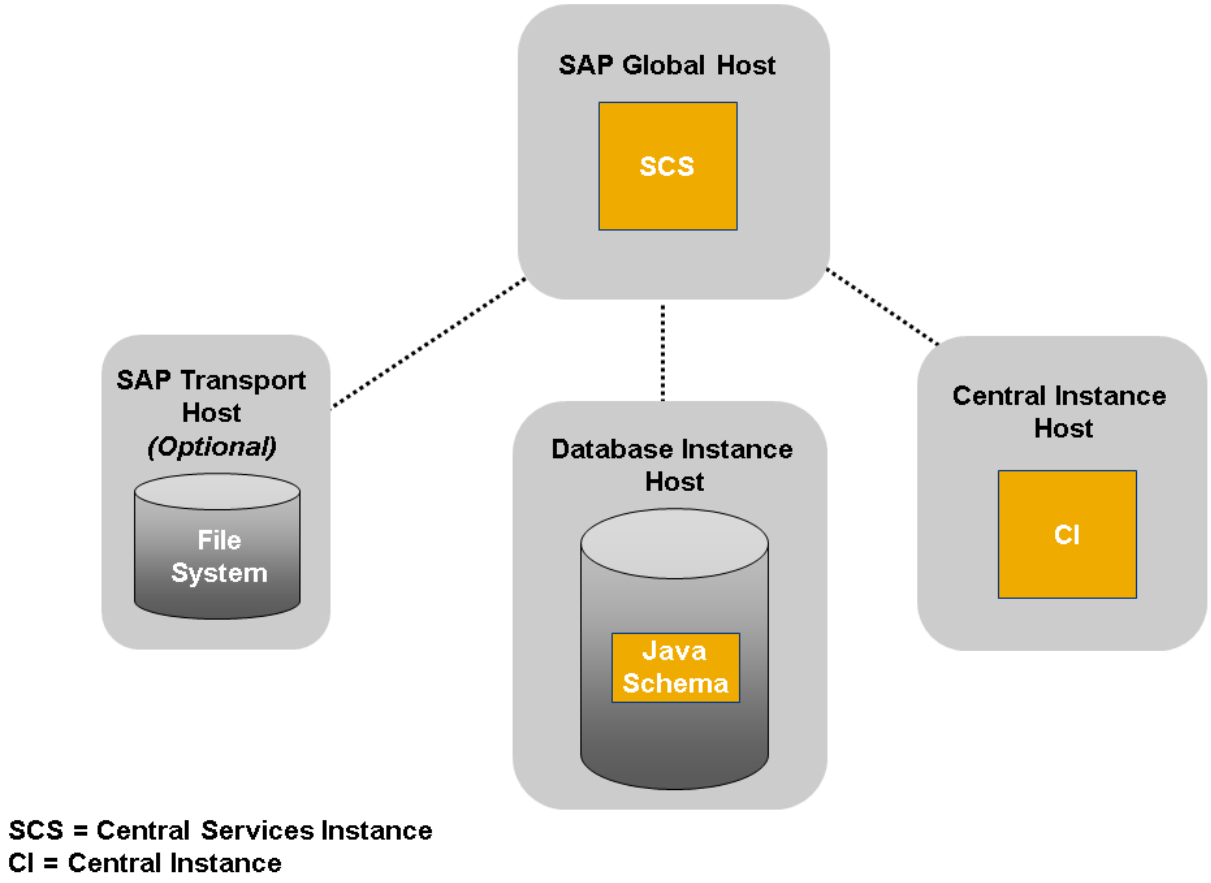


Figure 2: Distributed Java System

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].

Only valid for 'Software Component': SAP NetWeaver

> **Note**
>
> You can install the following optional standalone units only as a central system [page 13], but not as a distributed or high-availability system:
>
> - Application Sharing Server
> - J2EE Adapter Engine
> - Partner Connectivity Kit

End of 'Software Component': SAP NetWeaver

End of 'High Availability': HA (Windows)

2.4 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 44].

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

Dialog Instance for a Central System

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

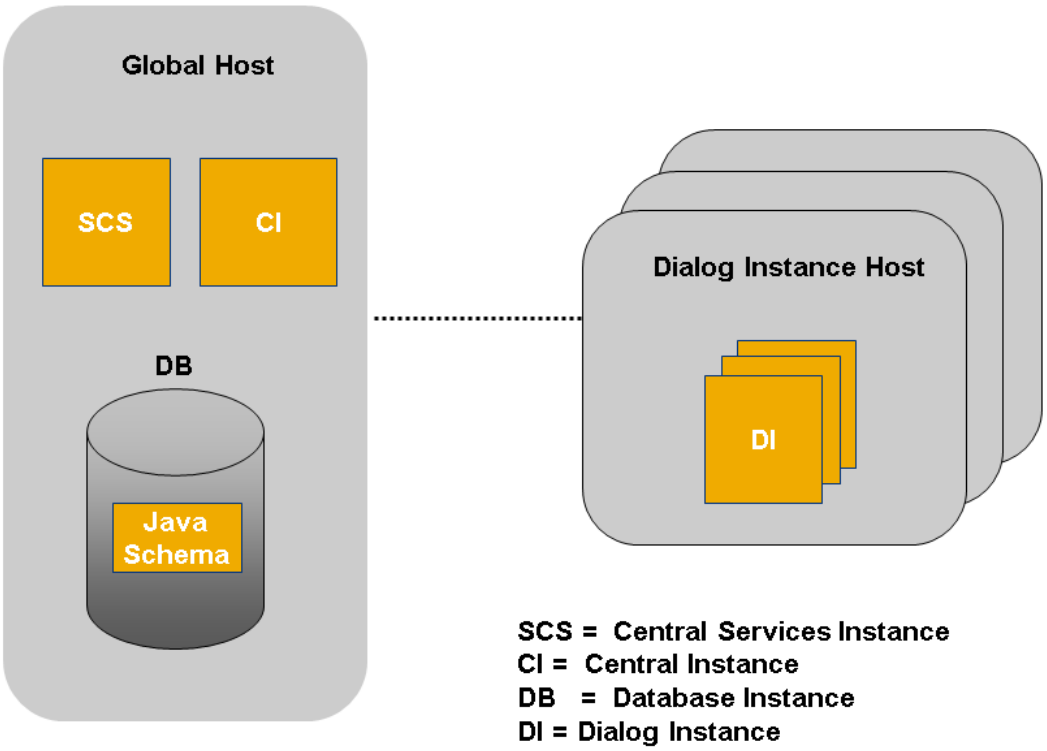


Figure 3: Dialog Instance for a Central Java System

For more information, see Central System [page 13].

Dialog Instance for a Distributed System

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

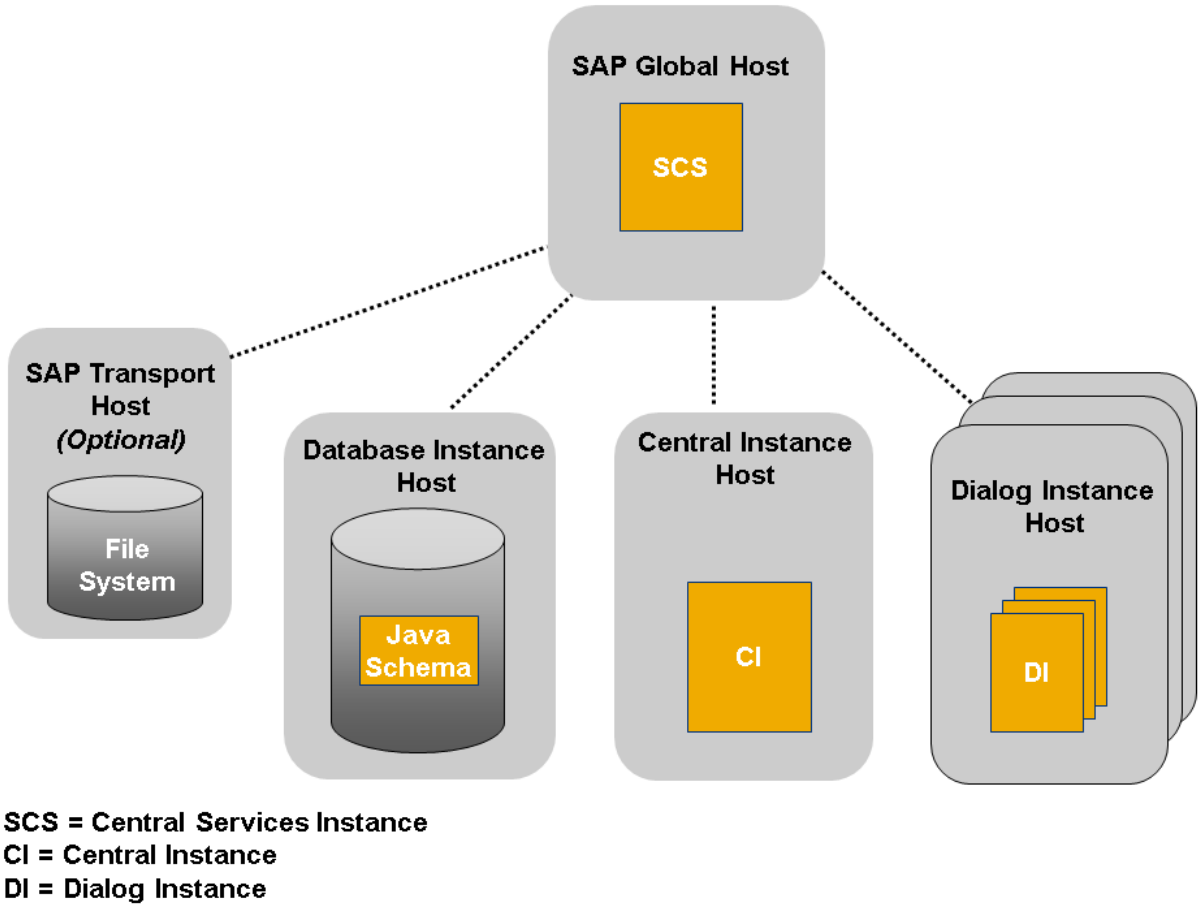


Figure 4: Dialog Instance for a Distributed Java System

For more information, see Distributed System [page 14].

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)

2.5 SAP Host Agent as a Separate Installation

Under certain circumstances you need to install SAP Host Agent separately.

SAP Host Agent is an agent that can accomplish several life-cycle management tasks, such as operating system monitoring, database monitoring, system instance control and provisioning. When you install a new SAP system or instance, the SAP Host Agent is in most cases installed automatically on the SAP system or instance host.

It is only required to install the SAP Host Agent separately if one of the following is true:

- There is no SAP system or instance on the host.
- The SAP system or instance running on the host has a kernel release **lower** than SAP kernel 7.20 and the host does not yet have an SAP Host Agent. During the installation of new SAP instances with SAP kernel 7.20 or higher, the SAP Host Agent is installed automatically (integrated installation).
- You have upgraded your SAP system to a release with a kernel release lower than SAP kernel 7.20 and the host of the upgraded system or instance does not yet have an SAP Host Agent.

The section Installing the SAP Host Agent Separately [page 124] describes how to perform the installation.

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 is available in the relevant chapter.

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 10].
2. You have decided on your installation option (see Installation Options Covered by this Guide [page 13]).

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 21] for each installation host.
2. You plan how to set up user and access management [page 30].
3. You identify Basic SAP System Installation Parameters [page 31].
4. You decide whether you want to perform a domain or local installation [page 44].
5. For the database installation, you decide how to distribute your system components [page 45].
6. You decide on the transport host to use [page 48].
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 50].

Dialog Instance

1. You check the hardware and software requirements [page 21] for the installation host on which you want to install one or more dialog instances.
2. You identify Basic SAP System Installation Parameters [page 31].
3. Continue with Preparation [page 50].

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

- ⚠ Caution

  SAP is going to restrict maintenance for operating system versions that have been initially released with SAP kernel 7.2<x> but are no longer supported for SAP kernel 7.40 and higher. The following Software Provisioning Manager operating system versions are affected:

  - WINDOWS SERVER ON IA32 32BIT
  - WINDOWS ON IA64
  - WINDOWS ON X86_64 64BIT: < 6.0 aka Windows 2008

  With the release of Software Provisioning Manager 1.0 SPS 18, the `70SWPM*.SAR` archive will stop working on the above listed outdated operating system versions.

  Instead of using the `70SWPM*.SAR` archive, you must use the `RMOS70SWPM*.SAR` archive for these outdated operating system versions.

  Keep in mind that the `RMOS70SWPM*.SAR` archive will not receive improvements in the future. SAP maintenance for `RMOS70SWPM*.SAR` will be finally stopped by the end of 2017.

  SAP recommends upgrading the operating system to a more recent version and using `RMOS70SWPM*.SAR` to export from existing SAP systems.

- 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 22].
     - Integrated in the installer (mandatory) **during** the installation process
       For more information, see Running the Installer [page 65].
   - The hardware and software requirements tables in Requirements for the SAP System Hosts [page 23]
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.

     > **Note**
     >
     > If you want to install usage type Development Infrastructure (DI), also check SAP Note 737368 for system requirements and sizing.

   - You contact your hardware vendor, who can analyze the load and calculate suitable hardware sizing depending on:
     - The set of applications to be deployed
     - How intensively the applications are to be used
     - The number of users

3.2.1 Running the Prerequisites Check in Standalone Mode (Optional)

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

Context

> **Recommendation**
>
> We recommend that you use **both** the *Prerequisites Check* and the requirements tables for reference.

Procedure

1. Download and unpack the Software Provisioning Manager 1.0 archive to a local directory and make the SAP kernel media available as described in Preparing the Installation Media [page 57].

2. Start the installer as described in Running the Installer [page 65].
3. On the *Welcome* screen, choose <Product> > *Software Life-Cycle Options* > *Additional Preparation Options* > *Prerequisites Check*.
4. Follow the instructions in the installer dialogs and enter the required parameters.

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

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

Results

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

3.2.2 Requirements for the SAP System Hosts

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

- Windows Server 2012 (R2):
  1. Check that your cluster hardware is certified for Windows Server 2012 (R2) and has the Windows Server 2012 (R2) logo.
  2. 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 warnings and errors.
- Windows Server 2008 (R2):
  1. Check that your cluster hardware is certified for Windows Server 2008 (R2) and has the Windows Server 2008 (R2) logo.
  2. You must validate your failover cluster configuration by running the *Validate a Configuration Wizard*, which is included in the *Failover Cluster Management* snap-in. This must not show any warnings and 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 SAP MaxDB system database, 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 six 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 158].
- 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.

Table 5: Hardware Requirements

Hardware Requirement	Requirement	How to Check
Minimum disk space	• Database software: 1 GB • Central services instance (SCS) (not including paging file): 5 GB (x64) 8 GB (IA64) • For the SAP data: 6 GB Distribute the space for the SAP data across at least three physically separate disks • Only valid for 'High Availability': HA (Windows) Enqueue replication server instance (ERS) (not including paging file): 5 GB (x64) 8 GB (IA64) End of 'High Availability': HA (Windows) • Central instance (not including paging file): 5 GB (x64) 8 GB (IA64) ○ In addition you require 4 GB (x64), or 8 GB (IA64) per additional platform. ○ Up to 2 GB for each usage type or software unit you want to install. • Dialog instance (not including paging file): 2.5 GB (x64) 5 GB (IA64) • 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	To check disk space: • Windows Server 2012 (R2): 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. • Windows Server 2008 (R2): 1. Choose *Start* > *All Programs* > *Administrative Tools* > *Storage* > *Computer Management* > *Disk Management*. 2. Right-click the drive and choose *Properties*.

Hardware Requirement	Requirement	How to Check
Minimum RAM	• All instances, except SAP Host Agent: 4 GB • SAP Host Agent: 0.5 GB	To check RAM: • Windows Server 2012 (R2): Open PowerShell in elevated mode, and enter the following command: `Get-WmiObject Win32_ComputerSystem` • Windows Server 2008 (R2): Choose *Start* > *Control Panel* > *System*. **Note** If *System* is not visible, change *View by:* from *Category* into *Large icons*. If you want to install usage type BI Java, see SAP Note 927530 for current information on hardware sizing.

Hardware Requirement	Requirement	How to Check
Paging file size	For more information, see SAP Note 1518419.	If you want to install usage type BI Java, see SAP Note 927530 for current information on hardware sizing. To check paging file size: • Windows Server 2012 (R2): For more information, see Checking and Changing the Paging File Settings on Windows Server 2012 (R2) [page 114] • Windows Server 2008 (R2): 1. Choose *Start* > *Control Panel* > *System*. **Note** If *System* is not visible, change *View by:* from *Category* into *Large icons*. 2. Choose *Advanced system settings*. 3. In section *Performance*, select *Settings...* > *Advanced*. 4. If required, in section *Virtual memory*, choose *Change*. **Note** Do **not** select *Automatically managed paging file size for all drives*. Only valid for 'High Availability': HA (Windows) **Note** You must adjust the size of the paging file on **all** cluster nodes. End of 'High Availability': HA (Windows)

Hardware Requirement	Requirement	How to Check
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 SCS 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.	–
Suitable backup system	–	–

Table 6: 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 2012 (R2):
	  ○ Windows Server Standard Edition
	  ○ Windows Server Datacenter Edition
	  ○ Windows Server 2008 (R2):
	  ○ Only valid for 'High Availability': non-HA Windows Server Standard Edition End of 'High Availability': non-HA
	  ○ Windows Server Enterprise Edition
	  ○ Windows Server Datacenter Edition
	  ○ Windows Server 2008 (R2) for Itanium-Based Systems 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:
		• Windows Server 2012 (R2):
		Open PowerShell in elevated mode, and enter the following command:
		`Get-WmiObject Win32_OperatingSystem | select caption`
		• Windows Server 2008 (R2):
		1. Choose *Start* > *All Programs* > *Accessories* > *Command Prompt*
		2. Enter the command **winver**
		Only valid for 'High Availability': HA (Windows)
		i Note
		Windows Server 2008 (R2) and higher:
		You must add the operating system feature *Failover Clustering* on **all** cluster nodes.
		End of 'High Availability': HA (Windows)

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*.

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:

- The database of AS Java
- An external ABAP system as the data source for user data

> **Note**
>
> If you want to install the **J2EE Adapter Engine** as an optional standalone unit, you have to configure the User Management Engine (UME) for the ABAP UME of the SAP NetWeaver Process Integration (PI) system.

- Use an LDAP directory as the data source for user data.
  You cannot configure the AS Java to access an LDAP directory and an AS ABAP as the data source simultaneously. The AS Java can also use its own database as the data source.

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

http://help.sap.com/nw70 ▶ *SAP NetWeaver* ▶ *SAP NetWeaver 7.0* `<including Enhancement Package>` ▶ *Application Help* ▶ *Function-Oriented View: English* ▶ *Security* ▶ *Identity Management* ▶ *Identity Management for System Landscapes* ▶ *Integration of User Management in Your System Landscape*

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 63]

3.4 Basic Installation Parameters

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

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

- *Typical*
  If you choose *Typical*, you perform the installation with default settings. This means that the installer prompts you only for a small selection of input parameters. These parameters include at least the following:
  - SAP System ID and Database Connectivity Parameters
  - SAP system profile directory – only for systems with instances on separate hosts
  - Master password
  - System Landscape Directory (SLD) destination

  For more information about the parameters, see the corresponding tables below in this document. If you want to change any of the default settings, you can do so on the *Parameter Summary* screen.
- *Custom*
  If you choose *Custom*, you are prompted for all parameters. At the end, you can still change any of these parameters on the *Parameter Summary* screen.

> **Recommendation**
>
> If you want to configure the user management of your SAP system for an external ABAP system, as described in Preparing an External ABAP System as Source for User Data [page 118], we recommend that

you select the *Custom* parameter mode. When you do this, you are prompted to select the appropriate option and to enter the required parameters

If you do **not** choose the *Custom* parameter mode, you have to change the required parameters on the *Parameter Summary* screen.

> **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 F1 help on the installer screens.

Related Information

SAP System Parameters [page 32]
SAP System Database Parameters [page 44]

3.4.1 SAP System Parameters

Table 7: General Parameters

Parameter	Definition
Unicode System	A Java standalone system is always a Unicode system.

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. **Example** If you have already installed an ABAP system and you want to install a new Java system on the same host, make sure that you enter a <SAPSID> that is different from the <SAPSID> of the existing ABAP system. The <SAPSID> of a Java stack can only by equal to the <SAPSID> of an ABAP stack if they form a dual-stack system. • Consists of exactly three alphanumeric characters • Contains only uppercase letters • Has a letter for the first character • Does not include any of the reserved IDs listed in SAP Note 1979280. • If you want to install a dialog instance, make sure that no Gateway instance with the same SAP system ID (SAPSID) exists in your SAP system landscape.

Parameter	Definition
SAP System Instance Numbers	Technical identifier for internal processes. It consists of a two-digit number from 00 to 97. The instance number must be unique on a host. That is, if more than one SAP instance is running on the same host, these instances must be assigned different numbers. If you do not enter a specific value, the instance number is set automatically to the next free and valid instance number that has not yet been assigned to the SAP system to be installed or to SAP systems that already exist on the installation host. 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 103]. **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
SAP System Profile Directory	`\\<SAPGLOBALHOST>\sapmnt\<SAPSID>\SYS\profile` The installer retrieves parameters from the SAP system profile directory of an existing SAP system. SAP profiles are operating system files that contain instance configuration information. The installer prompts you to enter the location of the `profile` directory when the installation option that you execute is not the first one belonging to your SAP system installation, for example if you are installing a distributed system or a dialog instance to an existing SAP system. See also the description of the parameters *SAP System ID* and *Database ID*.

Parameter	Definition
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. **Password policy** The master password must meet the following requirements: • It must not contain \ (backslash) and " (double quote) • It must be 8 to 9 characters long • It can contain the following characters: @, _,#, $, a-z, A-Z, 0-9 • It must contain at least one letter in uppercase (A-Z) • It must contain at least one letter in lowercase (a-z) • Must contain at least one digit (0-9), but must not begin with a digit • Depending on the installation option, additional restrictions may apply. For example, the master password must not contain the name of a Java user created during the installation. • Depending on the configuration of the password policy, additional restrictions may apply.
Key Phrase for Secure Store Settings	This is a random word or phrase that is used to encrypt the secure store. The J2EE engine uses this phrase to generate the key that is used to encrypt the data. The uniqueness of the phrase you use contributes to the uniqueness of the resulting key. **Recommendation** Use a long key phrase that cannot be guessed easily. Use both uppercase and lowercase letters in the phrase and include special characters. **Note** If you choose *Typical* mode, the installer sets the master password for the key phrase. In this case, make sure that you replace the master password with the required unique key phrase either on the *Parameter Summary* screen or after the installation has finished.

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 and Java application servers. It is appended to the server name to calculate the FQDN. For more information, see SAP Note 654982. **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 Service Marketplace, 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.

Table 8: Ports

Parameter	Description
Java 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. The SCS instance profile contains the configuration for the Java message server. The Java message server port uses the parameter `rdisp/msserv_internal` with default value `39<Instance_Number_Of_SCS_Message_Server_Instance>`. For more information about the parameters used for message server ports, see SAP Note 821875.

Table 9: 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 installer processes the passwords of operating system users as follows:
	• If the operating system users do **not** exist, the installer 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 installer 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 111]. For security reasons, however, SAP strongly recommends to create this user as a local user.
	The installer sets the master password for these users by default. You can overwrite and change the passwords either by using the parameter mode *Custom* or by changing them on the *Parameter Summary* screen.
	• If the operating system users already exist, the installer prompts you for the existing password, except if the password of these users is the same as the master password.
	Note
	This does not apply if the `<dasid>adm` user already exists. The installer 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 54] for these accounts before you start the installation with the installer.

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 installer 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 installer 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  .

Table 10: User Management Engine Parameters

Parameter	Definition

UME Configuration	You are prompted for how to configure the UME during the input phase of the installation.
	
	You can choose between the following options:
	
	• *Use Java database (default)*
	  ○ If you choose this option, administrators can manage users and groups with the `UME Web admin` tool and `SAP NetWeaver Administrator` only.
	  ○ For LDAP, use this configuration for the installation and change the configuration to LDAP after the installation (see Configuring User Management to Use an LDAP Directory [page 88]).
	• *Use ABAP*
	  ○ If you choose this option, administrators can manage users with the transaction SU01 on the external ABAP system, and, depending on the permissions of the communication user, also with the `UME Web admin tool` and `SAP NetWeaver Administrator`.
	  ○ Make sure that you have created the required users manually on the external ABAP system before you choose this option (see Preparing an External ABAP System as Source for User Data [page 118]).
	
	Recommendation
	
	Select the *Custom* parameter mode. When you do this, you are prompted to select the appropriate option and to enter the required parameters.
	
	If you do **not** choose the *Custom* parameter mode, you have to change the required parameters on the *Parameter Summary* screen.
	
	Only valid for 'Software Component': SAP NetWeaver
	
	Note
	
	If you want to install the **J2EE Adapter Engine** as an optional standalone unit, we recommend that you configure the User Management Engine (UME) for the ABAP UME of the SAP NetWeaver Process Integration (PI) system.
	
	End of 'Software Component': SAP NetWeaver
	
	For more information about supported UME data sources and change options, see SAP Note 718383.

Parameter	Definition
Using the Java Database:	
Java Administrator User and Password	The installer sets the user name `Administrator` and the master password by default. This user has administrative permissions for user management.
Java Guest User and Password	The installer sets the user name `Guest` and the master password by default. This user is used for anonymous access.
Using an External ABAP System – Parameters for the ABAP Connection:	
Application Server Number	This is the instance number on the application server of the central ABAP system to which you want to connect the Application Server Java. To find out the number on the host of the central instance, look under the SAP directory `usr/sap/<SAPSID>/DVEBMGS<Instance_Number>`. The value `<Instance_Number>` is the number assigned to the SAP system.
Application Server Host	This is the host name of the relevant application server instance. To find out the host name, enter **`hostname`** at the command prompt of the host running the central instance.
Communication User and Password	This is the name and password of the existing ABAP communication user. You must have created this user manually on the external ABAP system.
SDM Password	This user is used for the Software Deployment Manager (SDM). The installer sets the master password by default.
Using an External ABAP System – Parameters for the Application Server Java Connection:	
Administrator User and Password	This is the name and password of the administrator user that you must have created on the external ABAP system. This user has administrative permissions for user management.
Administrator Role	The role `SAP__ADMIN` must exist on the external ABAP system.

Parameter	Definition
Guest User and Password	This is the name and password of the guest user that you must have created on the external ABAP system. This user is used for anonymous access.
Guest Role	The role `SAP__GUEST` must exist on the external ABAP system.
Communication User and Password	This is the name and password of the existing ABAP communication user. You must have created this user manually on the external ABAP system.
SDM Password	This user is used for the Software Deployment Manager (SDM). The installer sets the master password by default.

Table 11: System Landscape Directory

Parameter	Definition
SLD Destination	The System Landscape Directory (SLD) is designed for registering the systems (along with the installed software) of your whole system landscape. The usual case is to configure one SLD for your complete system landscape. You can choose between the following options: • *Register in existing central SLD* Choose this option to register the SAP system you are installing in an existing SAP System Landscape Directory (SLD) by specifying the SLD connection parameters listed below in this table. • *No SLD destination* Choose this option if you do **not** want to register the SAP system you are installing in an existing SAP System Landscape Directory (SLD). You then have to configure the SLD destination manually after the installation has finished. • *Configure a local SLD* Choose this option if you want to have a local SLD on the SAP Java system that you are installing. Then the SAP system you are installing is the SLD server. **Note** The usual case is to configure one central SLD for your whole system landscape outside the SAP Solution Manager. However, we strongly recommend that you check the Master Guide for recommendations about which option to choose.
Register in existing central SLD	
SLD HTTP Host	The host name of the existing central SLD.

Parameter	Definition
SLD HTTP Port	The HTTP port of the existing central SLD. The following naming convention applies: `5<Instance_Number>00`. **Example** If the instance number of your Java system is 01, the SLD HTTP Port is 50100.
SLD Data Supplier User and password	The existing SLD Data Supplier user and password of the existing central SLD
SLD ABAP API User and password	The existing SLD ABAP API user and password of the existing central SLD
Configure a local SLD	
SLD Data Supplier User and password	Specify the name of the SLD Data Supplier user to be created. This user is used to send the self-registration data of your system to the SLD. **Recommendation** We recommend that you name this user `SLDDSUSER`
Object Server Name	The Object Server Name together with the CIM namespace identifies the absolute location of your System Landscape Directory. If you do not have a prefix reserved on SAP Market Place for Object Server Name, or if you just want to install a test or development system, enter the central instance host of your system. For more information about the Object Server Name parameter, see SAP Note 935245.

3.4.2 SAP System Database Parameters

Table 12:

Parameters	Description

Database ID <DBSID>	The <DBSID> identifies the database instance. The installer prompts you for the <DBSID> when you are installing the database instance.
	The <DBSID> can be the same as the <SAPSID>
	⚠ Caution
	Choose your database ID carefully. Renaming is difficult and requires that you reinstall the SAP system.
	• If you want to install a new database, make sure that your database ID:
	  ○ Is unique throughout your organization
	  ○ Consists of exactly three alphanumeric characters
	  ○ Contains only uppercase letters
	  ○ Has a letter for the first character
	  ○ Does not include any of the reserved IDs listed in SAP Note 1979280.
	ℹ Note
	SAP SCM only: If you are installing liveCache OneDB, <DBSID> is valid for both liveCache and SAP MaxDB, which are both installed in the same database.

Database schema	SAP<SAPSID>DB
Database file systems	• Drive for global programs • Drive for global data • Drive for instance-dependent software • Drive for instance-dependent data • Drives for SAP data and log volumes

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:
>
> http://support.sap.com/sltoolset > *Software Logistics Toolset 1.0* > *Documentation* > *System Provisioning*

More Information

Required User Authorization for the Installation [page 54]

3.6 Distribution of Components to Disks

Use

When you install the SAP system, the installation tools prompt you to enter drive letters for the main components of the system. This lets you distribute components to disks in the system as required. How you do this significantly affects system throughput and data security, so you need to plan it carefully.

The best distribution depends on your environment and must reflect 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. On the basis of sample configurations and the recommendations provided in this documentation, you can then choose the best setup for your particular system.

In most situations, SAP systems are installed on RAID arrays to guarantee data redundancy. Therefore, this documentation focuses on RAID subsystems and drives.

Features

The following graphic shows how you can distribute the main directories created during the installation to Redundant Arrays of Independent Disks (RAID). The distribution is suitable for an average-sized production system. Keep in mind that this is only an example and that no single solution fits all environments.

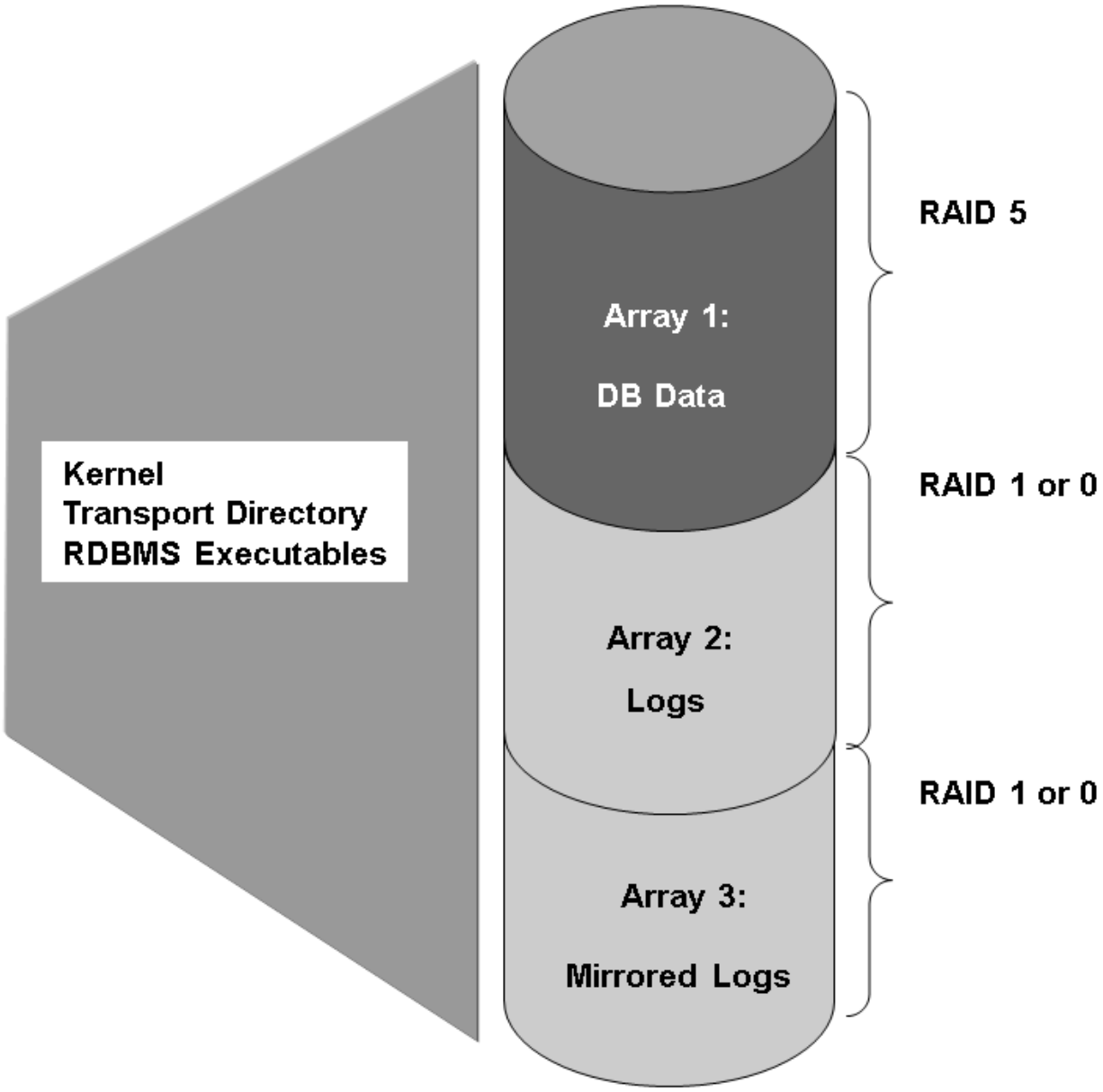


Figure 5: RAID Distribution

This configuration is suitable for the main host of a central system or the database server of a standalone database system. You can assign the components on the left to any of the arrays shown. You do not necessarily have to place the transport directory on the central instance host.

Table 13:

Array 1	<DRIVE>:\sapdb\<DBSID>\sapdata\DISKD001 ... <DRIVE>:\sapdb\<DBSID>\sapdata\DISKD999

Array 2	<DRIVE>:\sapdb\<DBSID>\saplog\DISKL001 ... <DRIVE>:\sapdb\<DBSID>\saplog\DISKL999 <DRIVE>:\usr\sap
Array 3	<DRIVE>:\sapdb\<DBSID>\saplog\M_DISKL001 ... <DRIVE>:\sapdb\<DBSID>\saplog\M_DISKL999

This setup has the following key features:

- Security of the Logs
  The security of the logs is crucial. The logs record all the changes made to the database and so provide the information that is necessary to recover a damaged database. Therefore, it is important that they are stored securely and that you never lose them at the same time as the database data. By placing the redo logs on a **different** array to the database data, you can make sure that they are not lost if the array with the database data is severely damaged.
- Performance
  You can reduce I/O bottlenecks by placing the original logical log on a different array than the mirrored log. Original and mirrored logs are written in parallel. If they are located on the same array, this results in a high level of write activity that has to be handled by the same controller. By separating original and mirrored logs, you can distribute the write activity to two different arrays, so reducing I/O bottlenecks.
- RAID
  By using RAID 1 arrays for the original and mirrored logs, you obtain high data security and good performance. The data is written to a primary disk and duplicated identically to a second disk. If one disk fails, the data is still intact on the second disk.
  The use of RAID 5 for the database ensures fault tolerance. The data is striped over all the disks in the array together with parity information. If one disk fails, the parity information is used to automatically reconstruct the data lost on the damaged disk.

3.7 SAP System Transport Host

Use

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

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

- Use the transport directory that the installer creates during the installation of the SAP system by default on the global host in <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 56].

More Information

- SAP Directories [page 103]
- See the SAP Library:
  http://help.sap.com/nw70 ▶ *SAP NetWeaver Platform* ▶ *SAP NetWeaver 7.0* `<Enhancement_Package>` ▶ *Application Help* ▶ *Function-Oriented View: English* ▶ *Solution Life Cycle Management by Key Capability* ▶ *Software Life Cycle Management* ▶ *Software Logistics* ▶ *Change and Transport System* ▶ *Change and Transport System – Overview* ▶ *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 is available in the relevant chapter.

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. Windows Server 2008 (R2) or higher: you disable the Windows Server firewall [page 51] on each host.
2. You perform basic preparations on Windows [page 52].
3. You check that you have the required user authorization for running the installer [page 54].
4. If required, you set up virtual host names [page 55].
5. If required, you prepare the SAP system transport host [page 56] for your SAP system.
6. You check that the required installation media [page 57] are available on each host.
7. 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)
8. Continue with Installation [page 62].

The following preparation is **optional**:

Preparing an External ABAP System as Source for User Data [page 118]

Dialog Instance

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

1. Windows Server 2008 (R2) or higher: You disable the Windows Server firewall [page 51] on each host.
2. You perform basic preparations on Windows [page 52].
3. You check that you have the required user authorization for running the installer [page 54].
4. If required, you prepare the SAP system transport host [page 56] for your SAP system.
5. You check that the required installation media [page 57] 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 121].
7. Continue with Installation [page 62].

4.2 Disabling the Windows Server Firewall on Windows Server 2008 (R2) and Higher

Use

The Windows firewall – which is turned on by default as of Windows Server 2008 (R2) – 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 default firewall settings are valid for the out-of-the-box installation of Windows Server 2008 (R2) and higher. These 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 installer. 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)

- Windows Server 2012 (R2):
  Open PowerShell in elevated mode, and enter the following command:
  ```
  Set-NetFirewallProfile -enabled false
  ```

- Windows Server 2008 (R2):
  1. Choose *Start* > *Administrative Tools* > *Windows Firewall with Advanced Security*.
  2. Right-click *Windows Firewall with Advanced Security* and choose *Properties*.
  3. Choose the relevant profile (in most cases *Domain Profile*) and set the *Firewall state* to *Off*.

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:

- 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

Checking the Windows File System

You need to check that you are using the Windows file system NTFS on hosts where you want to install the SAP system. NTFS supports full Windows security and long file names.

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

Perform the check as follows:

- Windows Server 2012 (R2):
  1. Open PowerShell in elevated mode, and enter the following command:
     ```
     get-volume
     ```
  2. Check that the value *FileSystem* is NTFS.
- Windows Server 2008 (R2):
  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 installer 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 installer 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 installer does **not** create OUs. The installer does **not** move existing domain users or groups. The installer 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 SWPM.

4.4 Required User Authorization for Running the Installer

Use

Although the installer 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.

Procedure

> ⚠ Caution
>
> Do **not** use the user `<sapsid>adm` 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` and the domain `Admins` group of the domain involved. 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 can be accessed by all hosts in the system.

If the SAP system is to be distributed across **more than one** machine, SAP strongly recommends you to 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.
> - If for any reason, the account used for the installation is not a member of the domain `Admins` group, you can perform the installation with a domain user who is a member of the local `Administrators` group. However, the domain administrator has to prepare the system appropriately for you.
>   For more information, see Performing a Domain Installation without being a Domain Administrator [page 111].

For a domain installation, you need to:

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

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 installer. The built-in account only has restricted network access rights that are required by the installer. 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.

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 installer 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 installer 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.

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 installer 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 installer 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 installer assigns the appropriate rights with the help of an additional `SAP_LocalAdmin` group.
>
> For more information, see Automatic Creation of Accounts and Groups [page 141].

4.7 Preparing the Installation Media

This section describes how to prepare the installation media.

Installation media are available as follows:

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

Related Information

Downloading the Software Provisioning Manager Archive [page 57]
Using the Physical Media from the Installation Package [page 58]
Downloading Installation Media [page 60]

4.7.1 Downloading the Software Provisioning Manager Archive

You always have to download and unpack the Software Provisioning Manager 1.0 archive (`70SWPM10SP<Support_Package_Number>_<Version_Number>.SAR`) from the software distribution center because you have to use the latest version.

Prerequisites

Make sure the latest version of the `SAPCAR` archiving tool is available on each installation host.

You require the `SAPCAR` archiving tool to be able to unpack software component archives (`*.SAR` files), which is the format of software lifecycle media and tools that you can download from the SAP software distribution center.

If required, you can download the latest version of `SAPCAR` from:

http://support.sap.com/swdc *Support Packages and Patches* > *Alphabetical list of products* > *S* > *SAPCAR* >.

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

Procedure

1. Download the latest version of the Software Provisioning Manager 1.0 archive `70SWPM10SP<Support_Package_Number>_<Version_Number>.SAR` from:

   http://support.sap.com/swdc *Support Packages and Patches* *Alphabetical list of products* *S* *SL Toolset* *SL Toolset* `<Release>` *Entry by Component* *Software Provisioning Manager* *Software Provisioning Manager 1.0* *Support Package Patches* `<OS>`

   > **Note**
   >
   > If you have an operating system version that has been initially released with SAP kernel 7.2`<X>` but is no longer supported for SAP kernel 7.21 or 7.22, instead of the `70SWPM*.SAR` archive you must download the `RMOS70SWPM*.SAR` archive for these outdated operating system versions. For more information, see Constraints [page 9]

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

   ```
   SAPCAR -xvf <Path>\<Download_Directory>\<Archive>.SAR -R <Path>\<Unpack_Directory>
   ```

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

   ```
   SAPCAR -xvf <Path_To_Download_Directory>\<Archive>.SAR -R <Unpack_Directory>
   ```

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

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

4.7.2 Using the Physical Media from the Installation Package

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

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 SAP NetWeaver application server Java:

> **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, central services instance, and database instance.

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

Table 14:

SAP Instance Installation	Required Media
Central services instance (SCS instance)	○ Software Provisioning Manager 1.0 archive ○ UC Kernel (folder `K_<Version>_U_<OS>`) where `U` means Unicode and `N` means non-Unicode.
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 Kernel (folder `K_<Version>_U_<OS>`) where `U` means Unicode. ○ Java Components ○ RDBMS 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. ○ Java Components ○ RDBMS

SAP Instance Installation	Required Media
Dialog instance	○ Software Provisioning Manager 1.0 archive ○ UC Kernel (folder `K_<Version>_U_<OS>`) where `U` means Unicode. ○ Java Components

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 the Software Provisioning Manager Archive [page 57].
   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.

4.7.3 Downloading Installation Media

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

Procedure

1. Download and unpack the latest version of Software Provisioning Manager as described in Downloading the Software Provisioning Manager Archive [page 57].
2. Create a download directory on the host on which you want to run the installer.
3. Identify **all** download objects that belong to one installation medium according to the following criteria:

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

- Download path or location:
  You can download installation media from the SAP Software Download Center using one of the following paths:
  - http://support.sap.com/swdc > *Software Downloads* > *Installations & Upgrades* > *By Alphabetical Index (A-Z)* > `<First_Letter_Of_Product>` > `<Product_Version>`
  - http://support.sap.com/swdc > *Software Downloads* > *Installations & Upgrades* > *By Category* > `<Product>` > `<Product_Version>`
  - For downloading the kernel media, proceed as described in the *Kernel Media* section of SAP Note 1680045.
- Material number
  All download objects that are part of an installation medium have the same material number and an individual sequence number:
  `<Material_Number>_<Sequence_Number>`

  > **Example**
  >
  > `51031387_1`
  >
  > `51031387_2`
  >
  > `...`

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

4. Download the objects to the download directory.
5. To correctly recombine the media that are split into small parts, unpack all parts into the same directory.

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

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

Related Information

Downloading Installation Media [page 60]

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 is available in the relevant chapter.

Central System

1. You check the prerequisites [page 64] and run the installer [page 65] on the central system host with option *Central System* to install the SAP system.
2. You continue with Post-Installation [page 78].

Distributed System

1. On the **SCS instance host**, you check the prerequisites [page 64] and run the installer [page 65] to install the central services instance and to prepare this host as the SAP global host.
2. On the database instance host, you check the prerequisites [page 64] and run the installer [page 65] to install the database instance.
3. On the central instance host, you check the prerequisites [page 64] and run the installer [page 65] to install the central instance.
4. If required, you install one or more dialog instances on the chosen hosts as described in subsection *Dialog Instance* of this section.
5. You continue with Post-Installation [page 78].

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 78].

Dialog Instance

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

1. You check the prerequisites [page 64] and run the installer [page 65] to install the dialog instance.
2. You continue with Post-Installation [page 78].

5.2 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 30].

Procedure

Using the Database of AS Java

You install your SAP system as described in this installation guide. During the installation, you specify the Java database as data source for the User Management Engine (UME) (see SAP System Parameters [page 32]).

During the installation, the SAP system is automatically configured to use the Java database as data source for the UME.

After the installation has finished, you can still change the user management configuration. For more information, see Configuring User Management [page 88].

Using an External SAP ABAP System as Source for User Data

1. You prepare the external SAP ABAP system as described in Preparing an External ABAP System as Source for User Data [page 118].
2. You install your SAP system as described in this installation guide.
   During the installation, you specify an external ABAP system as data source for the User Management Engine (UME) (see SAP System Parameters [page 32]).
3. After the installation has finished, you can no longer change this configuration of the UME. For more information, see Configuring User Management [page 88].

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 88].

5.3 Prerequisites for Running the Installer

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

- Make sure that you use an account with the required user authorization to run the installer [page 54].
- Make sure that you have specified the most important SAP system parameters as described in Basic SAP System Installation Parameters [page 31] **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 22].
- If you are installing a second or subsequent SAP system into an existing database (MCOD), make sure that the database is **up and running before** starting the installation.
  For more information, see Installation of Multiple Components in One Database [page 116].
- 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_JC20_wsi6408_12` to **`<Drive>:\usr\sap\S14\SYS\profile\S14_JC20_wsi6408.12`**.
- Make sure that the following ports are not used by other processes:
  - Port 21212 is used by default for communication between the installer GUI server and the installer GUI client.
    If this port cannot be used, you can assign a free port number by executing `sapinst.exe` with the following command line parameter:
    `SAPINST_DIALOG_PORT=<Port_Number>`
  - Port 4239 is used by default for displaying the feedback evaluation form at the end of the installer processing.
    The filled-out evaluation form is then sent to SAP using HTTPS.
    If this port cannot be used, you can assign a free port number by executing `sapinst.exe` with the following command line parameter:
    `SAPINST_HTTP_PORT=<Port_Number>`

5.4 Running the Installer

This section describes how to run the installation tool Software Provisioning Manager 1.0 (the “installer” for short).

Software Provisioning Manager 1.0 includes a GUI client and a GUI server, which both use Java. In the following, GUI client and GUI server are called the “installer GUI”. For more information about the installer, see Useful Information About the Installer [page 67].

This procedure describes an installation where the installer and the installer GUI are running on the same host.

Prerequisites

For more information, see Prerequisites for Running the Installer [page 64].

Procedure

1. Log on to the installation host using an account with the required user authorization to run the installer [page 54].

   > **Caution**
   >
   > Do **not** use an existing `<sapsid>adm` user.

2. Make the installation media available on the installation host.
   For more information, see Preparing the Installation Media [page 57].
3. Start the installer by double-clicking `sapinst.exe` from the directory to which you unpacked the Software Provisioning Manager archive.
   The GUI starts automatically by displaying the *Welcome* screen.

Only valid for 'High Availability': non-HA

> **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 installer 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 55].

End of 'High Availability': non-HA

4. On the *Welcome* screen, choose your SAP system. You can do either one of the following:
   - Install an SAP system
     Install an SAP system or an optional standalone unit:
     - To install an SAP system based on SAP NetWeaver Application Server for Java, choose
       ▶ `<Product>` ▶ *SAP Application Server Java* ▶ `<Database>` ▶ `<System Variant>` ◀.
     - To install an optional standalone unit – that is an Application Sharing Server, J2EE Adapter Engine, or an SAP Partner Connectivity Kit – choose one of the following:
       - Application Sharing Server
         ▶ *SAP NetWeaver 7.0* `<Support Release or Enhancement Package>` ▶ *Optional Standalone Units* ▶ *Application Sharing Server* ▶ `<Database>` ▶ *Application Sharing Server Installation* ◀.
       - J2EE Adapter Engine
         ▶ *SAP NetWeaver 7.0* `<Support Release or Enhancement Package>` ▶ *Optional Standalone Units* ▶ *J2EE Adapter Engine* ▶ `<Database>` ▶ *J2EE Adapter Engine Installation* ◀.
       - SAP Partner Connectivity Kit
         ▶ *SAP NetWeaver 7.0* `<Support Release or Enhancement Package>` ▶ *Optional Standalone Units* ▶ *Partner Connectivity Kit* ▶ `<Database>` ▶ *Partner Connectivity Kit Installation* ◀.
   - Perform other tasks or install additional components
     Choose ▶ `<Product>` ▶ *Software Life-Cycle Options* ◀.
5. Choose *Next*.
6. If the installer prompts you to log off from your system, log off and log on again.
   The installer restarts automatically.
7. Follow the instructions on the installer input screens and enter the required parameters.

> **Note**
>
> For more information about the input parameters, position the cursor on the parameter and press F1.

Only valid for 'Software Component': SAP NetWeaver

> **Note**
>
> **J2EE Adapter Engine only**
>
> - Make sure you use the *Custom* parameter mode.
> - On the *UME Configuration* screen, we recommend that you choose *Use ABAP*.

End of 'Software Component': SAP NetWeaver

   After you have entered all requested input parameters, the installer displays the *Parameter Summary* screen. This screen shows both the parameters that you entered and those that the installer set by default. If required, you can revise the parameters before starting the installation.
8. To start the installation, choose *Start*.
   The installer starts the installation and displays the progress of the installation.
   When the installation option has finished successfully, the installer displays the message *Execution of* `<Option Name>` *has completed*.

> **Note**
>
> **Enterprise Portal only:** During the last restart of Application Server Java performed by the installer, the portal starts the processing and upload of the new portal archives. It takes approximately 15 to 90 minutes before the deployment is completed and the portal is launched.
>
> Do **not** stop the installer or Application Server Java during this phase.

9. If required, install a dialog instance for a central system or distributed system.
10. We recommend that you delete the directory `%userprofile%\.sdtgui`.
11. If you copied installation media to your hard disk, you can delete these files when the installation has successfully completed.

5.5 Additional Information About the Installer

The following sections provide additional information about the installer:

- Useful Information About the Installer [page 67]
- How to Avoid Automatic Logoff by the Installer [page 68]
- Interrupted Installation [page 69]
- Performing a Remote Installation [page 71]
- Starting the Installer GUI Separately [page 73]
- Running the Installer with Accessibility Mode [page 75]
- Entries in the Services File Created by the Installer [page 76]
- Troubleshooting with the Installer [page 76]

5.5.1 Useful Information About the Installer

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

- When you start the installer, it automatically starts the installer GUI.
- The installer creates the installation directory `sapinst_instdir`, which is located directly in the `%ProgramFiles%` directory. If the installer is not able to create `sapinst_instdir` there, it tries to create `sapinst_instdir` in the directory defined by the environment variable `TEMP`.

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

- For each installation option, the installer creates a subdirectory located in the `sapinst_instdir` directory.
- The installer 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 installer has stopped running. The temporary directory `sapinst_exe.xxxxxx.xxxx` sometimes remains undeleted. You can safely delete it.

The temporary directory also contains the log file `dev_selfex.out` from the extraction process, which might be useful if an error occurs.

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

- To see a list of all available installer properties, open a command prompt and start the installer with command line parameter **`-p`**:
  ```
  sapinst.exe -p
  ```
- If you need to run the installer in accessibility mode, make sure that you have activated and adjusted accessibility settings as described in Running the Installer in Accessibility Mode [page 75].
- If required, you can stop the installer by choosing *SAPinst* > *Exit Process* in the installer GUI menu.

> **Note**
>
> If you need to terminate the installer, choose *File* > *Close GUI only* in the menu of the *Program Starter* window.

- If you want to install an SAP system in unattended mode, see SAP Note 2230669 which describes an improved procedure using `inifile.params`.

5.5.2 How to Avoid Automatic Logoff by the Installer

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

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 installer assigns them and automatically logs the account off to activate them. To avoid the installer 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.

> ⚠ Caution
>
> Be aware that domain policies override locally defined policies. This means that if you want to grant domain administrator rights to a user who belongs to the local `Administrators` group, make sure that you have also defined domain administrator rights for this user on domain level.

1. Windows Server 2012 (R2): Press `Ctrl` + `Esc` and choose *Administrative Tools* > *Local Security Policy*.
2. Windows Server 2008 (R2): Choose *Start* > *Control Panel* > *Administrative Tools* > *Local Security Policy*.
3. In the *Local Security Settings* window, choose *Local Policies* > *User Rights Assignment.*.
4. Double-click the required right under *Policy* and choose *Add User or Group*.
5. In the *Select Users and Groups* window, choose the required user and choose *Add*.
   The selected user appears in the box below.
6. Confirm your entry and then repeat the steps for each remaining policy that the user requires for the installation.
7. Log off and log on again to apply the changes.

More Information

Required User Authorization for Running the Installer [page 54]

5.5.3 Interrupted Processing of the Installer

Use

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

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

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

The following table describes the options in the dialog box:

Table 18:

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

Procedure

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

1. Log on to the installation host as a user with the required permissions as described in Running the Installer [page 65].
2. Make sure that the installation media are still available on the installation host.
   For more information, see Preparing the Installation Media [page 57].

   > **Recommendation**
   >
   > Make the installation media **locally** available. 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 installer by double-clicking **`sapinst.exe`** from the directory to which you unpacked the Software Provisioning Manager archive.

   > **Note**
   >
   > For more information about how to start the installer, see Running the Installer [page 65] or Performing a Remote Installation [page 71] and Starting the Installer GUI Separately [page 73].

4. 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.
5. On the *What do you want to do?* screen, decide between the following alternatives and continue with *Next*:

Table 19:

Alternative	Behavior

Run a new option	The installer does not continue the interrupted installation option. Instead, it moves the content of the old installation directory and all installation-specific files to a backup directory. Afterwards, you can no longer continue the old installation option.
	The following naming convention is used for the backup directory:
	`log_<Day>_<Month>_<Year>_<Hours>_<Minutes>_<Seconds>`
	Example
	`log_01_Oct_2008_13_47_56`
	Caution
	The installer moves all the files and folders to a new log directory, even if these files and folders are owned by other users. If there are any processes currently running on these files and folders, they might no longer function properly.

Continue with the old option	The installer continues the interrupted installation option from the point of failure.

5.5.4 Performing a Remote Installation

You use this procedure to install your SAP system on a **remote** host. In this case, the installer runs on the **remote host**, and the installer GUI runs on the **local** host. The local host is the host from which you control the installation with the installer GUI. The installer GUI connects using a secure SSL connection to the installer.

If your security policy requires that the person performing the installation by running the installer GUI on the local host is not allowed to know administrator credentials on the remote host, you can specify another operating system user for authentication purposes. You do this using the `SAPINST_REMOTE_ACCESS_USER` parameter when starting the `sapinst.exe` from the command line. You have to confirm that the user is a trusted one. For more information, see SAP Note 1745524.

Prerequisites

- The remote host meets the prerequisites for starting the installer as described in Prerequisites for Running the Installer [page 64].
- Both computers are in the same network and can ping each other.

To test this:

1. Log on to your remote host and enter the command **`ping <Local_Host>`**.
2. Log on to the local host and enter the command **`ping <Remote_Host>`**.

- Make sure that the `sapinst.exe` on the remote host and the `sapinstgui.exe` on the local host have exactly the same version. You can check this by using the option **`-sfxver`** as described in the procedure below and in the procedure in Starting the Installer GUI Separately [page 73].
- If you need to specify another operating system user with the `SAPINST_REMOTE_ACCESS_USER` command line parameter, make sure that this user exists on the remote host.

Procedure

1. Log on to your remote host as a user that has the required authorization for running the installer [page 54].
2. Make the installation media available on your remote host.
   For more information, see Preparing the Installation Media [page 57].
3. Open a command prompt and change to the directory to which you unpacked the archive `SWPM10SP<Support_Package_Number>_<Version_Number>.SAR`.
4. Check the version of the `sapinst` executable by entering the following command:
   `sapinst -sfxver`
   The version of the `sapinst` executable must be exactly the same as the version of the `sapinstgui` executable on the local host (see also Starting the Installer GUI Separately [page 73]).
5. Execute **`sapinst.exe -nogui`**

> **Note**
>
> If you need to specify another operating system user for authentication purposes, enter the following command:
>
> **`sapinst.exe -nogui SAPINST_REMOTE_ACCESS_USER=<Specified_OS_User>`**

Only valid for 'High Availability': non-HA

> **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 file `70SWPM10SP<Support_Package_Number>_<Version_Number>.SAR`.
>
> Start the installer with the following command:
>
> **`sapinst.exe -nogui SAPINST_USE_HOSTNAME=<Virtual_Host_Name>`** (in a command prompt)
>
> **`.\sapinst.exe -nogui SAPINST_USE_HOSTNAME=<Virtual_Host_Name>`** (in PowerShell)
>
> For more information, see Using Virtual Host Names [page 55].

End of 'High Availability': non-HA

The installer now starts and waits for the connection to the installer GUI. You see the following in the *Program Starter* window:

```
guiengine: no GUI connected; waiting for a connection on host <Host_Name>, port
<Port_Number> to continue with the installation
```

6. Start the installer GUI on your **local** host as described in Starting the Installer GUI Separately [page 73].

5.5.5 Starting the Installer GUI Separately

You use this procedure to start the installer GUI separately.

You need to start the installer GUI separately in the following cases:

- You closed the installer GUI using *File* > *Close GUI only* from the installer menu while the installer is still running.
- You want to perform a remote installation, where the installer GUI runs on a different host from the installer. For more information, see Performing a Remote Installation [page 71].

Prerequisites

- The host on which you want to start the installer GUI meets the prerequisites for starting the installer as described in Prerequisites for Running the Installer [page 64].

  > **Note**
  >
  > If you want to run the installer on a UNIX host, make sure that you meet the prerequisites for the installer listed in the relevant UNIX guide.

- Make sure that the `sapinst.exe` on the remote host and the `sapinstgui.exe` on the local host have exactly the same version. You can check this by using the option **`-sfxver`** as described in the procedure below and in the procedure in Performing a Remote Installation [page 71].

Procedure

In this procedure, the following variables are used: `<Remote_Host>` is the name of the remote host, and `<Port_Number_Gui_Server_To_Gui_Client>` is the port the GUI server uses to communicate with the GUI client (21212 by default).

> **Note**
>
> If you want to run the installer GUI on a remote host, it is mandatory to start the installer using the `-nogui` property. If you have already started the installer without the `-nogui` property and want to run the GUI on a different host, you have to exit the installation process by choosing *SAPinst* > *Exit Process* and then follow the steps described in Interrupted Installation [page 69]. Use the `-nogui` property to restart the installer and start the installer GUI on the intended host.

Starting the Installer GUI on Windows

1. Make the installer software available on the host on which you want to start the installer GUI.

For more information, see Preparing the Installation Media [page 57].

2. Start the installer GUI by executing **<Drive>:\<Path_To_Unpack_Directory>\sapinstgui.exe** with the appropriate command line parameters:
   - If you want to perform a remote installation, proceed as follows:
     1. Check the version of `sapinstgui.exe` by entering the following command:
        sapinstgui.exe -sfxver
        The version of the `sapinstgui` executable must be exactly the same as the version of the `sapinst` executable on the remote host (see also Performing a Remote Installation [page 71]).
     2. Start the installer GUI by entering the following command:
        sapinstgui.exe -host <Remote_Host> -port <Port_Number_Gui_Server_To_Gui_Client>
   - If you closed the installer GUI using *File* > *Close GUI only* and want to reconnect to the installer, proceed as follows:
     - If you are performing a local installation with the installer and the installer GUI running on the same host, execute the following command:
       sapinstgui.exe -port <Port_Number_Gui_Server_To_Gui_Client>
     - If you are performing a remote installation with the installer and the installer GUI running on different hosts, execute the following command:
       sapinstgui.exe -host <Remote_Host> -port <Port_Number_Gui_Server_To_Gui_Client>
3. The installer GUI starts and connects to the installer.

Starting the Installer GUI on UNIX

1. Make the installer software available on the host on which you want to start the installer GUI.
   For more information, see Preparing the Installation Media [page 57].
2. Start the `sapinstgui` executable with the appropriate command line parameters:
   - If you want to perform a remote installation, proceed as follows:
     1. Check the version of the `sapinstgui` executable by entering the following command:
        <Path_To_Unpack_Directory>/sapinstgui -sfxver
        The version of the `sapinstgui` executable must be exactly the same as the version of the `sapinst` executable on the remote host (see also Performing a Remote Installation [page 71]).
     2. Start the installer GUI by entering the following command:
        <Path_To_Unpack_Directory>/sapinstgui -host <Remote_Host> -port <Port_Number_Gui_Server_To_Gui_Client>
   - If you closed the installer GUI using *File* > *Close GUI only* and want to reconnect to the installer, proceed as follows:
     - If you are performing a local installation with the installer and the installer GUI running on the same host, execute the following command:
       <Path_To_Unpack_Directory>/sapinstgui -port <Port_Number_Gui_Server_To_Gui_Client>
     - If you are performing a remote installation with the installer and the installer GUI running on different hosts, execute the following command:
       <Path_To_Unpack_Directory>/sapinstgui -host <Remote_Host> -port <Port_Number_Gui_Server_To_Gui_Client>
3. The installer GUI starts and connects to the installer.

5.5.6 Running the Installer in Accessibility Mode

Use

You can also run the installer in accessibility mode. The following features are available:

- Keyboard access:
  This feature is generally available for all operating systems.
- High-contrast color:
  This feature is derived from the Windows display properties. You can use it either for a local installation or for a remote installation.
- Custom font setting:
  This feature is derived from the Windows display properties. You can use it either for a local installation or for a remote installation.

Procedure

Activating and Adjusting Accessibility Settings on Windows

You first have to activate and adjust the relevant settings for the font size and color schemes **before** you start the installer or the installer GUI.

> **Note**
>
> The following procedure applies for Windows Server 2012 and might be different when using another Windows operating system.

1. Right click on your Windows desktop and choose *Personalize*.
2. Select *Adjust font size (DPI)* and choose *Larger scale (120 DPI)*.
   To define other font size schemes, choose *Custom DPI*.
3. In the right-hand pane, select *Window Color and Appearance*.
   Select a color scheme from the *Color scheme* drop-down box.
   To define your own color schemes, choose *Advanced*.

Running the Installer in Accessibility Mode

You can either perform a local installation, where the installer and the installer GUI are running on the same host, or a remote installation, where the installer and the installer GUI are running on different hosts.

- Local installation:
  Start the installer as described in Running the Installer [page 65] by executing the following command:
  ```
  sapinst.exe -accessible
  ```
- Remote installation:
  1. Start the installer on the remote host by executing the following command from the command line as described in Performing a Remote Installation [page 71]:
     ```
     sapinst.exe -nogui
     ```

2. Start the installer GUI on the local host by executing the following command from the command line as described in Starting the Installer GUI Separately [page 73]:
   sapinstgui.exe -accessible -host <Remote_Host> -port <Port_Number_Gui_Server_To_Gui_Client>

5.5.7 Entries in the Services File Created by the Installer

After the installation has finished successfully, the installer 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
```

> **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.

5.5.8 Troubleshooting with the Installer

Use

This section tells you how to proceed when errors occur during the processing of the installer.

If an error occurs, the installer does one of the following:

- It stops the installer
- It displays a dialog informing you about the error

Procedure

1. Check SAP Note 1548438 for known installer issues.
2. To view the log file, choose *View Logs*.
3. If an error occurs during the *Define Parameters* or *Execute* phase, do one of the following:
   - Try to solve the problem
   - Stop the installer by choosing *Stop* from the error message or *SAPinst* > *Exit Process* in the tool menu.
     For more information, see Interrupted Installation [page 69].

   After resolving the problem, you can continue the processing of the installer by choosing *Retry*.
4. Check the log and trace files of the GUI server and the installer GUI in the directory `%userprofile%\.sdtgui\` for errors.
   - If the installer GUI does not start, check the file `sdtstart.err` in the current `%userprofile%` directory.
   - Only valid for 'High Availability': HA (Windows)
     If you experience network connection problems in a failover cluster, check IPv4 host name resolution as described in SAP Note 1365796.
     End of 'High Availability': HA (Windows)
5. Ignore error messages in the SDM logs that software components are not available. For more information, see SAP Note 828978.
6. If you cannot resolve the problem, create a customer message using component BC-INS.
   For more information about using subcomponents of BC-INS, see SAP Note 1669327.
7. When exporting a distributed system using local export directories, the created export directories need to be merged, that is copied together. Make sure that the `SOURCE.PROPERTIES` file is the one created when exporting the central instance (see also section *System Copy Procedure* > *Distributed System or High-Availability System* in the system copy guide). Otherwise the import aborts with the following error:

   ```
   FJS-00003 TypeError: sourceProps.get ("src.ci.host") has no properties (in
   script NW_Java_OneHost ind ind ind ind, line 11804: ???) FCO-00011 the step
   InitPrivateContext with step Key |NW_Java_OneHost|ind|ind|ind|ind|0|
   NW_OneHost_System| ind|ind|ind|ind|1|0|NW_CI_Instance|ind|ind|ind|ind|11|0|
   NW_CI_Instance_Configure_Java|ind|ind|ind|ind|3|0|NW_RUN_MIGRATION_CONTROLLER|
   ind|ind|ind|ind|2|0|InitPrivateContext was executed with status ERROR
   ```

   Solution: Copy the `SOURCE.PROPERTIES` file from the central instance export to the Java export medium or add the property `src.id.host` to the `SOURCE.PROPERTIES` file using the value created by the central instance export.

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 is available in the relevant chapter.

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.

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 101] immediately after the installation has finished.
2. You update database statistics [page 79].
3. You check whether you can log on to the Application Server Java [page 80].
4. If you have installed SAP NetWeaver Portal or SAP NetWeaver Portal Core Component, you check whether you can log on to the SAP NetWeaver Portal [page 81].
5. If you have installed Development Infrastructure, you check whether you can log on to the Development Infrastructure [page 83].
6. You provide access to the SAP NetWeaver Administrator [page 84].
7. You install the SAP license [page 84].
8. You configure the remote connection to SAP support [page 85].
9. Windows Server 2008 (R2) or higher: If required, you set up symbolic links for application servers [page 86].
10. You apply the latest kernel and Support Package stacks [page 87].
11. You configure the user management [page 88].
12. You ensure user security [page 88].
13. To perform basic configuration steps, you run the Configuration Wizard [page 93].
14. If required, you install SAP MaxDB administration tools [page 94].
15. If required, you generate the personal security environment (PSE) for SAP MaxDB [page 96].

16. You back up the SAP MaxDB database [page 100].
17. You update the database software to the current release [page 101].
18. You perform a full installation backup [page 101].
19. You check the Master Guide for your SAP Business Suite application or SAP NetWeaver application (chapter *Configuration of Systems and Follow-Up Activities*) for further implementation and configuration steps, such as language installation, monitoring, work processes, transports, SAP license, printers, system logs, and connectivity to system landscape directory (SLD).

Dialog Instance

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

1. If required, you perform a full system backup [page 101] immediately after the installation has finished.
2. You check whether you can log on to the Application Server Java [page 80].
3. If you have installed SAP NetWeaver Portal or SAP NetWeaver Portal Core Component on the central instance, you check whether you can log on to the portal [page 81] from the dialog instance host.
4. If you have installed Development Infrastructure on the central instance, you check whether you can log on to the Development Infrastructure [page 83] from the dialog instance host.
5. Windows Server 2008 (R2), or higher: If required, you set up symbolic links for application servers [page 86].
6. You ensure user security [page 88].
7. You perform a full installation backup [page 101].

6.2 Updating Database Statistics

Use

You have to update database statistics if you have installed software units or usage types based on AS Java.

Prerequisites

The database is up and running.

Procedure

1. Log on as user `<sapsid>adm` to the host where the database instance is running.

2. Open a command prompt and execute the following command:
   dbmcli -d <DBSID> -u control,<pwd> sql_updatestat "SAP<SAPSID>DB.*"

   Example

   dbmcli -d QE1 -u control,ctrlpwd sql_updatestat "SAPQE1DB.*"

6.3 Logging On to the Application Server Java

You need to check that you can log on to the Application Server Java with the appropriate administrator user, given in the table below.

Prerequisites

The SAP system is up and running.

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.

Depending on your SAP system installation, the administrator user can either reside in the database of your Java system or in an external ABAP system.

Table 20:

User	User Name Storage: Database	User Name Storage: External ABAP System
Administrator	The user name that you specified during the installation. The default name is `Administrator`.	The user that you created manually in the external ABAP system. The recommended name is `J2EE_ADM_<SAPSID_Java_System>`

You access AS Java with a URL using a web browser from your client machines. To log on to the application server Java, proceed as follows:

Procedure

1. Start a web browser and enter the following URL:

   `http://<Hostname_of_AS_Java_Server>:5<Instance_Number>00`

   > **Note**
   >
   > You must always enter a two-digit number for **`<Instance_Number>`**. For example, do **not** enter **`1`** but instead enter **`01`**.

   > **Example**
   >
   > If you installed SAP NetWeaver Application Server for Java on host `saphost06` and the instance number of your SAP NetWeaver Application Server for Java is `04`, enter the following URL:
   >
   > **`http://saphost06:50400`**

   The start page of the SAP NetWeaver Application Server for Java appears in the web browser.
2. Log on by pressing the link of any of the provided applications, for example *SAP NetWeaver Administrator* or *System Information*.

Related Information

Preparing an External ABAP System as Source for User Data [page 118]

6.4 Logging On to SAP NetWeaver Portal

You need to check that you can log on to the application server using the following standard users.

Prerequisites

The SAP system is up and running.

Context

This procedure applies when you install usage type `NetWeaver Enterprise Portal Core Components (EPC)` only and when you install it together with usage type `SAP NetWeaver Enterprise Portal (EP)`:

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

Table 21:

User	User Name Storage: Database	User Name Storage: External ABAP System
Administrator	The user name that you specified during the installation. The default name is `Administrator`.	The user that you created manually in the external ABAP system. The recommended name is `J2EE_ADM_<SAPSID_Java_System>`

You access the SAP NetWeaver Portal with a URL using a web browser from your client machines.

The default URL consists of the installation host name and the port on which the portal is listening. You can use the `HTTP` or `HTTPS` protocol. `HTTPS` is relevant if you are using `Secure Sockets Layer` (`SSL`) communication.

Procedure

1. Start a web browser and enter the following URL: **`http://<Hostname_Of_J2EE_Server>:5<Instance_Number>00/irj`**

   > **Note**
   >
   > You must always enter a two digit number for **`<Instance_Number>`**. For example, do **not** enter **`1`** but instead enter **`01`**.

   > **Example**
   >
   > If you installed the SAP NetWeaver Portal on host `saphost06` and the instance number of your Application Server Java is `04`, enter the following URL:
   >
   > **`http://saphost06:50400/irj`**

2. Log on by entering the required user and password.

6.5 Logging On to the SAP NetWeaver Development Infrastructure (NWDI)

If you have installed usage type DI, you have to log on to the services of SAP NetWeaver Development Infrastructure (NWDI) to check whether the installation of the usage type DI was successful.

Procedure

1. Start a web browser and enter the following URL: **`http://<hostname_of_J2EE_Engine_Server>:5<Instance_Number>00/devinf`**

   > **Note**
   >
   > You must always enter a 2-digit number for **`<Instance_Number>`**. For example, do **not** enter **`1`** but instead enter **`01`**.

   > **Example**
   >
   > If you installed SAP NetWeaver Application Server for Java with DI on host `saphost06` and the instance number of your SAP NetWeaver Application Server for Java is `04`, enter the following URL:
   >
   > **`http://saphost06:50400`**

2. Log on with the `NWDI_ADM` user.

   The start page *SAP NetWeaver Development Infrastructure* appears in the web browser.

   The following links appear:

   - *Design Time Repository*
   - *Component Build Service*
   - *Change Management Service*
   - *System Landscape Directory*

3. Log on to these services one after another by clicking the appropriate link:
   a. When you click *Design Time Repository*, the *Design Time Repository* page with the *Repository Browser* overview appears.
   b. When you click *Component Build Service*, the *Component Build Service* page with the *CBS Buildspace Information* appears.
   c. When you click *Change Management Service*, the *Change Management Service* page with the *CBS Buildspace Information* appears.
   d. When you click *System Landscape Directory*, you should see the *System Landscape Directory* start page.

   > **Note**
   >
   > The tables displayed on the pages might be empty. They are filled when you configure the development infrastructure either by running the Configuration Wizard or by configuring your system manually.

6.6 Providing Access to the SAP NetWeaver Administrator

Due to security restrictions, the SAP NetWeaver Administrator can only be accessed **locally** via `http://<Hostname_Of_J2EE_Engine_Server>:5<Instance_Number>00/nwa` after the installation has finished.

Procedure

Allow access to administration requests for the required network segments as described in SAP Note 1451753.

6.7 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)
>
> If you do a failover of the SAP (A)SCS instance from one cluster node to another node, and you do not have a permanent license on this node, the generated temporary license is only valid for 30 minutes. Java application servers automatically shut down after 30 minutes of operation. To avoid this, apply a permanent license key as soon as possible.
>
> End of 'High Availability': HA (Windows)

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)

> **Note**
>
> You do not have to perform these steps if you already completed them as configuration tasks in an implementation project with SAP Solution Manager 7.1 Content (`ST-ICO`).

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/nw70 ▶ `<Enhancement Package>` ▶ *Application Help* ▶ *Function-Oriented View: English* ▶ *Solution Life Cycle Management by Key Capability* ▶ *SAP Licenses* ▶ *SAP License Key / SAP Licensing Procedure*

6.8 Configuring Remote Connection to SAP Support

Use

SAP offers its customers access to support and to a number of remote services such as the SAP EarlyWatch service or the SAP 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.

> **Note**
>
> You do not have to perform these steps if you already completed them as configuration tasks in an implementation project with SAP Solution Manager 7.1 Content (`ST-ICO`).

6.9 Creating Symbolic Links on Windows Server 2008 (R2) and Higher for Application Servers

Use

As of Windows Server 2008 (R2), 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

Windows Server 2012 (R2)

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.

Windows Server 2008 (R2)

To create symbolic links, perform the following steps:

1. In the *Start* menu, right-click on *Command Prompt* and choose *Run as administrator*.

2. Enter the following command in a single line:
   `mklink /d <localdisk>:\usr\sap\<SAPID>\SYS \\<sapglobalhost>\sapmnt\<SAPID>\SYS`

   > **Note**
   >
   > Enter a blank before `\\<sapglobalhost>\...`.

3. If you use a central transport directory, you can also create the following link:
   `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.

6.10 Applying the Latest Kernel and Support Package Stacks

We strongly recommend that you apply the latest kernel and Support Package stacks from SAP Service Marketplace 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.

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.

6.11 Configuring User Management

During the installation of your SAP system, you specified the database of the AS Java as the initial data source of the User Management Engine (UME) (see SAP System Parameters [page 32]).

After the installation of your SAP system has finished, you can still change the data source of the UME to a directory service.

During the installation of your SAP system, you specified one of the following initial data sources of the User Management Engine (UME) (see SAP System Parameters [page 32]):

- Database of the AS Java
- External ABAP system

After the installation of your SAP system has finished, you can still change the data source of the UME. The following data source changes are supported:

- From the AS Java database to user management of an external ABAP system
- From the AS Java database to a directory service

For more information about changing the data source after installation and about related restrictions, see the SAP Library at:

http://help.sap.com/nw70 ▶ `<Enhancement Package>` ▶ *Application Help* ▶ *Function-Oriented View: English* ▶ *Security* ▶ *Identity Management* ▶ *User Management of the Application Server Java* ▶ *Configuring User Management* ▶ *UME Data Sources*

6.12 Ensuring User Security

You need to ensure the security of the users that the installer created during the installation. The tables below at the end of this section list these users:

- Operating system users
- SAP system users
- Users in the SAP NetWeaver Development Infrastructure (NWDI)

During the installation, the installer by default assigned the master password to all users created during the installation unless you specified other passwords.

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

Recommendation

User ID and password are encoded only when transported across the network. Therefore, we recommend using encryption at the network layer, either by using the Secure Sockets Layer (SSL) protocol for HTTP connections or Secure Network Communications (SNC) for the SAP protocols dialog and RFC.

For more information, see:

http://help.sap.com/nw70 ▶ <Enhancement_Package> ▶ *Application Help* ▶ *Function-Oriented View: English* ▶ *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.

Procedure

For the users listed below, take the precautions described in the relevant SAP security guide.

Security guides can be found at http://help.sap.com ▶ ▶ <Product Area> ▶ <Product> ▶ <Release> ▶ *Security Information*.

Operating System Users

After the installation, operating system users for SAP system, databaset, and SAP Host Agent are available as listed in the following table:

Table 22: Operating System and Database Users

User Type	User	Comment
Operating system user	<sapsid>adm	SAP system administrator
	sqd<dbsid>	SAP MaxDB database administrator
	SAPService<SAPSID>	User to run the SAP system
SAP MaxDB database users	SAP<SAPSID>DB	SAP MaxDB database owner
	CONTROL	SAP MaxDB database manager operator
	SUPERDBA	SAP MaxDB database system administrator

Table 23: 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

Depending on the UME (User Management Engine) configuration that you specified during the installation, the following UME users are available after the installation:

- If you chose option *Use Java Database*, UME users are stored in the database (Java UME) – see table *Users Stored in the Java Database* below.
  You can manage users and groups with the `UME Web admin` tool and the `Visual Administrator` only. If you want to use LDAP, you have to change the user configuration to LDAP. For more information, see Configuring User Management to Use an LDAP Directory [page 88].
- If you chose option *Use ABAP*, UME users are stored in an external ABAP system (ABAP UME) – see table *Users Stored in an External ABAP System* below.
  You can manage users with transaction SU01 in the external ABAP system and, depending on the permissions of the communication user, also with the `UME Web admin` tool and the `Visual Administrator`.
  For more information, see Preparing an External ABAP System as Source for User Data [page 118].

The following tables show these users together with recommendations on how you can ensure the security of these users:

Table 24: Users Stored in an External ABAP System

User	User Name Storage: External ABAP System	Comment
Administrator	The name that you gave this user when you created it manually in the external ABAP system	This user has administrative permissions for user management and its password is stored in secure storage. Therefore, whenever you change the administrator's password, you must also change the password in secure storage with the J2EE Engine Config Tool. ➡ Recommendation We recommend that you use strong password and auditing policies for this user.
Guest	The name that you gave this user when you created it manually in the external ABAP system	This user is used for anonymous access. Lock this user for interactive logon.

User	User Name Storage: External ABAP System	Comment
SDM	SDM	This user is used to access the Software Deployment Manager (SDM) in the Java system.
Communication user for the J2EE Engine	The name that you gave this user when you created it manually in the external ABAP system	This user is used for the communication between the ABAP system and the Java system. Specify this user as a *Communications* user and not as a dialog user. This user exists in at least the SAP system client that you specified during the installation.
Users for Adobe Document Services (ADS)	The name of this user is `ADSUSER`. This user resides in the external ABAP system.	This user exists in at least clients 000 and 001 of the external ABAP system. You must have created this user manually in the external ABAP system before you started the installation.
	`ADS_AGENT` This user resides in the external ABAP system.	This user exists in at least clients 000 and 001 of the external ABAP system. You must have created this user manually in the external ABAP system before you started the installation.
Data supplier user for System Landscape Directory (SLD) (optional)	The name that you gave this user when you created it manually in the external ABAP system	This user exists in at least clients 000 and 001 of the external ABAP system
ABAP API user for System Landscape Directory (SLD) (optional)	The name that you gave this user when you created it manually in the external ABAP system	This user exists in at least clients 000 and 001 of the external ABAP system

Table 25: Users Stored in the Java Database

User	User Name Storage: Database	Comment
Administrator	The name that you gave this user during the installation or the default name `Administrator`	This user has administrative permissions for user management and its password is stored in secure storage. Therefore, whenever you change the administrator's password, you must also change the password in secure storage with the J2EE Engine Config Tool. **➧ Recommendation** We recommend that you use strong password and auditing policies for this user.

User	User Name Storage: Database	Comment
Guest	The name that you gave this user during the installation or the default name `Guest`	This user is used for anonymous access. Lock this user for interactive logon.
SDM	SDM	This user is used to access the Software Deployment Manager (SDM) in the Java system.
Users for Adobe Document Services (ADS)	`ADSUSER`	This user's password is stored in secure storage. Therefore, whenever you change the administrator's password, you must also change the password in secure storage with the J2EE Engine Config Tool.
	`ADS_AGENT`	This user's password is stored in secure storage. Therefore, whenever you change the administrator's password, you must also change the password in secure storage with the J2EE Engine Config Tool.
Data supplier user for System Landscape Directory (SLD) (optional)	The name that you gave this user during the installation The recommended name is `SLDDSUSER`.	**Note** The installer created this user automatically if you chose *Configure local SLD* during the *Define Parameters* phase.

Users in the SAP NetWeaverTo change passwords at the Development Infrastructure (NWDI)

If you chose usage type (software unit) *SAP NetWeaver Development Infrastructure* (DI) during the installation, users in the SAP NetWeaver Development Infrastructure (NWDI) are available after the installation as listed in the following table:

Table 26:

User	User Name	Comment
Administrator of the SAP NetWeaver Development Infrastructure (NWDI) and password	`NWDI_ADM`	Administrator of the NWDI **Caution** This user has extensive authorizations. Make sure that you assign a secure password.
Developer in the SAP NetWeaver Development Infrastructure (NWDI) and password	`NWDI_DEV`	Developer in the NWDI

User	User Name	Comment
Landscape Directory Service User in the SAP NetWeaver Development Infrastructure (NWDI) and password	`NWDI_CMSADM`	Administrator of the NWDI Change Management System (CMS) **Caution** Do **not** log on with this user. It is used by the system for internal communication.

More Information

- For more information about managing Java users, see: http://help.sap.com/nw70 ▶ `<Enhancement_Package>` ▶ *Application Help* ▶ *Function-Oriented View: English* ▶ *Security* ▶ *Identity Management* ▶ *User Management of the Application Server Java*
- For more information about Java administration tools for user maintenance, see: http://help.sap.com/nw70 ▶ `<Enhancement_Package>` ▶ *Application Help* ▶ *Function-Oriented View: English* ▶ *Application Platform by Key Capability* ▶ *Java Technology* ▶ *Administration Manual* ▶ *J2EE Engine* ▶ *J2EE Engine Administration Tools*

6.13 Running the Configuration Wizard

This section provides information about how to run the configuration wizard for the SAP NetWeaver usage types.

Caution

You can run the configuration wizard **only once** and **only directly after you installed and patched** your SAP system.

You **cannot** use the configuration wizard after:

- Upgrade
- Installation of additional usage types in an existing SAP system
- System copy

In these cases, you need to manually perform the corresponding configuration steps.

BI Java only: This does not apply to configuration tasks for BI Java. For more information about BI Java, see SAP Note 917950. We recommend that you check the configuration of BI Java using SAP Note 937697.

To configure an SAP NetWeaver usage type, proceed as described in the SAP Library at:

http://help.sap.com/nw70 ▶ <Enhancement Package> ▶ *Configuration and Deployment Information* ▶ *Technology Consultant's Guide* ▶ *Developing, Configuring, and Adapting Applications* ▶ *Creating Java Applications Using Web Dynpro* ▶ *J2EE Engine Configuration* ▶ *Configuration Wizard*

More Information

- For more information about the configuration wizard and the configuration documentation, see the configuration structure of your implementation project in SAP Solution Manager.
- SAP Note 923359 *Collective Note: Configuration Wizard – Template Installer*

6.14 Installing or Upgrading Database Studio for SAP MaxDB

Use

This section describes how to install or upgrade Database Studio for SAP MaxDB and SAP liveCache. Database Studio is the database administration tool for SAP MaxDB. With Database Studio you can administer MaxDB databases version 7.6 and newer.

For more information about Database Studio, see http://help.sap.com ▶ *Data Management* ▶ *SAP MaxDB* ▶ *SAP MaxDB 7.9* ▶ *English* ▶ *Tools* ▶ *Database Studio*.

> **Note**
>
> Database Studio replaces Database Manager GUI and SQL Studio, which were available in previous releases.

For up-to-date information about installing Database Studio, see SAP Note 1097311.

Prerequisites

- You can install Database Studio on Linux or Windows in your network, even if your database runs on a different operating system. You can then remotely administer the database on a different host.
  The instructions below refer mainly to the Windows version.

  > **Note**
  >
  > To run Database Studio on Linux, you need to meet the requirements for the SAP MaxDB database server.

- Your PC must meet the following **minimum** requirements:
  - Software requirements:

    Table 27: Operating System Requirements for Database Studio 7.9

Operating System	Database Studio 7.9.08	Database Studio 7.9.09
Windows 2008	X64	X64
Windows 2008 R2	X64	X64
Windows Vista	IA32 and X64	X64
Windows 7	IA32 and X64	X64
Windows 8	IA32 and X64	X64
Windows 10	IA32 and X64	X64

  - Hardware requirements:
    - RAM: 512 MB (recommended RAM: 1 GB)
    - Processor speed: 1.5 GHz
    - Free disk space: 200 MB
    - Monitor: 1024x768 pixels, 256 colors

- You can obtain the required files by downloading them from:
  http://support.sap.com/patches *Databases* > *SAP MaxDB* > *Database Patches* > *MAXDB GUI COMPONENTS/TOOLS* > *MAXDB DATABASE STUDIO 7.9*
- Database Studio 7.9.09 comes with the SAP Java Runtime SAPJVM.
  You no longer need to download the Java runtime.
- Database Studio 7.9.08 is still available for downloading.
  To check your Java version, enter the following command:
  ```
  java -version
  ```
  To download Java, go to http://java.com/en/download .

Procedure

1. Start the installation or upgrade by simply executing the downloaded `SDBSETUP.EXE` (Windows clients) or `SDBSETUP` (Linux clients) file.
   The *Installation Manager* starts.
2. Follow the Installation Manager steps to install or upgrade Database Studio.
3. If you are prompted to restart your computer after the installation, make sure that you first shut down any databases that are running.

More Information

For more information about Database Studio, including troubleshooting, see SAP Note 1097311 and 1795588.

6.15 Secure Sockets Layer Protocol for Database Server Communication

The SAP MaxDB database server supports the Secure Sockets Layer (SSL) / Transport Layer Security (TLS) protocol. You can use this protocol to communicate between the database server and its client, here the Application Server (AS). SSL guarantees encrypted data transfer between the SAP MaxDB database server and its client applications. In addition, the server authenticates itself to the client. You need to install SAP's cryptographic library - SAPCRYPTOLIB. For more information on software versions, see SAP Note 2243688.

> **Caution**
>
> There is a performance cost for SSL since the data has to be encrypted, which requires time and processing power.

To use SSL you need to install the SAP Cryptographic Library [page 96] and generate the personal security environment [page 98] (PSE) on the server (SSL Server PSE) and on the client (SSL Client PSE). In addition, you need to configure the SSL communication between the application server and the database server [page 100].

6.15.1 Installing the SAP Cryptographic Library

Context

The SAP Cryptographic Library supplies the cryptographic functions required to build a database server-client connection using the Secure Sockets Layer (SSL) protocol. Therefore, you need to install the SAP Cryptographic Library on the host machine of the SAP MaxDB database server and the SAP Application Server (AS).

The installation package consists of the following:

- The SAP Cryptographic Library:
  - SAP liveCache >= 7.9.09: CommonCryptoLib (CCL)
  - SAP liveCache < 7.9.09: SAPCRYPTOLIB
- Configuration tool `sapgenpse.exe`

The installation package is called `SAPCRYPTOLIBP_<patch_level>-<platform_id>.SAR`. For example, CCL 8.4.45 on 64-bit AIX is called `SAPCRYPTOLIBP_8445-20011699.SAR`.

You use the configuration tool to generate key pairs and PSEs.

Prerequisites

Download the appropriate installation package for your operating system and liveCache version from:

- SAP liveCache >= 7.9.09
  http://support.sap.com/software/patches.html ▶ *Browse Download Catalog* ▶ *SAP Cryptographic Software* ▶ *SAPCRYPTOLIB* ▶ *COMMONCRYPTOLIB* `<version>`
- SAP liveCache< 7.9.09
  http://support.sap.com/software/patches.html ▶ *Browse Download Catalog* ▶ *SAP Cryptographic Software* ▶ *SAPCRYPTOLIB* ▶ *SAPCRYPTOLIB* `<version>`

For more information on the CCL, see SAP Note 1848999.

Procedure

1. Unpack the installation package for the SAP Cryptographic Library using `sapcar.exe`, which you can find for example on your installation master media, using the following command:

   ```
   sapcar -xvf <name of your package>
   ```

   > **Note**
   >
   > The remainder of the procedure (as described below) does not apply to client applications such as SQL Studio, which do not recognize an **independent** directory. In this case, you must copy the `sapcrypto` installation package to the installation directory of the application

2. Copy the `sapcrypto` library to the `lib` subdirectory of the **independent program** directory.

   You can find the value of the independent program directory by entering the following command:

   ```
   dbmcli dbm_getpath IndepProgPath
   ```

   Example

   The independent program directory might be called the following:

   `/sapdb/programs/lib`

3. Copy the configuration tool `sapgenpse.exe` to the directory `<independent program>\lib`.
4. Create a subdirectory called `sec` under the **independent data** directory.

   Example

   The result might look as follows:

   `/sapdb/data/sec`

5. Make sure that the directory and the files that the `sec` directory contains – including the SSL Server PSE – belong to the user `lcown` and the group `lcadm`, and that the rights are restricted to `0660`.

6.15.2 Generating the Personal Security Environment

Use

The information required by the database server or client application to communicate using Secure Sockets Layer is stored in the Personal Security Environment (PSE). The required information differs according to whether SSL PSE is for the server or client:

- SSL Server PSE
  This PSE contains the security information from the database server, for example, the public-private cryptographic key pair and certificate chain. To install the SSL Server PSE, you need to generate the PSE. You can either do this for a single database server or system-wide. The SSL Server PSE is called `SDBSSLS.exe`.
- SSL Client PSE
  The client requires an anonymous certificate called `SDBSSLA.exe`, which contains the list of the public keys of trustworthy database servers.

Procedure

Generating the SSL Server PSE

> **Note**
>
> You need to know the naming convention for the distinguished name of the database server. The syntax of the distinguished name, which you enter in the procedure below, depends on the Certification Authority (CA) that you are using.

1. Change to the `<global programs>\lib` directory.
2. Set up the following environment variable:
   `SECUDIR=<global data>\sec`
3. Enter `<global program>/lib` in the environment variable `LD_LIBRARY_PATH`.
4. Create a SSL Server PSE, `SDBSSLS.pse`, and generate a certificate request file, `certreq`, in the directory defined by `SECUDIR` (see step 2):
   `sapgenpse gen_pse -v -r <SECUDIR>\certreq -p SDBSSLS.pse "<your distinguished name>"`
   For each database server that uses a server-specific PSE, you must set up a unique certificate request. If you are using a valid system-wide SSL Server PSE, you only need to set up a single certificate request for all servers.
5. Send the certificate request to the CA for signing. You can either send it to the SAP CA or to another CA.
   You must make sure that the CA offers a certificate corresponding to the PKCS#7 certificate chain format. Thawte CA at the Thawte website offers a suitable certificate, either SSL Chained CA Cert or PKCS#7 certificate chain format.
   The CA validates the information contained in the certificate request, according to its own guidelines, and sends a reply containing the public key certificate.
6. After you have received the reply from the CA, make sure that the contents of the certificate request have not been destroyed during download.
   For example, if you requested the certificate on a UNIX system and stored it on a Windows front end, the formatting (that is, line indents and line breaks) is affected.

To check the contents, open the certificate request with a text editor (such as Notepad) and repair the line indents and the line breaks.

> **Example**
>
> This is an example of a certificate request:
>
> ```
> -----BEGIN CERTIFICATE REQUEST-----
>
> MIIBPzCBqQIBADAAMIGfMA0GCSqGSIb3DQEBAQUAA4GNADCBiQKBgQD/302IT+/Y
> wpignSw7U9FWneyWz3Wil0S18aFCYkRo00wCpD8UwcaC4dds4uGT6hl2WlJ0/FOtUg
> +EQxonZbaRrk9sTalkn1mqx3YAUe/gEaGdf1wvuYkb0gjMk81iM/
> jb9BJd8srMPyoBy9jMC7v5u7+TZWmWa6RjnvClvYGgMwIDAQABoAAwDQYJKoZIhvcNAQEFBQADgYEAx2z
> uaTAOKPdGmxUKYlWdasUpim4vhfaHa7ZDBwipvKJ8akYCT
> +dpmVjhcph9E7cUjL80/6Rup5cnLAAO5FhVt5MS6zNJa9YYSN9XP+5/
> MPF6Q4ayJ0VryTkSpbbPrWLbKh1Dds97LQVuQ/myKIAHECwyW6t7sAFJWn4P0fdxmKo=
>
> -----END CERTIFICATE REQUEST-----
> ```

7. Import the reply to the SSL Server PSE:
   1. Copy the text to a temporary file called `srcert`.
   2. Enter the following command:
      `sapgenpse import_own_cert -c srcert -p SDBSSLS.pse`

   You have generated the SSL Server PSE. You can now start the XServer as usual (if it is already running, you must stop and restart it).
8. To check whether the SSL functionality is working correctly, view the trace file `niserver_<local computer name>.trace` in the `<global data>\wrk` directory.

Generating the SSL Client PSE

1. Change to the `<global programs>\lib` directory.
2. Set up the following environment variable:
   `SECUDIR=<global data>\sec`
3. Create an anonymous client SSL Client PSE, `SDBSSLA.pse` in the directory defined by `SECUDIR` (see previous step):
   `sapgenpse gen_pse -v -noreq -p SDBSSLA.pse`
   You can leave the distinguished name empty.
   Before you can establish an SSL connection to a database server, the server certificate must be entered in the PK list of the anonymous client certificate.
4. To see the database server certificate, enter the following command:
   `„x_ping -n <servermode> -c[apture]`
   You can check whether to trust the database server certificate. The client certificate is not affected by this.
5. Start the import with this command:
   `„x_ping -n <servermode> -i[mport]`
6. To administer the PSE, use the configuration tool sapgenpse. For more information, enter the following command:
   `sapgenpse -h`

> **Note**
>
> For applications such as SQL Studio replace the global data or global program in the above description with the relevant installation directory.

6.15.3 Configuring the SSL Communication between the Application Server and the Database Server

Procedure

Using transaction `dbco`, set the connection information for each database connection for which SSL is to be used as follows:

- Connection information for database connection `<name>`
  `maxdb:remotes://<host>/database/<SID>-<SID>`
- Connection information for database connection `<name>+`
  `@DBM_SSL:<host>-<SID>`

For more information, see SAP Note 2190094.

Example

Database connection: `Test`

<host>: `lu12345`

<SID>: `WB9`

Connection information for database connection `Test`:

`maxdb:remotes://lu12345/database/WB9-WB9`

Connection information for `Test+`:

`@DBM_SSL:lu12345-WB9`

6.16 Backing Up the SAP MaxDB Database

Use

You need to define backup media and back up the SAP MaxDB database using Database Manager GUI (DBMGUI).

Prerequisites

- You have finished client maintenance.
- You have installed Database Studio [page 94].

- You can find more information on backing up the database at:
  http://help.sap.com/maxdb ▶ *SAP MaxDB 7.9* ▶ *English* ▶ *Glossary* ▶ *Backup* ▶

Procedure

1. Define the backup template as described in ▶ *Glossary* ▶ *Backup Templates* ▶ in the above documentation.
2. Back up the database as described in ▶ *Glossary* ▶ *Data Backup* ▶ and *Log Backup* in the above documentation.

6.17 Updating the Database Software to the Current Release

Use

After the installation and before you start production operation, we strongly recommend you to update the database software.

Procedure

1. Download the latest SAP MaxDB patches from http://support.sap.com/swdc ▶ *Databases* ▶ *SAP MaxDB* ▶.
   For more information about upgrading to a SAP MaxDB patch from a SWDC Support Package, see SAP Note 735598.

6.18 Performing a Full System Backup

Use

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:

Table 28:

Release	SAP Library Path
SAP NetWeaver 7.0	–
SAP NetWeaver 7.0 including enhancement package 1	http://help.sap.com/nw701 ▶ *System Administration and Maintenance Information* ▶ *Technical Operations for SAP NetWeaver: English* ▶ *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* ▶ *Function-Oriented View: English* ▶ *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* ▶ *Function-Oriented View: English* ▶ *Solution Life Cycle Management by Key Capability* ▶ *Backup and Recovery* ▶ *Backing Up and Restoring Your SAP System on Windows*

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 installer 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 SCS 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 installer 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**
>
> Windows Server 2008 (R2) and higher:
>
> 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.

End of 'High Availability': HA (Windows)

- `\usr\sap\trans`
  The transport directory contains SAP software for the transport of objects between SAP systems. The installer 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 56].

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:
>
> Central services instance: `SCS<Instance_Number>`

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

Enqueue Replication Server instance: `ERS<Instance_Number>`

End of 'High Availability': HA (Windows)

Central instance: `JC<Instance_Number>`

Dialog instance: `J<Instance_Number>`.

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

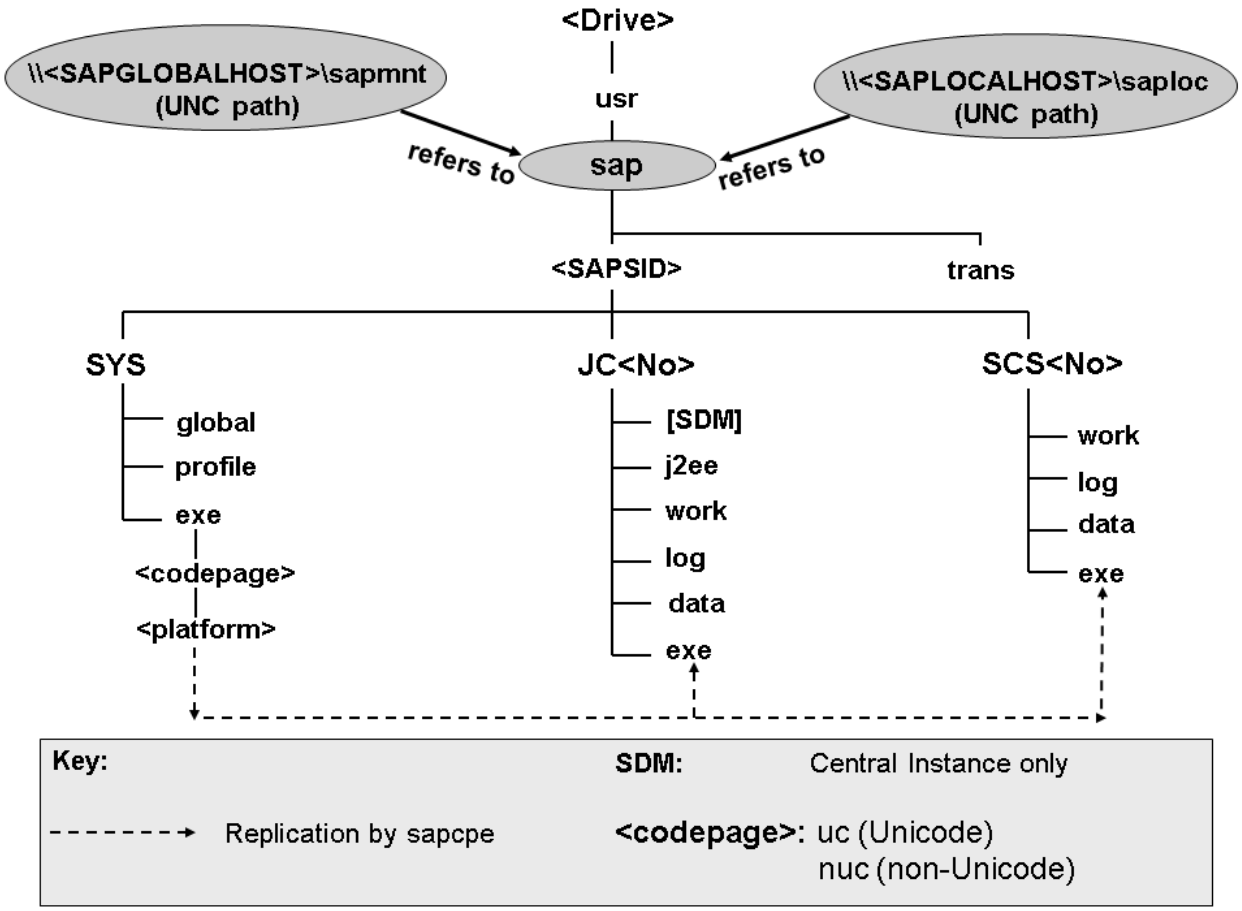


Figure 6: Directory Structure on the Global Host in a Central Java System

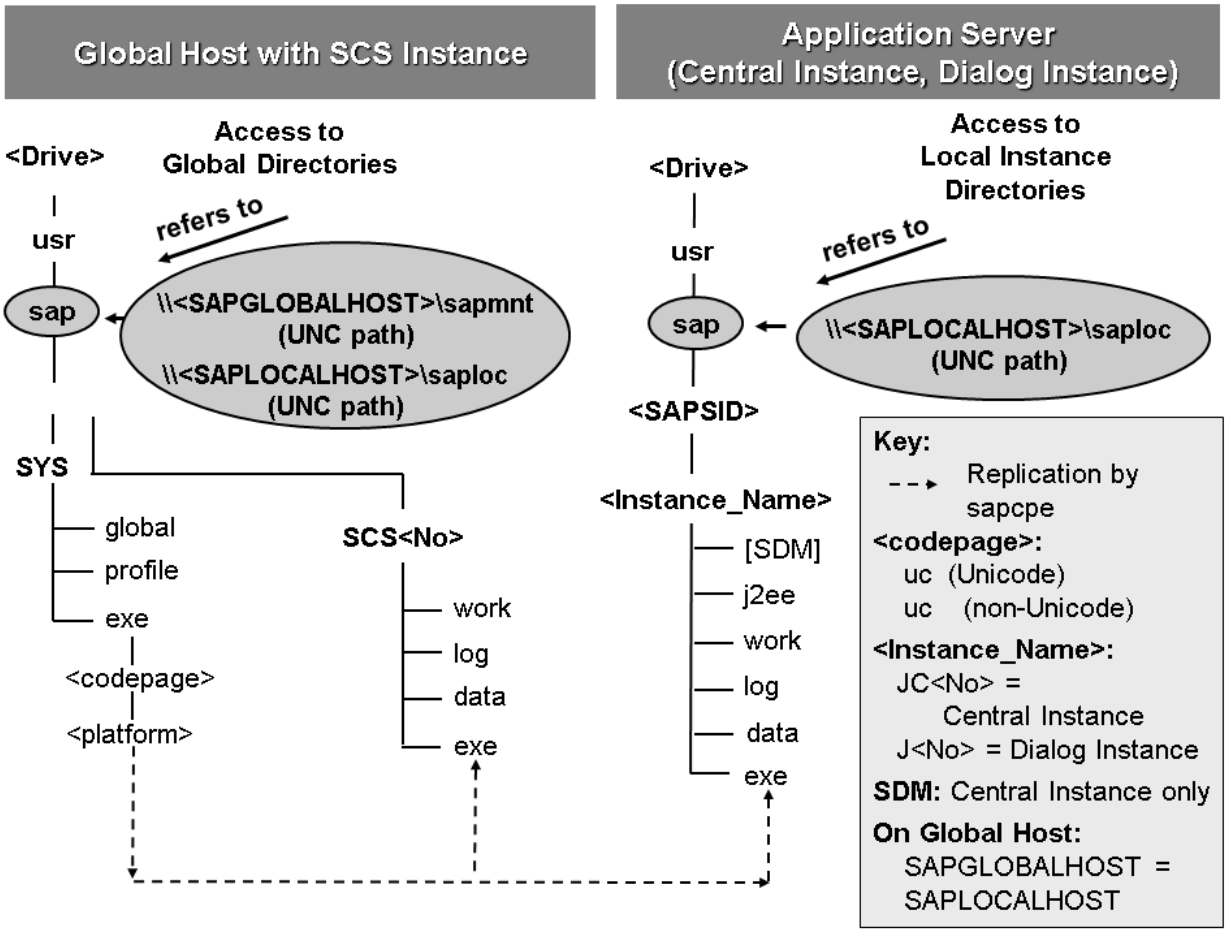


Figure 7: Directory Structures in a Distributed Java System

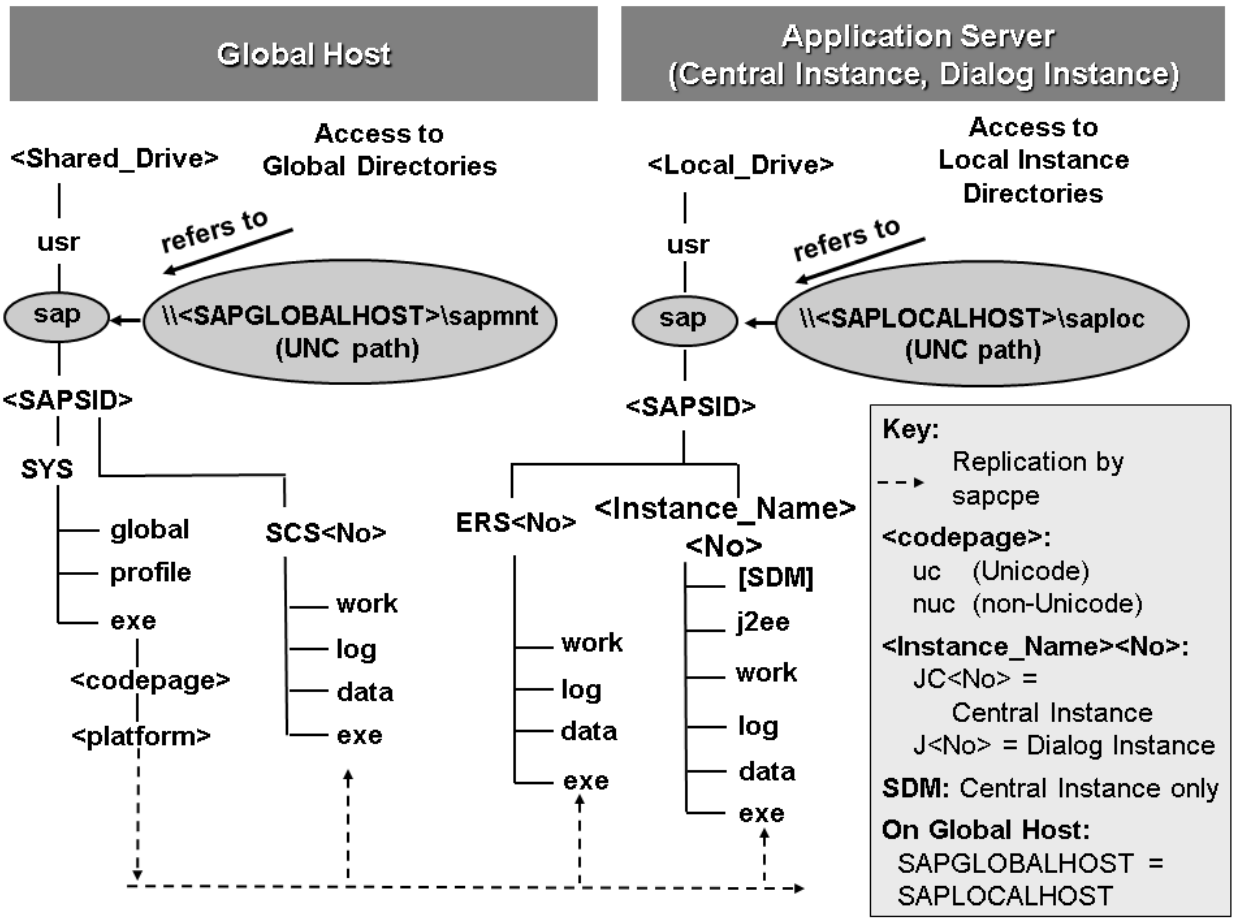


Figure 8: Directory Structure in a High-Availability Java System

7.2 Integration of LDAP Directory Services

Use

This section explains the benefits of using the SAP system with the Lightweight Directory Access Protocol (LDAP) directory and gives an overview of the configuration steps required to use an SAP system with the directory.

LDAP defines a standard protocol for accessing directory services, which is supported by various directory products such as Microsoft Active Directory, and `OpenLDAP slapd`. Using directory services enables important information in a corporate network to be stored centrally on a server. The advantage of storing information centrally for the entire network is that you only have to maintain data once, which avoids redundancy and inconsistency.

If an LDAP directory is available in your corporate network, you can configure the SAP system to use this feature. For example, a correctly configured SAP system can read information from the directory and also store information there.

> **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**.

Prerequisites

You can only configure the SAP system for Active Directory services or other LDAP directories if these are **already available** on the network. As of Windows 2000 or higher, the Active Directory is automatically available on all domain controllers. A generic LDAP directory is an additional component that you have to install separately on a UNIX or Windows server.

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:
  http://scn.sap.com/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:

Table 29:

Release	Path in SAP Library
• SAP NetWeaver 7.0 • SAP NetWeaver 7.0 including enhancement package 1 • SAP NetWeaver 7.0 including enhancement package 2	http://help.sap.com/nw70 ▶ `<Enhancement_Package>` ▶ *Application Help* ▶ *Function-Oriented View: English* ▶ *Application Platform by Key Capability* ▶ *Java Technology* ▶ *Administration Manual* ▶ *J2EE Engine* ▶ *J2EE Engine Administration Tools* ▶ *SAP Management Console*

Release	Path in SAP Library
SAP NetWeaver 7.0 including enhancement package 3	http://help.sap.com/nw703 ▶ *Application Help* ▶ *Function-Oriented View: English* ▶ *Solution Life Cycle Management by Key Capability* ▶ *SAP Management Console* ▶

Configuration Tasks for LDAP Directories

This section describes the configuration tasks for the Active Directory or other (generic) LDAP directories.

Configuration Tasks for Active Directory

To enable an SAP system to use the features offered by the Active Directory, you have to configure the Active Directory so that it can store SAP system data.

To prepare the directory, you use the installer to automatically:

- Extend the Active Directory schema to include the SAP-specific data types
- Create the domain accounts required to enable the SAP system to access and modify the Active Directory. These are the group `SAP_LDAP` and the user `sapldap`.
- Create the root container where information related to SAP is stored
- Control access to the container for SAP data by giving members of the `SAP_LDAP` group permission to read and write to the directory

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

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

http://scn.sap.com/docs/DOC-14384

Enabling the SAP System LDAP Registration

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

To do this, run the installer **once** for your system and choose ▶ `<Product>` ▶ *Software Life-Cycle Options* ▶ *LDAP Registration* ▶ *LDAP Support* ▶

If you use a directory server other than Microsoft Active Directory and/or non-Windows application servers, you have to store the directory user and password information by using `ldappasswd pf=<Instance_Profile>`. The information is encrypted for storage in `DIR_GLOBAL` and is therefore valid for all application servers. After restarting all application servers and start services, the system is registered in your directory server. The registration protocols of the components are `dev_ldap*`. The registration is updated every time a component starts.

7.3 Performing a Domain Installation Without Being a Domain Administrator

Use

You normally perform a domain installation of the SAP system with a user who is a member of the domain `Admins` group, as described in Required User Authorization for Running the Installer [page 54]. If for any reason, the account used for the installation is not a member of the domain `Admins` group, you can perform the installation with a domain user who is a member of the local `Administrators` group. In this case, the domain administrator has to prepare the system appropriately for you. The domain administrator can perform the following steps either using the installer or manually:

1. Create the new global group `SAP_<SAPSID>_GlobalAdmin`.
2. Create the two new SAP system users `<sapsid>adm` and `SAPService<SAPSID>`.
3. Add the users `<sapsid>adm` and `SAPService<SAPSID>` to the newly created group `SAP_<SAPSID>_GlobalAdmin`.

> **Note**
>
> The installer 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:
>
> 1. Create the new global group `SAP_SAP_GlobalAdmin`.
> 2. Create the SAP system user `sapadm`.
> 3. Add the user `sapadm` to the newly created group `SAP_SAP_GlobalAdmin`.
>
> However, for security reasons we strongly recommend you to create this users as a local user.

Prerequisites

- You must be domain administrator to perform the required steps.
- Windows Server 2008 (R2) and Windows Server 2012 (R2):
  You must have installed the feature *Remote Server Administration Tools* as follows:
  - Windows Server 2012 (R2):
    Open PowerShell in elevated mode, and enter the following command:
    ```
    add-windowsfeature RSAT-ADDS
    ```

- Windows Server 2008 (R2):
  1. Choose *Start* > *Administrative Tools* > *Server Manager*.
  2. In the *Server Manager* window, select *Features*.
  3. Select the feature *Remote Server Administration Tools* > *Role Administration Tools* > *Active Directory Domain Services Tools*.

Procedure

Creating the Required Users and Groups Using the Installer

On the host where the SAP system is to be installed, the domain administrator runs the installer [page 65], and chooses *<Product>* > *Software Life-Cycle Options* > *Additional Preparation Options* > *Operating System Users and Groups* to have the group and users created automatically.

Creating the Required Users and Groups Manually

> **Note**
>
> To create the users and groups specific to the SAP Host Agent, you must follow the procedure below, and replace the users and groups with those for the SAP Host Agent.

Creating the New Global Group SAP_<SAPSID>_GlobalAdmin

Perform the following steps:

- Windows Server 2012 (R2):
  Open PowerShell in elevated mode, and enter the following command:
  `net group SAP_<SAPSID>_GlobalAdmin /add /domain`
- Windows Server 2008 (R2):
  1. Log on as domain administrator.
  2. Start the *Active Directory Users and Computers Console* by choosing:
     Start > *Control Panel* > *Administrative Tools* > *Active Directory Users and Computers*.
  3. Right-click *Users* in *Tree*, and choose *New* > *Group*.
  4. Enter the following:
     Group name: **`SAP_<SAPSID>_GlobalAdmin`**
  5. Select the following:
     1. *Group scope*: Global
     2. *Group type*: Security
  6. Choose *OK*.

Creating the New SAP System Users <sapsid>adm and SAPService<SAPSID>

Perform the following steps:

- Windows Server 2012 (R2):
  1. Open PowerShell in elevated mode.
  2. Create the `<sapsid>adm` user with the following command:
     `net user sapsid>adm <password> /add /domain`

3. Create the `SAPService<SAPSID>` user with the following command:
   `net user SAPService<SAPSID> <password> /add /domain`

- Windows Server 2008 (R2):
  1. In *Active Directory Users and Computers Console*, right-click *Users* in *Tree* and choose:
     New > *User*
  2. Enter the following:

     Table 30:

Field	Input for <sapsid>adm	Input for SAPService<SAPSID>
First name:	None	None
Initials:	None	None
Last name:	None	None
Full name:	`<sapsid>adm`	`SAPService<SAPSID>`
User logon name:	`<sapsid>adm`	`SAPService<SAPSID>`
Full name:	`<sapsid>adm`	`SAPSE<SAPSID>`
User logon name:	`<sapsid>adm`	`SAPSE<SAPSID>`

  3. Choose *Next* and enter the following:
     Password: **`<password>`**
     Confirm password: **`<password>`**
  4. Select *Password never expires*.

     > **Note**
     >
     > Make sure that no other options are selected.

  5. Choose *Next* > *Finish*.

Adding the Manually Created Users to Groups

> **Note**
>
> To add the users specific to the SAP Host Agent to the relevant groups, you must follow the procedure below, and replace the users and groups with those for the SAP Host Agent.

Adding the <sapsid>adm User to the SAP_<SAPSID>_GlobalAdmin Group

- Windows Server 2012 (R2):
  Open PowerShell in elevated mode, and enter the following command:
  `net group SAP_<SAPSID>_GlobalAdmin <sapsid>adm /add /domain`
- Windows Server 2008 (R2):
  1. In the *Users* folder, double-click the newly created user account `<sapsid>adm` in the list on the right.
  2. Choose *Member* > *Add*.

3. Select the new *SAP_<SAPSID>_GlobalAdmin* group and choose *Add* to add it to the list.

> **Note**
>
> By default, the user is also a member of the `Domain Users` group.

4. Choose *OK* twice.

Adding the SAPService<SAPSID> User to the SAP_<SAPSID>_GlobalAdmin Group

- Windows Server 2012 (R2):
  Open PowerShell in elevated mode, and enter the following command:
  `net group SAP_<SAPSID>_GlobalAdmin SAPService<SAPSID> /add /domain`
- Windows Server 2008 (R2):
  1. In the *Users* folder, double-click the newly created user account *SAPService<SAPSID>* in the list on the right.
  2. Choose *Member* > *Add*.
  3. Select the new *SAP_<SAPSID>_GlobalAdmin* group.
  4. Choose *Add* to add it to the list, and then *OK*.
  5. Choose *OK* to close *SAPService<SAPSID>Properties*.
  6. Close the *Active Directory Users and Computers Management Console*.

7.4 Checking and Changing the Paging File Settings on Windows Server 2012 (R2)

Use

This section describes how to check and change the paging file size on Windows Server 2012 (R2) 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 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).

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

With MCOD we distinguish two scenarios:

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

Prerequisites

- For more information about MCOD and its availability on different platforms, see http://scn.sap.com/docs/DOC-8559.
- 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.
  - 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 database system ID can be different from the SAP system ID.
- For the second SAP system, you must use the same `<DBSID>` as for the first SAP system.
- If you decide to turn off database logging during the database load phase of the installation, you need to plan downtime for all MCOD systems sharing the database.

7.6 Preparing an External ABAP System as Source for User Data

You can use an external ABAP system as the data source for user data for the AS Java of your SAP Java system to be installed. To do this, you configure the User Management Engine (UME) of the J2EE engine for the user management of the external ABAP system.

Prerequisites

The ABAP system is based on at least SAP Web AS ABAP release 6.20 SP25.

Context

> **Note**
>
> If you want to install the **J2EE Adapter Engine** as an optional standalone unit, you have to configure the User Management Engine (UME) for the ABAP UME of the SAP NetWeaver Process Integration (PI) system.

If you want to connect more than one Java system to the same ABAP system, you need to work out a concept for the communication, administrator, and guest users for each engine.

You can take one of the following approaches:

Table 31:

Approach	Advantages	Disadvantages
Each Java system uses different users	No interdependencies between the connected engines	Initially more administration to create the users in the ABAP system

Approach	Advantages	Disadvantages
All Java systems use the same configuration	You create the users only once and enter the same information for every Java system that you install.	Interdependencies between the connected engines: • If you change the password of any of the users on the ABAP system, this change affects **all** connected engines. • If you change the administrator user's password, you must also change the password in secure storage on **all** of the connected J2EE Engines

The procedures below assume that you are using the **first** approach.

> **Recommendation**
>
> For security reasons, we recommend the first approach.

- For more information about UME, see: http://help.sap.com/nw70 ▶ *<Enhancement Package>* ▶ *Application Help* ▶ *Function-Oriented View: English* ▶ *Security* ▶ *Identity Management* ▶ *User Management of the Application Server Java* ▶ *User Management Engine*
- For more information about creating users and roles in an ABAP system, see: http://help.sap.com/nw70 ▶ *<Enhancement Package>* ▶ *Application Help* ▶ *Function-Oriented View: English* ▶ *Security* ▶ *Identity Management* ▶ *User and Role Administration of Application Server ABAP*
- For more information about SLD users and security roles, see the *Post-Installation Guide - SLD of SAP NetWeaver 7.0* at http://scn.sap.com/docs/DOC-8042.

The following procedures describe the activities you have to perform in the existing ABAP system and for the Java system to be installed.

Procedure

- Perform the following steps in the existing ABAP system:
  a. Call transaction `PFCG` to do the following:
     - Check that the roles `SAP_BC_JSF_COMMUNICATION` and `SAP_BC_JSF_COMMUNICATION_RO` exist and make sure that their profiles are generated.
     - Check that the roles `SAP_J2EE_ADMIN`, `SAP_J2EE_GUEST`, and `SAP_BC_FP_ICF` exist. Neither role contains any ABAP permissions, so you do not need to generate any profiles.
     - If you want to use Adobe Document Services (ADS), do the following:
       - Check that the role `SAP_BC_FPADS_ICF` exists.
       - Create a role named `ADSCallers`. You do not need to maintain authorization data or generate any profiles for this role.

- If you want to install the system with a local System Landscape Directory, check that the following roles exist and make sure that their profiles are generated:
  - SAP_SLD_CONFIGURATOR
  - SAP_SLD_ADMINISTRATOR
  - SAP_SLD_DEVELOPER
  - SAP_SLD_GUEST
  - SAP_SLD_ORGANIZER

b. Call transaction SU01 to do the following:

c. Make sure that you change the initial passwords of these users and take the precautions described in the relevant SAP security guide **before** you start the installation of the Java system. You can find the security guides at http://service.sap.com/securityguide.

1. Call transaction PFCG to do the following:
   - Check that the roles SAP_BC_JSF_COMMUNICATION and SAP_BC_JSF_COMMUNICATION_RO exist and make sure that their profiles are generated.
   - Check that the roles SAP_J2EE_ADMIN, SAP_J2EE_GUEST, and SAP_BC_FP_ICF exist. Neither role contains any ABAP permissions, so you do not need to generate any profiles.
   - If you want to use Adobe Document Services (ADS), do the following:
     - Check that the role SAP_BC_FPADS_ICF exists.
     - Create a role named ADSCallers. You do not need to maintain authorization data or generate any profiles for this role.
   - If you want to install the system with a local System Landscape Directory, check that the following roles exist and make sure that their profiles are generated:
     - SAP_SLD_CONFIGURATOR
     - SAP_SLD_ADMINISTRATOR
     - SAP_SLD_DEVELOPER
     - SAP_SLD_GUEST
     - SAP_SLD_ORGANIZER
2. Call transaction SU01 to do the following:
   - Create a new communication user and assign it to the role SAP_BC_JSF_COMMUNICATION_RO. We recommend that you do the following:
     - Name this user SAPJSF. You can use any password.
     - Assign this user the role SAP_BC_JSF_COMMUNICATION_RO for read-only (display) access to user data with Java tools. If you intend to maintain user data (that is, to change, create, or delete users) with Java tools, you need to assign the role SAP_BC_JSF_COMMUNICATION instead.
     - Assign this user the type *Communications* under *Logon data* to make sure that it can only be used for communication connections between systems and not as a dialog user.
   - Create a new administrator user for the J2EE engine and assign it to role SAP_J2EE_ADMIN. We recommend that you name this user J2EE_ADM_<SAPSID_Java_System>. You can use any password.
   - Create a new guest user for the J2EE engine and assign it to role SAP_J2EE_GUEST. We recommend that you name this user J2EE_GST_<SAPSID_Java_System>. You can use any password.
     Since this user is only used for anonymous access to the system, we recommend you to deactivate the password and, if required, lock it after installation to prevent anyone from using it for explicit named logons.

- If you want to use Adobe Document Services (ADS), do the following:
  - Create a user `ADSUSER` for basic authentication and assign this user the role `ADSCallers`.
    You can use any password.
  - Create a user `ADS_AGENT` and assign this user the role `SAP_BC_FPADS_ICF`.
    You can use any password.
- If you want to install the system with a local System Landscape Directory, do the following:
  1. Create an SLD Data supplier user. We recommend that you name this user `SLDDSUSER`. You can use any password.
  2. Assign this user the following roles:
     - `SAP_SLD_CONFIGURATOR`
     - `SAP_SLD_ADMINISTRATOR`
     - `SAP_SLD_DEVELOPER`
     - `SAP_SLD_GUEST`
     - `SAP_SLD_ORGANIZER`
- If you want to install Development Infrastructure (DI), create the following users:
  - `NWDI_ADM`
    You do not need to assign a role and you can use any password.
  - `NWDI_DEV`
    You do not need to assign a role and you can use any password.
  - `NWDI_CMSADM`
    You do not need to assign a role and you can use any password.

3. Make sure that you change the initial passwords of these users and take the precautions described in the relevant SAP security guide **before** you start the installation of the Java system. You can find the security guides at http://service.sap.com/securityguide.

- Perform the following steps in the Java System:
  a. **Before** the installation of the Java system, make sure that you have the correct user names and passwords of the users listed above for the separate ABAP system.
  b. **During** the installation of the Java system, make sure that you enter the correct users and passwords in the corresponding installer dialogs.

7.7 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. Change the instance profile of the central services instance for Java (SCS 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 SCS instance:
>
> **Before the change:**
>
> ...
>
> `rdisp/msserv = 4711`
>
> ...
>
> **After the change:**
>
> ...
>
> `rdisp/msserv = 0`
>
> `rdisp/msserv_internal = 4711`
>
> ...

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

7.8 Installation of Additional Usage Types or Software Units in an Existing SAP System

You can install additional usage types or software units in an **existing** Java system using Software Update Manager (SUM).

The procedure how to do this is described in the documentation *Update of SAP Systems Using Software Update Manager 1.0 SP*`<Current_Number>`, which is available at: http://support.sap.com/sltoolset ▶ *System Maintenance* ▶ *Software Update Manager (SUM) SP*`<Current_Number>` ▶ *Guides for SUM 1.0 SP* `<Current_Number>` ▶

7.9 Installing the SAP Host Agent Separately

This procedure tells you how to install an SAP Host Agent **separately**.

Context

The SAP Host Agent is installed automatically during the installation of new SAP instances with SAP kernel 7.20 or higher (integrated installation). This procedure is only for hosts with no SAP Host Agent running on them, due to the following reasons:

- There is no SAP system or instance on the host.
- The SAP system or instance running on the host has a kernel release lower than SAP kernel 7.20 and the host does not yet have an SAP Host Agent.
- You have upgraded your SAP system to a release with a kernel release lower than SAP kernel 7.20 and the host of the upgraded system or instance does not yet have an SAP Host Agent.

SAP Host Agent has the following executable programs and services:

- The `SAPHostExec` service
- The `sapstartsrv` service `SAPHostControl`
- The operating system collector `saposcol`

> **Note**
>
> The installed programs are automatically started when the host is booted.
>
> On Microsoft Windows hosts, the services `SAPHostControl` and `SAPHostExec` automatically start the installed programs.

For more information about the SAP Host Agent, see the SAP Library at:

Table 32:

Release	SAP Library Path
• SAP NetWeaver 7.0 • SAP NetWeaver 7.0 including enhancement package 1 • SAP NetWeaver 7.0 including enhancement package 3	http://help.sap.com/nw70 ▶ `<Enhancement Package>` ▶ *Application Help* ▶ *Function-Oriented View: English* ▶ *Solution Life Cycle Management by Key Capability* ▶ *SAP Host Agent*
SAP NetWeaver 7.0 including enhancement package 2	http://help.sap.com/nw702 ▶ *Application Help* ▶ *Function-Oriented View: English* ▶ *Solution Life Cycle Management by Key Capability* ▶ *Solution Monitoring* ▶ *SAP Host Agent*

The following procedure describes the steps you have to perform on the host where you install the SAP Host Agent separately.

Procedure

1. You check the hardware and software requirements [page 21] on the installation host.
2. You perform basic preparations on Windows [page 52].
3. You check that you have the required user authorization for running the Installer [page 54].
4. Make the unpacked Software Provisioning Manager 1.0 archive available on the installation host as described in Downloading the Software Provisioning Manager Archive [page 57].
5. Make the medium for the UC kernel available on the installation host.

   Use folder `K_<Version>_U_<OS>`), where "_U_" means Unicode.

   You can either use the physical kernel medium from the installation package of your SAP system, or download the kernel medium from https://support.sap.com/swdc (see Downloading Installation Media [page 60])
6. You run the installer [page 65] to install the SAP Host Agent.

   On the *Welcome* screen, choose `<Product>` > *Software Life-Cycle Options* > *Additional Preparation Options* > *Host Agent*.
7. Check whether the installed services are available as follows:
   a. Log on as user `sapadm`.
   b. Check whether the following services are available:
      - The control program `saphostexec`
      - The operating system collector `saposcol`.
      - The SAP NetWeaver Management agent `SAPHostControl` (`sapstartsrv` in host mode)

   > **Note**
   >
   > The installed programs are automatically started when the host is booted.
   >
   > This is done by the services `SAPHostControl` and `SAPHostExec`.

7.10 Starting and Stopping the SAP System

Use

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 177].
>
> 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.

> ℹ Note
>
> - You can also start and stop a UNIX system with the SAP MMC.
> - The SAP MMC is not available on Server Core for Windows Server 2012 (R2).

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

Table 33:

Release	SAP Library Path
• SAP NetWeaver 7.0 SR3 • SAP NetWeaver 7.0 incl. EHP1 • SAP NetWeaver 7.0 incl. EHP2	http://help.sap.com/nw70 ▶ *<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*

Release	SAP Library Path
SAP NetWeaver 7.0 incl. EHP3	http://help.sap.com/nw703 ▶ *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
  ```

7.11 Configuring the Windows Server Firewall on Windows Server 2008 (R2) and higher

Use

As of Windows Server 2008 (R2), 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 Used by SAP Applications* at:

http://service.sap.com/security ▶ *Infrastructure Security* ▶

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)

Prerequisites

You turn on the disabled firewall [page 51] as follows:

- Windows Server 2012 (R2):
  Open Windows PowerShell in elevated mode, and enter the following command:
  `Set-NetFirewallProfile "public","domain","private" -enabled true`
- Windows Server 2008 (R2):
  1. Choose ▶ *Start* ▶ *Administrative Tools* ▶ *Windows Firewall with Advanced Security* ▶.
  2. Right-click *Windows Firewall with Advanced Security* and choose *Properties*.
  3. Set the *Firewall state* to *On*.

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:

Table 34:

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

- Windows Server 2012 (R2):
  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`

- Windows Server 2008 (R2):
  1. Choose ▶ *Start* ▶ *Administrative Tools* ▶ *Windows Firewall with Advanced Security* ▶.
  2. Right-click *Inbound Rules* and choose *New Rule*.
     The *New Inbound Rule Wizard* starts.
  3. For *Rule Type*, select *Port* and choose *Next*.
  4. For *Protocol and Ports*, select port type *TCP* or *UDP* depending on the port type used.
     Select *Specific local ports*, and enter the port numbers for which you want to apply the new rule.
     Note that the final two digits of the port number correspond to the instance number.
  5. Choose *Next*.
  6. For *Action*, select *Allow the connection*, and choose *Next*.
  7. For *Profile*, keep *Domain*, *Private* and *Public* selected, and choose *Next*.
     For more information, see the link *Learn more about profiles* on this screen.
  8. Enter the *Name*, for example `SAP ABAP Server 00`, and *Description* for the new rule.
  9. Choose *Next*.
  10. Choose *Finish* to save the rule.
      The new inbound rule appears in the *Inbound Rules* list. To modify the settings, right-click on the rule and choose *Properties*.

> **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.

7.12 Usage Type-Specific Initial Technical Configuration Done by the Installer

The installer automatically performs initial technical configuration steps for the usage types shown below during the installation. However, you might have to perform these steps manually if you want to change existing parameters or you want to set additional parameters.

For more information, see the following usage type-specific sections.

Related Information

Initial Technical Configuration for SAP NetWeaver Application Server for Java (AS Java) [page 130]
Initial Technical Configuration for Development Infrastructure (DI) [page 133]
Initial Technical Configuration for the Portal (Usage Types EPC and EP) [page 134]
Initial Technical Configuration for BI Java [page 135]

7.12.1 Initial Technical Configuration for SAP NetWeaver Application Server for Java (AS Java)

The installer automatically performs initial technical configuration steps for some components of SAP NetWeaver Application Server for Java (AS Java). However, you might have to perform some of these steps manually after the installer has finished, depending on your installation scenario.

These are the following components.

Related Information

Initial Technical Configuration for Adobe Document Services [page 130]
Initial Technical Configuration for Composite Application Framework Core (CAF) [page 131]
Initial Technical Configuration for the System Landscape Directory (SLD) [page 132]

7.12.1.1 Initial Technical Configuration for Adobe Document Services

The installer automatically performs some initial technical configuration steps for Adobe Document Services (ADS) during the installation. However, you might have to perform these steps manually if you want to change existing parameters or if you want to set additional parameters.

The installer performs the following steps:

- The installer creates user `ADSUser` in AS Java for basic authentication and assigns it to group `ADSCallers`. For more information about this user, see Ensuring User Security [page 88].
- The installer sets up basic authentication in the Java environment.

More Information

For more information about how to perform these steps manually, see the SAP Library at the following locations:

Table 35:

Release	SAP Library Path
• SAP NetWeaver 7.0 • SAP NetWeaver 7.0 including enhancement package 1 • SAP NetWeaver 7.0 including enhancement package 2	http://help.sap.com/nw70 ▶ *<Enhancement Package>* ▶ *Configuration and Deployment Information* ▶ *Technology Consultant's Guide: English* ▶ *Business Task Management* ▶ *Adobe Document Services (Configuration)* ▶ *Adobe Document Services Configuration Guide* ▶ *Configuring the Web Service* ▶ *Securing Access to the Web Service* ▶ *Configuration of the Web Service for Basic Authentication*
SAP NetWeaver 7.0 including enhancement package 3	http://help.sap.com/nw703 ▶ *Application Help* ▶ *Function-Oriented View: English* ▶ *Application Platform by Key Capability* ▶ *Adobe Document Services Configuration Guide* ▶ *Configuring the Web Service* ▶ *Securing Access to the Web Service* ▶ *Configuration of the Web Service for Basic Authentication*

7.12.1.2 Initial Technical Configuration for Composite Application Framework Core (CAF)

The installer automatically performs some initial technical configuration steps for Composite Application Framework Core (CAF) during the installation. However, you might have to perform these steps manually if you want to change existing parameters or if you want to set additional parameters.

The installer performs the following steps:

- The installer creates the following roles with the required User Management Engine (UME) actions:
  - `CAFAdmin`
  - `CAFUIAdmin`

  For more information about how to perform this step manually, see the SAP Library at: http://help.sap.com/nw70 ▶ *<Enhancement Package>* ▶ *Configuration and Deployment Information* ▶ *Technology Consultant's Guide: English* ▶ *Developing, Configuring, and Adapting Applications* ▶ *Creating Composite Applications* ▶ *Composite Application Framework Core Configuration Guide* ▶ *Setting Up Roles*
- The installer configures CAF runtime properties for SAP NetWeaver Business Warehouse (BW) integration. For more information about how to perform this step manually, see the SAP Library at: http://help.sap.com/nw70 ▶ *<Enhancement Package>* ▶ *Configuration and Deployment Information* ▶ *Technology Consultant's Guide: English* ▶ *Developing, Configuring, and Adapting Applications* ▶ *Creating*

Composite Applications > *Composite Application Framework Core Configuration Guide* > *Configuring CAF Core for BW Integration* > *Configuring CAF Runtime Properties for BW Integration*

- The installer configures CAF runtime properties for knowledge management integration.
  For more information about how to perform this step manually, see the SAP Library at:
  http://help.sap.com/nw70 > *<Enhancement Package>* > *Configuration and Deployment Information* > *Technology Consultant's Guide: English* > *Developing, Configuring, and Adapting Applications* > *Creating Composite Applications* > *Composite Application Framework Core Configuration Guide* > *Configuring CAF Core for Knowledge Management Integration* > *Configuring CAF Repository Managers* > *Configuring CAF Runtime Properties*
- The installer creates data sources to extract custom enumeration types.
  For more information about how to perform this step manually, see the SAP Library at:
  http://help.sap.com/nw70 > *<Enhancement Package>* > *Development Information* > *Developer's Guides: English* > *Fundamentals* > *Creating Composite Applications* > *Developing Composite Applications with CAF Core* > *Integration* > *CAF Core and SAP Business Information Warehouse Integration* > *DataSource Use in CAF and SAP BW Integration* > *DataSources to Extract Custom Enumeration Types*

7.12.1.3 Initial Technical Configuration for the System Landscape Directory (SLD)

The installer automatically performs some initial technical configuration steps for the System Landscape Directory (SLD) during the installation. However, you might have to perform these steps manually if you want to change existing parameters or if you want to set additional parameters.

- If you choose option *Register in existing central SLD*, the installer automatically configures the connection of the system being installed to an existing **central** SLD.
  For more information about how to perform these steps manually, see:
  http://help.sap.com/nw70 > *<Enhancement Package>* > *Application Help* > *Function-Oriented View: English* > *Solution Life Cycle Management by Key Capability* > *Software Life Cycle Management* > *System Landscape Directory* > *Configuring Systems to Connect to SLD*
- If you choose option *Configure a local SLD*, the installer automatically sets up and configures a **local** SLD during the installation.
  For more information about how to perform these steps manually, see the documentation *Post Installation Guide – System Landscape Directory of SAP NetWeaver 7.0* at http://scn.sap.com/docs/DOC-8042.

7.12.2 Initial Technical Configuration for Development Infrastructure (DI)

The installer automatically performs some initial technical configuration steps for usage type Development Infrastructure (DI) during the installation. However, you might have to perform these steps manually if you want to change existing parameters or you want to set additional parameters.

The installer performs the following steps:

- The installer creates the following NWDI users:
  - `NWDI_ADM`
  - `NWDI_DEV`
  - `NWDI_CMSADM`

  For more information about these NWDI users, see the table in *Users in the SAP NetWeaver Development Infrastructure (NWDI)* of Ensuring User Security [page 88].
- The installer creates the following roles:
  - `NWDI.Administrator`
  - `NWDI.Developer`
- The installer adds the following actions to the role `NWDI.Administrator`:
  - `CBS.Administrator`
  - `sap.com_com.sap.lcr.LcrInstanceWriterAll`
- The installer adds the following actions to the role `NWDI.DEVELOPER`:
  - `CBS.Developer`
  - `CMS.Display`
  - `CMS.ExportOwn`
  - `sap.com_com.sap.lcr.LcrInstanceWriterNR`
- The installer creates the following groups:
  - `NWDI.Administrators`
  - `NWDI.Developers`
- The installer assigns the security role `LcrInstanceWriterAll` of the component `sap.com/com.sap.lcr*sld` to the group `NWDI.Administrators`.
- The installer assigns the security role `LcrInstanceWriterNR` of the component `sap.com/com.sap.lcr*sld` to the group `NWDI.Developers`.
- The installer assigns the role `NWDI.Administrator` to the group `NWDI.Administrators`.
- The installer assigns the role `NWDI.Developer` to the group `NWDI.Developers`.
- The installer assigns the group `NWDI.Administrators` to the user `NWDI_ADM`.
- The installer assigns the group `NWDI.Developers` to the user `NWDI_DEV`.
- The installer assigns the group `NWDI.Administrators` to the user `NWDI_CMSADM`.

More Information

For more information about how to perform these steps manually, see the SAP Library at:

- http://help.sap.com/nw70 ▶ *<Enhancement Package>* ▶ *Configuration and Deployment Information* ▶ *Technology Consultant's Guide: English* ▶ *Developing, Configuring, and Adapting Applications* ▶ *Post Installation Steps of Usage Type DI* ▶ *Setting Up Privileges, Roles and Groups* ▶
- http://help.sap.com/nw70 ▶ *<Enhancement Package>* ▶ *Application Help* ▶ *Function-Oriented View: English* ▶ *Security* ▶ *Identity Management* ▶ *User Management of the Application Server Java* ▶ *Administration of Users and Roles* ▶ *Managing Users, Groups, and Roles* ▶

7.12.3 Initial Technical Configuration for the Portal (Usage Types EPC and EP)

This section applies when you install usage type EPC only and when you install it together with usage type EP. The installer automatically performs some initial technical configuration steps for the usage types EPC and EP during the installation. However, you might have to perform these steps manually if you want to change existing parameters or you want to set additional parameters.

Context

The installer performs the following steps:

- The installer copies the `CMS_MAPPING Properties` file.
- The installer renames the `InitialPermissions.xml.template` file to `initialPermissions.xml`.
- The installer renames the `initialPermissionsKMC.xml.template` file to `initialPermissionsKMC.xml`.

Procedure

- **Copying CMS_MAPPING properties**
  a. Change to the following source directory:

     ```
     <drive:>\usr\sap\<sapsid>\<Instance_Name>\j2ee\cluster\server<x>\apps\sap.com
     \irj\servlet_jsp\irj\root\WEB-INF\portal\system\pcd\Migration\mapping\
     ```

  b. Copy file `cms_mapping.properties` from the source directory to the following target directory:

     ```
     <drive:>\usr\sap\<sapsid>\SYS\global\pcd\Migration\mapping\.
     ```

> **Note**
>
> If the target directory does not exist, you also have to create it.

- **Renaming InitialPermissions.xml.template**
  a.
  b. Go to the following directory:

     `<drive:>\usr\sap\<sapsid>\<Instance_Name>\j2ee\cluster\server<x>\apps\sap.com\irj\servlet_jsp\irj\root\WEB-INF\portal\system\xml\acl`.
  c. Rename file `initialPermissions.xml.template` to **`initialPermissions.xml`**.
- **Renaming initialPermissionsKMC.xml.template**
  a. Go to the following directory:

     `<drive:>\usr\sap\<sapsid>\<Instance_Name>\j2ee\cluster\server<x>\apps\sap.com\irj\servlet_jsp\irj\root\WEB-INF\portal\system\xml\acl`
  b. Rename file `initialPermissionsKMC.xml.template` to **`initialPermissionsKMC.xml`**.

7.12.4 Initial Technical Configuration for BI Java

The installer automatically performs BI Java-specific initial technical configuration steps during the installation.

However, you might have to perform these steps manually if you want to change existing parameters or you want to set additional parameters.

The following steps might be affected.

Related Information

Configuring BI Java Information Broadcasting [page 136]
Process Chains: Transporting Texts for the Alert Category [page 137]
Renaming initialPermissionsBI.xml.template [page 137]

7.12.4.1 Configuring BI Java Information Broadcasting

The installer automatically configures BI Java information broadcasting. However, you might have to perform some of these steps manually if you upgraded your SAP system to the current release. The following steps might be required.

Context

For the configuration of the BI Information Broadcasting you need to perform the following steps in your ABAP system:

Procedure

1. Call transaction `SPRO` and perform the following steps:
   a. **Settings for Information Broadcasting:**

      Go to *SAP NetWeaver* > *Business Intelligence* > *Reporting-relevant Settings* > *Settings for Information Broadcasting*.
   b. **Destinations for Web Dynpro ALV:**

      Go to *SAP NetWeaver* > *Application Server* > *Web Dynpro for ABAP* > *Set-Up Printing for Web Dynpro ABAP ALV*.
      - Create the RFC destination in the SAP NetWeaver Portal
      - Create the RFC destination to the SAP NetWeaver Portal
      - Set up the Web Service destination for the Adobe Document Services
2. Installation of BI Content:

   Call transaction `RSTCO_ADMIN` to check whether the installation has been performed successfully. If the installation status is red, restart the installation by calling transaction `RSTCO_ADMIN` again. If you need further assistance or information, check the installation log.

   For more information, see SAP Note 834280.

   > **Note**
   >
   > For the installation of SAP NetWeaver 7.0 BI Content Add-On 2 or higher on the AS ABAP system, see SAP Note 847019.

7.12.4.2 Process Chains: Transporting Texts for the Alert Category

Alert categories need to be defined.

Context

Alerts can be triggered and sent for BI process chains that contain errors. For this purpose, you need to define alert categories. Alert category `BWAC_PROCESS_CHAIN_FRAMEWORK` is returned for errors in background processing of process chains. This category has set texts that are not transported when the alert category is transported.

Procedure

To manually transport the texts, proceed as described in SAP Note 601619.

7.12.4.3 Renaming initialPermissionsBI.xml.template

If the installer does not automatically rename the initialPermissionsBI.xml.template file, you need to rename it yourself.

Procedure

1. Go to the following directory:

   `<drive:>\usr\sap\<sapsid>\JCxx\j2ee\cluster\server<x>\apps\sap.com\irj\servlet_jsp\irj\root\WEB-INF\portal\system\xml\acl`
2. Rename file `initialPermissionsBI.xml.template` to **`initialPermissionsBI.xml`**.

7.13 SAP System Security on Windows

In a standard SAP system installation, the installer automatically performs all steps relevant for security. Although the installer 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 installer creates during a domain installation and shows how these are related to the SAP directories.

User Accounts

The installer creates the following accounts for SAP system administration:

Table 36:

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 installer creates the following domain and local groups:

Table 37:

Group	Description
`SAP_<SAPSID>_GlobalAdmin`	This domain (global) group is a domain-level SAP administration group for organizing SAP system administrators.
`SAP_SAP_GlobalAdmin`	This domain group for the SAP Host Agent is only created if you create the SAP Host Agent user `sapadm` as a domain user.
`SAP_<SAPSID>_LocalAdmin`	This local group is created on each host.

Group	Description
SAP_SAP_LocalAdmin	If you create the SAP Host Agent user as domain user, the group SAP_SAP_LocalAdmin is also created.
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 installer 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 installer for the <sapsid>adm and SAPService<SAPSID> users in a system infrastructure consisting of two SAP systems.

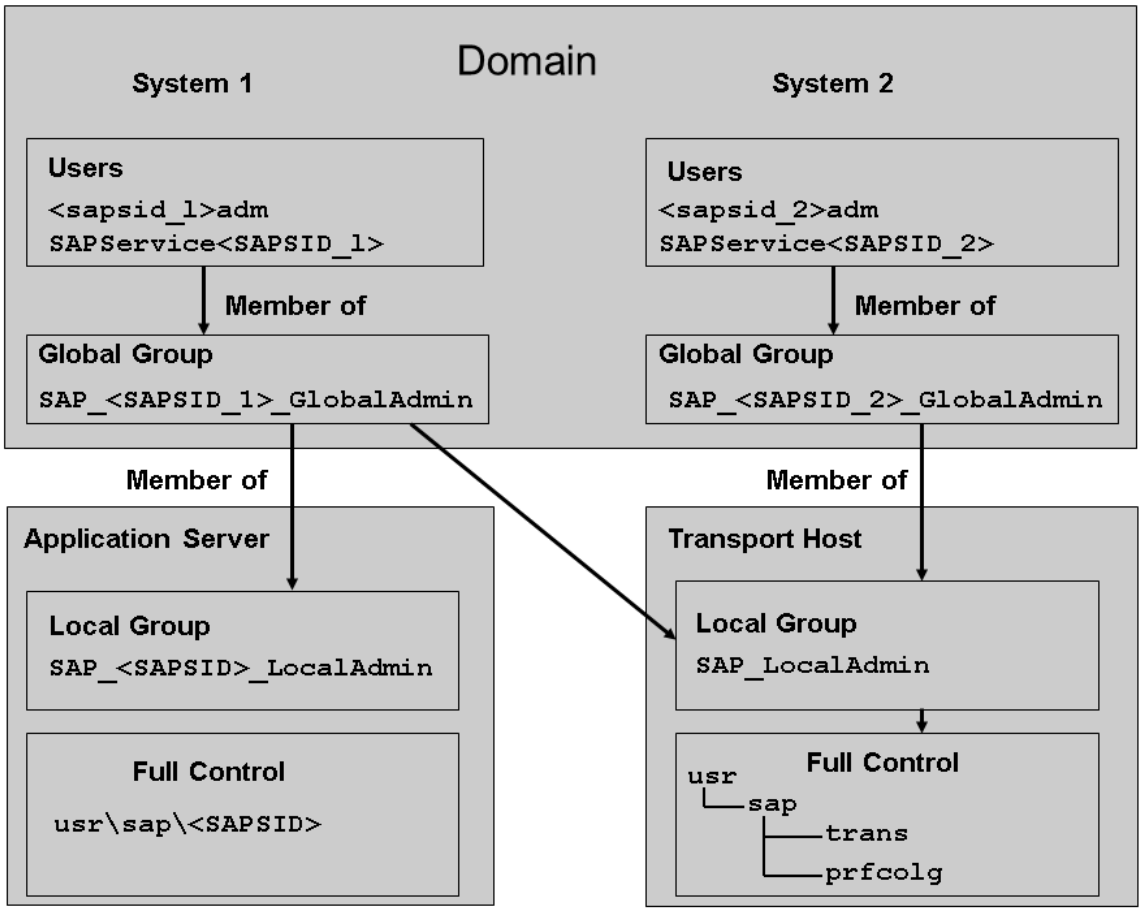


Figure 9: User Groups and Accounts

> **Note**
>
> 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 141]

7.14 Automatic Creation of Accounts and Groups

The installer 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 137].

Features

The following figures show the steps that the installer 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.

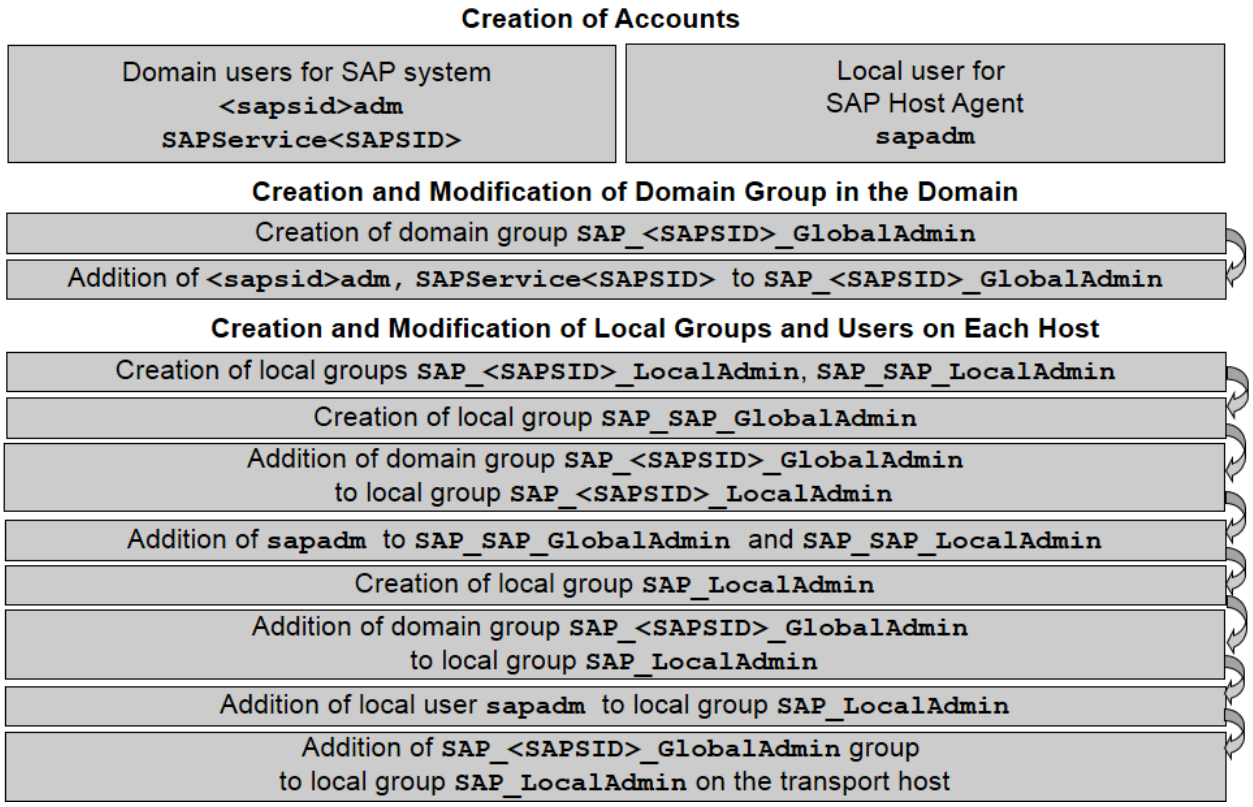


Figure 10: Creating Users and Groups

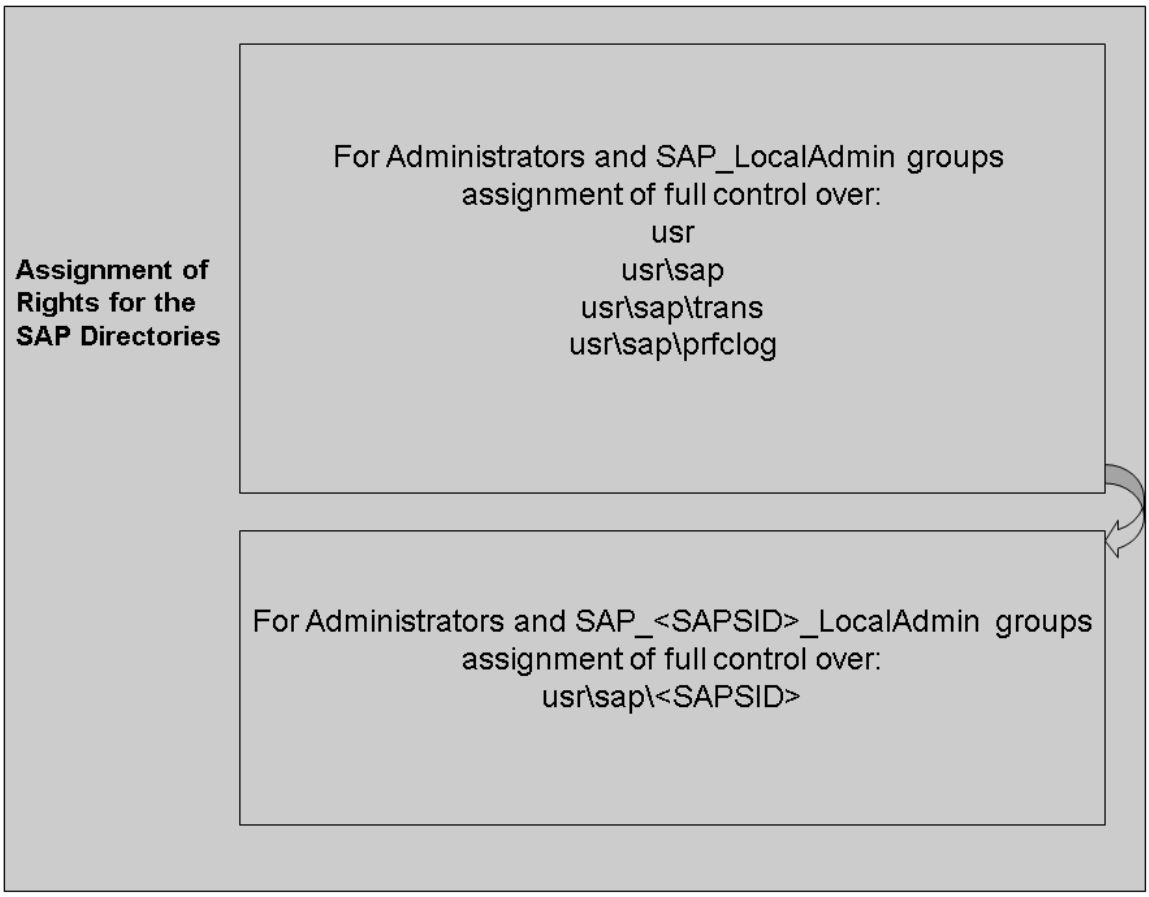


Figure 11: Assigning Rights to SAP Directories

7.15 Verifying and Adjusting the `instanceID` of an AS Java Instance

Using option *Adjust instanceID of an AS Java Instance*, you can verify the correctness of the `instanceID` and `box number` parameters of an existing AS Java instance, and adjust them if required.

Prerequisites

- The AS Java instance can be started.
- **Caution:** SoftwareProvisioning Manager performs changes in the database which are related to J2EE Engine configuration. Therefore it is recommended that you back up the J2EE Engine configuration using the `ConfigTool`. You can do this by exporting configurations `cluster_data`,`HttpHosts`, `apps`, `jms_provider`, and `WebContainer` using `OfflineConfigEditor` and configuration of `<SAPSID>/Server <xxx>/Services/Key Storage` using the `Visual Administrator`.

Context

When to Use Option *Adjust instanceID of an AS Java Instance*

- Software Update Manager (SUM) fails due to incorrect parameter `instanceID`.

  Example

  An error like the following occurs during the upgrade of a Java system based on SAP NetWeaver 7.0x:

  ```
  The detected instance ID IDXXXXX and the one calculated from the box number
  IDXXXXX do not match. A possible reason for this could be that you have changed
  the box number in the central instance instance.properties file.
  ```

- Software provisioning manager (70SWPM*.SAR) fails due to incorrect parameter `instanceID`.

  Example

  An error like the following occurs during system copy, dual-stack split, or system rename of a Java system based on SAP NetWeaver 7.0x with Software Provisioning Manager:

  ```
  The source or target cluster ID is not present on the system! The current
  (source) cluster ID is XXXXX and the new (target) cluster ID is XXXXX
  ```

- You are in doubt about consistency or correctness of the `instanceID` parameter of an AS Java instance.

Background Information About How *Adjust instanceID of an AS Java Instance* Works

Software logistics tools (Software Provisioning Manager, Software Update Manager) verify if the `instanceID` parameter corresponds to the box number of an SAP system based on SAP NetWeaver AS for Java. If the `instanceID` parameter is not consistent, Software Provisioning Manager fails.

The Box number has the format `<SAPSID><instance_name><host_name>` and is used as a parameter for the `instanceID` generation. `instanceID` is a unique identifier generated for each instance and is stored in the SAP system database schema when creating a new Java system.

An inconsistency between `instanceID` and `box number` is caused by applying an unsupported procedure to create or maintain the system. Using Software Provisioning Manager for system copy or system rename (changing the `<SAPSID>`, host name, or instance name) guarantees consistency.

Adjust instanceID of an AS Java Instance changes the `box number` and `instanceID` in the database and synchronizes the `instance.properties` file.

More Information

For more information, such as troubleshooting and FAQ, see SAP Note 2259748.

Procedure

1. Stop the AS Java instance or dual-stack instance and make sure that the database is running running.
2. Start Software Provisioning Manager (the installer) and choose option *Adjust instanceID of an AS Java Instance*.

The procedure how to start Software Provisioning Manager (the installer) is described in section

3. Follow the instructions given on the screens.

Next Steps

Perform the following activities after applying the correction:

1. Calculate the box number using the `SAPLOCALHOST` profile parameter in lower case.
2. Calculate the correct `instanceID` using the tool attached to SAP Note 1987497.
3. Adapt the `/usr/sap/<SAPSID>/<instance_name>/j2ee/cluster/bootstrap/bootstrap.properties` file: Assign the `instance.prefix` property to the correct `instanceID`.
4. Examine the instance profile - if `j2ee/instance_id` exists, change it to the new `instanceID`.
5. Open the `OfflineConfigEditor` and expand `cluster_data`
   If the `perfomerID` property exists, change it to the new `instanceID`.
6. If you have **EP: Knowledge Management and Collaboration** installed on your system, you have to do the following adjustments for the **Scheduler Service**:
   Assign scheduler tasks to the new system IDs of the target system. This is required because after applying the correction, tasks are still assigned to the IDs of the source system.
   For more information, see the *SAP Library* for your release at:

   Table 38:

URL	Path
○ **SAP NetWeaver 7.0**:http://help.sap.com/nw70 ○ **SAP NetWeaver 7.0 including EHP1**:http://help.sap.com/nw701 ○ **SAP NetWeaver 7.0 including EHP2**:http://help.sap.com/nw702 ○ **SAP NetWeaver 7.0 including EHP3**:http://help.sap.com/nw703	*Application Help* > *Function-Oriented View* > `<Language>` > *Information Integration: Key Areas* > *Knowledge Management* > *Administration Guide* > *Minimal Configuration for Knowledge Management* > *Cluster Only: Assigning Tasks to Nodes*

7.16 Troubleshooting for Portal Installation

This section applies both when you install usage type EPC only and when you install it together with usage type EP.

Context

If the iViews are not displayed correctly, or if the portal does not launch, the reason might be that the portal was not deployed completely.

To check the deployment of the portal, proceed as follows:

Procedure

1. Open a new console with the user `<sapsid>adm`.
2. Go to the directories `deployment`, `pcd`, and `pcdContent`, in the following paths:
   - `/usr/sap/<SAPSID>/JC<Instance_Number>/j2ee/cluster/server0/apps/sap.com/irj/servlet_jsp/irj/root/WEB-INF/deployment`
   - `/usr/sap/<SAPSID>/JC<Instance_Number>/j2ee/cluster/server0/apps/sap.com/irj/servlet_jsp/irj/root/WEB-INF/deployment/pcd`
   - `/usr/sap/<SAPSID>/JC<Instance_Number>/j2ee/cluster/server0/apps/sap.com/irj/servlet_jsp/irj/root/WEB-INF/deployment/pcdContent`
   - `/usr/sap/<SAPSID>/JC<Instance_Number>/j2ee/cluster/server0/apps/sap.com/irj/servlet_jsp/irj/root/WEB-INF/deployment/pcdContent/no_overwrite`
   - `/usr/sap/<SAPSID>/DVEBMGS<Instance_Number>/j2ee/cluster/server0/apps/sap.com/irj/servlet_jsp/irj/root/WEB-INF/deployment`
   - `/usr/sap/<SAPSID>/DVEBMGS<Instance_Number>/j2ee/cluster/server0/apps/sap.com/irj/servlet_jsp/irj/root/WEB-INF/deployment/pcd`
   - `/usr/sap/<SAPSID>/DVEBMGS<Instance_Number>/j2ee/cluster/server0/apps/sap.com/irj/servlet_jsp/irj/root/WEB-INF/deployment/pcdContent`
   - `/usr/sap/<SAPSID>/DVEBMGS<Instance_Number>/j2ee/cluster/server0/apps/sap.com/irj/servlet_jsp/irj/root/WEB-INF/deployment/pcdContent/no_overwrite`
   - `<Drive>:\usr\sap\<SAPSID>\JC<Instance_Number>\j2ee\cluster\server0\apps\sap.com\irj\servlet_jsp\irj\root\WEB-INF\deployment`
   - `<Drive>:\usr\sap\<SAPSID>\JC<Instance_Number>\j2ee\cluster\server0\apps\sap.com\irj\servlet_jsp\irj\root\WEB-INF\deployment\pcd`
   - `<Drive>:\usr\sap\<SAPSID>\JC<Instance_Number>\j2ee\cluster\server0\apps\sap.com\irj\servlet_jsp\irj\root\WEB-INF\deployment\pcdContent`
   - `<Drive>:\usr\sap\<SAPSID><Instance_Number>\j2ee\cluster\server0\apps\sap.com\irj\servlet_jsp\irj\root\WEB-INF\deployment\pcdContent\no_overwrite`
   - `<Drive>:\usr\sap\<SAPSID>\DVEBMGS<Instance_Number>\j2ee\cluster\server0\apps\sap.com\irj\servlet_jsp\irj\root\WEB-INF\deployment`
   - `<Drive>:\usr\sap\<SAPSID>\DVEBMGS<Instance_Number>\j2ee\cluster\server0\apps\sap.com\irj\servlet_jsp\irj\root\WEB-INF\deployment\pcd`
   - `<Drive>:\usr\sap\<SAPSID>\DVEBMGS<Instance_Number>\j2ee\cluster\server0\apps\sap.com\irj\servlet_jsp\irj\root\WEB-INF\deployment\pcdContent`
   - `<Drive>:\usr\sap\<SAPSID>\DVEBMGS<Instance_Number>\j2ee\cluster\server0\apps\sap.com\irj\servlet_jsp\irj\root\WEB-INF\deployment\pcdContent\no_overwrite`
3. Look for files with the extension `*.err`.
4. Do one of the following:
   - If error and log files do not appear, the portal installation has been completed successfully and you can continue.

- Rename the `*.err` files:
  1. Remove the `err` extension; so the extensions of the files become `*.ept` or `*.par`.
  2. Restart the Java Engine, using the commands **`stopsap`** and **`startsap`**, to change the files to **`*.bak`**.

7.17 Deleting an SAP System or Single Instances

This section describes how to delete a complete SAP system or single SAP instances with the *Uninstall* option of the installer.

Prerequisites

- You have installed your SAP system with standard SAP tools according to the installation documentation.
- You are logged on with a user account that has the required authorization to run the installer tool and the SAP system. For more information, see Required User Authorization for Running The Installer [page 54].

  > **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 the following when deleting an SAP system:

- You cannot delete an SAP system remotely.
- The installer deletes the database instance and optionally the database software.
- If you delete network-wide users, groups, or service entries in an environment with Network Information System (NIS), other SAP installations might also be affected. Make sure that the users, groups, and service entries to be deleted are no longer required.
- During the uninstall process, all file systems and subdirectories of the selected SAP system or single instance are deleted. Before you start uninstalling, check that you have saved a copy of all files and directories that you want to keep in a secure location.

- The uninstall process is designed to remove as much as possible of the SAP system to be deleted. If an item cannot be removed, a message informs you that you have to remove this item manually. You can do this either at once or after the uninstall process has finished. As soon as you confirm the message, the uninstall process continues.

Procedure

1. Start the installer as described in Running the Installer [page 65].
2. On the *Welcome* screen, choose: <Product> > *Software Life-Cycle Options* > *Uninstall* > *Uninstall - System / Standalone Engine / Optional Standalone Unit*
3. Follow the instructions in the installer input dialogs to delete a complete SAP system or single instances.

   > **Note**
   >
   > For more information about the input parameters, place the cursor on the relevant field and press F1.

   The following table provides information about deleting a complete system or single instances with the installer.

   Table 39:

Deletion of	Remarks
Central system	You can delete a central system (where all instances reside on the same host), in one installer run.

Deletion of	Remarks
Distributed or high-availability system	If you want to delete a distributed or high-availability system, you have to run the installer to delete the required instances **locally** on each of the hosts belonging to the SAP system in the following sequence: 1. Dialog instances, if there are any **⚠ Caution** Do **not** select checkbox *Uninstall all instances of the SAP system from this host* if you do **not** want to uninstall the complete SAP system or standalone engine. For example, do not select this checkbox if you only want to uninstall a dialog instance of an existing SAP system distributed over several hosts. Otherwise the contents of mounted global directories under `/<sapmnt>/<SAPSID>/` , such as instance profiles and kernel executables, are also deleted. 2. Central instance If the installer stops responding while trying to delete the central instance, do the following: 1. Close the installer with *Cancel* and *Exit*. 2. Log off and log on again. 3. To finish uninstalling the central instance, restart the installer. 3. Database instance Since the installer only stops local instances automatically, make sure that before deleting the database instance of a distributed system, you stop all remaining instances. You must stop the instance with the message server only after having entered all installer parameters for the deletion of the database instance. Choose whether you want to drop the entire database or only one or more database schemas. If you drop the entire database, the installer also asks whether you want to remove the database software. 4. Only valid for 'High Availability': HA (Windows) Enqueue Replication Server End of 'High Availability': HA (Windows) 5. Central services instance (SCS)
Dialog instance	If you want to delete dialog instances of an existing SAP system, you have to run the installer to delete them **locally** on each dialog instance host.
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 local user group `SAP_<SAPSID>_LocalAdmin` manually as follows:
   -

- Windows Server 2012 (R2):
  Open a PowerShell in elevated mode and enter the following command:
  `net localgroup SAP_<SAPSID>_LocalAdmin /delete`
- Windows Server 2008 (R2):
  1. Choose *Start* > *Programs* > *Administrative Tools* > *Computer Management*.
  2. Choose *Local Users and Groups* > *Groups*.
  3. Right-click the local group `SAP_<SAPSID>_LocalAdmin` and choose *Delete*.

6. If required, you can delete the directory `\usr\sap\trans` and its contents manually.

   The installer does not delete `\usr\sap\trans` because it might be shared.

7. To remove obsolete SLD data, see the following document: http://scn.sap.com/docs/DOC-8516 *How-to Manage House-Cleaning in the System Landscape Directory - Duplicate System Entries*

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 have the following options to install the database instance with a 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.
- 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 or shared disks.
- You have to install and configure the SCS 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://service.sap.com/instguides *<Release>* *Installation* *Installation - SAP NetWeaver Systems* *System Copy: Systems Based on SAP NetWeaver <Release>*
>
> 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.
- As of Windows Server 2008 there are the following terminology changes for a cluster configuration:
  - The cluster feature is called *Failover Clustering*. You might still find the previous terminology *Microsoft Cluster Service* and abbreviation *MSCS* in some sections of this guide.
  - *Cluster groups* are called *services and applications* (Windows Server 2008 (R2)), or *roles* (Windows Server 2012 (R2)).
    In some sections we are continuing to use the old term. In this case, “cluster group” also means “service and application”, or “role”.
  - The *Cluster Administrator* is called *Failover Cluster Manager*.

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 20] as for a non-HA system, including the hardware and software requirements [page 21].
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 158].

4. You read Directories in a Microsoft Failover cluster Configuration [page 162].
5. You read IP Addresses in a Microsoft Failover Cluster Configuration [page 162].
6. You obtain IP addresses for a high-availability system [page 166].

Preparation

1. You check that you have completed the same preparations [page 50] 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 domain administrator, unless otherwise specified.
   2. You do **not** use the user `<sapsid>adm` unless specified.
   3. If you are prompted during the installation process, log off and log on again.
2. You configure the first cluster node [page 169].
3. You install the SAP MaxDB database on the first cluster node [page 170].
4. You configure the SAP MaxDB database on the additional cluster node [page 170].
5. You install the database instance on the first cluster node [page 171] of the database instance host.
6. You configure the additional cluster node [page 172].
7. You install the central instance [page 173].
8. You install at least one dialog instance [page 174].

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 78] as for a non-HA system.

Additional Information

- Moving Cluster Groups, or Services and Applications, or Roles [page 175]
- Starting and Stopping the SAP System in a Microsoft Failover Cluster [page 177].

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 configuration 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]
- Enqueue Replication Server in a Microsoft Failover Cluster [page 157]

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:

Table 40: SAP System Components in an HA Configuration

Component	Number of Components per SAP System	Single Point of Failure (SPOF)
SCS 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 an 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.

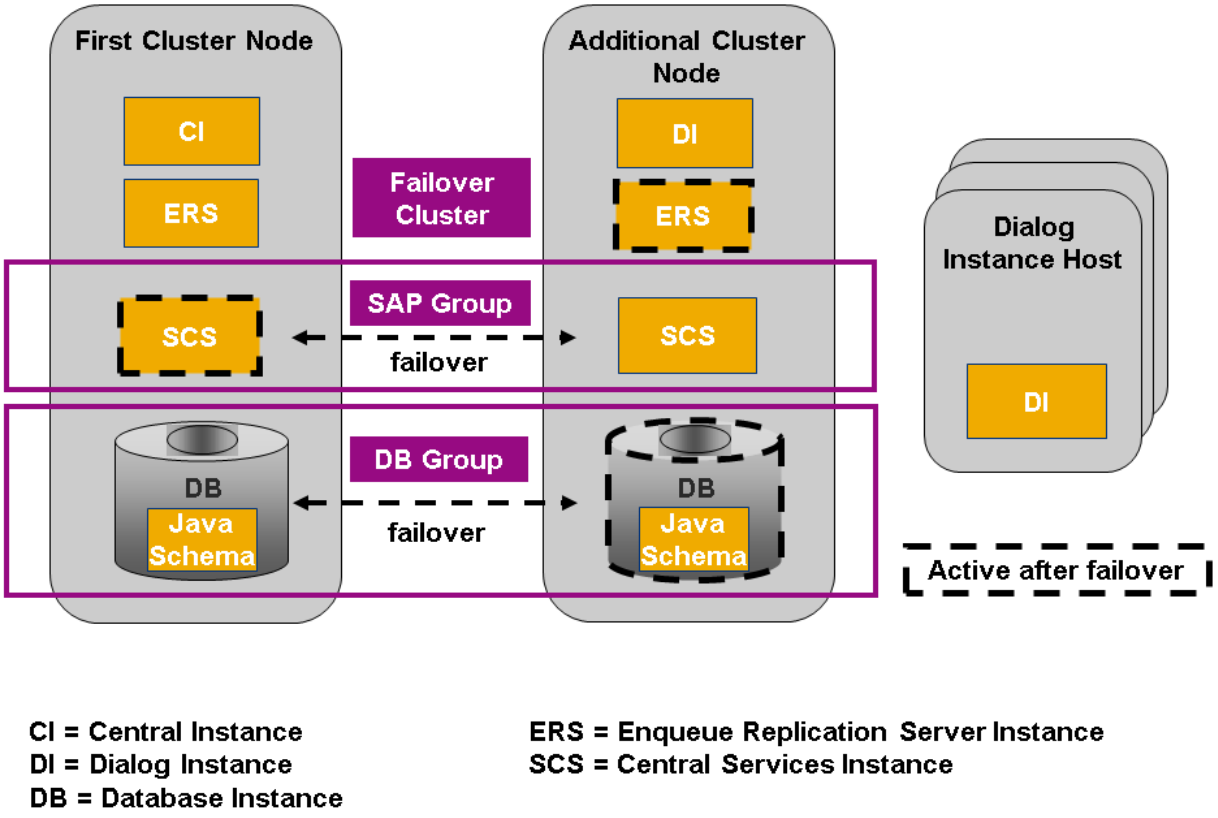


Figure 12: Java System with SPOFs, where non-SPOFs are installed locally on the Failover Cluster Nodes

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.

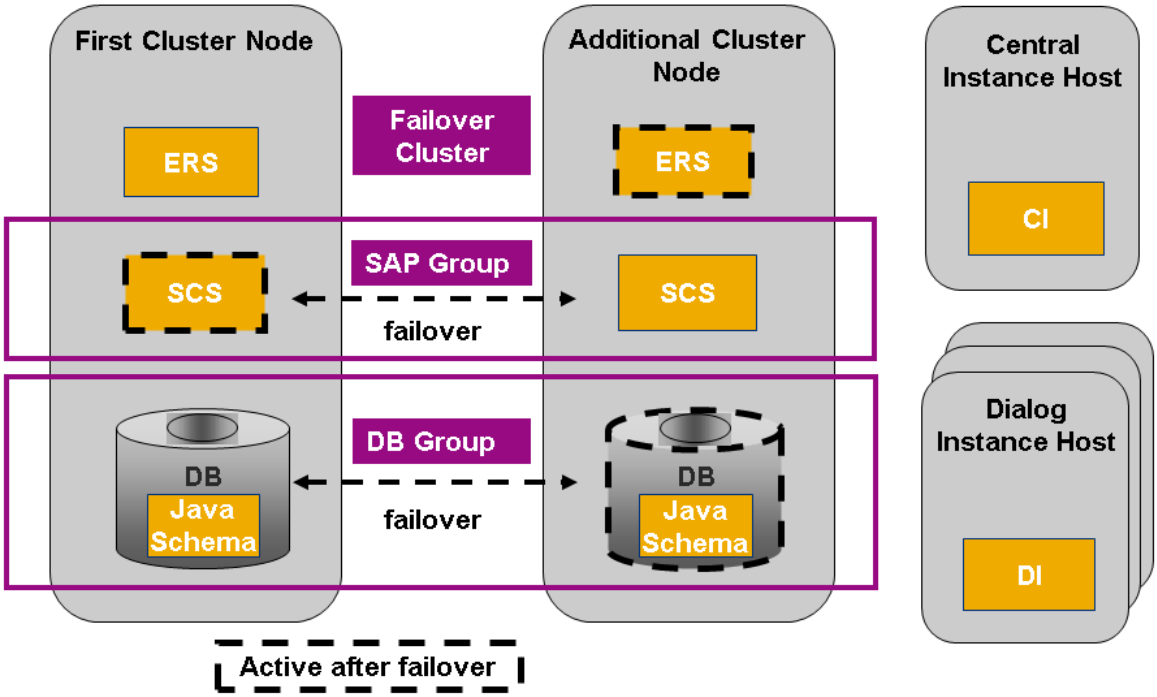


Figure 13: Java System where the non-SPOFs are installed on hosts outside of the Microsoft Failover Cluster

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.

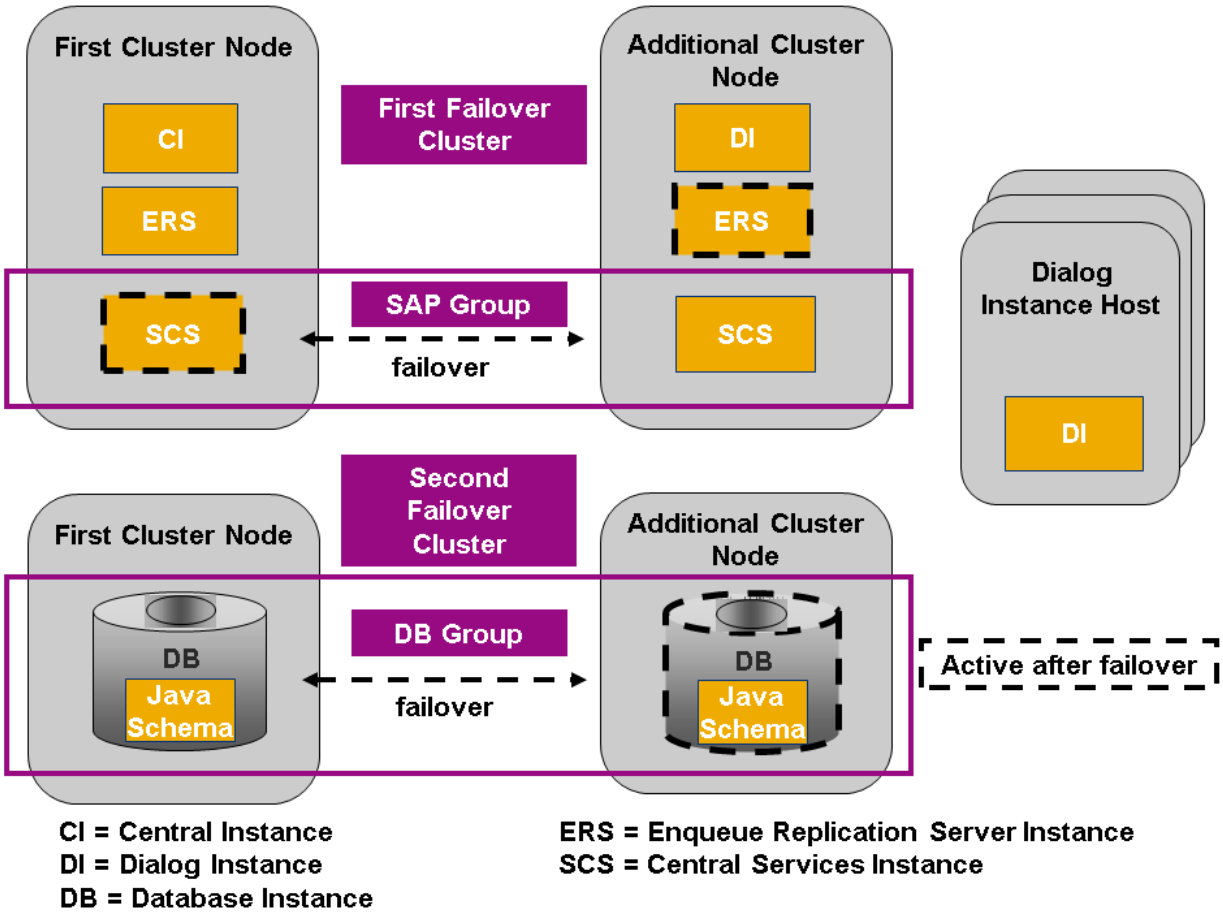


Figure 14: Java System

8.2.1.2 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:

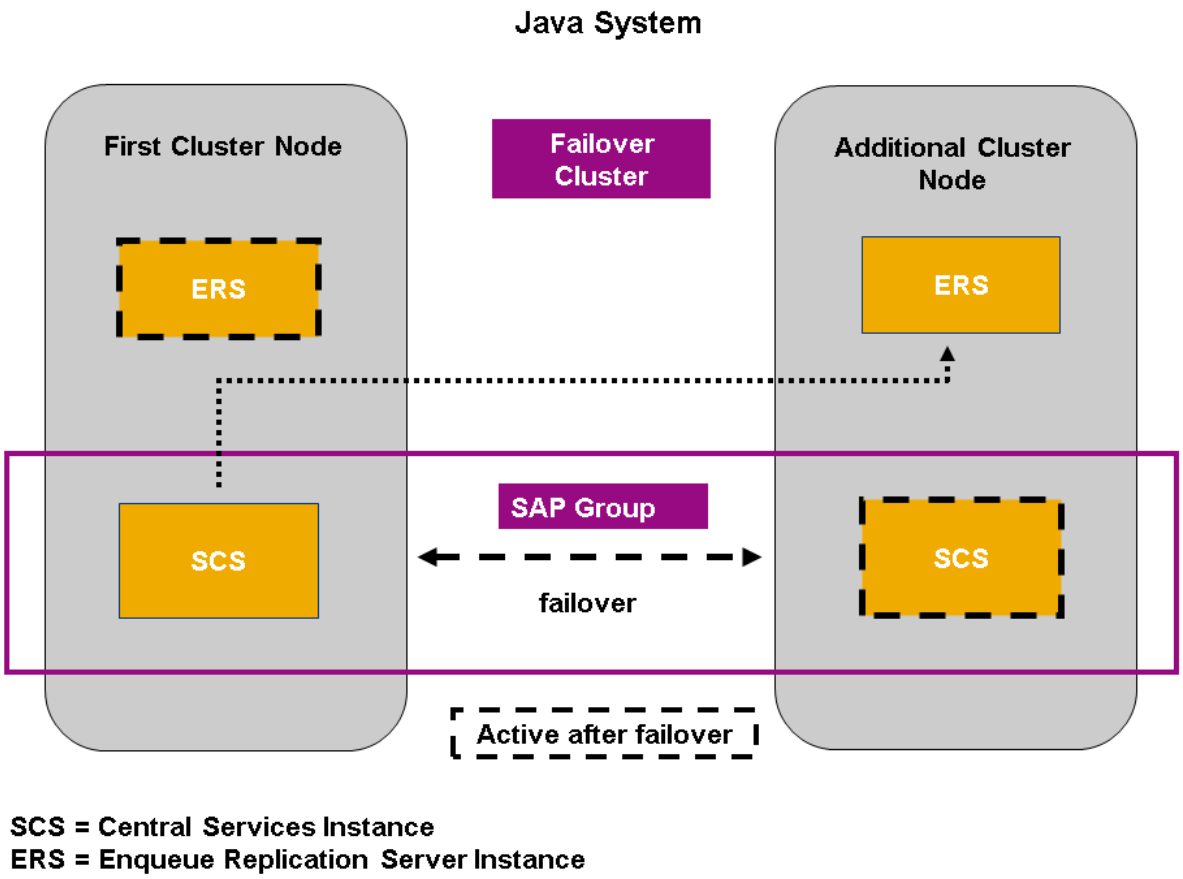


Figure 15: Enqueue Replication Server Mechanism on One Microsoft Failover Cluster with Two Nodes

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:

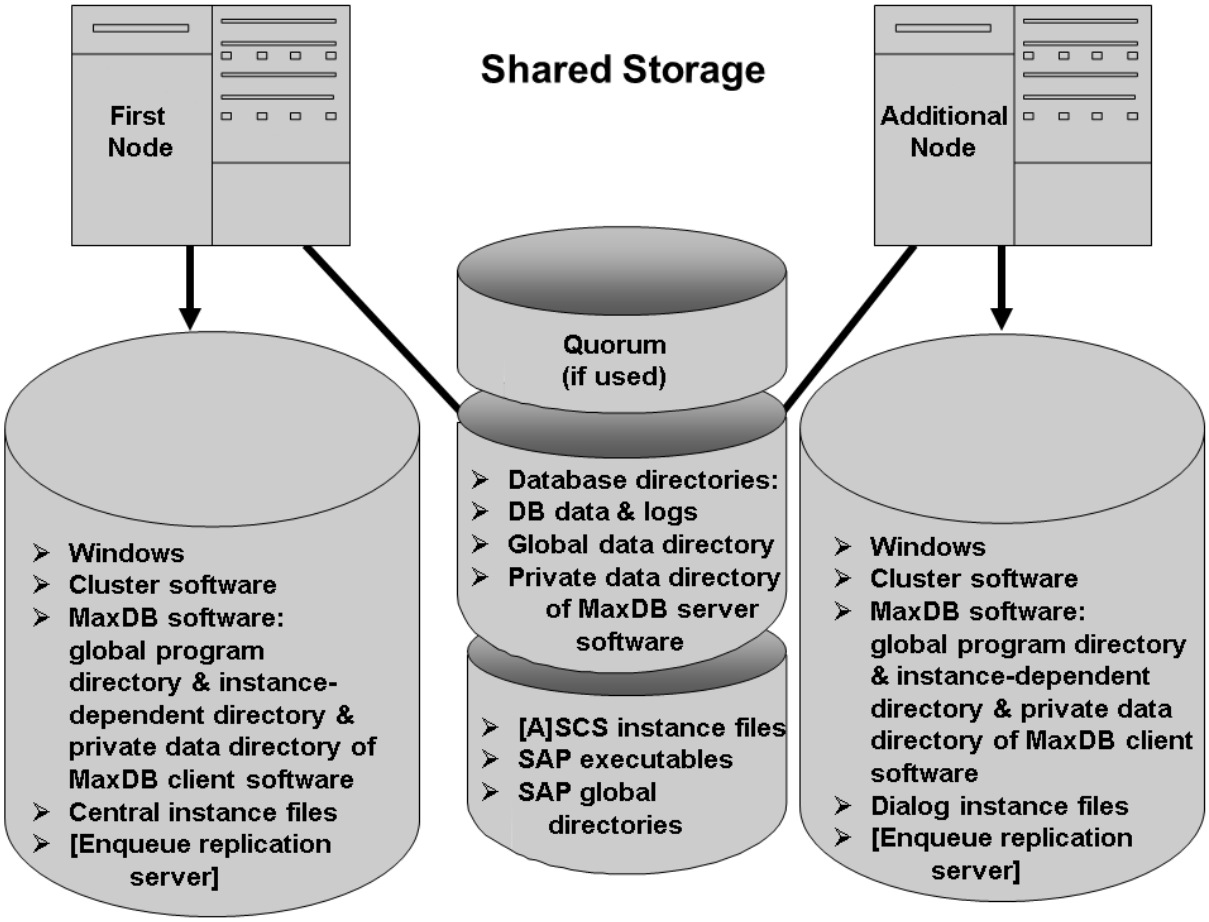
- Separately on all cluster nodes to use the local storage on each node
- On the shared storage used in common by all cluster nodes

You install the following on **different** shared disks:

- Database instance files, if the database instance is installed in a Microsoft failover cluster.
- (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.



> **Note**
>
> The following software on the local disks must have the **same drive letter and path** on both nodes:
>
> - Global program software
> - Instance-dependent software

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 2008 (R2) and higher 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.

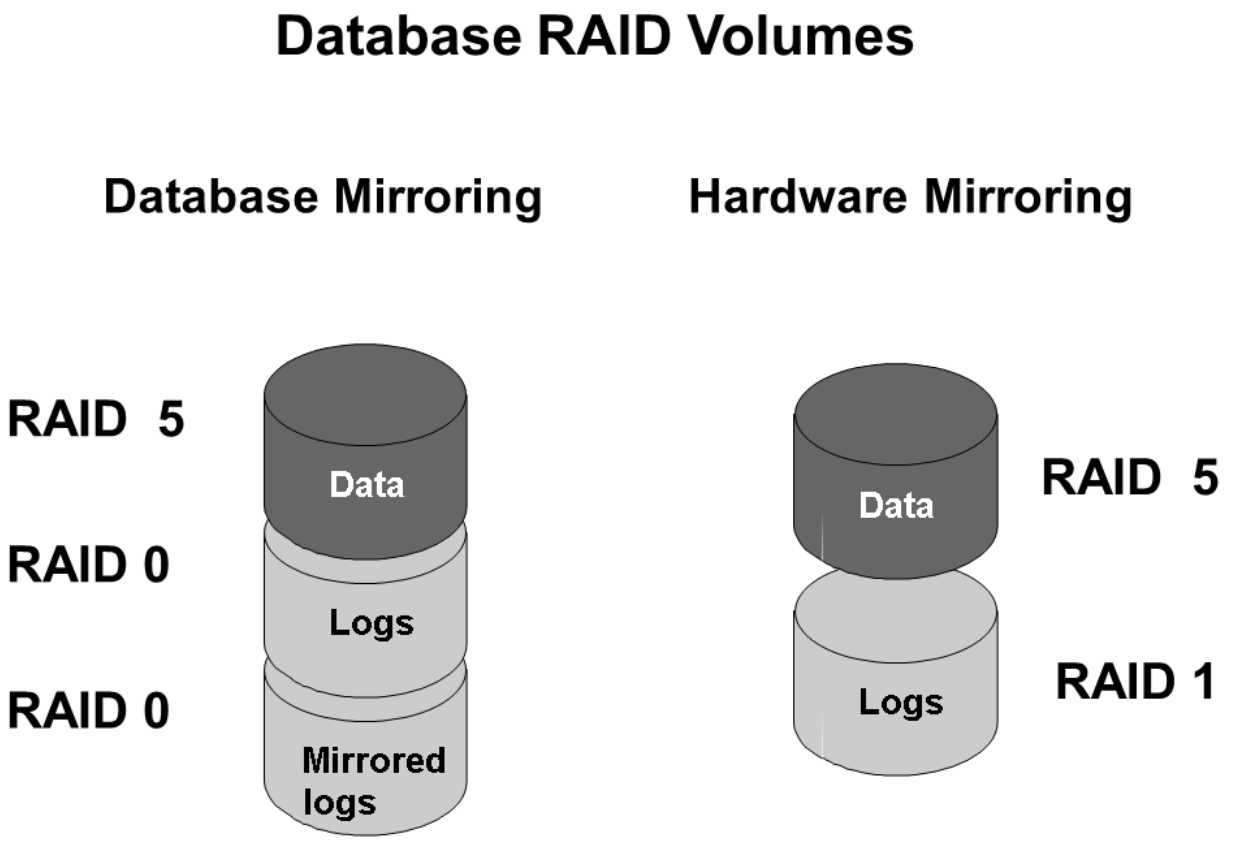
> ⚠ Caution
>
> The numerous variants with geospan cluster configurations and the complex technical requirements are the reasons why the installation and configuration of such high-availability (HA) systems are not directly supported by SAP. Instead, the hardware vendors of this cluster configuration are responsible for the installation, configuration, and operation of the HA components running in geospan clusters. SAP only supports the standard operation and function of the SAP components running in such HA configurations.

All functionality to set up geospan clusters is available since Windows Server 2008 (R2).

Distribution of Database Files in a RAID Configuration

> ⚠ Caution
>
> Microsoft does **not** support host-based RAID configurations (Dynamic Disks) on shared disks.

The following figure shows a secure method to distribute the database directories to different RAID volumes.



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:

Table 41: Directories on Local Disks on Cluster Nodes

Component	Default Directory
A supported operating system [page 23]	%windir%
Microsoft Failover Clustering software	%windir%\Cluster
Application server (if installed locally)	<Local_Drive>:\usr\sap\<SAPSID>\<Instance>
Enqueue replication server	<Local_Drive>:\usr\sap\<SAPSID>\ERS<Instance_Number>
Diagnostics Agent (optional)	<Local_Drive>:\usr\sap\<DASID>\SMDA<Instance_Number>
SAP Host Agent	%ProgramFiles%\SAP\hostctrl
SAP MaxDB global programs	<Drive>:\sapdb\program
SAP MaxDB instance-dependent software	<Drive>:\sapdb\<DBSID>\db

Table 42: Directories on Shared Disks

Component	Default Directory
Cluster *quorum resource* (if used)	<Drive>:\Cluster
SAP global and instance directories	<Drive>:\usr\sap ...
SAP MaxDB data volumes	<Drive>:\sapdb\<DBSID>\sapdata\...
SAP MaxDB database log volumes	<Drive>:\sapdb\<DBSID>\saplog\...
SAP MaxDB mirrored database log volumes	<Drive>:\sapdb\<DBSID>\saplog\...
SAP MaxDB global data	<Drive>:\sapdb\data
SAP MaxDB private data	<Drive>:\sapdb\<DBSID>\data

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.

> **Note**
>
> As of Windows Server 2008, besides static IP addresses, you can also have DHCP-based (dynamic) IP addresses.
>
> Currently DHCP-based IP configurations are not supported for high-availability SAP systems. If the virtual IP address of the SAP cluster group changes during a failover, your clients can no longer reach the system due to DNS caching.

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.

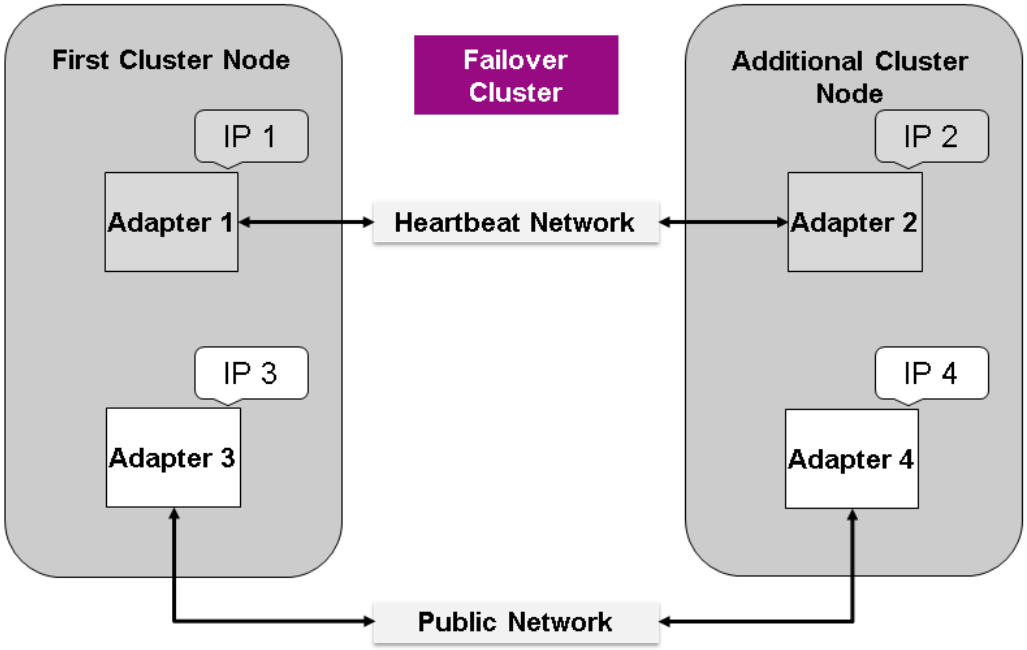


Figure 16: Adapters and IP Addresses Required for Public and Private Networks in an Microsoft Failover Cluster with Two Nodes

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:

Table 43: IP Addresses and Host Names

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

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.

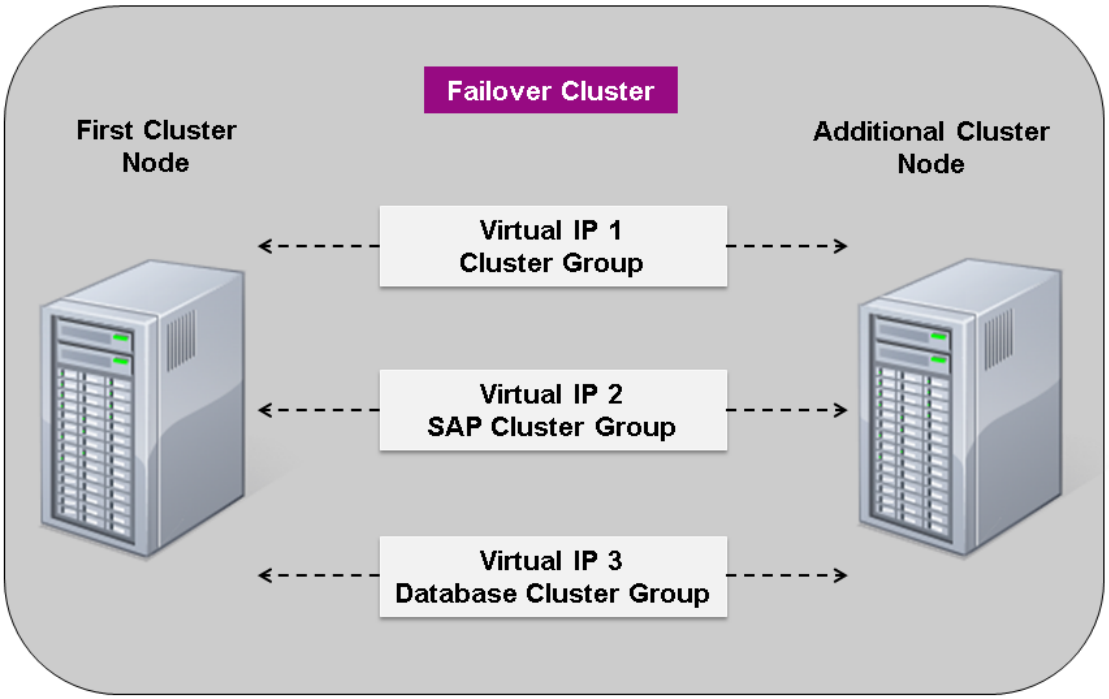


Figure 17: Failover of Virtual IP Addresses

8.2.5 Obtaining IP Addresses for a Microsoft Failover Cluster Configuration

Use

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.

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**
>
> Note: In the following tables we are still using the Windows Server 2003 terminology *cluster group*, and not the Windows Server 2008 (R2) terminology *services and applications* or the Windows Server 2012 (R2) terminology *Roles*.

Table 44: 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

Table 45: 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 installation
SAP cluster group	`129.20.5.4`	`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 installer on the first node
Database cluster group	`129.20.5.5`	`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

8.3 Preparation

This section provide 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 50] 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 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 central services instance (SCS) and prepares this host as the SAP global host
- Creates the SAP cluster group and adds the SCS instance to the SAP cluster group
- Installs the enqueue replication server instance (ERS instance) for the SCS 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 local user with domain administration rights. For more information, see Performing a Domain Installation without being a Domain Administrator [page 111].
- You must install the SCS instance on a shared disk, and the ERS instance and SAP Host Agent on a local disk.

Procedure

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

   > **Note**
   >
   > If the installer 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 installer.
   > - If you have a Microsoft cluster configuration with more than two nodes in one cluster, apply SAP Note 1634991.

- On the installer screen *SAP System > MSCS Cluster* do **not** select this checkbox: *Support of multiple SAP systems in one MSCS cluster?*

More Information

Moving Cluster Groups or Services and Applications or Roles [page 175]

8.4.2 Installing the Database on the First Node

Perform the following steps to install the database on the first node:

1. Make sure that all shared disks of the cluster are available on this node.
2. Run the installer [page 65] and choose:
   <Product> > *<System>* > *<Database>* > *High-Availability System* > *MaxDB Database Installation*
3. If you are installing the SAP MaxDB database with the installer for the first time and the installer prompts you to log off, do the following:
   1. Choose *OK* and log on again.
   2. Perform step 1 above.
   3. Select *Run a new installation* and choose *OK*..
4. Follow the instructions in the installer dialogs and enter the required parameter values.

> **Note**
>
> - Make a note of the disk drives that you choose during the installation, since you need to enter these during the installation on additional nodes
> - For more information about the input parameters, position the cursor on a parameter and press `F1` in the installer.

> **Caution**
>
> Make sure that you distribute the SAP MaxDB software and logs correctly to local and shared disks as described in Directories in an MSCS Configuration [page 162].

8.4.3 Configuring the Database on the Additional Node

Perform the steps below to configure the database on the additional MSCS node.

> **Caution**
>
> Do **not** attempt to move the shared disks from node A to node B. The installer does this automatically. It is not possible to move the shared disks before the installation starts.

1. On the additional MSCS node, run the installer [page 65] and choose:
   <Product> ▸ *<System>* ▸ *<Database>* ▸ *High-Availability System* ▸ *MaxDB Database Configuration*
2. Follow the instructions in the installer dialogs and enter the required parameter values.

> **Caution**
>
> - Make sure that you enter the **same drive** as you did on the first database node [page 170].
> - Make sure that you distribute the SAP MaxDB software and logs correctly to local and shared disks as described in Directories in an MSCS Configuration [page 162].

> **Note**
>
> For more information about the input parameters, position the cursor on a parameter and press the F1 key in the installer.

8.4.4 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 MaxDB cluster group is *Online* on the first cluster node

Procedure

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

1. Run the installer [page 65] and on the *Welcome* screen, choose:
   `<Product>` ▸ `<System>` ▸ `<Database>` ▸ *High-Availability System* ▸ *Database Instance*
2. Follow the instructions in the installer 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. When the installer prompts you for the database host, make sure that you enter the **virtual** database host.

> **Note**
>
> For more information about the input parameters, position the cursor on a parameter and press the F1 key in the installer.

8.4.5 Configuring the Additional Cluster Node

Use

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 SCS 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.

Prerequisites

- You are logged on to the **additional** cluster node as domain administrator or as a domain user who is a local administrator on all cluster nodes. For more information, see Performing a Domain Installation without being a Domain Administrator [page 111].
- You have already performed the First Cluster Node [page 169] option.

Procedure

1. Run the installer and choose:
   <Product> ▸ *<System>* ▸ *<Database>* ▸ *High-Availability System* ▸ *Additional Cluster Node*

   > **Note**
   >
   > If the installer 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 installer.

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

More Information

Moving Cluster Groups or Services and Applications or Roles [page 175]

8.4.6 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.
  The MaxDB cluster group is online on this node if it is located in the same cluster as the central instance.
- 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 installer [page 65] and choose:
   <Product> ▸ *<System>* ▸ *<Database>* ▸ *High-Availability System* ▸ *Central Instance*
2. If the installer prompts you to log off, choose *OK* and log on again.
3. Follow the instructions in the installer 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 installer.
   > - 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.

8.4.7 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.
  The MaxDB cluster group is online on this node if it is located in the same cluster as the dialog instance.
- 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 installer [page 65] and choose:
   <Product> ▸ *<System>* ▸ *<Database>* ▸ *High-Availability System* ▸ *Dialog Instance*
2. If the installer prompts you to log off, choose *OK* and log on again.
3. Follow the instructions in the installer 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 installer.
> - 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 following steps:

1. You perform the post-installation checks for the enqueue replication server.
   For more information, see the SAP Library at:
   http://help.sap.com/nw70 ▶ *SAP NetWeaver 7.0* `<including Enhancement Package>` ▶ *System Administration and Maintenance Information* ▶ *Technical Operations for SAP NetWeaver: English* ▶ *Administration of Standalone Engines* ▶ *Standalone Enqueue Server* ▶ *Replication Server: Check Installation*
2. If required, you perform the general post-installation steps [page 78] listed in this guide.

8.6 Additional Information

The following sections provide additional information about:

- Moving Cluster Groups, or Services and Applications, or Roles [page 175]
- Starting and Stopping the SAP System in a Microsoft Failover Cluster Configuration [page 177].

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:

- *PowerShell* (Windows Server 2012 (R2))
- *Failover Cluster Manager* (Windows Server 2008 (R2)

> **Note**
>
> As of Windows Server 2008 (R2) there are the following terminology changes:
>
> - Cluster groups are called *services and applications* (Windows Server 2008 (R2), or *Roles* (Windows Server 2012 (R2))
>   We do not always use all names in this section.
> - The *Cluster Administrator* is now called *Failover Cluster Manager*.

Prerequisites

Windows Server 2008 (R2):

The services or applications you want to move are configured and are visible in the *Failover Cluster Manager*.

Procedure

Moving Roles, or Services and Applications, or Groups

To move the roles (Windows Server 2012 (R2)) or services and applications (Windows Server 2008 (R2)), proceed as follows:

- Windows Server 2012 (R2):
  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.
- Windows Server 2008 (R2):
  1. Start the *Failover Cluster Manager* with *Start* > *Administrative Tools* > *Failover Cluster Manager*.
  2. In the *Failover Cluster Manager*, right-click the service and application you want to move.
  3. Choose *Move this service or application to another node* > *Move to <relevant node>*.
  4. Repeat the previous step for each service and application that you want to move.

> **Note**
>
> You can only move disks that are assigned to *Services and Applications* (Windows Server 2008 (R2)) or *Roles* (Windows Server 2012 (R2)).
>
> The disks that are added to the cluster are automatically added to a group named *Available Storage*. Although the groups *Available Storage* and *Cluster Group* exist in a failover cluster on Windows Server 2008 (R2) or higher, they are not visible under *Services and Applications* (Windows Server 2008 (R2)) or *Roles* (Windows Server 2012 (R2)). Therefore, you cannot move these groups with the *Failover Cluster Manager*.
>
> - If you use Windows Server 2012 (R2) proceed as follows:
>   - To move *Cluster Group*, open PowerShell in elevated mode, and enter the following command:
>     ```
>     move-clustergroup "cluster group"
>     ```
>   - To move *Available Storage*, open PowerShell in elevated mode, and enter the following command:
>     ```
>     move-clustergroup "Available Storage"
>     ```

- If you use Windows Server 2008 (R2) proceed as follows:
  - To move *Cluster Group*, open a command prompt and enter:
    ```
    cluster group "cluster group" /move
    ```
  - To move *Available Storage*, open a command prompt and enter:
    ```
    cluster group "Available Storage" /move
    ```

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

Use

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 125].

> **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).

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

With certain HA administration tools, such as *PowerShell* (Windows Server 2012 (R2)) or *Failover Cluster Manager* (Windows Server 2008 (R2)), 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* (Windows Server 2012 (R2))
  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* (Windows Server 2008 (R2))
  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:

Table 46: Documentation

Description	Internet Address	Title
Installation of Multiple Components in One Database (MCOD) and its availability on different platforms	http://scn.sap.com/docs/DOC-8559	*Multiple Components in One Database (MCOD)*
SAP Front End installation Guide	http://scn.sap.com/docs/DOC-25456	*SAP Front End Installation Guide – <Current Release>*
Software Provisioning Manager 1.0 SP <No> Guides	http://help.sap.com/sltoolset *System Provisioning*	*Software Provisioning Manager 1.0 SP <No> Install, copy, transform, split, rename, and uninstall products based on SAP NetWeaver AS ABAP and AS Java*
Maintenance Planning Guide	https://scn.sap.com/docs/DOC-35437	*Maintenance Planning Guide for SAP Solution Manager <Release, SP>*

Table 47: General Quick Links

Description	Internet Address
SAP Help Portal	http://help.sap.com
SAP NetWeaver Library in SAP Help Portal	http://help.sap.com/netweaver
SAP ERP Library in SAP Help Portal	http://help.sap.com/erp
SAP CRM Library in SAP Help Portal	http://help.sap.com/crm
SAP SRM Library in SAP Help Portal	http://help.sap.com/srm
SAP SCM Library in SAP Help Portal	http://help.sap.com/scm
SL toolset	http://help.sap.com/sltoolset

Description	Internet Address
Software logistics in application lifecycle management	http://scn.sap.com/community/it-management/alm/software-logistics
SAP Notes	https://support.sap.com/notes
Supported platforms and operating systems	http://scn.sap.com/community/database *Related Resources*
Product availability matrix (PAM)	http://support.sap.com/pam
System sizing (Quick sizer tool)	http://sap.com/sizing
SAP NetWeaver capabilities	http://scn.sap.com/community/netweaver
Application lifecycle management for SAP NetWeaver	http://scn.sap.com/community/it-management/alm
Information about SAP support package stacks	http://support.sap.com/sp-stacks
SAP Solution Manager	http://support.sap.com/solutionmanager

A.2 Using PowerShell

For Windows Server 2012 (R2), 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 2012 R2
  Windows Server 2012 R2 contains PowerShell 4.0.
- Windows Server 2012
  Windows Server 2012 contains PowerShell 3.0.
  You can update to PowerShell 4.0 (search the internet for *Windows Management Framework 4.0*).
- Windows Server 2008 R2
  Windows Server 2008 R2 contains PowerShell 2.0.
  For more information about PowerShell 2.0, see http://support.microsoft.com/kb/968929 .
  You can update to PowerShell 3.0 or 4.0 (search the internet for *Windows Management Framework 3.0* or *Windows Management Framework 4.0*).

- Windows Server 2008
  Windows Server 2008 contains PowerShell 1.0.
  You have to activate the PowerShell feature with *Start* > *Administrative Tools* > *Server Manager* > *Features*.
  On Windows Server 2008, you can update to PowerShell 3.0 (search the internet for *Windows Management Framework 3.0*).

How to Start PowerShell

> **Caution**
>
> Make sure that you start the PowerShell in administrator mode.

- Windows Server 2012 (R2)
  Open the command prompt and enter the command:
  `powershell.exe`

To start PowerShell on Windows Server 2008 (R2), you have the following options:

- From the command prompt, by entering the command:
  `powershell.exe`
- From the *Start* Menu:
  - PowerShell 1.0:
    Choose *Start* > *All Programs* > *Windows PowerShell 1.0* > *Windows PowerShell*.
  - PowerShell 2.0:
    Choose *Start* > *All Programs* > *Windows PowerShell* > *Windows PowerShell*.

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 that are available on Windows Server 2012 (R2):

Table 48:

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

Command	Explanation
`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”

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Any software coding and/or code lines / strings ("Code") included in this documentation are only examples and are not intended to be used in a productive system environment. The Code is only intended to better explain and visualize the syntax and phrasing rules of certain coding. SAP does not warrant the correctness and completeness of the Code given herein, and SAP shall not be liable for errors or damages caused by the usage of the Code, unless damages were caused by SAP intentionally or by SAP's gross negligence.

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Open Source Software and Third Party Components

Please refer to https://scn.sap.com/docs/DOC-42044 for information respecting open source software components made available by SAP as part of SAP NetWeaver and any specific conditions that apply to your use of such open source software components. Please refer to https://scn.sap.com/docs/DOC-42045 for information relating to SAP's use of third party software with or within SAP NetWeaver.

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